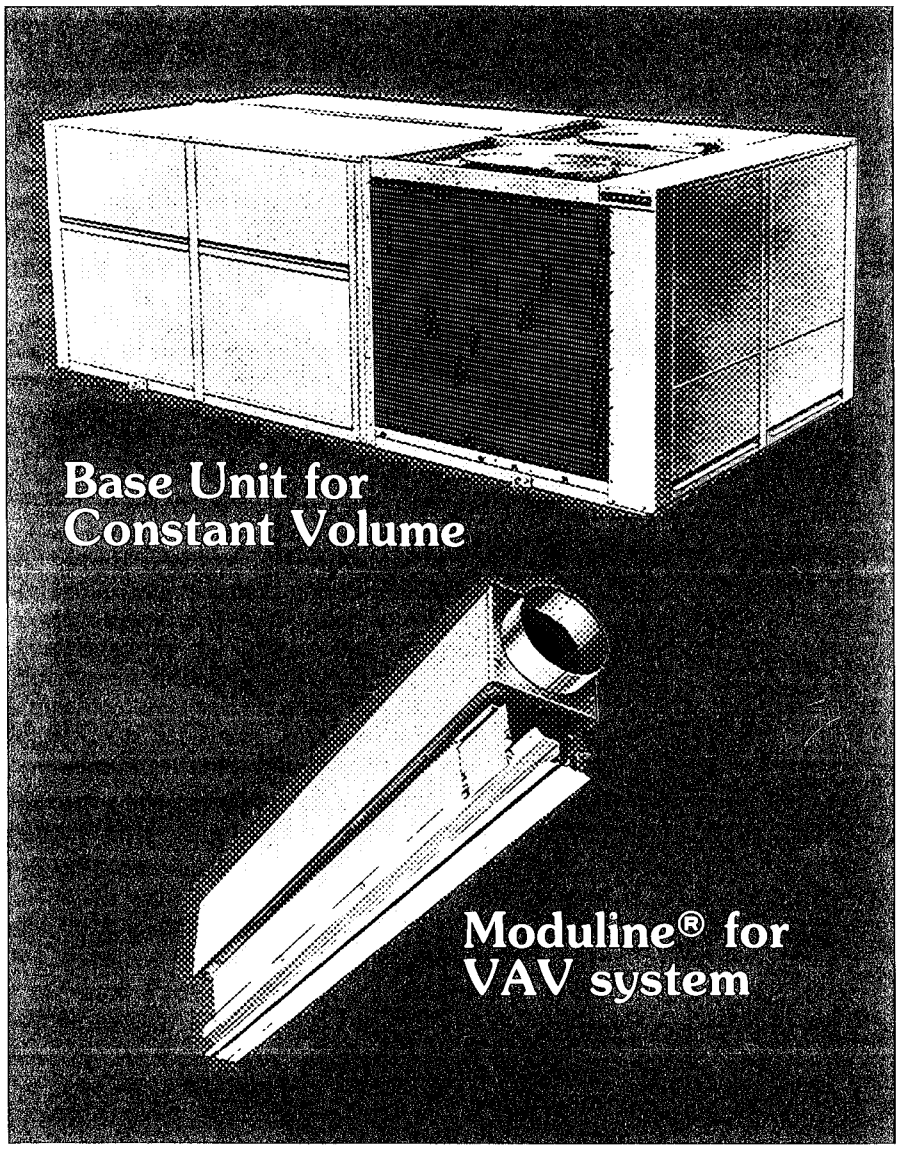
Carrier
Single-Package Cooling Units and Modu-Pac® Variable Volume Air Distribution System

50DF

Electric Heating: 182,500 to 808,000 Btuh
→ Electric Cooling: 220,000 to 753,000 Btuh

50DF Modu-Pac

→ Electric Cooling: 220,000 to 744,000 Btuh



Versatile rooftop units — for constant or variable air volume applications in the 20- to 60-ton range

NOW — with energy-saving features for years of outstanding performance

- SOLID-STATE CONTROL LOGIC
- INTEGRATED ECONO-MIZER/MECHANICAL COOLING
- LOW-LEAKAGE DAMPERS
- INTERTWINED COILS
- TWO-SPEED INDOOR FAN OPTION

Carrier®

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High quality features assure easy installation — plus performance and energy savings

Solid-state components for precise system control — Units contain a solid-state control system that provides maximum operating economy. The "brain" of the system is a logic panel that offers 2-stage heating and cooling modes based on space requirements. Panel also is the logic network that coordinates operation of the economizer, energy management and two-speed indoor fan options.

Solid-state components require no calibration, are easily replaced and have long operating life.

Practical curb design for low installation costs — The curb supports unit on the roof. Eliminates special steel support frames and assures a low roof silhouette. Weatherproof enclosure eliminates need for a rooftop adapter or roof openings that could be sources of troublesome leaks. All utilities enter unit within the curb; saves time and reduces installation costs. A wood nailstrip is also included.

Adaptable duct connections — The Carrier design provides large duct openings that permit low airflow velocities and even air distribution. Bottom supply and return ductwork is easily installed. Concentric ductwork with diffusers also may be connected to the 20-, 25-, and 30-ton units...with no internal modifications.

For convenience, alternate side supply and return openings are provided for horizontal duct applications. Simply relocate side supply and return panels, place them in the bottom openings, relocate one interior panel and the unit is quickly converted for side duct connection. An accessory conversion kit is required for units with economizer.

Factory-installed filter rack includes 2-in. filters.

115-volt convenience outlet — An on-the-job power source for service light or hand tools.

Pre-installed tracks for hydronic coil application. Factory installed on units without electric heat option.

Weather Armor cabinet stands up to the weather. Cabinet design exceeds UL and Carrier rain test requirements. Units keep attractive appearance for years — even in salt air or heavy industrial environment.

Time Guard® circuit — Compressor will not short cycle on a safety device or power interruption. Starts outdoor air fans 15 seconds before compressor to minimize solar heat buildup and reduce start-up load.

Single-location power connections — Unit is factory wired with all heating and cooling power circuits internally routed to a terminal block in one compartment. Some units, with higher heat/cool ratios, have 2 terminal blocks. No need to route expensive wiring to separate heating and cooling power locations. Saves time, money and labor.

Fixed-speed evaporator fan drive — less vibration than variable-speed drive. Extends belt life and minimizes drive noise.

Manual damper, on standard units, can be preset to admit as much as 25% outdoor air for year-round ventilation.

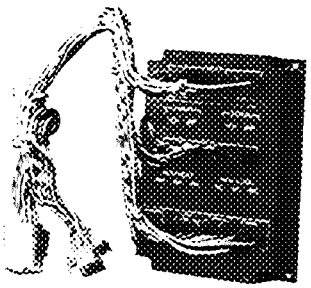
Built-in convenience — Quick-release access panels, slide-out filters and plug-in relays simplify routine inspection and maintenance.

Carrier-built intertwined refrigerant coils have staggered copper tubes with mechanically bonded fins to ensure optimum heat transfer. Intertwined design provides cooling of the full air stream with minimum compression.

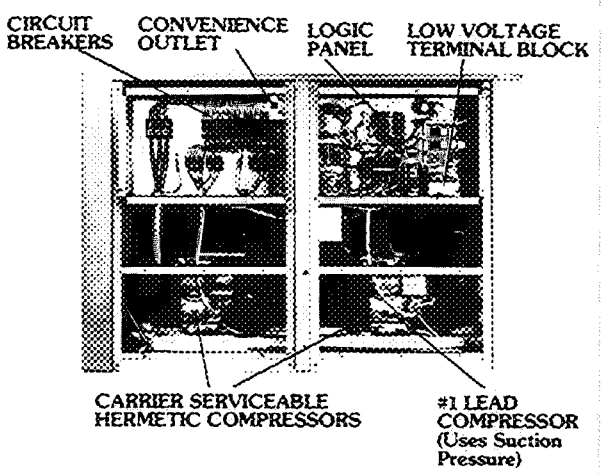
Direct-drive condenser fans are factory lubricated. Vertical discharge moves air quietly and efficiently.

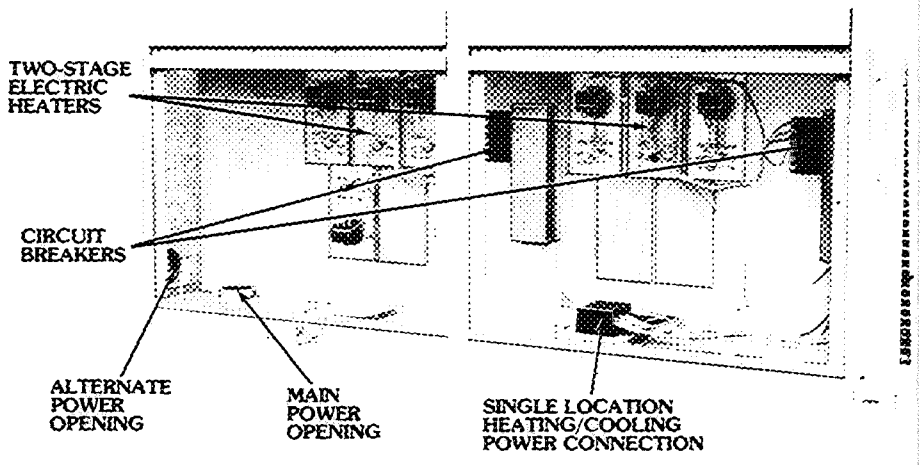
Carrier compressors have factory-installed service valves, crankcase heaters, reversible oil pumps, mufflers, overloads in the control box and internal motor protection. Liquid line sight glasses and filter driers are also included.

Low-ambient temperature capability permits all units to operate at outdoor temperatures as low as 35 F.



LOGIC PANEL





50DF

Factory-installed options and field-installed accessories offer flexibility to suit most any application

Modulating outdoor air control package (economizer) — Even when outdoor air temperatures are low, many installations still require cooling. The economizer uses the cool outside air to provide this cooling. Saves energy, reduces compressor wear and tear and lowers operating costs.

The economizer contains these energy saving features:

- *Electronic control logic* balances the conditioned space demand against the cooling system output. Ensures that the economizer modulates to correct position or closes to minimum position to maintain a stable temperature in the conditioned space. Never too much or too little cooling.

The control logic also integrates economizer cooling with mechanical cooling. If outdoor enthalpy permits, economizer acts as first stage of cooling. If conditioned space requires more cooling, economizer works in conjunction with mechanical cooling to maintain required indoor temperature.

The integrated system supplies only the amount of mechanical cooling necessary.

- *Low-leakage dampers* limit infiltration. Rated by the manufacturer at 3% with 3-in. wg pressure differential.
- *Spring return damper motor* automatically closes the outdoor air dampers in the event of a power failure. (Option or Accessory)

Two-speed indoor fan option — Substantial energy cost savings can be obtained because fans automatically operate at low speed during most cooling operating hours. High speed is used only if and when necessary to maintain comfort conditions.

A 4-stage electronic logic panel selects the most efficient fan speed and compressor stage to satisfy room demand. Economizer performance is optimized by utilizing low-speed operation except when space conditions require the additional capacity of high-speed "free cooling".

The two-speed option is available in either standard or alternate motor sizes. All control and power wiring are factory installed; thus, costly field wiring and adjustments are not necessary.

The two-speed fan motors are 2 winding (4 pole/6 pole) with rpm's of 1760/1170.

Power exhaust — Coupled with the economizer, up to 75% of the return air can be exhausted. Also, eliminates over-pressurization of the building. Designed for use with bottom duct connection arrangements. Used only with economizer. (Option or Accessory)

Electric heaters — Three factory-installed and one field-installed heating capacity are available. Factory wired for 2-stage heat. Outdoor air thermostats can be added to provide additional stages as required. Branch circuit protection is built in on each unit. (Option or Accessory)

Bag filter — Extended surface media provides high filtration of 50% (NBS Dust Spot Test). Filter frame permits use of field-supplied bag filters to provide up to 95% filtering efficiency. (Option only)

Alternate indoor fan motor and drive provides increased performance for application requirements beyond standard unit operation range. (Option only)

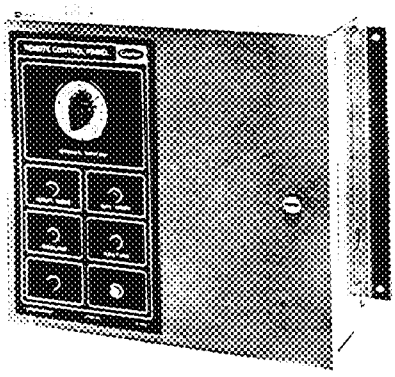
Energy management kit—Additional energy savings occur thru the use of the multi-feature energy management kit which contains a setback/setup module, a 7-day programmable clock and morning warmup thermostat.

During unoccupied periods, the setback/setup module provides a selectable amount of heating setback and either cooling shutdown or a selectable amount of cooling setup

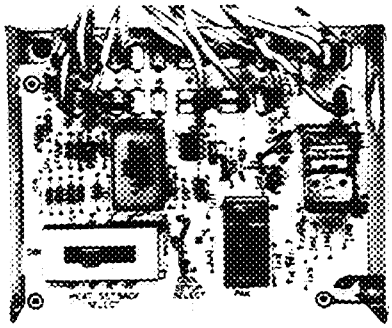
The 7-day clock controls unit operation in and out of the setback/setup modes. Clock contains a 10-hour spring carryover for continuous operation during power failures. Re-programming is not necessary.

A 5-hour bypass switch provides unit operation during unoccupied modes. The clock and bypass switch are contained in an attractive remote control panel which installs in a convenient location. Six status lights on the panel indicate system operating modes.

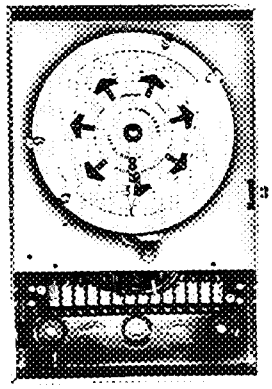
The morning warmup thermostat senses return air temperature and saves energy by keeping the outdoor air damper closed until morning warmup is complete. Avoids using energy to warm cold outside air. (Option or Accessory)



REMOTE CONTROL PANEL
(Control Box)



SETBACK/SETUP MODULE



7-DAY CLOCK

Barometric relief damper operates automatically to help exhaust excess air during economizer operation. Accessory comes partially assembled for easy installation.

Roof curb supports unit and frames roof opening. Provides a strong, watertight interface between unit and roof. Once curb is set in place, the unit may be rigged at any time — no need to schedule around the roofer. Design complies with National Roofing Contractors Association (NRCA) requirements.

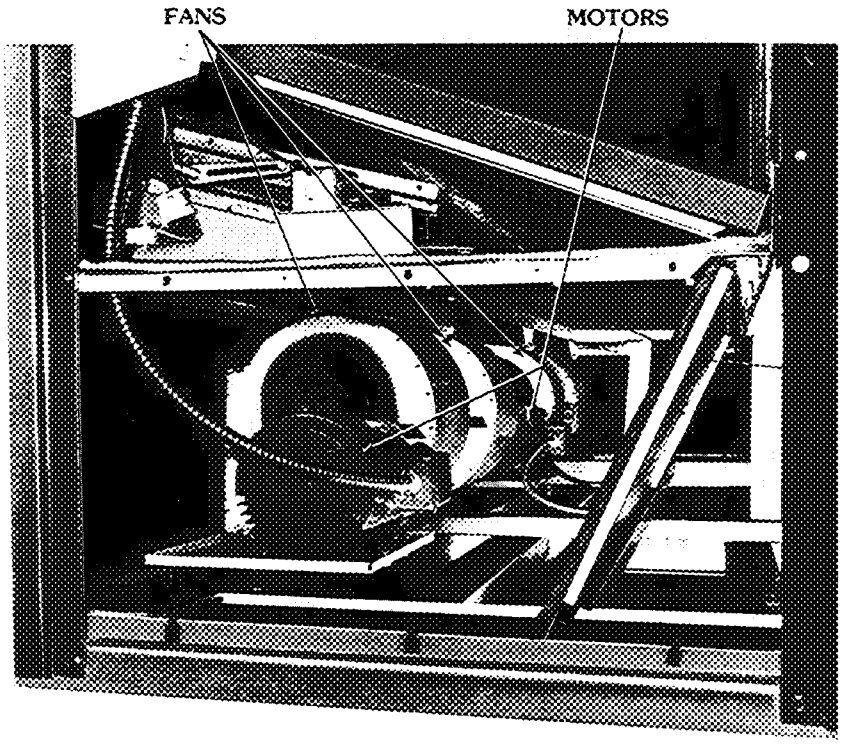
Outdoor air thermostat allows additional staging of electric heat. Multiple thermostats permit as many stages of control as there are heaters in the unit.

Suction pressure unloader package — Additional staging, beyond the standard 2 stages of capacity control, can be accomplished with field-installed suction pressure actuated compressor unloaders. (024 size is excluded, uses a standard electric unloader.)

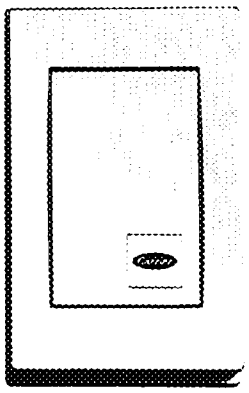
Motormaster® head pressure control modulates the speed of outdoor air fan motor to maintain correct condensing temperature at low outdoor air temperatures. Permits operation to -20 F, if required.

Electronic temperature sensing — Three electronic sensing/transmitting devices are available to meet your specific application requirements. Each transmitting device contains dual (heating/cooling) set point adjustment levers concealed under a locking cover. Light emitting diodes (LED's), also concealed under the cover, allow diagnostic checkout of control system from the transmitting device. The choices are:

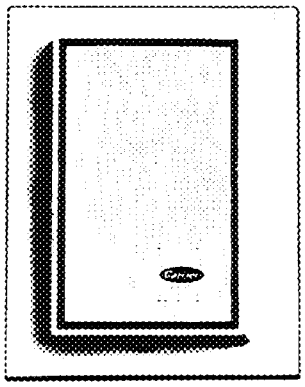
- *Thermostat with integral sensor* — A traditional application. Both the temperature set points and the sensing device are contained in one device installed in the conditioned space.
- *Transmitter with remote sensor* — The transmitter contains the temperature set points and LED's under its cover. In this application, a remote wall-mounted sensor is installed in the conditioned space and the transmitter is installed in a restricted-access area. Eliminates unauthorized adjustment of conditioned space temperature.
- *Thermostat or transmitter on subbase* —provides manual COOL-AUTO.-HEAT-OFF system switching and AUTO.-ON fan switching from a convenient location. Recommended for units without energy management kit.



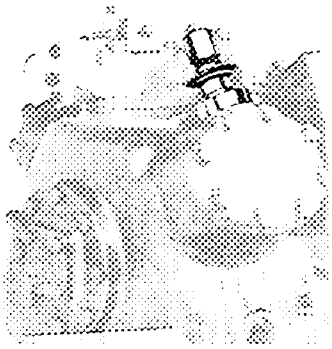
POWER EXHAUST FANS AND MOTORS



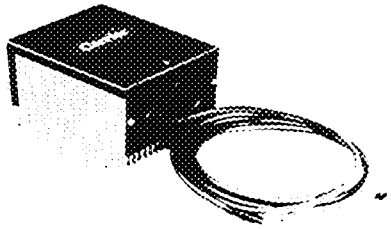
THERMOSTAT OR TRANSMITTER



REMOTE SENSOR



UNLOADER PACKAGE



MOTORMASTER CONTROL

50DF

Physical data

UNIT 50DF	024	028	034	044	054	064
OPERATING WEIGHT (lb)						
Base Unit	3000	3700	4400	5406	6100	6485
Economizer	150	175	200	225	250	250
Roof Curb	125	150	175	200	225	225
COMPRESSOR			Serviceable, Hermetic			
No ..Type	1 06E	2 06D	2 06D	2 06E	2 06E*	2 06E
No Cylinders (ea)...Rpm	4 1750	6 1750	6 1750	4 1750	4,6 1750	6 1750
Capacity Steps (%) (Std)	50,100	60,100	50,100	50,100	60,100	50,100
With Accessory Unloaders	—	19,38,57,100	16,33,50,100	25,50,75,100	20,40,60,80,100	16,33,50,67,83,100
REFRIGERANT CHARGE			Type 22; Controlled by Thermostatic Expansion Valve			
Sys 1...Sys 2 (lb)	36 0 —	23 75 18 25	29 0 29 0	37 0 37 0	53 0 42 0	81 0 81 0
OUTDOOR AIR FANS			Direct Driven, Propeller Type			
No ...Diameter (in.)	2 30	2 30	3 .30	3 30	4 30	4 30
Nominal Cfm	14,000	14,000	21,000	21,000	28,000	31,000
Motor Hp...Rpm	1 1050	1 1050	1 1050	1 1050	1 1050	1 1150
CONDENSER COIL						
Rows.. Fins/in.	3 13 9	3 13 9	3 15 8	3 15 8	3 15 8	4 15 8
Total Face Area (sq ft)	31 1	38.0	49 0	61 0	81 5	81 25
INDOOR AIR FAN†			Belt Drive, Centrifugal Type			
No. ...Size (in.)	2 15x11	2 15x15	3 15x9	4 15x9	4 15x11	4 15x11
Max Allowable Rpm	1300	1300	1300	1300	1300	1450
Nominal Cfm	8,000	10,000	12,000	16,000	20,000	24,000
Standard Motor and Drive						
Motor Hp	5 (460V) 7-1/2 (208-230V)	7-1/2	10	15	20	25
Motor Frame Size						
Single-Speed	184T (460V) 213T (208-230V)	213T	215T	254T	256T	284T
Two-Speed	215T (460V) 254T (208-230V)	254T	256T	284T	286T	286T
Fan Pulley Pitch Diam (in)	10 6	10 6	10 6	10 6	10 6	8 0
Fan Pulley Bore	1-3/16	1-3/16	1-11/16	1-11/16	1-11/16	1-11/16
Single-Speed Motor Rpm	1750	1750	1750	1750	1750	1750
Two-Speed Motor Rpm	1750/1170	1750/1170	1750/1170	1750/1170	1750/1170	1750/1170
Motor Pulley Pitch Diam (in.)						
Pulley A	6 5	6 5	6 5	6 5	6 5	5 6
Pulley B	6 0	5 6	5 6	5 6	6 0	6 0
Resulting Fan Rpm						
Single-Speed with Pulley A...B	1073 991	1073 925	1073 925	1073 925	1073. 925	1225 1312
Two-Speed with Pulley A.. B	1073/751 991/661	1073/751 . 925/617	1073/751 925/617	1073/751 925/617	1073/751 991/661	1225/817 1312/875
Alternate Motor and Drive						
Motor Hp	7-1/2	10	15	20	25‡	30‡
Motor Frame Size						
Single-Speed	213T	215T	254T	256T	284T	286T
Two-Speed	254T	256T	284T	286T	286T	—
Fan Pulley Pitch Diam (in.)	8 0	8 0	8 0	8 0	8 0	6 0
Fan Pulley Bore	1-3/16	1-3/16	1-11/16	1-11/16	1-11/16	1-11/16
Single-Speed Motor Rpm	1750	1750	1750	1750	1750	1750
Two-Speed Motor Rpm	1750/1170	1750/1170	1750/1170	1750/1170	1750/1170	1750/1170
Motor Pulley Pitch Diam (in.)						
Pulley A	5 3	5 3	5 3	5.3	5 3	5 0
Pulley B	5 6	5 6	5 6	5 6	5 6	**
Resulting Fan Rpm						
Single-Speed with Pulley A...B	1159 1225	1159 1225	1159 1225	1159 1225	1159 1225	1450 —
Two-Speed with Pulley A...B	1159/773 . 1225/817	1159/773 1225/817	1159/773 . 1225/817	1159/773 1225/817	1159/773 1225/817	1450/967 . —
EXHAUST FAN MOTOR Qty...Hp	1 3	1 3	1 3	2 3	2 3	2. 3
EVAPORATOR COIL						
Rows...Fins/in.	4 15	4 15	4 15	4 15	4 15	4 13 9
Total Face Area (sq ft)	15 1	17 7	24 8	30 2	35.4	35 4
ELEC RESISTANCE HEATERS			Open Nichrome Wire Elements with Multiple-Stage Control			
Heat:Kw	37,55,91	55,73,110	55,91,128	73,110,165	91,146	91,146
INDOOR AIR FILTERS						
No .. Size						
Standard; 2-in Throwaway	6 20x25 6 15x25	18. 16x25	9. 20x25 12 16x25	27.. 16x25	9 20x25 21 16x25	9 20x25 21 16x25
Bag Type; 12-in. (Opt)	3 12x24 3 24x24	4 .12x24 4. .24x24	5.. 12x24 5. 24x24	6. 12x24 6 24x24	7 12x24 7 24x24	—

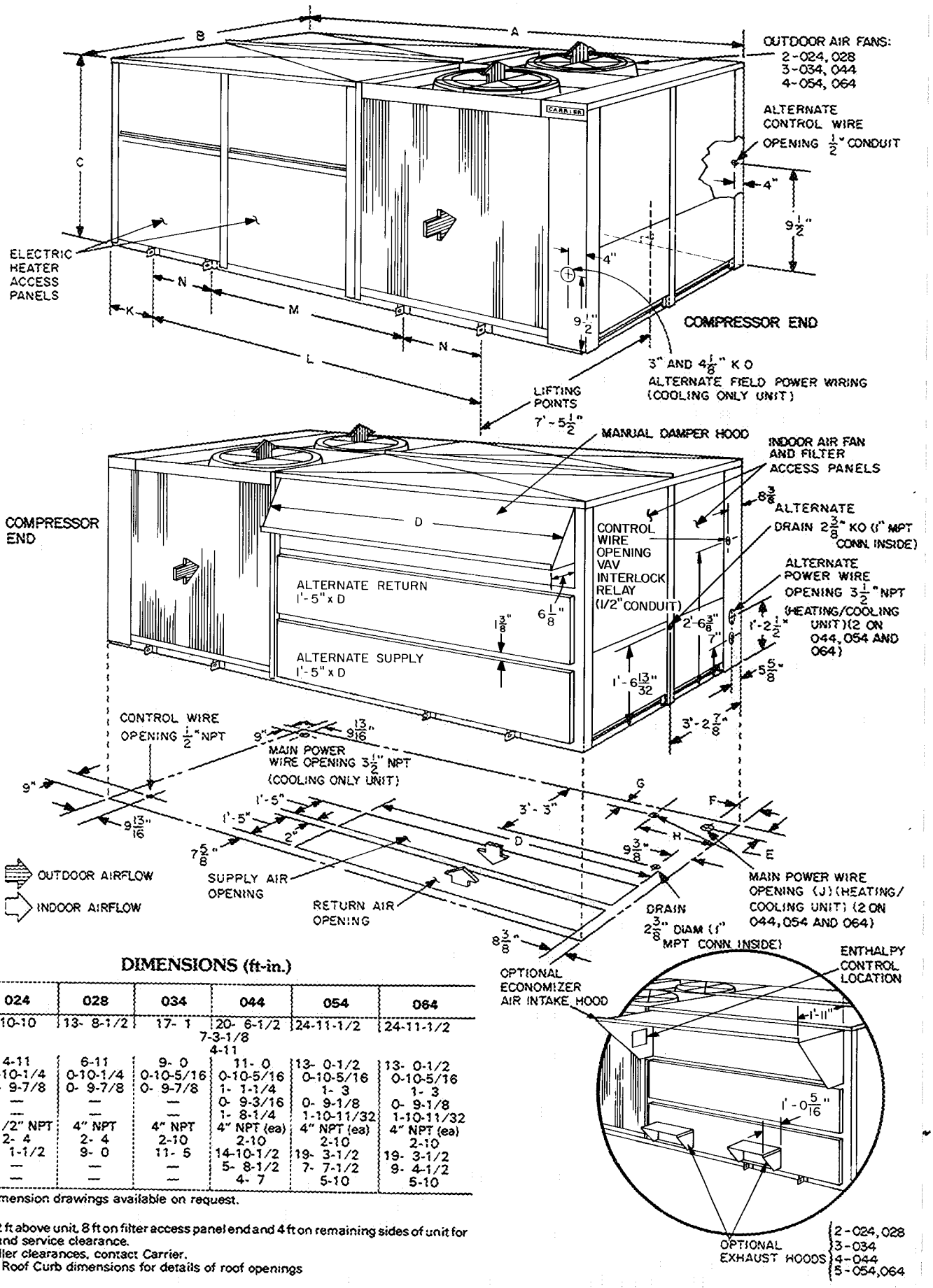
*Unit contains one 06EA250 and one 06EA275 compressor

†Standard fan motor supplied with standard fan drive pulleys and belts; alternate fan motor supplied with alternate fan drive pulleys and belts Other combinations are field supplied Pulley A is installed in unit; pulley B is shipped with unit (024-054)

‡Due to large frame size, the 25 hp, 208-230 volt and 30 hp motors are available in single speed only

**The 50DF064 alternate drive is supplied with Pulley A only

Base unit dimensions



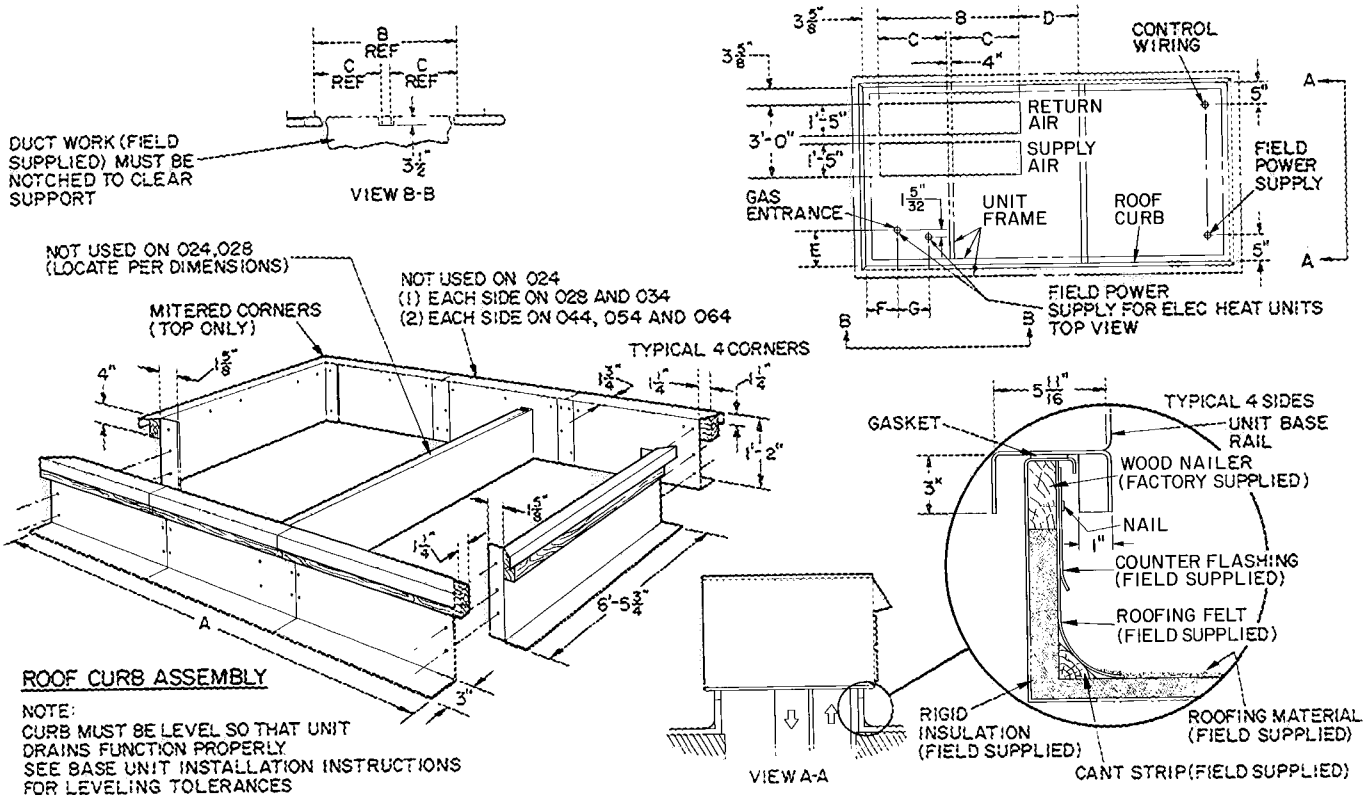
DIMENSIONS (ft-in.)

UNIT 50DF	024	028	034	044	054	064
A	10-10	13- 8-1/2	17- 1	20- 6-1/2	24-11-1/2	24-11-1/2
B				7-3-1/8		
C				4-11		
D	4-11	6-11	9- 0	11- 0	13- 0-1/2	13- 0-1/2
E	0-10-1/4	0-10-1/4	0-10-5/16	0-10-5/16	0-10-5/16	0-10-5/16
F	0- 9-7/8	0- 9-7/8	0- 9-7/8	1- 1-1/4	1- 3	1- 3
G	—	—	—	0- 9-3/16	0- 9-1/8	0- 9-1/8
H	—	—	—	1- 8-1/4	1-10-11/32	1-10-11/32
J	3-1/2" NPT	4" NPT	4" NPT	4" NPT (ea)	4" NPT (ea)	4" NPT (ea)
K	2- 4	2- 4	2-10	2-10	2-10	2-10
L	6- 1-1/2	9- 0	11- 5	14-10-1/2	19- 3-1/2	19- 3-1/2
M	—	—	—	5- 8-1/2	7- 7-1/2	9- 4-1/2
N	—	—	—	4- 7	5-10	5-10

Certified dimension drawings available on request.

NOTES:
1. Allow 12 ft above unit, 8 ft on filter access panel end and 4 ft on remaining sides of unit for airflow and service clearance.
2. For smaller clearances, contact Carrier.
3. Refer to Roof Curb dimensions for details of roof openings

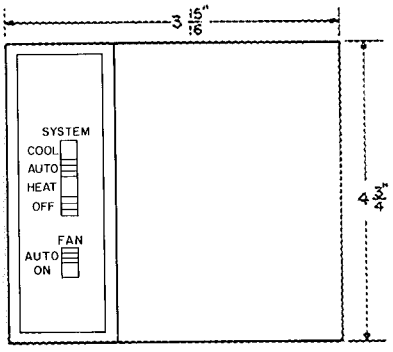
Accessory dimensions



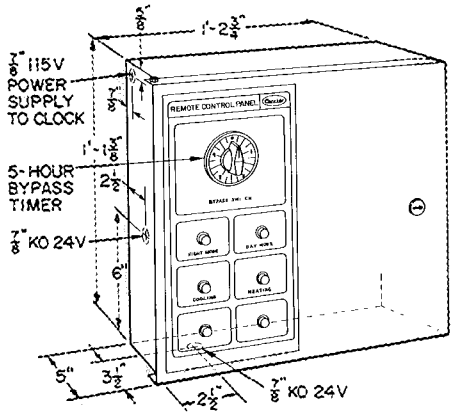
DIMENSIONS (ft-in.)

UNIT	A	B	C	D	E	F	G
50DF024	10- 0-1/4	4-11	—	—	0-6-1/4	0-5-1/8	—
50DF028	12-10-3/4	6-11	—	—	0-6-1/4	0-5-1/8	—
50DF034	16- 3-1/8	9- 0	4-4	0-6	0-6-1/4	0-5-7/8	—

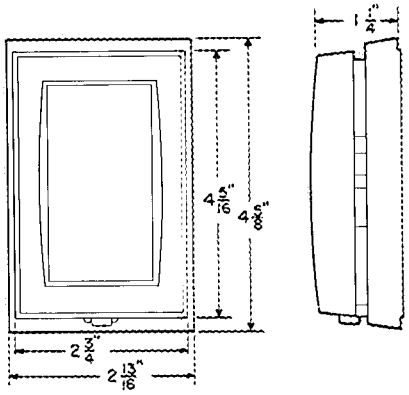
UNIT	A	B	C	D	E	F	G
50DF044	19-8-1/4	11-0	5-4	0-6	0-6-1/4	0-9-1/4	0-7
50DF054	24-1-3/4	13-0	6-4	0-6	0-6-1/4	0-6-3/4	0-7-11/32
50DF064							



SUBBASE



REMOTE CONTROL PANEL
(Control Box)



THERMOSTAT/TRANSMITTER

Selection procedure (with example)

I Determine cooling and heating requirements at design conditions.

Given

Required Cooling Capacity (TC)	300,000 Btuh
Sensible Heat Capacity (SHC)	236,000 Btuh
Required Heating Capacity	240,000 Btuh
Condenser Entering Air Temperature	95 F
Indoor Air Temperature	80 F edb, 67 F ewb
Evaporator Air Quantity	10,000 cfm
External Static Pressure	1 80 in wg
Electrical Characteristics (V-Ph-Hz)	460-3-60

II Select unit based on required cooling capacity

Enter Cooling Capacities table at condenser entering temperature of 95 F Unit 50DF028 at 10,000 cfm and 67 F ewb will provide a total capacity of 308,000 Btuh and a SHC of 236,000 Btuh. Calculate SHC correction, if required, using notes under cooling capacities tables

III Select heating capacity of unit to provide design condition requirement.

In the Heating Capacities table, note that unit 50DF028 with 73 kw heaters will provide 249150 Btuh

IV Determine fan speed and power requirements at design conditions.

Enter Fan Performance table at 10,000 cfm and 1 80 in wg Note that the fan speed is 1210 rpm and the power required is 9.0 bhp. The optional 10 hp motor is required

V Select unit that corresponds to power source available.

The Electrical Data table shows that a 460-3-60 unit is available.

Performance data

COOLING CAPACITIES

50DF024

Temp (F) Air Ent Cond		Evap Air — Cfm/BF: 6000/.042			8000/.061			9000/.070		
		Evap Air — Ewb (F): 72	67	62	72	67	62	72	67	62
85	TC	266	243	220	278	255	233	283	260	237
	SHC	132	165	197	147	191	231	157	206	237
	KW	21.3	20.1	19 0	22.0	20.8	19.6	22.4	21.1	20.0
95	TC	250	228	206	263	239	218	268	243	222
	SHC	127	159	191	142	184	218	153	198	222
	KW	22.6	21.6	20.1	23.4	22.0	20.8	23.7	22.5	21.1
100	TC	243	221	201	255	232	212	260	236	216
	SHC	124	157	189	139	182	212	150	196	216
	KW	23 2	22 2	20 7	24 0	22.8	21 4	24 3	23 1	21 7
105	TC	236	214	195	247	225	206	251	229	210
	SHC	122	154	186	137	179	206	147	192	210
	KW	23 9	22 6	21 4	24.6	23.4	22.1	24.9	23.7	22.3
110	TC	227	207	188	238	216	198	241	220	202
	SHC	119	151	183	135	176	198	144	189	202
	KW	24 8	23 2	22 0	25 3	24 1	22 5	25 6	24 4	22 8

50DF028

Temp (F) Air Ent Cond		Evap Air — Cfm/BF: 9000/.058			10,000/.066			11,000/ 074		
		Evap Air — Ewb (F): 72	67	62	72	67	62	72	67	62
85	TC	345	318	294	351	322	298	355	327	302
	SHC	178	229	278	185	242	296	194	253	302
	KW	29.5	27.8	26.2	30.0	28 2	26.4	30.2	28 4	26.6
95	TC	330	303	278	335	308	283	339	312	287
	SHC	174	223	272	181	236	283	190	248	287
	KW	31 2	29.3	27.7	31.4	29.5	28.2	31.7	30.1	28.5
100	TC	320	295	271	325	299	275	329	303	279
	SHC	171	220	268	178	233	275	187	245	279
	KW	32 7	30 4	29 0	33 1	30.8	29 2	33 3	31 3	29 6
105	TC	310	286	263	315	290	267	318	294	270
	SHC	168	216	263	176	229	267	183	242	270
	KW	34 0	31 7	29 9	34.4	32 1	30.2	24 7	32 3	30 5
110	TC	300	277	255	305	281	259	309	284	262
	SHC	165	213	255	171	226	259	180	239	262
	KW	35 3	33 1	31 0	35 5	33 4	31 2	35 7	33 6	31 7

50DF034

Temp (F) Air Ent Cond		Evap Air — Cfm/BF: 10,000/.068			12,000/.082			13,500/.088		
		Evap Air — Ewb (F): 72	67	62	72	67	62	72	67	62
85	TC	412	380	349	424	391	360	430	397	366
	SHC	214	266	321	226	292	356	240	311	366
	KW	32 0	30 7	29 3	33.2	31.5	29.7	33.5	31 8	29 9
95	TC	392	360	332	401	370	342	408	376	347
	SHC	203	258	315	218	283	342	231	303	347
	KW	34 7	33 4	31 5	35.9	33.8	31.8	36 2	34 4	32 4
100	TC	383	352	323	392	361	334	399	367	339
	SHC	200	255	311	214	280	334	227	300	339
	KW	35 9	34 6	32 6	37 1	35.0	33 2	37 5	35 7	33 6
105	TC	373	344	316	384	353	325	390	358	330
	SHC	197	252	308	211	278	325	222	297	330
	KW	37 4	35 8	34 2	38.1	36 2	34 6	38 7	36 8	34 8
110	TC	354	326	299	363	335	308	370	340	312
	SHC	191	245	299	206	271	308	215	291	312
	KW	39 3	37 8	36 0	39.9	38 3	36.6	40 5	38 5	36 9

50DF044

Temp (F) Air Ent Cond		Evap Air — Cfm/BF: 14,000/.051			16,000/.062			18,000/.070		
		Evap Air — Ewb (F): 72	67	62	72	67	62	72	67	62
85	TC	538	499	457	549	507	468	558	515	476
	SHC	281	357	436	295	383	468	312	408	476
	KW	43.7	41 8	39 5	45.1	42.5	39.8	45 4	42 9	40 6
95	TC	506	465	427	516	475	436	524	481	445
	SHC	269	345	419	285	369	436	301	394	445
	KW	46.8	43.7	41.0	47.1	44.5	41 8	47 5	45 0	42 7
100	TC	491	450	411	499	460	420	506	466	428
	SHC	263	339	411	280	364	420	295	390	428
	KW	47 9	45 0	42 5	48 3	45.6	43 1	48 7	46 2	44 1
105	TC	475	436	397	483	444	405	490	450	412
	SHC	258	333	397	275	358	405	290	383	412
	KW	49 2	46 6	43 6	49.8	47 1	44 3	50 6	47 5	45 2
110	TC	458	419	380	465	427	388	473	433	395
	SHC	252	326	380	269	353	388	283	377	395
	KW	50 8	47 9	45 2	51 3	48.5	46.0	51 7	49 0	46 8

Performance data (cont)

COOLING CAPACITIES

50DF054

Temp (F) Air Ent Cond		Evap Air — Cfm/BF								
		18,000/ 058			20,000/.065			22,000/.073		
		Evap Air — Ewb (F)								
		72	67	62	72	67	62	72	67	62
85	TC	686	639	596	696	648	604	704	654	612
	SHC	361	462	565	376	485	600	392	514	612
	KW	56 3	53 2	50 4	57 6	54.2	50.7	58 6	54 5	51 6
95	TC	650	602	558	659	610	566	666	616	572
	SHC	347	446	546	363	472	566	380	499	572
	KW	61 1	57 6	53 8	61.5	57.8	53.7	62 2	58 8	54 7
100	TC	629	581	538	637	589	545	644	597	552
	SHC	340	438	538	354	465	545	371	493	552
	KW	63 1	59 0	56 3	63.7	59.8	56.6	64 3	60 2	56 9
105	TC	608	563	518	616	570	525	622	576	532
	SHC	333	432	518	348	457	525	365	483	532
	KW	51 0	61 4	58 1	—	61 6	58 4	—	62 1	58 7
110	TC	589	540	496	597	546	502	604	552	510
	SHC	325	423	496	344	448	502	359	475	510
	KW	—	63 8	60 3	—	64.2	60.5	—	64 8	60 9

→ 50DF064

Temp (F) Air Ent Cond		Evap Air — Cfm/BF								
		21,000 / .070			24,000 / .081			26,400 / .090		
		Evap Air — Ewb (F)								
		72	67	62	72	67	62	72	67	62
85	TC	796	731	669	807	744	684	820	753	696
	SHC	413	521	620	432	553	658	449	579	683
	KW	61 9	58.8	55 9	62.4	59.4	56.6	63	59.9	57 1
95	TC	751	693	634	766	703	649	775	714	660
	SHC	397	505	600	418	536	635	433	563	657
	KW	66 0	62 8	59 6	66.8	63.4	60.4	67.2	62.7	61.1
105	TC	709	650	598	718	663	612	726	671	624
	SHC	387	487	579	400	521	609	416	546	624
	KW	70 3	66.6	63 4	70.9	67.4	64.3	71 4	67 8	65 8
115	TC	665	609	562	672	617	576	678	624	591
	SHC	365	471	556	384	502	576	399	526	591
	KW	74 3	70 5	67 0	74.9	71.1	68.1	75 4	71 6	71 9

BF — Bypass Factor
Ewb — Entering Wet-Bulb
KW — Compr Mtr Pwr Input
SHC — Sensible Heat Cap (1000 Btuh)
TC — Total Cap (1000 Btuh) Gross

NOTES:
1 Direct interpolation is permissible Do not extrapolate
2 The following formulas may be used.

$$t_{ldb} = t_{edb} - \frac{\text{sensible capacity (Btuh)}}{1.09 \times \text{cfm}}$$

t_{lwb} = Wet-bulb temperature of corresponding to enthalpy of air leaving evaporator coil (h_{lwb})

$$h_{lwb} = h_{ewb} - \frac{\text{total capacity (Btuh)}}{4.5 \times \text{cfm}}$$

Where:

h_{ewb} = Enthalpy of air entering evaporator coil

3 SHC is based on 80 F edb temp of air entering evaporator coil Below 80 F edb, subtract (corr factor x cfm) from SHC

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

BF	Entering Air Dry-Bulb Temp (F)					
	79	78	77	76	75	under 75
	81	82	83	84	85	over 85
	Correction Factor					
.05	1.04	2 07	3 11	4 14	5 18	use formula shown below
.10	98	1 96	2 94	3 92	4 91	
.20	87	1 74	2.62	3.49	4 36	

Interpolation is permissible
Correction Factor = 1.09 x (1 - BF) x (edb - 80)

→ 4 Cooling capacities are gross and do not include deduction for indoor fan motor heat

→ OPTIONAL EQUIPMENT RESISTANCES (in. wg)

UNIT MODEL	OPTION	UNIT CFM/TON 300	400	500
50DF 024-044	Bag Filter	14	25	38
	Economizer	03	05	08
	Economizer with Exhaust	.09	.15	.23
	Electric Heaters 0 5:1 (Low)	06	09	13
	(Heat Cool Ratio) 0 75 1 (Med)	09	15	23
	1.0.1 (High)	.14	.25	.35
50DF 054	Bag Filter	14	25	38
	Economizer	03	04	08
	Economizer with Exhaust	.11	.15	.24
	Electric Heaters 0 5:1 (Low)	12	23	38
	(Heat: Cool Ratio) 0 75 1 (Med)	15	30	46
	1 0 1 (High)	22	39	61
50DF 064	Bag Filter	20	36	55
	Economizer	04	07	11
	Economizer with Exhaust	13	21	31
	Electric Heaters 0 5 1 (Low)	18	35	54
	(Heat Cool Ratio) 0 75:1 (Med)	24	44	68

→ HEATING CAPACITIES

UNIT	VOLTS (Nominal)	KW	STAGE 1%	BTUH
50DF024	208-230	30-37	50	102,390-126,280
	460	37	50	126,280
	208-230	45-55	67	153,585-187,715
	460	55	67	187,715
	208-230	75-91	60	255,975-310,585
	460	91	60	310,585
50DF028	208-230	45-55	67	153,585-187,715
	460	55	67	187,715
	208-230	60-73	50	204,780-249,150
	460	73	50	249,150
	208-230	90-110	50	307,170-375,430
	460	110	50	375,430
50DF034	208-230	45-55	67	153,585-187,715
	460	55	67	187,715
	208-230	75-91	60	255,975-310,585
	460	91	60	310,585
	208-230	105-128	57	358,365-436,865
	460	128	57	436,865
50DF044	208-230	60-73	50	204,780-249,150
	460	73	50	249,150
	208-230	90-110	50	307,170-375,430
	460	110	50	375,430
	208-230	135-165	56	460,755-563,145
	460	165	56	563,145
50DF054	208-230	75-91	66	255,975-310,585
	460	91	60	310,585
	208-230	120-146	50	409,560-498,300
	460	146	50	498,300
50DF064	208-230	75-91	66	255,975-310,585
	460	91	60	310,585
	208-230	120-146	50	409,560-498,300
	460	146	50	498,300

INDOOR AIR FAN PULLEY DATA

UNIT	FAN RPM	MOTOR PULLEY	FAN PULLEY	SINGLE-SPEED BELT NO.—SIZE	TWO-SPEED BELT NO.—SIZE
		No. Grooves—Type—in.			
50DF024	925	2—3V—5.6	2—3V—10.6	2—3V—710	2—3V—710
	991	2—3V—6.0	2—3V—10.6	2—3V—750	2—3V—750
	1073	2—3V—6.5	2—3V—10.6	2—3V—750	2—3V—750
	1093	2—3V—5 0	2—3V— 8.0	2—3V—670	2—3V—710
	1159	2—3V—5.3	2—3V— 8.0	2—3V—670	2—3V—710
	1225	2—3V—5.6	2—3V— 8.0	2—3V—670	2—3V—710
	1300	2—3V—6 0	2—3V— 8.0	2—3V—710	2—3V—750
50DF028	925	2—3V—5.6	2—3V—10.6	2—3V—750	2—3V—750
	984	2—3V—4 5	2—3V— 8.0	2—3V—670	2—3V—670
	1073	2—3V—6.5	2—3V—10.6	2—3V—750	2—3V—750
	1093	2—3V—5 0	2—3V— 8 0	2—3V—710	2—3V—710
	1139	2—3V—6 9	2—3V—10.6	2—3V—750	2—3V—750
	1159	3—3V—5.3	3—3V— 8.0	3—3V—710	2—3V—710
	1225	2—3V—5.6	3—3V— 8.0	3—3V—710*	3—3V—710
	1300	2—3V—6 0	2—3V— 8 0	2—3V—710	2—3V—710
50DF034	925	2—3V—5.6	2—3V—10.6	2—3V—750	2—3V—750
	991	2—3V—6 0	2—3V—10.6	2—3V—750	2—3V—750
	1073	2—3V—6.5	2—3V—10.6	2—3V—750	2—3V—750
	1093	3—3V—5 0	3—3V— 8 0	3—3V—710	3—3V—670
	1141	4—3V—4.5	4—3V— 6.9	4—3V—670	4—3V—670
	1159	4—3V—5.3	4—3V— 8.0	4—3V—710	4—3V—710
	1225	4—3V—5.6	4—3V— 8.0	4—3V—710	4—3V—710
	1300	3—3V—6.0	3—3V— 8 0	3—3V—710	3—3V—710
50DF044	925	4—3V—5.6	4—3V—10.6	3—3V—750†	3—3V—770
	991	3—3V—6.0	3—3V—10.6	3—3V—750	3—3V—770
	1073	4—3V—6.5	4—3V—10.6	3—3V—750†	3—3V—770
	1093	4—3V—5.0	4—3V— 8 0	4—3V—710	4—3V—710
	1159	5—3V—5.3	5—3V— 8.0	5—3V—710	5—3V—710
	1225	4—3V—5.6	5—3V— 8.0	5—3V—710*	5—3V—710
	1300	4—3V—6 0	4—3V— 8 0	4—3V—710	4—3V—710
50DF054	925	4—3V—5 6	4—3V—10.6	4—3V—750	4—3V—750
	991	4—3V—6.0	4—3V—10.6	4—3V—750	4—3V—770
	1039	5—3V—4.75	5—3V— 8.0	5—3V—710	5—3V—710
	1073	4—3V—6.5	4—3V—10.6	4—3V—750	4—3V—770
	1093	5—3V—5 0	5—3V— 8.0	5—3V—710	5—3V—720
	1159	5—3V—5.3	5—3V— 8.0	5—3V—710	5—3V—720
	1225	5—3V—5.6	5—3V— 8.0	5—3V—710	5—3V—720
50DF064	925	4—3V—5 6	4—3V—10 6	4—3V—750	4—3V—750
	991	4—3V—6 0	4—3V—10 6	4—3V—750	4—3V—770
	1039	5—3V—4 75	5—3V— 8 0	5—3V—710	5—3V—710
	1073	4—3V—6 5	4—3V—10 6	4—3V—750	4—3V—770
	1093	5—3V—5 0	5—3V— 8 0	5—3V—710	5—3V—720
	1159	5—3V—5 3	5—3V— 8.0	5—3V—710	5—3V—720
	1225	5—3V—5.6	5—3V— 8.0	5—3V—710	5—3V—720
	1312	5—3V—6.0	5—3V— 8.0	5—3V—710	5—3V—720
	1450	5—3V—5.0	5—3V— 6.0	5—3V—670	—

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

*Remove one belt.

†Drive requires 3 belts; 4 belts may be used if desired.

Performance data (cont)

FAN PERFORMANCE

EXTERNAL STATIC PRESSURE (in. wg)

UNIT 50DF	CFM	0.20		0.40		0.60		0.80		1.00		1.20		1.40		1.60		1.80		2.00		2.20	
		Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
024	6000	699	1 72	763	2 04	820	2 34	872	2 64	922	2 95	969	3 26	1012	3 56	1054	3 85	1094	4 16	1134	4 48	1173	4.80
	6500	746	2 12	807	2 48	862	2 81	912	3 13	959	3 46	1005	3 79	1048	4 13	1089	4 45	1126	4 77	1165	5 10	1202	5.44
	7000	794	2 59	852	2 97	905	3 34	953	3 69	999	4 03	1042	4 39	1084	4 75	1125	5 12	1162	5 47	1198	5.31	1233	6.15
	7500	843	3 13	897	3 54	948	3 94	995	4 32	1039	4 69	1081	5 06	1121	5 44	1160	5.83	1198	6 23	1234	6.60	1268	6.97
	8000	892	3 74	943	4 17	992	4 60	1038	5 02	1080	5.42	1121	5 81	1159	6 21	1197	6.62	1234	7 04	1270	7.46		
	8500	941	4 42	990	4 89	1037	5 35	1081	5 79	1122	6 23	1162	6 65	1199	7.07	1235	7.48	1270	7.93				
	9000	991	5 19	1037	5 68	1082	6 17	1125	6 65	1165	7.12	1203	7 57	1240	8 01	1275	8.46						
	9500	1041	6.04	1085	6 56	1128	7 08	1169	7 59	1208	8 09	1246	8 58	*1281*	*9 05*								
	10000	1091	6.99	1133	7 53	1174	8.08	1214	8.62	*1252*	*9.15*	*1288*	*9.67*										
028	7500	662	1 78	731	2 25	791	2 71	848	3 21	904	3 76	956	4 36	1005	4 98	1054	5 69	1105	6 47	1153	7 31	1199	8 18
	8000	696	2 09	763	2 60	820	3 07	877	3 60	928	4 15	980	4 76	1028	5 40	1074	6 07	1120	6.82	1167	7.64	1213	8.53
	8500	730	2 43	796	2 99	851	3 49	905	4 03	955	4 59	1004	5 20	1052	5 87	1096	6 55	1140	7 26	1183	8 05	1227	8.91
	9000	764	2 81	829	3 41	883	3 95	933	4 49	983	5 09	1029	5 70	1076	6 36	1120	7 08	1162	7.80	1203	8 55	1244	9.37
	9500	799	3 22	862	3 87	915	4 46	963	5 01	1012	5 63	1057	6 26	1100	6 92	1144	7 63	1186	8 39	1226	9.15	1264	9.93
	10000	834	3 68	895	4 37	948	5 01	994	5 59	1040	6 20	1085	6 87	1127	7 53	1169	8.24	1210	9.00	1250	9.81	1287	10.60
	10500	870	4 20	929	4 90	981	5 60	1027	6 20	1069	6 80	1113	7 50	1155	8 20	1194	8 90	1234	9.70	1273	10.50		
	11000	905	4 70	963	5 50	1014	6 20	1059	6 90	1100	7 50	1142	8.20	1184	9 00	1222	9.70	1260	10.40	1298	11.20		
	11500	941	5 30	997	6 10	1047	6 90	1092	7 60	1132	8 30	1171	9 00	1212	9.70	1251	10.50	1286	11.30				
	12000	977	6 00	1031	6 80	1080	7 70	1125	8.40	1165	9 10	1202	9.80	1240	10 60	1279	11 40						
	12500	1013	6.70	1065	7.60	1114	8.40	1157	9.30	1197	10.00	1234	10.70	1270	11.50								
* 034	9000	690	2 86	755	3 40	812	3 91	865	4 42	916	4 94	960	5 42	1006	5 94	1052	6 48	1094	7 02	1133	7.57	1173	8 18
	9500	720	3 29	784	3 88	839	4 42	891	4 95	940	5 49	985	6 03	1026	6 54	1071	7 10	1114	7 67	1153	8 24	1190	8 81
	10000	751	3 76	813	4 40	867	4 97	917	5 53	964	6 09	1010	6 67	1051	7 22	1091	7 77	1133	8 36	1174	8 97	1211	9.56
	10500	782	4 28	842	4 96	895	5 57	943	6 16	990	6 75	1034	7 35	1076	7 96	1114	8.51	1152	9 10	1193	9 73	1232	10.37
	11000	814	4 80	871	5 60	923	6 20	971	6 80	1016	7 50	1059	8 10	1100	8 70	1139	9 30	1174	9 90	1212	10.50	1250	11.20
	11500	845	5 50	901	6 20	952	6 90	999	7 60	1042	8 20	1085	8 90	1125	9 50	1164	10 20	1200	10.80	1233	11 40	1270	12.10
	12000	877	6 10	931	7 00	981	7 70	1027	8 40	1069	9.00	1110	9 70	1150	10 40	1188	11 10	1225	11.80	1258	12.40	1291	13.10
	12500	909	6 80	962	7 70	1010	8 50	1055	9 20	1097	9 90	1136	10 60	1176	11 30	1213	12.00	1249	12.80	1284	13.50		
	13000	941	7 60	992	8 50	1039	9 40	1083	10 10	1125	10 90	1163	11.60	1201	12 30	1238	13.10	1273	13.80				
	13500	973	8 50	1023	9 40	1069	10 30	1112	11.10	1153	11 90	1191	12.60	1227	13.40	1264	14.10	1298	14.90				
#	14000	1006	9 40	1054	10 40	1099	11 30	1141	12 10	1181	12 90	1218	13 70	1254	14.50	1290	15.30						
	14500	1038	10 30	1085	11 40	1129	12 30	1170	13 20	1209	14 10	1246	14.90	1282	15.70								
	15000	1071	11.30	1116	12.40	1159	13.50	1200	14.40	1238	15.30	1275	16.10										
044	12000	734	4 80	784	5 40	838	6 20	889	7 00	937	7 80	987	8 70	1034	9 50	1081	10 50	1125	11 40	1169	12 50	1211	13.70
	13000	791	6 00	831	6 60	883	7 40	930	8 20	977	9 10	1022	10 00	1068	11 00	1110	11 90	1165	12.90	1195	13 90	1237	15.10
	14000	848	7 40	880	7 90	928	8 80	974	9 70	1017	10 60	1060	11 60	1102	12 60	1145	13 60	1184	14 50	1227	15 60	1266	16.70
	15000	907	9 10	932	9 50	974	10 40	1019	11 40	1060	12 40	1101	13 40	1140	14 40	1179	15 40	1220	16.50	1257	17.50	1295	18.60
	16000	966	11 00	985	11 40	1022	12 20	1064	13 30	1104	14 30	1142	15 30	1181	16.40	1217	17.50	1254	18.60	1292	19.70		
	17000	1026	13 30	1040	13 50	1071	14 30	1110	15 30	1150	16 50	1186	17.60	1221	18.60	1259	19.80	1292	20 90				
	18000	1086	15 70	1097	15 90	1122	16 60	1157	17 60	1195	18.80	1231	20.00	1265	21.10	1299	22 30						
	19000	1147	18 50	1154	18 60	1175	19 20	1205	20.20	1241	21.40	1276	22.70										
	20000	1208	21.70	1212	21.70	1229	22.20	1255	23.00	*1288*	*24.20*												
054	15000	704	5 08	772	6 10	829	6 94	882	7 80	933	8 71	983	9 68	1031	10 67	1077	11 75	1122	12 82	1166	13 87	1206	14 94
	16000	741	6 00	807	7 13	863	8 08	913	8 93	963	9 91	1010	10 89	1057	11 93	1101	12 99	1144	14 13	1187	15 29	1228	16 41
	17000	779	7 02	843	8 26	898	9 32	946	10 24	993	11 21	1039	12 25	1083	13 31	1127	14 42	1169	15 54	1209	16 75	1249	17 99
	18000	817	8 17	878	9 51	933	10 68	980	11 70	1024	12 65	1069	13 75	1112	14 84	1153	15 97	1194	17 16	1234	18 34	1272	19 61
	19000	855	9 44	915	10 87	968	12 16	1015	13 28	1058	14 30	1100	15 36	1142	16 54	1181	17 68	1221	18 89	1260	20 14	1297	21 39
	20000	894	10 84	951	12 37	1003	13 76	1050	15 00	1092	16 11	1132	17 17	1172	18 35	1211	19 58	1249	20.79	1286	22 07	1323	23.39
	21000	933	12 38	988	14 00	1038	15 50	1084	16.85	1126	18 07	1165	19 19	1203	20 32	1241	21 62	1278	22.90	1314	24.17	1349	25.52
	22000	972	14 06	1025	15 77	1074	17 37	1119	18 84	1161	20 17	1199	21 38	1235	22 54	1272	23.79	1308	25.16	1343	26.49	1377	27.82
	23000	1011	15 90	1062	17 69	1110	19 40	1155	20 98	1196	22.42	1234	23 74	1269	24 97	1304	26.19	1338	27.54	1373	28.98	1407	30.36
	24000	1051	17 90	1100	19 78	1147	21 58	1190	23 27	1231	24 83	1268	26.25	1304	27.58	1337	28 85	1370	30.13	1403	31.59	1437	33.09
	25000	1090	20 06	1138	22 03	1183	23 92	1226	25 72	1266	27 39	1303	28.93	1338	30 36	1371	31.71	1403	33.03	1434	34 40		

Alternate fan motor or drive is required

‡ Field supplied drive required

Bhp — Brake horsepower
Rpm — Revolutions per minute

NOTES:
1 *Values in italics* indicate that motor larger than optional fan motor is required
2 Fan performance has deductions for unit casing losses, wet coil and clean standard filters
3 Fan motor bhp is based on minimum voltages and 80 F air across motor

EXTERNAL STATIC PRESSURE (in. wg)

UNIT 50DF	CFM	0.75		1.00		1.25		1.50		1.75		2.00		2.25		2.50		2.75		3.00		3.25	
		Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
064	15000	868	7 56	934	8 72	996	9 94	1054	11 20	1110	12 55	1165	13 85	1216	15 21	1266	16 61	1314	18 06	1361	19 54	1406	21 04
	16000	901	8 71	963	9 90	1022	11 16	1079	12 46	1134	13 84	1186	15 29	1237	16 67	1286	18 11	1333	19 59	1378	21 12	1423	22 68
	17000	935	10 02	993	11 20	1050	12 51	1106	13 88	1158	15 26	1209	16 75	1259	18 29	1307	19 75	1353	21 27	1397	22 83	1441	24 44
	18000	969	11 45	1024	12 65	1080	14 01	1133	15 41	1185	16 88	1234	18 34	1282	19 94	1329	21 57	1375	23 12	1419	24 71		
	19000	1004	13 02	1058	14 30	1110	15 64	1162	17 10	1212	18 60	1260	20 16	1307	21 71	1352	23 40	1396	25 13	1440	26 78		
	20000	1038	14 71	1092	16 11	1141	17 44	1191	18 96	1240	20 49	1287	22 10	1332	23 73	1376	25 37	1420	27 15				
	21000	1074	16 53	1126	18 07	1175	19 47	1222	20 94	1269	22 56	1314	24 19	1359	25 89	1402	27 60	1444	29 32				
	22000	1109	18 50	1161	20 17	1208	21 67	1253	23 13	1298	24 78	1343	26.48	1386	28 20	1429	29 99						
	23000	1144	20 62	1196	22 42	1243	24 05	1287	25 58	1329	27 18	1373	28.95	1415	30 71								
	24000	1180	22 89	1231	24 83	1277	26.59	1320	28 22	1361	29.81	1403	31 56	1444	33.42								
	25000	1217	25 32	1266	27 40	1312	29.30	1355	31.04	1395	32.70	1434	34 40										

‡ Alternate fan motor and drive required

Electrical data

50DF024 and 028

MODEL NOMINAL VOLTS/PH/HZ	VOLTAGE RANGE		COMPR NO. 1		COMPR NO. 2		OUTDOOR FAN MOTORS		INDOOR FAN MOTOR		EXHAUST FAN MOTOR		HEATERS		POWER SUPPLY* Circuit No. 1		Circuit No. 2	
	Min	Max	RLA	LRA	RLA	LRA	Qty	FLA	Hp	FLA	Hp	FLA	Kw	FLA	MCA	MOCP	MCA	MOCP
									7 5	24 2	—	—	—	—	138	200	—	—
									7 5	24 2	3	11	—	—	149	225	—	—
									7 5	24 2	—	—	—	—	138	200	—	—
									7 5	24 2	—	—	30- 36 6	83- 92	138-146	200-200	—	—
									7 5	24 2	—	—	45- 54 9	125-138	187-203	200-225	—	—
									7 5	24 2	—	—	75- 91 5	208-230	138-146	200-200	156-173	175-200
									7 5	24 2	3	11	—	—	149	225	—	—
50DF024 208-230/3/60	187	254	80	345	—	—	2	7 6 (ea)	7 5	24 2	3	11	30- 36 6	83- 92	149-149	225-225	—	—
									7 5	24 2	3	11	45- 54 9	125-138	187-203	225-225	—	—
									7 5	24 2	3	11	75- 91 5	208-230	149-149	225-225	156-173	175-200
									7 5	24 2	—	—	30- 36 6	83- 92	128-146	200-200	—	—
									7 5	24 2	—	—	45- 54 9	125-138	187-203	200-225	—	—
									7 5	24 2	—	—	75- 91 5	208-230	138-146	200-200	156-173	175-200
									7 5	24 2	3	11	30- 36 6	83- 92	149-149	225-225	—	—
									7 5	24 2	3	11	45- 54 9	125-138	187-203	225-225	—	—
									7 5	24 2	3	11	75- 91 5	208-230	149-149	225-225	156-173	175-200
									5	7 6	—	—	—	—	60	90	—	—
									5	7 6	3	4 8	—	—	65	100	—	—
									7 5	11 0	—	—	—	—	63	100	—	—
									5	7 6	—	—	36 6	46	67	90	—	—
									5	7 6	—	—	54 9	69	96	90	—	—
									5	7 6	—	—	91	115	154	125	—	—
									7 5	11 0	3	4 8	—	—	68	100	—	—
50DF024 460/3/60	414	508	37 0	173	—	—	2	3 3 (ea)	5	7 6	3	4 8	36 6	46	67	100	—	—
									5	7 6	3	4 8	54 9	69	96	100	—	—
									5	7 6	3	4 8	91	115	154	125	—	—
									7 5	11 0	—	—	36 6	46	72	100	—	—
									7 5	11 0	—	—	54 9	69	100	110	—	—
									7 5	11 0	—	—	91	115	158	150	—	—
									7 5	11 0	3	4 8	36 6	46	72	100	—	—
									7 5	11 0	3	4 8	54 9	69	100	110	—	—
									7 5	11 0	3	4 8	91	115	158	150	—	—
									5	6 1	—	—	—	—	49	70	—	—
50DF024 575/3/60	518	632	30 0	120	—	—	2	2 7 (eá)	5	6.1	3	3 9	—	—	53	80	—	—
									7 5	9 0	—	—	—	—	52	80	—	—
									7 5	9 0	3	3 9	—	—	56	80	—	—
									7 5	24 2	—	—	—	—	160	225	—	—
									7 5	24 2	3	11	—	—	171	225	—	—
									10	30 8	—	—	—	—	167	225	—	—
									7 5	24 2	—	—	45- 54 9	125-138	187-203	200-225	—	—
									7 5	24 2	—	—	60- 73 2	166-184	238-261	250-250	—	—
									7 5	24 2	—	—	90-109 8	249-276	187-203	225-225	156-173	175-200
									10	30 8	3	11	—	—	178	225	—	—
50DF028 208-230/3/60	187	254	63 5	266	43	191	2	7 6 (ea)	7 5	24 2	3	11	45- 54 9	125-138	187-203	225-225	—	—
									7 5	24 2	3	11	60- 73 2	166-184	238-261	250-250	—	—
									7 5	24 2	3	11	90-109 8	249-276	187-203	225-225	156-173	175-200
									10	30 8	—	—	45- 54 9	125-138	195-211	225-250	—	—
									10	30 8	—	—	60- 73 2	166-184	246-269	250-300	—	—
									10	30 8	—	—	90-109 8	249-276	195-211	225-250	156-173	175-200
									10	30 8	3	11	45- 54 9	125-138	195-211	225-250	—	—
									10	30 8	3	11	60- 73 2	166-184	246-269	250-300	—	—
									10	30 8	3	11	90-109 8	249-276	195-211	225-250	156-173	175-200
									7 5	11 0	—	—	—	—	71	90	—	—
									7 5	11 0	3	4 8	—	—	76	100	—	—
									10	14 0	—	—	—	—	74	100	—	—
									7 5	11 0	—	—	55	69	100	110	—	—
									7 5	11 0	—	—	73.2	92	129	125	—	—
									7 5	11 0	—	—	109 8	138	187	175	—	—
									10	14 0	3	4 8	—	—	79	100	—	—
50DF028 460/3/60	414	508	27 5	120	19 3	86	2	3 3 (ea)	7 5	11 0	3	4 8	55	69	100	110	—	—
									7 5	11 0	3	4 8	73 2	92	129	125	—	—
									7 5	11 0	3	4 8	109 8	138	187	175	—	—
									10	14 0	—	—	55	69	104	125	—	—
									10	14 0	—	—	73 2	92	133	125	—	—
									10	14 0	—	—	109 8	138	190	175	—	—
									10	14 0	3	4 8	55	69	104	125	—	—
									10	14 0	3	4 8	73 2	92	133	125	—	—
									10	14 0	3	4 8	109 8	138	190	175	—	—
									7 5	9 0	—	—	—	—	57	70	—	—
50DF028 575/3/60	518	660	22 0	96	15 0	69	2	2 7 (ea)	7 5	9 0	3	3 9	—	—	61	80	—	—
									10	11 0	—	—	—	—	59	80	—	—
									10	11 0	3	3 9	—	—	63	80	—	—

LEGEND

COMPR — Compressor
FLA — Full Load Amps
Hp — Nominal Horsepower
Kw — Kilowatts
LRA — Locked Rotor Amps
MCA — Minimum Circuit Ampacity
MOCP — Maximum Overcurrent Protection
RLA — Rated Load Amps
*Fuse only

NOTES:
1 All outdoor fan motors are single-phase motors
2 All heaters are 3-phase assemblies
3 Circuit no 2 is provided as indicated; total unit MCA equals the sum of circuit no 1 MCA plus circuit no 2 MCA

50DF

Electrical data (cont)

50DF034 and 044

MODEL NOMINAL VOLTS/PH/HZ	VOLTAGE RANGE		COMPR NO. 1		COMPR NO. 2		OUTDOOR FAN MOTORS		INDOOR FAN MOTOR		EXHAUST FAN MOTOR		HEATERS		POWER SUPPLY* Circuit No. 1		Circuit No. 2	
	Min	Max	RLA	LRA	RLA	LRA	Qty	FLA	Hp	FLA	Hp	FLA	Kw	FLA	MCA	MOCP	MCA	MOCP
50DF034 208-230/3/60	187	254	63 5	266	63 5	266	3	7 6 (ea)	10	30 8	—	—	—	—	197	250	—	—
									10	30 8	3	11	—	—	208	250	—	—
									15	46 0	—	—	—	—	212	250	—	—
									10	30 8	—	—	45- 54 9	125-138	197-211	250-250	—	—
									10	30 8	—	—	75- 91 5	208-230	197-197	250-250	156-173	175-200
									10	30 8	—	—	105-128 1	291-322	197-211	250-250	208-230	225-250
									15	46 0	3	11	—	—	223	250	—	—
									10	30 8	3	11	45- 54 9	125-138	208-211	250-250	—	—
									10	30 8	3	11	75- 91 5	208-230	208-208	250-250	156-173	175-200
									10	30 8	3	11	105-128 1	291-322	208-211	250-250	208-230	225-250
									15	46 0	—	—	45- 54 9	125-138	214-230	300-300	—	—
									15	46 0	—	—	75- 91 5	208-230	212-212	250-250	156-173	175-200
									15	46 0	—	—	105-128 1	291-322	214-230	300-300	208-230	225-250
									15	46 0	3	11	45- 54 9	125-138	223-230	300-300	—	—
									15	46 0	3	11	75- 91 5	208-230	223-223	250-250	156-173	175-200
									15	46 0	3	11	105-128 1	291-322	223-230	300-300	208-230	225-250
50DF034 460/3/60	414	508	27 5	120	27 5	120	3	3 3 (ea)	10	14 0	—	—	—	—	86	110	—	—
									10	14 0	3	4 8	—	—	91	110	—	—
									15	21 0	—	—	—	—	93	110	—	—
									10	14 0	—	—	54 9	69	104	125	—	—
									10	14 0	—	—	91 5	115	162	150	—	—
									10	14 0	—	—	128 1	161	219	200	—	—
									15	20 0	3	4 8	—	—	98	125	—	—
									10	14 0	3	4 8	54 9	69	104	125	—	—
									10	14 0	3	4 8	91 5	115	162	150	—	—
									10	14 0	3	4 8	128 1	161	219	200	—	—
									15	21 0	—	—	54 9	69	113	150	—	—
									15	21 0	—	—	91 5	115	170	175	—	—
									15	21 0	—	—	128 1	161	228	225	—	—
									15	21 0	3	4 8	54 9	69	113	150	—	—
									15	21 0	3	4 8	91 5	115	170	175	—	—
									15	21 0	3	4 8	128 1	161	228	225	—	—
50DF034 575/3/60	518	660	22 0	96	22 0	96	3	2 7 (ea)	10	11 0	—	—	—	—	69	90	—	—
									10	11 0	3	3 9	—	—	73	90	—	—
									15	—	—	—	—	—	75	90	—	—
									—	—	3	3 9	—	—	79	100	—	—
50DF044 208-230/3/60	187	254	80	345	80	345	3	7 6 (ea)	15	46 0	—	—	—	—	249	300	—	—
									15	46 0	3	11	—	—	271	350	—	—
									20	53 5	—	—	—	—	263	300	—	—
									15	46 0	—	—	60- 73 2	166-184	265-288	350-350	—	—
									15	46 0	—	—	90-109 8	249-276	249-249	300	208-230	275-250
									15	46 0	—	—	135-164 7	374-414	265-288	350-350	259-288	300-300
									20	53 5	3	11	—	—	285	350	—	—
									15	46 0	3	11	60- 73 2	166-184	271-288	350-350	—	—
									15	46 0	3	11	90-109 8	249-276	271-271	350-350	208-230	225-250
									15	46 0	3	11	135-164 7	374-414	271-288	350-350	259-288	300-300
									20	53 5	—	—	60- 73 2	166-184	283-305	350-350	—	—
									20	53 5	—	—	90-109 8	249-276	263-263	300-300	208-230	225-250
									20	53 5	—	—	135-164 7	374-414	283-305	350-350	259-288	300-300
									20	53 5	3	11	60- 73 2	166-184	285-305	350-350	—	—
									20	53 5	3	11	90-109 8	249-276	285-305	350-350	208-230	225-250
									20	53 5	3	11	135-164 7	374-414	285-305	350-350	259-288	300-300
50DF044 460/3/60	414	508	37 0	173	37 0	173	3	3 3 (ea)	15	21 0	—	—	—	—	115	150	—	—
									15	21 0	3	4 8	—	—	124	150	—	—
									20	27 0	—	—	—	—	121	150	—	—
									15	21 0	—	—	73 2	92	142	175	—	—
									15	21 0	—	—	109 8	138	199	200	—	—
									15	21 0	—	—	164 7	207	142	175	144	150
									20	27 0	3	4 8	—	—	130	150	—	—
									15	21 0	3	4 8	73 2	92	142	175	—	—
									15	21 0	3	4 8	109 8	138	199	200	—	—
									15	21 0	3	4 8	164 7	207	142	175	144	150
									20	27 0	—	—	73 2	92	149	200	—	—
									20	27 0	—	—	109 8	138	207	225	—	—
									20	27 0	—	—	164 7	207	149	200	144	150
									20	27 0	3	4 8	73 2	92	149	200	—	—
									20	27 0	3	4 8	109 8	138	207	225	—	—
									20	27 0	3	4 8	164 7	207	149	200	144	150
50DF044 575/3/60	518	632	30 0	120	30 0	120	3	2 7 (ea)	15	15 4	—	—	—	—	93	110	—	—
									15	15 4	3	3 9	—	—	101	125	—	—
									20	20	—	—	—	—	98	125	—	—
									20	20	3	3 9	—	—	106	125	—	—

LEGEND

COMPR — Compressor
FLA — Full Load Amps
Hp — Nominal Horsepower
Kw — Kilowatts
LRA — Locked Rotor Amps
MCA — Minimum Circuit Ampacity
MOCP — Maximum Overcurrent Protection
RLA — Rated Load Amps
*Fuse only

NOTES:
1 All outdoor fan motors are single-phase motors
2 All heaters are 3-phase assemblies
3 Circuit no 2 is provided as indicated; total unit MCA equals the sum of circuit no 1 MCA plus circuit no 2 MCA

50DF054 and 064

MODEL NOMINAL VOLTS/PH/HZ	VOLTAGE RANGE		COMPR NO 1		COMPR NO 2		OUTDOOR FAN MOTORS		INDOOR FAN MOTOR		EXHAUST FAN MOTOR		HEATERS		POWER SUPPLY* Circuit No. 1		Circuit No. 2	
	Min	Max	RLA	LRA	RLA	LRA	Qty	FLA	Hp	FLA	Hp	FLA	Kw	FLA	MCA	MOCP	MCA	MOCP
									20	60 0	—	—	—	—	312	400	—	—
									20	60 0	3	11	—	—	334	450	—	—
									25	75 0	—	—	—	—	327	400	—	—
									20	60 0	—	—	75- 91 5	208-230	335-363	400-450	—	—
									20	60 0	—	—	120-146 6	332-368	312-312	400-400	260-288	300-300
									20	60 0	—	—	165-201 3	457-506	335-363	400-400	312-345	350-400
									25	75 0	3	11	—	—	349	450	—	—
50DF054	187	254	117	506	78 5	345	4	7 6	20	60 0	3	11	75- 91.5	208-230	335-363	450-450	—	—
208-230/3/60								(ea)	20	60 0	3	11	120-146 6	332-368	334-334	450-450	260-288	300-300
									20	60 0	3	11	165-201 3	457-506	335-363	450-450	312-345	350-400
									25	75 0	—	—	75- 91 5	208-230	354-382	500-500	—	—
									25	75 0	—	—	120-146 6	332-368	327-327	400-400	260-288	300-300
									25	75 0	—	—	165-201 3	457-506	354-382	500-500	312-349	350-400
									25	75 0	3	11	75- 91.5	208-230	354-382	500-500	—	—
									25	75 0	3	11	120-146 6	332-368	349-349	450-450	260-288	300-300
									25	75 0	3	11	165-201 3	457-506	354-382	500-500	312-345	350-400
									20	27 0	—	—	—	—	141	175	—	—
									20	27 0	3	4 8	—	—	151	200	—	—
									25	34 0	—	—	—	—	148	200	—	—
									20	27 0	—	—	91.5	115	178	200	—	—
									20	27 0	—	—	146 6	184	264	250	—	—
									20	27 0	—	—	201 3	253	149	200	202	225
									25	34 0	3	4 8	—	—	158	200	—	—
50DF054	414	508	53 0	253	36 0	173	4	3 3	20	27 0	3	4 8	91 5	115	178	200	—	—
460/3/60								(ea)	20	27 0	3	4 8	146 6	184	264	250	—	—
									20	27 0	3	4 8	201 3	253	151	200	202	225
									25	34 0	—	—	91.5	115	187	250	—	—
									25	34 0	—	—	146.6	184	273	300	—	—
									25	34 0	—	—	201 3	253	158	200	202	225
									25	34 0	3	4 8	91 5	115	187	250	—	—
									25	34.0	3	4 8	146 6	184	273	300	—	—
									25	34.0	3	4.8	201 3	253	158	200	202	225
									20	22 0	—	—	—	—	113	150	—	—
50DF054	518	632	42 5	176	28 6	120	4	2 7	20	22 0	3	3 9	—	—	121	150	—	—
575/3/60								(ea)	25	27 0	—	—	—	—	118	150	—	—
									25	27 0	3	3 9	—	—	126	150	—	—
									25	75 0	—	—	—	—	370	400	—	—
									25	75 0	3	11 0	—	—	392	450	—	—
									30	88 0	—	—	—	—	383	450	—	—
									25	75 0	—	—	75- 91 5	208-230	370-382	500-500	—	—
									25	75 0	—	—	120-146.6	332-368	370-370	400-400	260-288	300-300
50DF064	187	254	119	506	119	506	4	6 6	30	88 0	3	11 0	—	—	405	450	—	—
208-230/3/60								(ea)	25	75 0	3	11 0	75- 91 5	208-230	392-392	500-500	—	—
									25	75 0	3	11 0	120-146 6	332-368	392-392	450-450	260-288	300-300
									30	88 0	—	—	75- 91 5	208-230	383-398	500-500	—	—
									30	88.0	—	—	120-146 6	332-368	383-383	450-450	260-288	300-300
									30	88 0	3	11 0	75- 91 5	208-230	405-405	500-500	—	—
									30	88 0	3	11 0	120-146 6	332-368	405-405	450-450	260-288	300-300
									25	34 0	—	—	—	—	166	200	—	—
									25	34 0	3	4 8	—	—	175	200	—	—
									30	40 0	—	—	—	—	172	200	—	—
									25	34 0	—	—	91 5	115	187	250	—	—
									25	34 0	—	—	146 6	184	273	300	—	—
50DF064	414	508	53	220	53	220	4	3 0	30	40.0	3	4 8	—	—	181	200	—	—
460/3/60								(ea)	25	34 0	3	4 8	91.5	115	187	250	—	—
									25	34 0	3	4 8	146.6	184	273	300	—	—
									30	40 0	—	—	91 5	115	194	250	—	—
									30	40 0	—	—	146 6	184	280	300	—	—
									30	40 0	3	4 8	91.5	115	194	250	—	—
									30	40 0	3	4.8	146 6	184	280	300	—	—

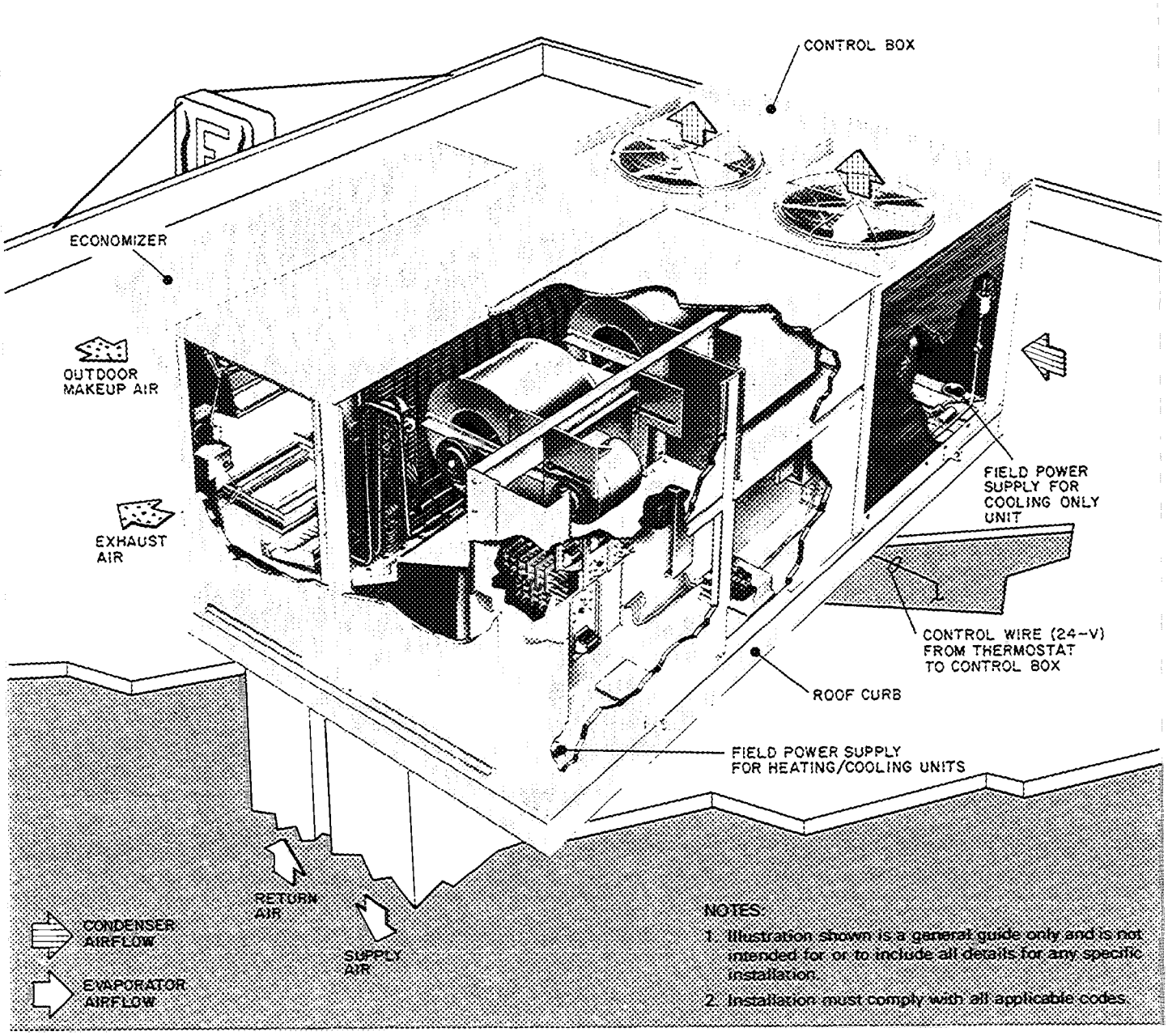
LEGEND

COMPR — Compressor
FLA — Full Load Amps
Hp — Nominal Horsepower
Kw — Kilowatts
LRA — Locked Rotor Amps
MCA — Minimum Circuit Ampacity
MOCP — Maximum Overcurrent Protection
RLA — Rated Load Amps
*Fuse only

NOTES:
1 All outdoor fan motors are single-phase motors
2 All heaters are 3-phase assemblies
3 Circuit no. 2 is provided as indicated; total unit MCA equals the sum of circuit no 1 MCA plus circuit no 2 MCA.

50DF

Typical piping and wiring



Controls

Operating sequence with economizer — (Without energy management Option/Accessory) using thermostat with subbase.

Cooling

System switch set at AUTO. or COOL, indoor air fan runs continually. Thermostat set at desired setting.

When thermostat calls for cooling and outdoor air enthalpy is below setting of enthalpy controller, economizer modulates open. (If outdoor air enthalpy is above enthalpy set point, economizer remains at the minimum position.) Economizer acts as first stage of cooling, providing "free cooling" with outside air. If outside air alone cannot satisfy the cooling requirements of the conditioned space, economizer cooling is integrated with mechanical cooling.

Compressor(s), working simultaneously with economizer, will be staged on to meet cooling load.

As conditioned space temperature approaches thermostat's cooling set point, stages cycle off, last stage first. After all stages of mechanical cooling are off, economizer modulates to minimum position.

During the cooling cycle, a discharge air sensor senses discharge air temperature. If discharge air temperature drops below 62 F, economizer starts to modulate toward the minimum position. At 50 F, economizer will be at the minimum position.

Heating

System switch set at HEAT and AUTO., thermostat set at desired setting. When thermostat calls for heating, one or 2 stages of heat energize to satisfy the heating demand.

As space temperature approaches the heating temperature set point, heating stages cycle off.

During heating, economizer is limited to the minimum position to provide minimum outdoor air for ventilation requirements.

Operating sequence with economizer and energy management Option/Accessory (Using electronic thermostat or transmitter)

Clock in remote control box switches controls to DAY (OCCUPIED) mode. Indoor air fan runs continually while in DAY (OCCUPIED) mode.

If return air temperature is below the adjustable setting of the morning warm-up thermostat, economizer remains closed.

When return air temperature goes above the setting of morning warm-up thermostat, economizer goes to adjustable minimum position.

When thermostat calls for cooling and outdoor air enthalpy is below setting of enthalpy controller, economizer modulates open. (If outdoor air enthalpy is above enthalpy set point, economizer remains at minimum position.) The economizer acts as first stage of cooling, providing "free cooling" with outside air. If outside air alone cannot satisfy cooling requirements of conditioned space, economizer cooling is integrated with mechanical cooling.

Compressor(s), working simultaneously with economizer, will be staged on to meet cooling load.

As conditioned space temperature approaches the thermostat's cooling set point, stages cycle off, last stage first. After all stages of mechanical cooling are off, economizer modulates to minimum position.

During cooling cycle, a discharge air sensor senses discharge air temperature. If discharge air temperature drops below 62 F, economizer starts to modulate toward minimum position. At 50 F, economizer wil be at minimum position.

At end of the DAY (OCCUPIED) mode on the clock, unit controls enter NIGHT (UNOCCUPIED) mode. Economizer closes. Indoor air fan runs only on a call for heating or cooling. The temperature controls go into a HEATING SETBACK, COOLING SETUP or COOLING SHUTDOWN mode.

The HEATING SETBACK is field selectable at the unit for 5, 8, 12 or 15 F below set point on the room thermostat.

The COOLING SETUP is field selectable at unit for 5, 8, or 12 F above the set point on the room thermostat.

During the UNOCCUPIED mode, unit continues to use economizer cooling first and then integrates economizer cooling with mechanical cooling to meet cooling requirements.

A 5-hour manual bypass timer is located in the remote control box to provide for times when air conditioning is needed during normally unoccupied hours.

→ **Two-speed indoor fan option**

The 2-speed indoor fan staging sequence is based upon room demand. As the conditioned space requires cooling, this cooling demand is transmitted from the room thermostat to the logic panel. Up to 4 stages of cooling can be sequenced on to meet the demand from the conditioned space.

As shown in the 2-speed indoor fan staging tables, the high fan speed is used only if and when needed.

When outdoor air enthalpy permits economizer operation, the indoor fan runs at high speed only when necessary to take maximum advantage of outside air to provide cooling. Low speed is used when modulating economizer can handle the cooling load.

When outdoor air enthalpy does not permit economizer operation, the economizer dampers remain at minimum position and the indoor fan motor runs at high speed only when cooling is at its highest demand.

During HEATING mode, the fans operate at low speed for ventilation only, and at high speed at all times during active heating.

→ **TWO-SPEED INDOOR AIR FAN STAGING ECONOMIZER COOLING (Enthalpy Permitting)**

OPERATING CONDITION	FAN SPEED	ECONOMIZER DAMPER POSITION	COMPRESSOR OPERATION
No Call for Cooling (Vent Air)	Low	Min Position	Off
Step 1 (Call for Minimum Cooling)	Low	Modulating Between Min and Full Open	Off
Step 2 (Economizer Cooling)	High	Full Open	Off
Step 3 (Integrated Econ /Mech Cooling)	High	Full Open	Compr 1
Step 4 (Integrated Econ /Mech Cooling)	High	Full Open	Compr 1 and 2

MECHANICAL COOLING (Enthalpy Not Permitting Economizer Cooling)

OPERATING CONDITION	FAN SPEED	ECONOMIZER DAMPER POSITION	COMPRESSOR OPERATION
No Call for Cooling (Ventilation Air)	Low	Min Position	Off
Step 1	Low	Min Position	Off
Step 2	Low	Min Position	Compr 1
Step 3	Low	Min Position	Compr 1 and 2
Step 4	High	Min Position	Compr 1 and 2

Electrical protection devices

Compressor circuit breakers, calibrated for specific applications, are current sensitive and temperature compensated to shut off compressor if current draw is excessive. Must be manually reset.

Inherent compressor thermal protection with automatic reset de-energizes control circuit if extreme motor temperature should occur due to excessive suction gas temperature or motor overloading.

Low-pressure switch automatically shuts off compressor if refrigerant pressure drops below setting for loss-of-charge protection.

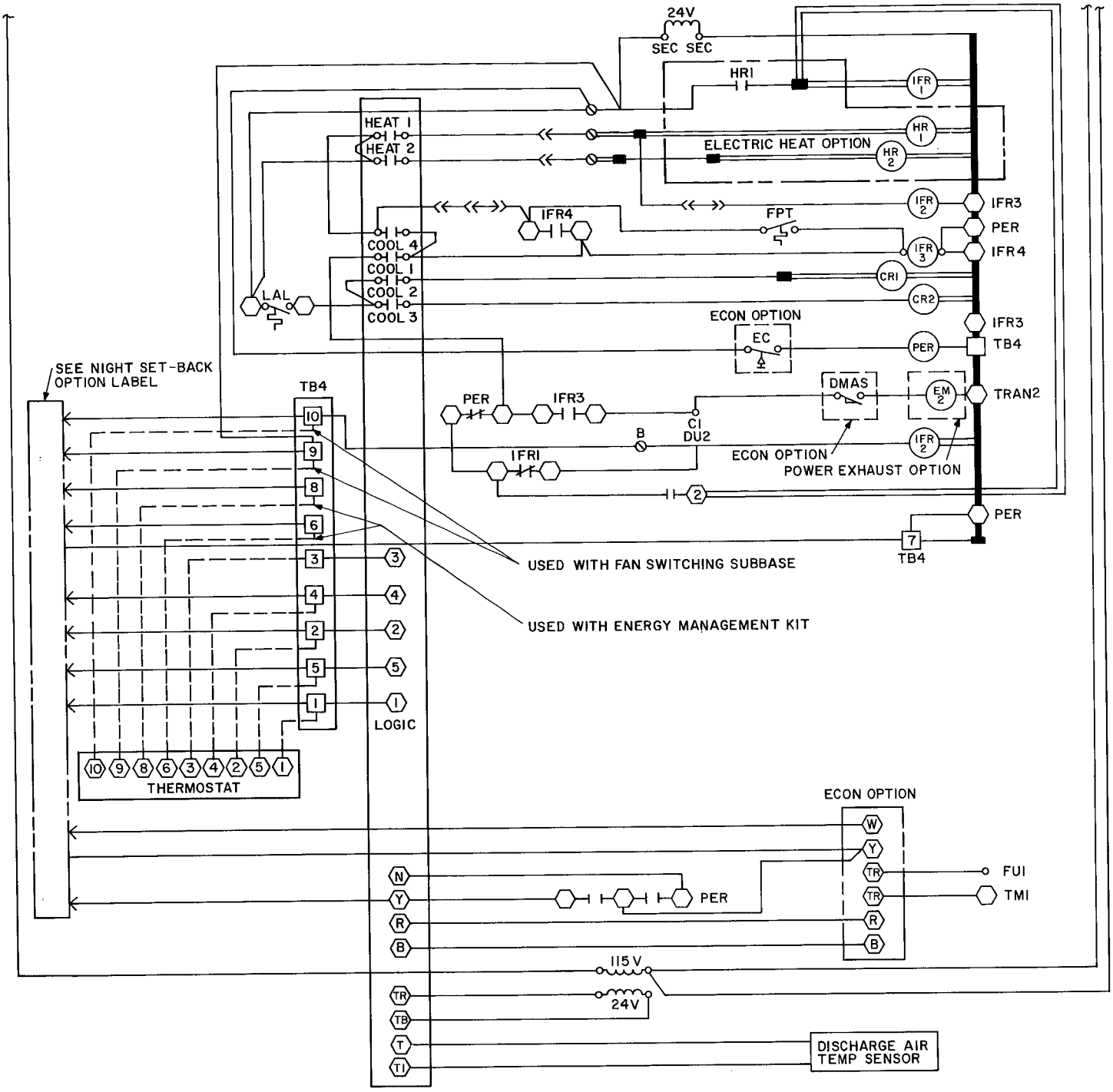
Fusible plugs, located in refrigerant system, protect against excessive pressures or temperatures in case of fire or other abnormal high-temperature condition.

Inherent outdoor fan motor protection with automatic reset — Power circuit opens if motor temperature becomes excessive.

Indoor fan motor circuit breakers — These manually reset circuit breakers protect against fan motor overload.

Limit switches, heat limiters and overcurrent circuit breakers provide thermal and overcurrent protection for electric resistance heaters.

Typical wiring schematic (2-speed option shown)



LEGEND

CCSV — Capacity Control Solenoid Valve
CR — Control Relay
DM — Damper Motor
DMAS — Damper Motor Auxiliary Switch
Econ — Economizer
EMC — Exhaust Motor Contactor
ENTH — Enthalpy Control
FPT — Freezeup Protection Thermostat
Fu — Fuse
Hr — Heater Relay
IFC — Indoor Fan Contactor
IFM — Indoor Fan Motor
IFR — Indoor Fan Relay
IP — Internal Protector
LAL — Low-Ambient Lockout
LPS — Low-Pressure Switch
OFC — Outdoor Fan Contactor
OFM — Outdoor Fan Motor
PER — Power Exhaust Relay
Pl — Plug
Sec — Secondary
TB — Terminal Block
TM — Timer Motor
Tran — Transformer

□ Terminal Block
○ Terminal (Unmarked)
⬡ Terminal (Marked)
▬ Terminal (Circuit Board, Factory Connected)
⊘ Terminal (Circuit Board, Field or Accessory Connected)
——— Factory Wiring
═══ Circuit Board Run
– – – Option Wiring
— — — Field Wiring
• Splice
▬▬ To indicate common potential only; not to represent wire
←— Plug
—≺ Receptacle

Application data

Duct connections — Concentric ducting requires a field-fabricated transition piece external to the unit.

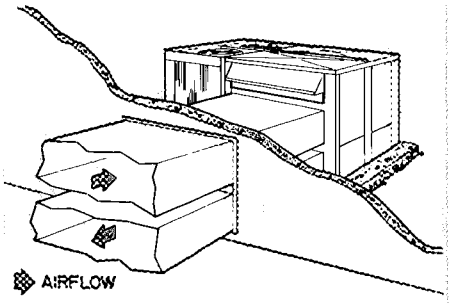
Field conversion to side duct connections is possible on all models except those utilizing power exhaust. Units using economizer with side duct connections require accessory conversion kit.

Head pressure control — The refrigeration systems in all units are inherently designed to operate efficiently at outdoor air temperatures down to 35 F without extra controls or modifications. An outdoor air temperature activated fan cycling thermostat is factory installed in each unit, as required, to accomplish this.

To permit unit to operate at outdoor air temperatures below 35 F, a Motormaster® head pressure control may be field installed. This control varies the outdoor air fan speed to maintain correct condensing temperature at outdoor air temperatures down to -20 F. A Motormaster accessory package is available for each unit and voltage configuration.

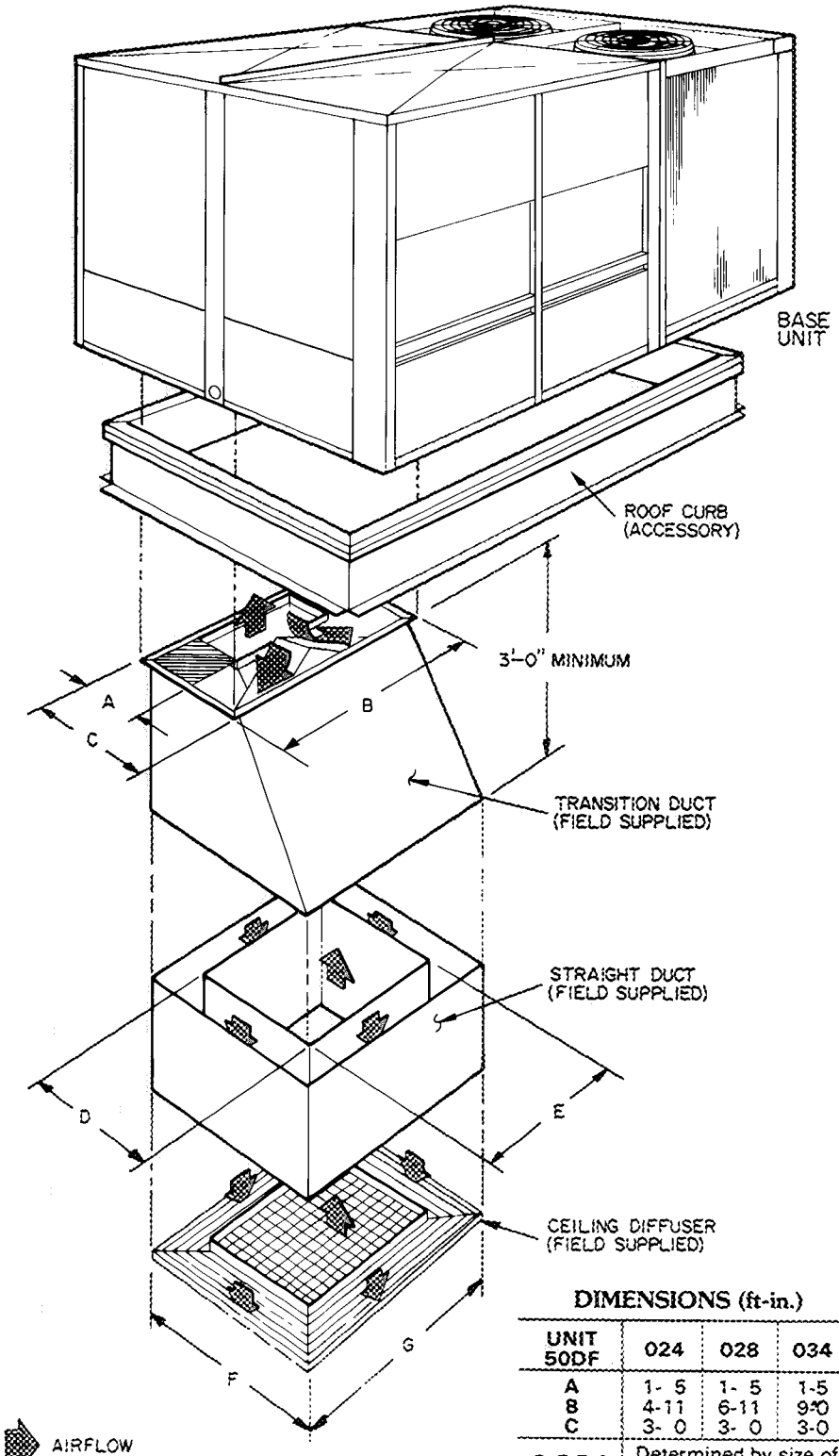
Sound and vibration — Operation of rooftop units on modern, light roof construction may induce sound and vibration problems. On each individual job, unit location, vibration isolation, sound attenuation and local outdoor noise codes may require special consideration. For installation information, refer to ASHRAE Systems Handbook, Chapter 35, Sound and Vibration and Carrier application literature.

THRU-THE-SIDE DUCT CONNECTIONS



NOTE: Thru-the-side connections are not applicable to units with power exhaust option.

CONCENTRIC DUCT CONNECTION



DIMENSIONS (ft-in.)

UNIT 50DF	024	028	034
A	1- 5	1- 5	1-5
B	4-11	6-11	9-0
C	3- 0	3- 0	3-0
D,E,F,G	Determined by size of diffuser selected		

50DF

Guide Specifications

BASE UNIT

Unit shall be of a one-piece air-to-air electric cooling and electric heating unit and shall be mounted on a full perimeter roof curb.

Total cooling capacity of the unit shall be _____ Btuh or greater, and sensible capacity shall be _____ Btuh or greater at conditions of: _____ cfm evaporator air entering unit at _____ wet-bulb, _____ dry-bulb and condenser entering air temperature of _____ dry-bulb.

Heating capacity of the system shall be _____ kw

Unit cabinet shall be constructed of galvanized steel, bonderized and coated with baked enamel.

Compressor system — The unit shall contain serviceable hermetic compressor(s) with service valves, suitable vibration isolators, crankcase heater(s), sight glass(es) and filter drier(s).

Coils shall be aluminum plate fins mechanically bonded to copper tubes. They shall be of an *intertwined design* for equal circuit loading and full active coil on part load operation to assure proper treatment of conditioned air.

115-volt convenience outlet shall be sized to handle a small power load or service light.

Controls shall contain a solid-state logic panel providing: ability to accept parallel inputs from multiple dual set point thermostats, 2-position on/off outputs for staged heating/cooling control. Shall utilize electronic space sensor in conjunction with discharge thermostat for stable operation, and contain adjustable outdoor air thermostat to lock out mechanical cooling when outdoor air is below its setting

Pre-installed tracks shall be provided on non-electrically heated units to accommodate a field-installed hydronic coil.

Fans and motors — The indoor air fans shall be of the forward-curved centrifugal Class I type, belt driven by a _____ hp motor. The outdoor air fan(s) shall be of the propeller type, each directly driven by a _____ hp inherently protected motor.

Electric heaters shall have a total output of _____ Btuh Each heater assembly shall include circuit breakers, automatic resetting limit switches and heat limiters for primary and secondary over-current and thermal protection.

Safety controls — Cooling section shall be protected by fusible plug, low and high pressurestat, compressor motor overloads, and a timing device which will prohibit the compressor motor from being subjected to starting current more than once every 5 minutes.

Unit connections — Heating and cooling power wires in the unit shall be powered by single-point terminal connections. All utility connections shall be routed thru bottom of unit. Alternate openings in sides of unit shall also be provided.

Dimensions — The unit casing shall have width of not more than _____ in., length of not more than _____ in., and height of not more than _____ inches

Options and accessories

Belt-driven centrifugal power exhaust, coupled with the economizer, to exhaust up to 75% return air. (Option or Accessory)

Bag filters with 50% efficiency (NBS Dust Spot Test). Bag filter rack shall accept filter of up to 95% efficiency. (Option)

Indoor fan motor and drive to provide higher fan output when job requirements exceed standard fan capacity. (Option)

→ **Two-speed indoor fan option** shall provide economical indoor fan operation based on conditioned space demands. Economizer (when supplied) and compressor operation shall be integrated with 2-speed fan control to supply optimum cooling performance and energy savings.

Roof curb — Roof curb shall be of same manufacture as unit, shall support unit and provide a watertight enclosure to protect ductwork and utility services. Curb design shall comply with NRCA requirements. (Accessory)

Suction pressure unloader shall provide capacity control for reduced compressor capacity at light loads. (Accessory)

Head pressure control — An outdoor air fan speed control to permit unit to operate down to -20 F shall be provided. (Accessory)

Outdoor air thermostats shall be provided for additional staging of electric heaters. (Accessory)

Modulating outdoor air control package (economizer) shall provide "free cooling" with outside air without compressor operation. The package shall:

- Contain low leak dampers rated at 3% at 3-in. static pressure.
- Contain spring return motor to close dampers during power failure.
- Be capable of integrated (simultaneous) economizer cooling and mechanical cooling.
- Utilize room demand signal, enthalpy changeover and discharge air sensor for damper control. (Option or Accessory)

Energy management shall provide energy-saving settings for unoccupied periods. It shall include these components:

- *Setback/setup module* providing a selectable amount of heating setback or cooling setup or shut down.
- *Morning warmup thermostat* to hold outdoor air dampers closed until return air temperature exceeds the selected set point.

• *Remote control box* containing 6-system status lights and a 7-day clock which shall control the unoccupied to occupied time periods; with a 10-hour spring carryover; contain a 5-hour manual override switch for entering unit in occupied mode during normally unoccupied time periods. (Option or Accessory)

Barometric relief damper — An automatic damper to relieve positive building pressure shall be provided.

Electronic sensing device shall be of a solid-state dual set point type. It shall be one of the following:

• *Electronic thermostat* with integral temperature sensor. Capable of automatic heating to cooling changeover without system switches.

• *Transmitter* with a remote temperature sensor. Capable of automatic heating-to-cooling changeover without system switches.

• *Electronic thermostat* with integral sensor on a subbase. Subbase shall provide manual HEAT-COOL-AUTO.-OFF system switching and AUTO.-ON fan switching.

• *Transmitter* on a subbase with a remote sensor. Subbase shall provide manual HEAT-COOL-AUTO.-OFF system switching and AUTO.-ON-FAN switching.

Each Thermostat or Transmitter shall have these features:

— Separate locking heating and cooling set point adjustment levers concealed under a locking cover.

— An adjustable (3 F — 30 F) "dead-band" between heating and cooling set points

— Two LED's, concealed under locking cover, to provide remote checkout of control system.

— Load reactive time delays to insure stable system performance.

— Capability to utilize 4 remote space sensors for control of average temperature of conditioned space. (Accessory)

Modu-Pac®
the uncomplicated way to air condition your building for today . . . and tomorrow!

Modu-Pac is Carrier's packaged cooling and air distribution system for variable volume, constant temperature applications. The self-contained 50DF rooftop unit, in 5 popular sizes, supplies the cooling. The air is distributed by Carrier's Moduline® or Modubox variable volume terminals, with airflows from 15 thru 400 cfm. Together they form Modu-Pac, the air conditioning system that allows your building to change with the times, whenever interior layouts are updated or modified.

The secret to Modu-Pac's unparalleled flexibility is the Moduline terminals which leave all your design options open. A single thermostat and volume regulator, located in one of the air terminals, can be used to control the variable supply air quantity individually or in a series of air terminals. When interior partitioning changes, you'll see how adaptable this air conditioning system really is. There'll be a minimum of changes needed... terminals, ductwork or thermostats.

Modu-Pac serves any building... schools, offices, libraries, shopping centers... new construction or renovation. Just set the packaged cooling unit on its accessory roof curb, attach the ductwork and install the self-contained Moduline terminals. Get the performance you expect from a built-up system without the extra costs of designing and installing one. Modu-Pac does it all.

And the Moduline terminals are suitable for any type of ceiling... T-bar, concealed spline, metal pan, wet plaster, hardboard. Save on ductwork expenses, too, since the plenum of each terminal is a part of the duct system.

With Modu-Pac, the building starts paying for itself sooner. Added income is possible because the self-balancing Moduline terminals permit quicker individual occupancy. Tenants can move in weeks, even months, ahead of conventional schedules. There's no need to balance the entire system after the building interior is completed.

Whatever your cooling needs, Modu-Pac's unique system approach handles them with ease. Today. Five years from now. Or whenever interior layouts are changed.

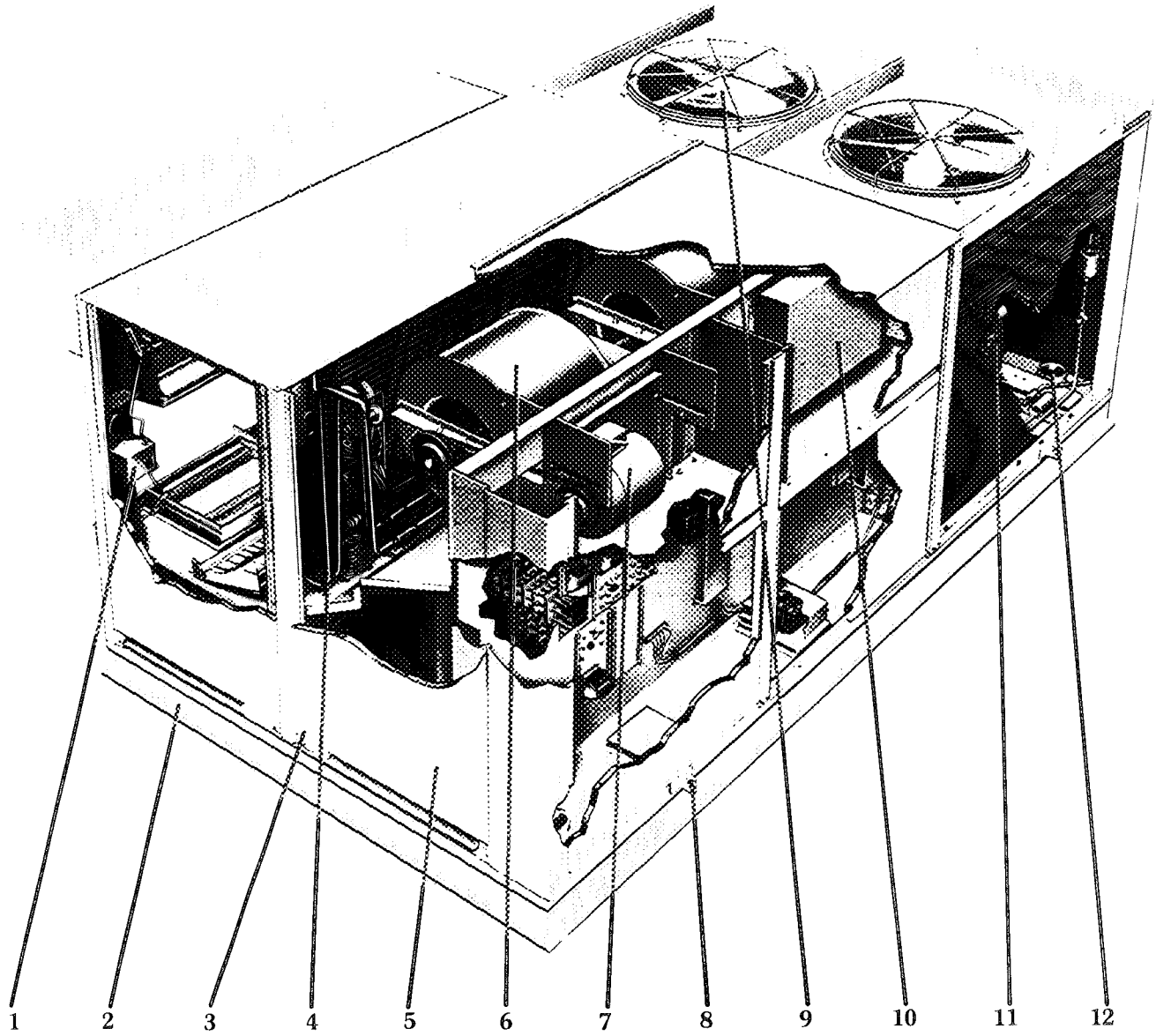
The simplicity of rooftop, packaged air conditioners brings reduced design time and low installation costs to Moduline systems.

With a packaged system, there's no need to put design time into selecting various components of a split system. Just select the appropriately sized rooftop unit. You know the components are compatible... you know they've been thoroughly tested... there's no guesswork. And when you see how smoothly installation goes, you know you made the right move. A trouble-free installation saves money from start to finish.

Jobsite expenses are minimized

The full perimeter roof curb eliminates costly steel support frames and permits a low silhouette which often eliminates the need for expensive parapets. The National Roofing Contractors Association (NRCA) approved curb is installed and made watertight by the roofer... before the unit is installed. All ductwork, utility and condensate connections enter the unit within the curb.

1 — Economizer Damper Control
2 — Accessory Roof Curb
3 — Accessory Static Pressure Control Regulator
4 — Hot Gas Bypass
5 — Weather Armor Cabinet
6 — Belt-Driven Evaporator Fans
7 — Heavy-Duty Fan Motor and Drive
8 — Lifting Lugs
9 — Direct Drive Condenser Fans
10 — Variable Volume Control Box
11 — Compressors with Electric Unloaders
12 — Power and Utility Connections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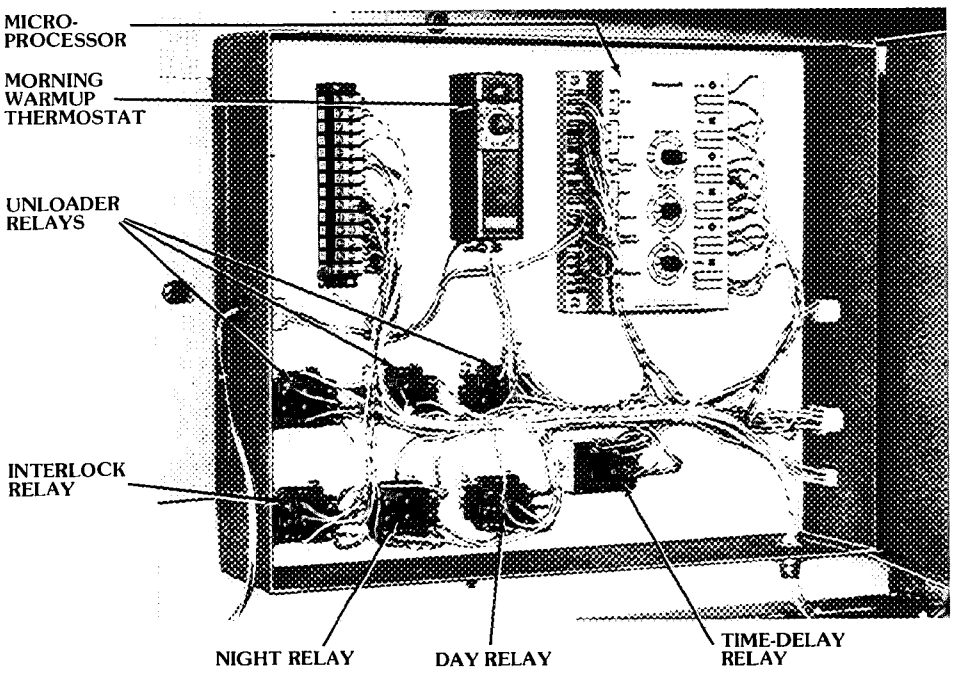
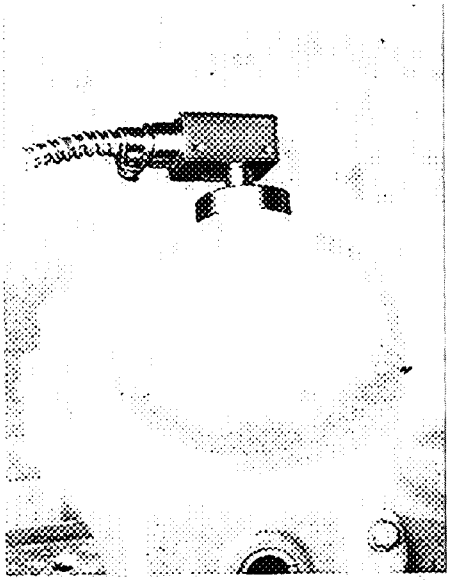

MICRO-PROCESSOR
MORNING WARMUP THERMOSTAT
UNLOADER RELAYS
INTERLOCK RELAY
NIGHT RELAY
DAY RELAY
TIME-DELAY RELAY

11



50DF Modu-Pac®

Reduced operating cost, energy conservation and high capacity performance are built into each unit.

50DF Modu-pac® units contain an advanced solid-state control system which provides maximum operating economy The "brain" of the system is a microprocessor that coordinates economizer operations, sequences cooling stages, and controls system modes

The economizer, standard on 50DF Modu-pac units, provides "free-cooling" on in-between days When outdoor temperatures are low, the economizer uses the cool outside air to provide cooling.

On occasion, the cool outside air may not meet the cooling demand The microprocessor moves into action. It integrates economizer cooling *with* mechanical cooling Cool, outside air is mixed with mechanically cooled air, providing low-cost comfort inside. The integrated system supplies only the amount of mechanical cooling necessary Saves energy, reduces compressor wear and lowers operating costs.

The microprocessor-reset capability prevents costly overcooling of the conditioned space If overcooling occurs, the microprocessor resets the discharge air temperature in relation to the conditioned space temperature A stable, comfortable temperature is maintained.

The microprocessor also features an adjustable control band to tune the control system for specific applications.

At very light loads, when the system experiences minimum airflows, hot gas bypass maintains capacity control, so space conditions stay comfortable.

The Modu-pac® control system includes a remote control box that contains a 7-day programmable clock. The clock saves energy by shutting down the system during unoccupied periods If a field-supplied thermostat and accessory electric heat are used, unit starts up only on a call for heating or cooling. There's no energy or dollars wasted when building is unoccupied

The clock contains a 10-hour spring carryover for continuous operation during power failure. No readjustment is necessary.

Standard features for years of energy savings and convenience

Low-leakage dampers limit infiltration. Rated by the manufacturer at 3% with 3-in. wg pressure differential.

Spring return damper motor automatically closes outdoor air dampers in the event of a power failure.

Enthalpy controller senses total heat content of outside air. Assures optimum use of outside air for cooling.

2-stage morning warmup thermostat saves fuel by keeping outdoor air damper closed until morning warmup is completed. Avoids using energy to warm cold outside air

Status lights on remote control box indicate operating mode

Five-hour manual bypass switch provides unit operation during unoccupied periods. Located at the remote control box, it's a quick and easy way to operate the system temporarily.

Intertwined coil provides cooling of the full air stream with use of minimum compression.

Options and Accessories

Static pressure control and damper assembly regulates duct static pressure at rooftop unit to keep the entire system at design level This assures quiet operation even when maximum static pressure exists in the duct. The static pressure damper assembly installs neatly and easily within the roof curb, and may also be used for side flow connection arrangements All necessary hardware and mounting fixtures are factory supplied A dial adjustment is all that's required to select the desired air pressure setting. (Accessory)

Roof curb supports entire unit and frames roof openings for ductwork, wiring and fast connections It provides a strong, watertight interface between unit and roof Once the curb is set in place, the unit may be rigged at any time No need to schedule around the roofer. The design complies with National Roofing Contractors Association requirements (Accessory)

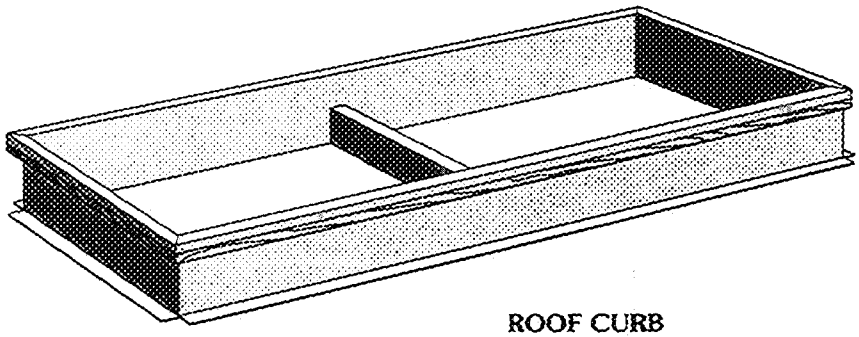
Motormaster® head pressure control modulates the speed of a condenser fan motor to maintain correct condensing temperature at low outdoor air temperatures. Permits subzero temperature operation to -20 F if required. (Accessory)

High-efficiency filter. Bag-type filter has 50% filtering efficiency (NBS Dust Spot Test). Unit bag filter frame also accepts field-supplied bag filters of up to 95% filtering efficiency.

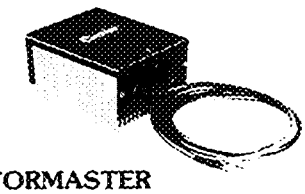
Filtration not only assures supply of clean air to terminals and conditioned space, but also reduces frequency of system and terminal cleaning. (Option)

Higher hp indoor fan motor and drive deliver more fan performance when it's needed Provide increased performance for variable volume applications (Option)

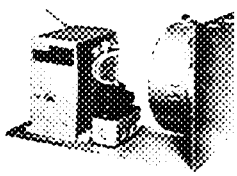
Electric heater provides morning warmup following unoccupied periods Prevents the early morning chill before internal loads buildup.



ROOF CURB



MOTORMASTER HEAD PRESSURE CONTROL



STATIC PRESSURE CONTROL REGULATOR

Physical data

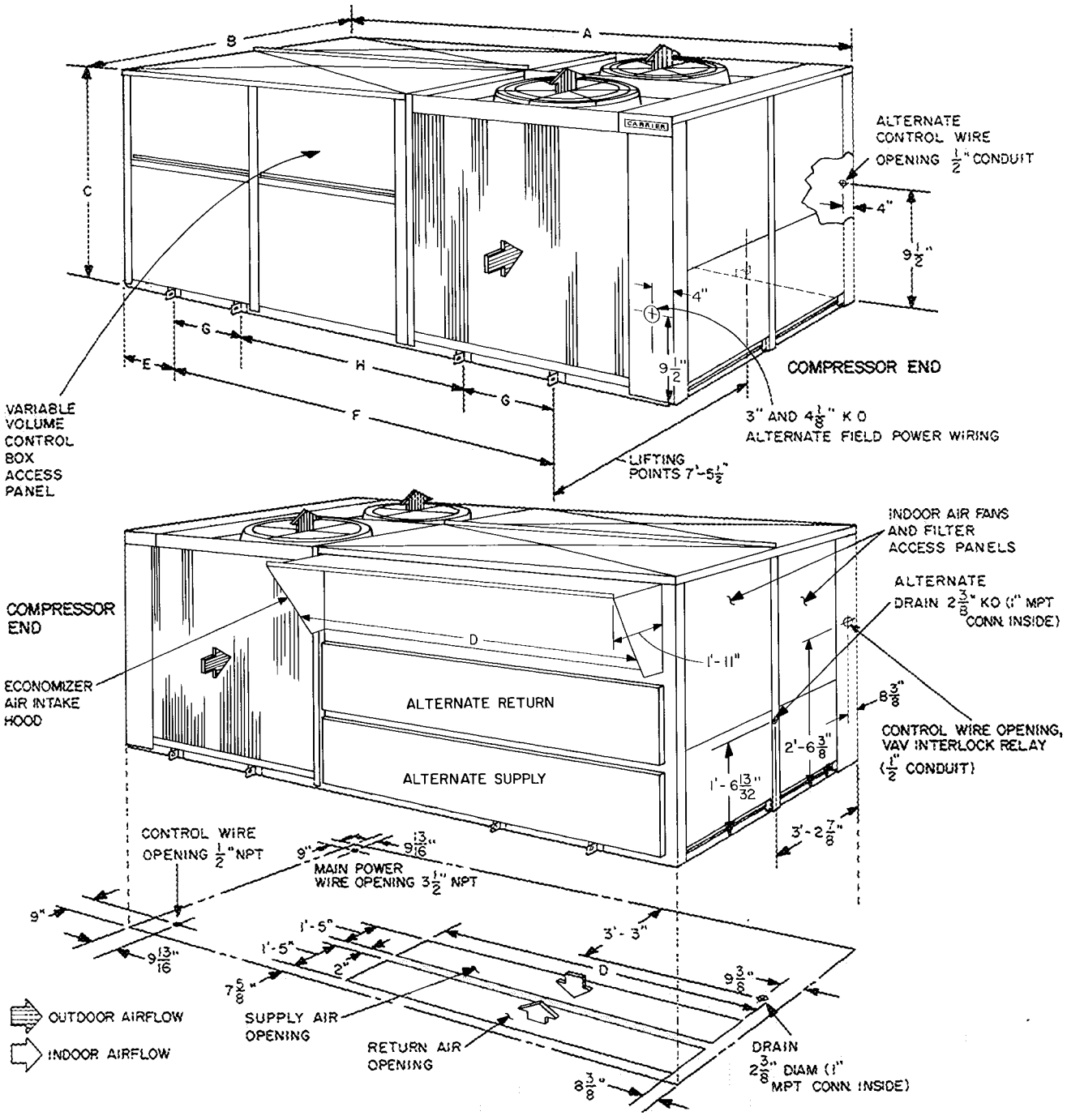
UNIT 50DF	024	028	034	044	054	064
OPERATING WEIGHT (lb)						
Base Unit	3000	3700	4400	5406	6100	6485
Economizer	150	175	200	225	250	250
Roof Curb	125	150	175	200	225	225
COMPRESSOR	Serviceable, Hermetic					
No. ..Type	1 06E	2 06D	2 06D	2 06E	2 06EA275,250	2 06E
No. Cylinders (ea). .Rpm	4 1750	6 1750	6 1750	4 1750	4,6 1750	6 1750
→ Capacity Steps (%) (Std)	50,100	19,38,57, 62,81,100	16,33,50, 63,83,100	25,50,75, 100	20,40,60, 80,100	16,33,50, 67,83,100
REFRIGERANT CHARGE	Type 22; Controlled by Thermostatic Expansion Valve					
Sys 1...Sys 2 (lb)	36 —	23 75 18 25	29 0 29 0	37 0 37 0	53 0 ..42 0	81 .81
OUTDOOR AIR FANS	Direct Driven, Propeller Type					
No. ...Diameter (in.)	2...30	2 30	3 30	3 30	4 30	4 30
Nominal Cfm	14,000	14,000	21,000	21,000	28,000	31,000
Motor Hp...Rpm	1 ..1050	1 1050	1 1050	1 1050	1 1050	1 1150
CONDENSER COIL						
Rows ..Fins/in.	3 13 9	3 13.9	3. .15 8	3 15 8	3 15 8	4 .15
Total Face Area (sq ft)	31 1	38 0	49 0	61 0	81 5	81 25
INDOOR AIR FAN	Belt Drive, Centrifugal Type					
No. ...Size (in.)	2 15x11	2 . 15x15	3 .15x9	4. .15x9	4 15x11	4 15x11
Max Allowable Rpm	1300	1300	1300	1300	1300	1450
Standard Drive* Fan Pulley Bore	1-3/16	1-3/16	1-11/16	1-11/16	1-11/16	1-11/16
Fan Pulley Pitch Diam (in.)	10 6	10 6	10 6	10.6	10 6	8 0
Motor Hp...Rpm	† 1750	7-1/2 . 1750	10 . 1750	15 1750	20 1750	25 1750
Motor Pulley Pitch Diam (in.)						
Pulley A	6 5	6 5	6 5	6 5	6 5	5 6
Pulley B	6 0	5.6	5 6	5.6	6 0	6 0
Resulting Fan Rpm						
With Pulley A	1073	1073	1073	1073	1073	1225
With Pulley B	991	925	925	925	991	1312
Optional Drive*						
Fan Pulley Pitch Diam (in.)	8 0	8 0	8 0	8 0	8 0	6 0
Motor Hp...Rpm	7½ 1750	10. .1750	15 1750	20 .1750	25 1750	30 1750
Motor Pulley Pitch Diam (in.)						
Pulley A	5 3	5 3	5 3	5 3	5 3	5 0
Pulley B	5 6	5 6	5 6	5 6	5 6	‡
→ Resulting Fan Rpm						
With Pulley A	1159	1159	1159	1159	1159	1450
With Pulley B	1225	1225	1225	1225	1225	‡
EXHAUST FAN MOTOR—No...Hp	1 .3	1 3	1 . 3	2 3	2 3	2 3
EVAPORATOR COIL						
Rows...Fins/in.	4 13 9	4 13 9	4 13 9	4 13 9	4 13 9	4 13 9
Total Face Area (sq ft)	15 1	17 7	24 8	30 2	35 4	35 4
ELEC RESISTANCE HEATERS	Open Nichrome Wire Elements with Multiple-Stage Control					
→ Kw	37	55	55	73	91	91
INDOOR AIR FILTERS						
No. ...Size						
Standard; 2-in. Throwaway	6 20x25 6 16x25	18 16x25	9 20x25 12 16x25	27 16x25	9 20x25 21 16x25	9 20x25 21. .16x25
Bag Type; 12-in. (Opt)	3 12x24 3 . 24x24	4 12x24 4 24x24	5 12x24 5 24x24	6 12x24 6 24x24	7 12x24 7. 24x24	

*Standard fan motor supplied with standard fan drive pulleys and belts; optional fan motor supplied with optional fan drive pulleys and belts Other combinations are field supplied Pulley A is installed in unit; pulley B is shipped with unit.

†208/230-volt units use standard 7-1/2 hp motors. 460-volt units use standard 5 hp motor and optional 7-1/2 hp motor

‡The 50DF064 optional drive is supplied with pulley A installed in unit Pulley B is not supplied

Base unit dimensions



DIMENSIONS (ft-in.)

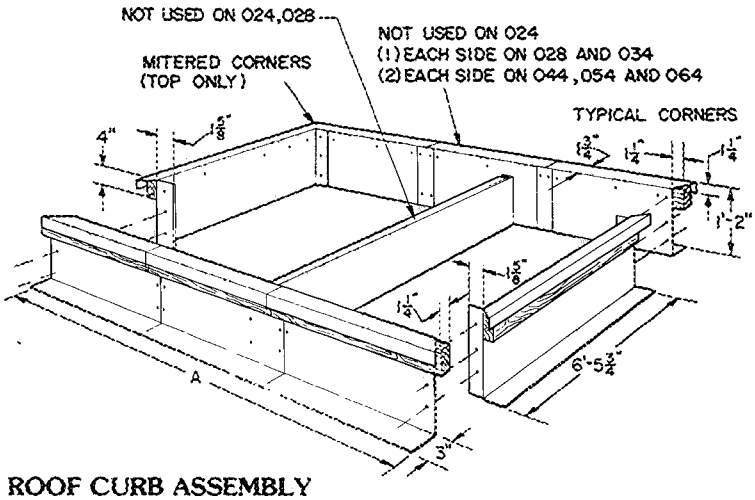
UNIT 50DF	024	028	034	044	054	064
A	10-10	13- 8-1/2	17- 1	20- 6-1/2	24-11-1/2	24-11-1/2
B	7-3-1/8					
C	4-11					
D	4-11	6-11	9- 0	11- 0	13- 0-1/2	13- 0-1/2
E	2- 4	2- 4	2-10	2-10	2-10	2-10
F	6- 1-1/2	9- 0	11- 5	14-10-1/2	19- 3-1/2	19- 3-1/2
G	—	—	—	5- 8-1/2	7- 7-1/2	9- 4-1/2
H	—	—	—	4- 7	5-10	5-10

NOTES:
1. Allow 12 ft above unit, 8 ft on filter access panel end and 4 ft on remaining sides of unit for airflow and service clearance.
2. For smaller clearances, contact Carrier.
3. Refer to Roof Curb Dimensions for details of roof openings.

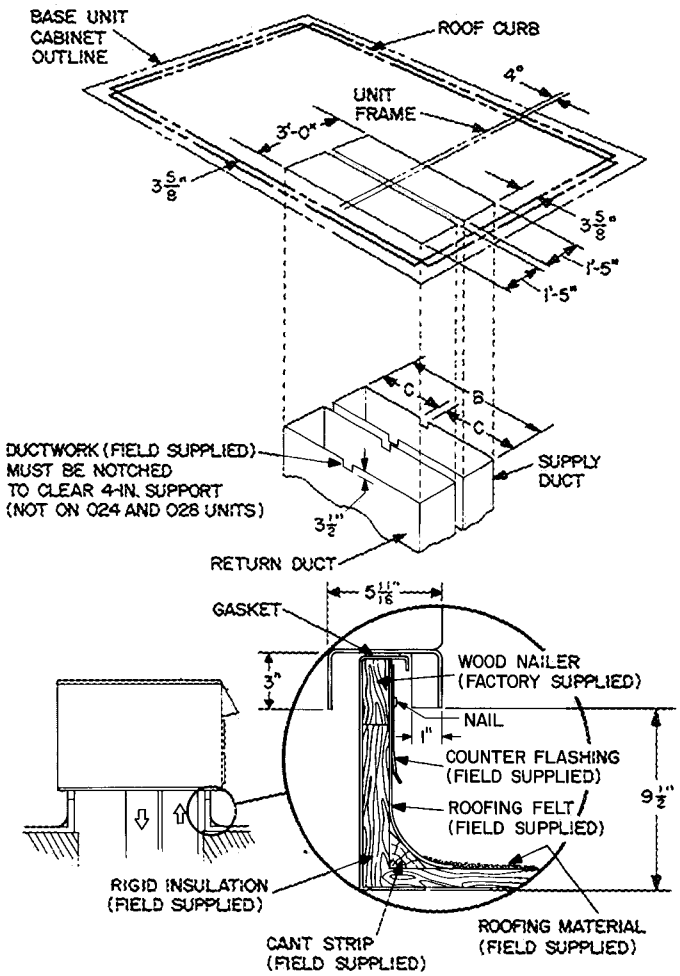
Certified dimension drawings available on request.

Accessory dimensions

ROOF CURB



ROOF CURB ASSEMBLY

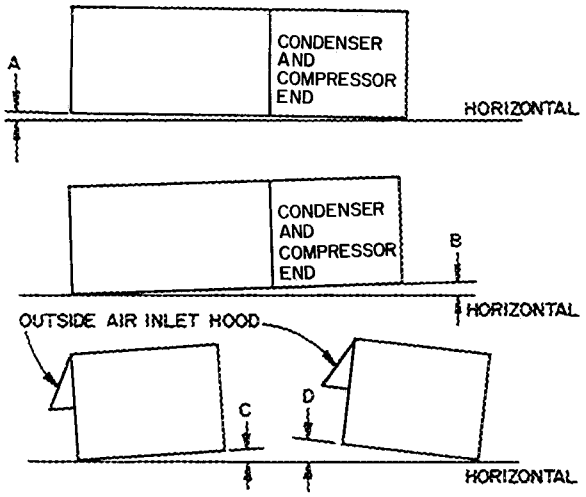


DIMENSIONS (ft-in.)

UNIT 50DF	024	028	034	044	054&064
A	10-0-1/4	12-10-3/4	16-3-1/8	19-8-1/4	24-1-3/4
B	4-11	6-11	9-0	11-0	13-0
C	—	—	4-4	5-4	6-4

Certified dimension drawings available on request.

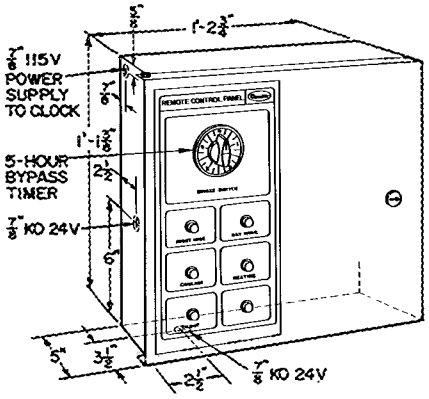
UNIT LEVELING TOLERANCES



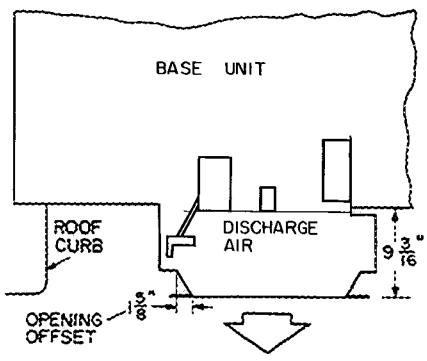
UNIT MODEL 50DF	DIMENSIONS (degrees and inches)							
	A		B		C		D	
	deg	in.*	deg	in.*	deg	in.*	deg	in.*
024	0.75	1-9/16	1.00	2-5/16	0.50	11/16	1.00	1-3/8
028	0.60	1-5/8	0.87	2-3/8	0.50	11/16	1.00	1-3/8
034	0.50	1-11/16	0.75	2-1/2	0.50	11/16	1.00	1-3/8
044	0.40	1-11/16	0.62	2-9/16	0.50	11/16	1.00	1-3/8
054&064	0.40	2	0.50	2-9/16	0.50	11/16	1.00	1-3/8

*From edge of unit to horizontal.

REMOTE CONTROL PANEL (CONTROL BOX)



STATIC PRESSURE REGULATOR



NOTE: Duct connection outlet dimensions are same as unit outlet openings.

Selection procedure (with example)

I Determine space requirements and design conditions.

Given:

Outdoor Air Temperature (T_{oa}) ..... 95 F db, 75 F wb
Room Design Conditions (T_{room}) ..... 75 F db/45% rh
Room Sensible Heat (RSH) ..... 265,000 Btuh
Room Latent Heat (RLH) ..... 60,000 Btuh
Space Area (A) ..... 11,000 sq ft
Ventilation Requirement (V) ..... 0.18 cfm/sq ft

Moduline® variable volume systems generally supply smaller quantities of air at lower temperatures than conventional constant volume systems. The lower temperature and moisture content (grains/lb of air) typically results in lower space relative humidity This example is based on 45% rh rather than the conventional 50%

Room sensible heat and room latent heat are block load maximum quantities

II Calculate block load grand total heat (GTH).

Total Ventilation Air (outdoor air) Cfm_{oa}
$Cfm_{oa} = A \times V$
$= 11{,}000 \times 0.18$
$= 1980$ cfm

Ventilation Total Heat (VTH)
Use psychrometric chart to determine this ventilation cooling load
$VTH = 4.5 \times Cfm_{oa} \times (Btuh_{oa} - Btuh_{room})$
$= 4\,5 \times 1980 \times (38\,6 - 27\,2)$
$= 101{,}500$ Btuh

Ventilation Sensible Heat (VSH)
$VSH = 109 \times Cfm_{oa} \times (T_{oa}db - T_{room}db)$
$= 1.09 \times 1980 \times (95 - 75)$
$= 43{,}200$ Btuh

Ventilation Latent Heat (VLH)
$VLH = VTH - VSH$
$= 101{,}500 - 43{,}200$
$= 58{,}300$ Btuh

Total Sensible Heat (TSH)
$TSH = RSH + VSH$
$= 265{,}000 + 43{,}200$
$= 308{,}200$ Btuh

Total Latent Heat (TLH)
$TLH = RLH + VLH$
$= 60{,}000 + 58{,}300$
$= 118{,}300$ Btuh

Grand Total Heat (GTH)
$GTH = TSH + TLH$
$= 308{,}200 + 118{,}300$
$= 426{,}500$ Btuh

III Determine block load air quantity (BL cfm).

If supply air temperature leaving the unit is maintained at 50 F, and 2 F is allowed for duct heat gain and safety factor, the sensible heat cooling capacity per cfm of supply air for a 75 F room design is

$1.08 \times (75 - 52) = 25$ Btu/cfm

The following formula may be used to determine the maximum block load air quantity:

$$BL\ cfm = \frac{RSH}{25}$$

$$= \frac{265{,}000}{25}$$

$= 10{,}600$ cfm

IV Determine outdoor air ventilation rate (OAVR)

$$OAVR = \frac{100\% \times cfm_{oa}}{BL\ cfm}$$

$$= \frac{100 \times 1980}{10{,}600}$$

$= 19\%$ outdoor air

This value will be used to set the outdoor air damper ventilation position (manual damper or economizer).

V Determine conditions of mixed air entering the evaporator.

Use a psychrometric chart or calculate to determine mixed air temperatures ($T_{ma}db$ and $T_{ma}wb$)

$T_{ma}db = 19 \times T_{oa} + .81 \times T_{room}db$
$= 79$ F db

$Btuh_{ma} = .19 \times Btuh_{oa} + .81 \times Btuh_{room}$
$= 19 \times 38.6 + 81 \times 27.2$
$= 29\,4$ Btuh

Therefore, Ewb = 64 2 F

VI Make unit trial selection.

The grand total heat expressed in tons is

$$GTH = \frac{426{,}500\ Btuh}{12{,}000\ Btu/ton}$$

$= 35\,6$ tons

Unit 50DF044 (nominal 40 tons) will be the trial selection Enter Cooling Capacities table for unit 50DF044 at 10,600 cfm and 95° By interpolation for 64.2 F ewb, calculate that

TC = 433,100 Btuh
SHC = 350,200 Btuh

Correct the sensible heat capacity for entering dry bulb of 79 F

Corr Factor = 1 09 (1 - BF) (edb - 80)
= 1 09 (1 - 037) (79 - 80)
= 1 09 (963) (-1) = -1.05

Heat Correction = Corr Factor x BL cfm
= -1 05 x 10,600
= -11,130 Btuh

Corrected SHC = 350,200 - 11,130
= 339,000 Btuh

$$TLDB = Evap\ Air\ db - \frac{SHC}{1.09\ BL\ cfm}$$

$$= 79 - \frac{339{,}000}{1.09 \times 10{,}600}$$

$= 49.7$ F

At design conditions, this unit will provide:

TC — 433,100 Btuh vs 426,500 Btuh required
SHC — 339,000 Btuh vs 308,200 Btuh required
Latent cooling — 93,900 Btuh vs 118,300 Btuh required

Unit 50DF044 is considered adequate for this example

VII Select indoor air fan speed and motor bhp. Enter Fan Performance table for unit 50DF044. At 10,600 cfm and system static pressure of 2.0 in. wg read by interpolation that the standard motor is suitable. Read the fan speed required (1133 rpm). Enter Indoor Air Fan Drive Data table. Select the next higher speed pulley/belt combination (i.e 1159 rpm; 5.3V - 5.3 motor pulley; 5 - 3V - 8.0 fan pulley; 5 - 3V - 710 belts).

VIII Select a unit that matches job electrical characteristics.

Enter Electrical Data table at unit 50DF044. Read electrical characteristics of unit to determine power supply requirements for unit of correct nominal voltage

Performance data

COOLING CAPACITIES

50DF024 — VAV

Temp (F) Air Ent Cond		Evap Air — Cfm/BF: 4000/.023			5000/.033			6000/.042			8000/.061		
		Evap Air — Ewb (F): 72	67	62	72	67	62	72	67	62	72	67	62
85	TC	241	219	197	255	233	211	266	243	220	278	255	233
	SHC	114	135	157	124	151	177	132	165	197	147	191	231
	KW	20 5	19 5	18 6	21 3	19 9	19 1	21 3	20 1	19 0	22 0	20 8	19 6
	TLDB	53.9	49.0	44 0	57.2	52 3	47 5	59 8	54 8	49 9	63.1	58.1	53 5
95	TC	229	207	185	241	220	198	250	228	206	263	239	218
	SHC	109	130	151	119	146	171	127	159	191	142	184	218
	KW	21 8	20 8	19 7	22 5	21 4	20.2	22 6	21 6	20 1	23 4	22 0	20 8
	TLDB	55.0	50.2	45 4	58 2	53.2	48.6	60 6	55 7	50 8	63.7	58 9	55.0
100	TC	223	202	183	234	214	193	243	221	201	255	232	212
	SHC	107	128	149	117	144	169	124	157	187	139	182	212
	KW	22 8	21 0	20 1	22 9	22.0	20 6	23 2	22 2	20 7	24 0	22 8	21 4
	TLDB	55.5	50 6	45 8	58.5	53.6	49 0	61 0	56 0	51 4	64 1	59.1	55.7
105	TC	216	197	177	227	208	188	236	214	195	247	225	206
	SHC	104	126	147	114	141	168	122	154	186	137	179	206
	KW	23 2	21 9	20 2	24 3	22.5	21 4	23 9	22 6	21 4	24 6	23 4	22 1
	TLDB	56.1	51 1	46.3	59 1	54.1	49 2	61 3	56 5	51 6	64.3	59.5	56.4
110	TC	210	190	172	220	201	182	227	207	188	238	216	198
	SHC	102	123	144	111	138	165	119	151	183	135	176	198
	KW	23 9	22 9	21 6	24.7	23.5	22 0	24 8	23 2	22 0	25 3	24 1	22.5
	TLDB	56 6	51 8	47 0	59.6	54 7	49 7	61 8	56 9	52 0	64 5	59.8	57.3
115	TC	203	184	167	213	194	175	218	200	182	228	209	181
	SHC	100	120	141	108	135	162	117	149	181	133	175	181
	KW	25 5	23 4	22 0	26 1	24.1	22 6	27 0	25 2	23 1	27 4	26 0	23.6
	TLDB	57 1	52 5	47 7	60 2	55.2	50 3	62 1	57 2	52 3	64 7	59 9	59.2

50DF028 — VAV

Temp (F) Air Ent Cond		Evap Air — Cfm/BF: 5000/ 028			7000/.044			9000/.058			10,000/.066		
		Evap Air — Ewb (F): 72	67	62	72	67	62	72	67	62	72	67	62
85	TC	307	283	260	330	305	281	345	318	294	351	322	298
	SHC	144	174	203	161	200	239	178	229	278	185	242	296
	KW	27 2	26 0	23 7	28.6	27 2	24 7	29 5	27 8	26 2	30 0	28.2	26.4
	TLDB	53.6	48.1	42 8	58.9	53.8	48 7	61 9	56 7	51 7	63.0	57.8	52.8
95	TC	294	269	248	316	290	266	330	303	278	335	308	283
	SHC	139	168	196	156	194	233	174	223	272	181	236	283
	KW	28 3	27 5	26 3	30 2	28 5	27 1	31 2	29 3	27 7	31 4	29 5	28 2
	TLDB	54 5	49 2	44 0	59 6	54.6	49 5	62 3	57 3	52 3	63 4	58.3	54.0
100	TC	286	262	240	307	283	259	320	295	271	325	299	275
	SHC	136	165	193	154	191	231	171	220	268	178	233	275
	KW	30 0	28 3	26 7	31 2	29 7	27 9	32 7	30 4	29 0	33 1	30 8	29 2
	TLDB	55 0	49 7	44 6	59 8	55 0	49 7	62 6	57 6	52 7	63.7	58.6	54.8
105	TC	279	255	233	298	274	251	310	286	263	315	290	267
	SHC	133	162	190	150	188	226	168	216	263	176	229	267
	KW	31 0	29 2	27 5	32 8	30 4	29 0	34 0	31 7	29 9	34 4	32 1	30 2
	TLDB	55.6	50.3	45 1	60 3	55 4	50.4	62 9	58 0	53 2	63.9	59 0	55.5
110	TC	271	248	227	289	266	244	300	277	255	305	281	259
	SHC	130	159	187	147	186	223	165	213	255	171	226	259
	KW	32 3	30 2	28 6	34 0	32 2	29 8	35 3	33 1	31 0	35 5	33 4	31 2
	TLDB	56 1	50 8	45 7	60 7	55 6	50 8	63 2	58 3	54 0	64 3	59 3	56.2
115	TC	266	241	220	280	258	237	290	268	247	294	272	250
	SHC	128	156	184	144	182	221	161	210	247	172	225	250
	KW	34 0	31 5	29 1	35 6	33 0	30 8	—	—	31 9	—	—	32 0
	TLDB	56 5	51 4	46 2	61 1	56.1	51 0	63 6	58 6	54 8	64 2	59 4	57 1

50DF034 — VAV

Temp (F) Air Ent Cond		Evap Air — Cfm/BF: 6000/ 034			8000/.053			10,000/ 068			12,000/.082		
		Evap Air — Ewb (F): 72	67	62	72	67	62	72	67	62	72	67	67
85	TC	374	341	313	398	365	336	412	380	349	424	391	360
	SHC	172	211	244	192	238	284	214	266	321	226	292	356
	KW	29 7	29 0	27 8	30 9	30 1	29 3	32 0	30 7	29 3	33.2	31.5	29 7
	TLDB	53 7	47 7	42 7	58 0	52 7	47 4	60 4	55 6	50 6	62 7	57 7	52.8
95	TC	356	324	299	377	347	318	392	360	332	401	370	342
	SHC	166	204	238	185	232	276	203	258	315	218	283	342
	KW	33 2	31 1	29 7	34 4	32 4	30 9	34 7	33 4	31 5	35.9	33 8	31 8
	TLDB	54 6	48 8	43 6	58 8	53 4	48 3	61 4	56 3	51 1	63.3	58.4	53.9
100	TC	349	317	292	369	340	311	383	352	323	392	361	334
	SHC	163	201	235	182	228	273	200	255	311	214	280	334
	KW	34 4	32 4	30 7	35 7	34 0	32 0	35 9	34 6	32 6	37 1	35 0	33.2
	TLDB	55 1	49 3	44 1	59 1	53 9	48.7	61 7	56 6	51 5	63 6	58.6	54.5
105	TC	341	311	285	360	332	304	373	344	316	384	353	325
	SHC	160	197	232	179	227	269	197	252	308	211	278	325
	KW	35 6	33 6	32 1	36 6	34.8	33.4	37 4	35 8	34 2	38.1	36.2	34.6
	TLDB	55 5	49 9	44 5	59.5	54.0	49 2	61 9	56 9	51 7	63 9	58 7	55.2
110	TC	333	303	277	352	323	297	354	326	299	363	335	308
	SHC	158	194	228	177	222	266	191	245	299	206	271	308
	KW	36 6	34 8	32 9	37 9	35.8	34 0	39 3	37 8	36.0	39 9	38 3	36.6
	TLDB	55 8	50 3	45 1	59.7	54 5	49 5	62 5	57 5	52 6	64 3	59 3	56.5
115	TC	324	296	270	343	315	288	355	326	299	363	335	308
	SHC	155	191	224	173	218	263	181	246	299	206	271	308
	KW	37 8	35 6	33 6	38 8	37.2	35.2	39 6	38 3	36 2	40 1	38 8	37 0
	TLDB	56 3	50 8	45 7	60 2	55.0	49 8	63 4	57 4	52 6	64 3	59 3	56.5

BF — Bypass Factor
Edb — Entering Dry-Bulb
Ewb — Entering Wet-Bulb
KW — Compressor Motor Power Input
SHC — Sensible Heat Capacity (1000 Btuh)
TC — Total Capacity (1000 Btuh) Gross
TLDB — Temperature Leaving Dry-Bulb

NOTES:

1 Direct interpolation is permissible Do not extrapolate

2 The following formulas may be used:

$$t_{ldb} = t_{edb} - \frac{\text{sensible capacity (Btuh)}}{1\ 09 \times \text{cfm}}$$

t_{lwb} = Wet-bulb temperature corresponding to enthalpy of air leaving evaporator coil (h_{lwb})

$$h_{lwb} = h_{ewb} - \frac{\text{total capacity (Btuh)}}{4\ 5 \times \text{cfm}}$$

Where:

h_{ewb} = Enthalpy of air entering evaporator coil

3 SHC is based on 80 F edb temperature of air entering evaporator coil
Below 80 F edb, subtract (corr factor x cfm) from SHC
Above 80 F edb, add (corr factor x cfm) to SHC.

BF	ENTERING AIR DRY-BULB TEMP (F): 79 / 81	78 / 82	77 / 83	76 / 84	75 / 85	under 75 / over 85
	Correction Factor					
.01	1 07	2 16	3 24	4 32	5 40	use formula shown below
.05	1 04	2 07	3 11	4 14	5 18	
.10	98	1 96	2 94	3 92	4 91	

Interpolation is permissible
Correction Factor = 1 09 x (1 – BF) x (edb – 80)

→ 4. Cooling capacities are gross and do not include deduction for indoor fan motor heat

Performance data (cont)

COOLING CAPACITIES

→ 50DF044 — VAV

Temp (F) Air Ent Cond		Evap Air — Cfm/BF: 8000/.016			10,000/.034			14,000/.051			16,000/.062		
		Evap Air — Ewb (F): 72	67	62	72	67	62	72	67	62	72	67	62
85	TC	484	445	407	518	479	439	538	499	457	549	507	468
	SHC	231	276	320	257	318	380	281	357	436	295	383	468
	KW	40.8	38 7	34 8	43.5	40.8	38.3	43 7	41 8	39.5	45.1	42.5	39.8
	TLDB	53.5	48.3	43.3	56.4	50.8	45.1	61.6	56.6	51.4	63.1	58.0	53.2
95	TC	454	415	380	487	447	408	506	465	427	516	475	436
	SHC	217	263	306	245	306	366	269	345	419	285	369	436
	KW	43 7	41.4	38.3	46.0	43.3	40.4	46 8	43.7	41.0	47.1	44.5	41.8
	TLDB	55.1	49.8	44.9	57.5	51.9	46.4	62.4	57.4	52.5	63.7	58.8	55.0
100	TC	440	403	368	471	431	394	491	450	411	499	460	420
	SHC	212	256	301	239	299	360	263	339	411	280	364	420
	KW	46 4	42 2	39 9	47.5	45.1	42.0	47 9	45 0	42.5	48.3	45.6	43.1
	TLDB	55.7	50.6	45.5	58.1	52.6	47.0	62 8	57.8	53.1	63.9	59.1	55.9
105	TC	427	389	352	456	417	380	475	436	397	483	444	405
	SHC	206	251	295	233	293	354	258	333	397	275	358	405
	KW	47 5	44.6	41 8	48.9	46.2	43.1	49 2	46.6	43 6	49.8	47.1	44.3
	TLDB	56 4	51 2	46 2	58.6	53.1	47.5	63 1	58.2	54 0	64.2	59.5	56.8
110	TC	413	376	344	440	402	366	458	419	380	465	427	388
	SHC	200	243	290	228	287	347	252	326	380	269	353	388
	KW	48 5	46.0	42 9	50.2	48.3	44.6	50 8	47.9	45 2	51.3	48.5	46.0
	TLDB	57.1	52.1	46.7	59.1	53.7	48.2	63 5	58.6	55 1	64.6	59.8	57.8
115	TC	400	364	332	426	388	354	442	396	366	448	410	371
	SHC	195	239	282	223	283	341	246	314	366	263	346	371
	KW	49 8	47.1	44 1	—	49.8	46.0	52 5	51.0	48 5	—	—	—
	TLDB	57 6	52.6	47 7	59.5	54.0	48.7	63 9	59.4	56 0	64.9	60.2	58.7

→ 50DF054 — VAV

Temp (F) Air Ent Cond		Evap Air — Cfm/BF: 10,000/.027			14,000/.043			18,000/.058			20,000/.065		
		Evap Air — Ewb (F): 72	67	62	72	67	62	72	67	62	72	67	62
85	TC	619	575	533	659	616	593	686	639	596	696	648	604
	SHC	291	353	415	326	408	491	361	462	565	376	485	600
	KW	51 7	48 9	45 9	54.8	52.0	47.9	56 3	53 2	50.4	57.6	54.2	50.7
	TLDB	53.3	47 6	41 9	58.6	53.3	47.8	61 6	56.5	51 2	62.8	57.8	52.5
95	TC	58.5	541	499	624	579	536	650	602	558	659	610	566
	SHC	278	338	398	313	394	474	347	446	546	363	472	566
	KW	56 0	52 1	49 3	59.0	55.4	51.6	61 1	57.6	53 8	61.5	57.8	53.7
	TLDB	54.5	49.0	43 5	59.5	54.2	48.9	62 3	57 3	52 2	63.3	58.3	54.0
100	TC	566	524	481	605	555	517	629	581	538	637	589	545
	SHC	271	331	389	307	385	467	340	438	538	354	465	545
	KW	57 8	54 5	51 1	60.7	57.6	54.2	63 1	59.0	562	63.7	59.8	56.6
	TLDB	55.1	49.6	44 3	59.9	54.8	49.4	62 7	57.7	52 6	63.8	58.7	55.0
105	TC	548	505	463	586	540	498	608	563	518	616	570	525
	SHC	264	322	380	301	380	458	333	432	518	348	457	525
	KW	60 2	56 6	53 1	63.4	59.6	56.0	51 0	61 4	58 1	—	61.6	58.4
	TLDB	55.8	50.5	45.1	60.3	55.1	50.0	63 0	58 0	53 6	64.0	59.0	55.9
110	TC	529	485	446	566	519	476	589	540	496	597	546	502
	SHC	256	314	371	294	372	448	325	423	496	344	448	502
	KW	62 6	59 0	55 0	—	61.8	58.5	—	63 8	60 3	—	64.2	60.5
	TLDB	56.5	51.2	46.0	60.7	55.6	50.6	63 4	58 4	54 7	64.2	59.4	57.0
115	TC	510	465	424	546	500	456	570	520	476	577	527	482
	SHC	249	306	360	287	363	439	320	414	476	336	442	482
	KW	—	61 6	57 7	—	—	—	—	—	—	—	—	—
	TLDB	57 2	51 9	47 0	61.2	56.2	51.2	63.7	58 9	55 7	64.6	59.7	57 9

→ 50DF064 — VAV

Temp Air Ent Cond		Evap Air — Cfm/BF: 12,000/.035			15,000/.047			18,000/.058			21,000/.070			24,000/.081		
		Evap Air — Ewb (F): 72	67	62	72	67	62	72	67	62	72	67	62	72	67	62
85	TC	713	650	592	750	686	625	776	711	649	796	731	669	807	744	684
	SHC	341	407	471	368	448	526	391	486	576	413	521	620	432	553	658
	KW	57 9	54 9	52 1	59.7	56.7	53.7	60 9	57 9	54 9	61.9	58.8	55.9	62 4	59 4	56 6
	TLDB	53.6	48.5	43.7	57.3	52.4	47.5	59 9	55 0	50 4	61.8	57.0	52.7	63 3	58 7	54.6
95	TC	679	619	562	713	651	593	732	674	615	751	693	634	766	703	649
	SHC	327	393	456	353	433	510	375	470	558	397	505	600	418	536	635
	KW	62 0	58 8	55 7	63.9	60.6	57.4	65 0	61 8	58 6	66.0	62.8	59 6	66 8	63 4	60 4
	TLDB	54.8	49.7	44 8	58.2	53.3	48.5	60 7	55 8	51 3	62.5	57.7	53 5	63 9	59 3	55 5
105	TC	643	586	532	671	616	560	692	633	581	709	650	598	718	663	612
	SHC	313	378	441	337	417	493	360	453	540	387	487	579	400	521	609
	KW	66 1	62 6	59 1	67.9	64.5	60.9	69 2	65 6	62 2	70.3	66.6	63.4	70 9	67 4	64 3
	TLDB	55.8	50.8	46.0	59.2	54.3	49.6	61 5	56 7	52 2	62.9	58.5	54.5	64 6	59 9	56.5
115	TC	604	552	501	631	579	526	650	594	546	665	609	562	672	617	576
	SHC	297	363	425	322	402	476	344	437	520	365	471	556	384	502	576
	KW	70 0	66 2	62 5	72.0	68.2	64.4	73 3	69 4	65 8	74.3	70.5	67.0	74 9	71 1	68 1
	TLDB	57 1	52 0	47 2	60.1	55.2	50.6	62 3	57 5	53 3	63.9	59.2	55.5	65 2	60 6	57 8

BF — Bypass Factor
Edb — Entering Dry-Bulb
Ewb — Entering Wet-Bulb
KW — Compressor Motor Power Input
SHC — Sensible Heat Capacity (1000 Btuh)
TC — Total Capacity (1000 Btuh) Gross
TLDB — Temperature Leaving Dry-Bulb

NOTES:

1 Direct interpolation is permissible Do not extrapolate

2 The following formulas may be used:

$$t_{ldb} = t_{edb} - \frac{\text{sensible capacity (Btuh)}}{1.09 \times \text{cfm}}$$

t_{lwb} = Wet-bulb temperature corresponding to enthalpy of air leaving evaporator coil (h_{lwb})

$$h_{lwb} = h_{ewb} - \frac{\text{total capacity (Btuh)}}{4.5 \times \text{cfm}}$$

Where:

h_{ewb} = Enthalpy of air entering evaporator coil

3. SHC is based on 80 F edb temperature of air entering evaporator coil.
Below 80 F edb, subtract (corr factor x cfm) from SHC
Above 80 F edb, add (corr factor x cfm) to SHC

BF	ENTERING AIR DRY-BULB TEMP (F): 79	78	77	76	75	under 75
	81	80	83	84	85	over 85
	Correction Factor					
.01	1 07	2.16	3 24	4 32	5 40	use formula shown below
.05	1.04	2 07	3 11	4 14	5 18	
.10	98	1 96	2 94	3 92	4 91	

Interpolation is permissible
Correction Factor = 1 09 x (1 – BF) x (edb – 80)

→ 4 Cooling capacities are gross and do not include deduction for indoor fan motor heat

FAN PERFORMANCE

UNIT 50DF	CFM	EXTERNAL STATIC PRESSURE (in. wg)																			
		1.00		1.20		1.40		1.60		1.80		2.00		2.20		2.40		2.60		2.80	
		Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
024	4000	788	1 45	844	1 66	897	1 89	947	2 11	944	2 34	1040	2.58	1084	2.82	1127	3.07	1167	3.32	1207	3.57
	4500	817	1.74	870	1 98	920	2 22	969	2 47	1016	2 72	1060	2.97	1102	3.23	1143	3.49	1183	3.76	1223	4.04
	5000	850	2.09	900	2 34	948	2 61	994	2 87	1038	3.14	1082	3.42	1125	3.70	1165	3.98	1203	4.27		
	5500	886	2 50	933	2 77	978	3 04	1022	3 33	1065	3.62	1106	3.92	1147	4.22	1187	4.52	1225	4.83		
	6000	922	2 95	969	3 26	1012	3 56	1054	3 85	1094	4.16	1134	4.48	1173	4.80	1211	5.12				
	6500	959	3 46	1005	3 79	1048	4.13	1089	4.45	1126	4.77	1165	5.10	1202	5.44						
	7000	999	4.03	1042	4.39	1084	4.75	1125	5.12	1162	5.47	1198	5.81								
	7500	1039	4.69	1081	5.06	1121	5.44	1160	5.83	1198	6.23										
	8000	1080	5.42	1121	5.81	1159	6.21	1197	6.62												
028	5000	807	2 49	872	3 10	934	3 78	993	4.52	1049	5 30	1103	6.11	1157	6.97	1213	7.88				
	5500	821	2 65	884	3 28	944	3 94	1002	4 67	1056	5.45	1109	6.28	1160	7.15	1209	8.05				
	6000	836	2 84	899	3 47	957	4 16	1012	4.88	1066	5 64	1117	6.46	1167	7.34	1215	8.25				
	6500	857	3 10	913	3 70	971	4 38	1025	5.13	1077	5 90	1127	6.69	1175	7.55	1222	8.46				
	7000	880	3 42	933	3 99	986	4 65	1039	5.38	1091	6.17	1139	7.00	1186	7.84						
	7500	904	3 76	956	4 36	1005	4 98	1054	5.69	1105	6.47	1153	7.31	1199	8.18						
	8000	928	4 15	980	4 76	1028	5 40	1074	6.07	1120	6.82	1167	7.64	1213	8.53						
	8500	955	4 59	1004	5 20	1052	5 87	1096	6.55	1140	7.26	1183	8.05	1227	8.91						
	9000	983	5 09	1029	5 70	1076	6 36	1120	7.08	1162	7.80	1203	8.55								
	9500	1012	5 63	1057	6 26	1100	6.92	1144	7.63	1186	8.39	1226	9.15								
	10000	1040	6.20	1085	6.87	1127	7.53	1169	8.24	1210	9.00										
034	6000	789	2 47	845	2 87	889	3 21	941	3 64	992	4 11	1036	4 54	1078	4.98	1119	5.43	1157	5.88	1195	6.34
	6500	806	2 76	862	3 20	914	3 63	955	4 00	1000	4 43	1050	4 95	1093	5.43	1132	5.90	1171	6.38	1209	6.87
	7000	827	3 12	878	3 54	930	4 02	979	4 48	1018	4 89	1056	5.31	1103	5.84	1147	6.39	1186	6.90	1223	7.41
	7500	846	3 50	899	3 95	946	4 41	995	4.92	1041	5.42	1080	5.88	1114	6.30	1154	6.81	1198	7.41		
	8000	866	3 92	919	4 40	967	4 88	1011	5.37	1057	5.92	1100	6.46	1139	6.96	1172	7.41	1205	7.88		
	8500	890	4 41	938	4 83	987	5 39	1032	5 90	1073	6.42	1116	7.00	1157	7.58	1196	8.14				
	9000	916	4 94	960	5 42	1006	5 94	1052	6.48	1094	7.02	1133	7.57	1173	8.18	1213	8.80				
	9500	940	5 49	985	6 03	1026	6 54	1071	7 10	1114	7.67	1153	8.24	1190	8.81						
	10000	964	6 09	1010	6 67	1051	7 22	1091	7.77	1133	8.36	1174	8.97	1211	9.56						
	10500	990	6 75	1034	7 35	1076	7.96	1114	8.51	1152	9.10	1193	9.73								
	11000	1016	7 50	1059	8 10	1100	8.70	1139	9.30	1174	9.90	1212	10.50								
	11500	1042	8 20	1085	8.90	1125	9.50	1164	10.20	1200	10.80										
	12000	1069	9.00	1110	9.70	1150	10.40	1188	11.10	1225	11.80										
044	8000	814	4 13	872	4 91	928	5 76	980	6 65	1027	7 55	1075	8 53	1121	9.56	1165	10.60	1207	11.70		
	9000	840	4 78	898	5 60	951	6 47	1001	7 37	1051	8 35	1097	9.34	1139	10.34	1182	11.40	1224	12.50		
	10000	870	5 60	924	6 40	977	7 30	1026	8 20	1073	9.20	1118	10.20	1163	11.30	1205	12.40				
	11000	903	6 60	954	7 40	1004	8 30	1052	9 30	1099	10.30	1143	11.30	1185	12.40	1226	13.50				
	12000	937	7 80	987	8 70	1034	9 50	1081	10.50	1125	11.40	1169	12.50	1211	13.70						
	13000	977	9 10	1022	10 00	1068	11.00	1110	11.90	1156	12.90	1195	13.90								
	14000	1017	10 60	1060	11 60	1102	12.60	1145	13.60	1184	14.50	1227	15.60								
	15000	1060	12 40	1101	13.40	1140	14.40	1179	15.40	1220	16.50										
	16000	1104	14.30	1142	15.30	1181	16.40	1217	17.50												
054	10000	811	4 51	870	5 26	925	6 06	977	6 85	1026	7 65	1074	8 50	1120	9 34	1164	10.17	1206	11.01	1246	11.87
	11000	832	5 18	889	5 96	943	6 78	995	7 65	1043	8 52	1089	9 39	1133	10 28	1177	11.21	1219	12.15	1260	13.07
	12000	855	5 91	911	6 77	963	7 62	1012	8 50	1061	9 43	1107	10 39	1151	11.34	1192	12.28	1232	13.26	1273	14.27
	13000	879	6 72	933	7 64	985	8 57	1033	9 48	1079	10 43	1124	11 42	1168	12 44	1210	13.48	1250	14.51	1288	15.53
	14000	906	7 67	957	8 58	1007	9 58	1055	10 58	1101	11 57	1144	12.57	1186	13.62	1227	14.71	1267	15.81		
	15000	933	8 71	983	9 68	1031	10 67	1077	11 75	1122	12.82	1166	13.87	1206	14.94	1246	16.04	1285	17.18		
	16000	961	9 86	1010	10 89	1057	11 93	1101	12 99	1144	14.13	1187	15.29	1228	16.41	1267	17.54				
	17000	992	11 18	1038	12 21	1084	13 31	1127	14.42	1169	15.54	1209	16.75	1249	17.99	1289	19.19				
	18000	1025	12 65	1067	13 68	1111	14.81	1154	15.98	1194	17.16	1234	18.34	1272	19.61						
	19000	1058	14 30	1099	15 33	1139	16.46	1181	17.67	1221	18.90	1260	20.14	1297	21.39						
	20000	1092	16.11	1132	17.17	1170	18 29	1209	19.50	1249	20.79	1286	22.08								

UNIT 50DF	CFM	EXTERNAL STATIC PRESSURE (in. wg)																			
		1.00		1.25		1.50		1.75		2.00		2.25		2.50		2.75		3.00		3.25	
		Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
064	12000	855	5 91	924	6 97	988	8 05	1049	9 20	1107	10 39	1161	11 58	1213	12 78	1263	14 03	1312	15 30	1359	16.54
	13000	880	6 73	946	7 88	1009	9 01	1068	10 19	1124	11 42	1179	12 70	1230	14 00	1279	15 29	1326	16 60	1373	17 96
	14000	906	7 67	970	8 82	1031	10 09	1089	11 30	1143	12 57	1196	13 89	1247	15.26	1297	16 65	1344	18 05	1388	19 44
	15000	934	8 72	996	9 94	1054	11 20	1110	12 55	1165	13 85	1216	15 21	1266	16.61	1314	18 06	1361	19 54	1406	21 04
	16000	963	9 90	1022	11 16	1079	12 46	1134	13 84	1186	15 29	1237	16 67	1286	18 11	1333	19 59	1378	21 12	1423	22 68
	17000	993	11 20	1050	12 51	1106	13 88	1158	15 26	1209	16 75	1259	18 29	1307	19 75	1353	21 27	1397	22 83	1441	24 44
	18000	1024	12.65	1080	14.01	1133	15.41	1185	16.88	1234	18.34	1282	19.94	1329	21.57	1375	23.12	1419	24.71		
	19000	1058	14 30	1110	15 64	1162	17 10	1212	18 60	1260	20 16	1307	21 71	1352	23 40	1396	25 13	1440	26 78		
	20000	1092	16 11	1141	17 44	1191	18 96	1240	20 49	1287	22 10	1332	23 73	1376	25 37	1420	27.15				
	21000	1126	18 07	1175	19 47	1222	20 94	1269	22 56	1314	24 19	1359	25 89	1402	27.60	1444	29.32				
	22000	1161	20 17	1208	21 67	1253	23 13	1298	24 78	1343	26.48	13 86	28.20	1429	29 99						
	23000	1196	22 42	1243	24 05	1287	25 58	1329	27 18	1373	28.95	1415	30.71								
	24000	1231	24 83	1277	26.59	1320	28.22	1361	29.81	1403	31.56	1444	33.42								
	25000	1266	27 40	1312	29.30	1355	31.04	1395	32.70	1434	34.40										

Optional fan motor or drive is required

Optional fan motor and field-supplied drive required

Bhp — Brake horsepower
Rpm — Revolutions per minute

NOTES:
1 Fan performance has deductions for unit casing losses, wet coil and clean standard filters
2 Fan motor bhp is based on minimum voltages and 80 F air across motor
3 Field-supplied indoor air fan drive data is shown in Application Data

Performance data (cont)

INDOOR AIR FAN PULLEY DATA

UNIT 50DF	FAN RPM	MOTOR PULLEY No. Grooves—Type—in.	FAN PULLEY No. Grooves—Type—in.	BELT NO —SIZE
024	925	2—3V—5.6	2—3V—10.6	2—3V—710
	991	2—3V—6.0	2—3V—10.6	2—3V—750
	1073	2—3V—6.5	2—3V—10.6	2—3V—750
	1093	2—3V—5.0	2—3V— 8.0	2—3V—670
	1159	2—3V—5.3	2—3V— 8.0	2—3V—670
	1225	2—3V—5.6	2—3V— 8.0	2—3V—670
	1300	2—3V—6.0	2—3V— 8.0	2—3V—710
028	925	2—3V—5.6	2—3V—10.6	2—3V—750
	984	2—3V—4.5	2—3V— 8.0	2—3V—670
	1073	2—3V—6.5	2—3V—10.6	2—3V—750
	1093	2—3V—5.0	2—3V— 8.0	2—3V—710
	1139	2—3V—6.9	2—3V—10.6	2—3V—750
	1159	3—3V—5.3	3—3V— 8.0	3—3V—710
	1225	2—3V—5.6	3—3V— 8.0	3—3V—710*
	1300	2—3V—6.0	2—3V— 8.0	2—3V—710
034	925	2—3V—5.6	2—3V—10.6	2—3V—750
	991	2—3V—6.0	2—3V—10.6	2—3V—750
	1073	2—3V—6.5	2—3V—10.6	2—3V—750
	1093	3—3V—5.0	3—3V— 8.0	3—3V—710
	1141	4—3V—4.5	4—3V— 6.9	4—3V—670
	1159	4—3V—5.3	4—3V— 8.0	4—3V—710
	1225	4—3V—5.6	4—3V— 8.0	4—3V—710
	1300	3—3V—6.0	3—3V— 8.0	3—3V—710
044	925	4—3V—5.6	4—3V—10.6	3—3V—750†
	991	3—3V—6.0	3—3V—10.6	3—3V—750
	1073	4—3V—6.5	4—3V—10.6	3—3V—750†
	1093	4—3V—5.0	4—3V— 8.0	4—3V—710
	1159	5—3V—5.3	5—3V— 8.0	5—3V—710
	1225	4—3V—5.6	5—3V— 8.0	5—3V—710*
	1300	4—3V—6.0	4—3V— 8.0	4—3V—710
054	925	4—3V—5.6	4—3V—10.6	4—3V—750
	991	4—3V—6.0	4—3V—10.6	4—3V—750
	1039	5—3V—4.75	5—3V— 8.0	5—3V—710
	1073	4—3V—6.5	4—3V—10.6	4—3V—750
	1093	5—3V—5.0	5—3V— 8.0	5—3V—710
	1159	5—3V—5.3	5—3V— 8.0	5—3V—710
	1225	5—3V—5.6	5—3V— 8.0	5—3V—710
→ 064	925	4—3V—5.6	4—3V—10.6	4—3V—750
	991	4—3V—6.0	4—3V—10.6	4—3V—750
	1039	5—3V—4.75	5—3V— 8.0	5—3V—710
	1073	4—3V—6.5	4—3V—10.6	4—3V—750
	1093	5—3V—5.0	5—3V— 8.0	5—3V—710
	1159	5—3V—5.3	5—3V— 8.0	5—3V—710
	1225	5—3V—5.6	5—3V— 8.0	5—3V—710
	1312	5—3V—6.0	5—3V— 8.0	5—3V—710
	1450	5—3V—5.0	5—3V— 6.0	5—3V—670

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

*Remove one belt.
†Drive requires 3 belts; 4 belts may be used if desired

→ OPTIONAL EQUIPMENT RESISTANCES (in. wg)

UNIT MODEL	OPTION	UNIT CFM/TON 300	400	500
50DF 024-044	Bag Filter	14	25	38
	Economizer	03	05	08
	Economizer with Exhaust	09	.15	.23
	Electric Heaters 0 5 1 (Low)	06	09	13
	(Heat: Cool Ratio) 0 75 1 (Med)	09	15	23
	1 0:1 (High)	14	.25	.35
50DF 054	Bag Filter	14	25	38
	Economizer	03	04	08
	Economizer with Exhaust	11	.15	.24
	Electric Heaters 0 5 1 (Low)	12	.23	.38
50DF 064	Bag Filter	.20	36	55
	Economizer	04	07	—
	Economizer with Exhaust	.13	.21	—
	Electric Heaters 0 5 1 (Low)	18	35	—

→ HEATING CAPACITIES

UNIT 50DF	VOLTS (Nominal)	KW	BTUH
024	208-230	30-37	126,280
	460	37	
028	208-230	45-55	187,715
	460	55	
034	208-230	45-55	187,715
	460	55	
044	208-230	60-73	249,150
	460	73	
054	208-230	75-91	310,585
	460	91	
064	208-230	75-91	310,585
	460	91	

Controls

Variable volume operating sequence (with optional electric heat)

Clock in remote control box switches controls to DAY (OCCUPIED) mode. Indoor air fan runs for one minute before any other controls function. (This allows sensing of unit discharge air to start from the conditioned space ambient rather than initial unit ambient.)

If return air is below adjustable set point of first stage of the morning warmup thermostat, heaters energize. Outdoor air dampers remain closed. Normally open contacts in base unit override the VAV terminal controls and room terminals remain open during heating. (Field-supplied controls)

When first stage of morning warmup thermostat is satisfied, heaters shut down, indoor air fan runs continuously, and outdoor air dampers remain closed.

When conditioned space temperature rises to adjustable set point of second stage of morning warmup thermostat, unit switches to COOLING mode; outdoor air dampers go to at least the minimum position. (Once the unit has gone into cooling mode, heat cannot come on during occupied time period set on the clock.)

If outdoor air enthalpy is below setting of enthalpy controller, economizer modulates open. (If outdoor air enthalpy is above enthalpy set point, economizer remains at minimum position.) Economizer acts as first stage of cooling providing "free-cooling" with outside air. If outside air alone cannot satisfy cooling requirements of the conditioned space, economizer cooling is integrated with mechanical cooling.

Compressor(s) will start, stop, load and unload and economizer will modulate to maintain discharge air temperature. If outside air temperature drops below the adjustable setting (normally 50F) of the low-ambient lockout, the compressor(s) will shut down.

At end of DAY (OCCUPIED) mode on the clock, the unit enters the NIGHT (UNOCCUPIED) mode. The outdoor air damper closes, and indoor fan and compressors shut down.

If a field-supplied night thermostat is installed in the conditioned space, indoor air fan runs only on a call for heating or cooling. Dampers open only on a call for cooling. On a call for cooling, economizer cooling is used first and then integrated with mechanical cooling to meet the cooling requirement.

A 5-hour, manual bypass timer is provided in remote control box. This timer, when manually set by building occupant, will override the UNOCCUPIED mode and place unit in OCCUPIED mode for up to 5 hours.

Static pressure regulator — When supply air static pressure exceeds or drops below pressure regulator setting, regulator completes an electrical circuit to a damper motor. The damper motor moves damper to a position that maintains required static air pressure in the system.

Electrical protection

Compressor circuit breakers, calibrated for specific applications, are current sensitive and temperature compensated to shut off compressor if current draw is excessive. Provide single-phase protection. Reset manually.

Inherent compressor thermal protection, with automatic reset, de-energizes the control circuit if extreme compressor motor temperature should occur due to excessive suction gas temperature or motor overloading.

Low-pressure switch automatically shuts off compressor if refrigerant pressure drops below setting; provides loss of charge protection.

Inherent outdoor fan motor protection with automatic reset — Power circuit opens if motor temperature becomes excessive.

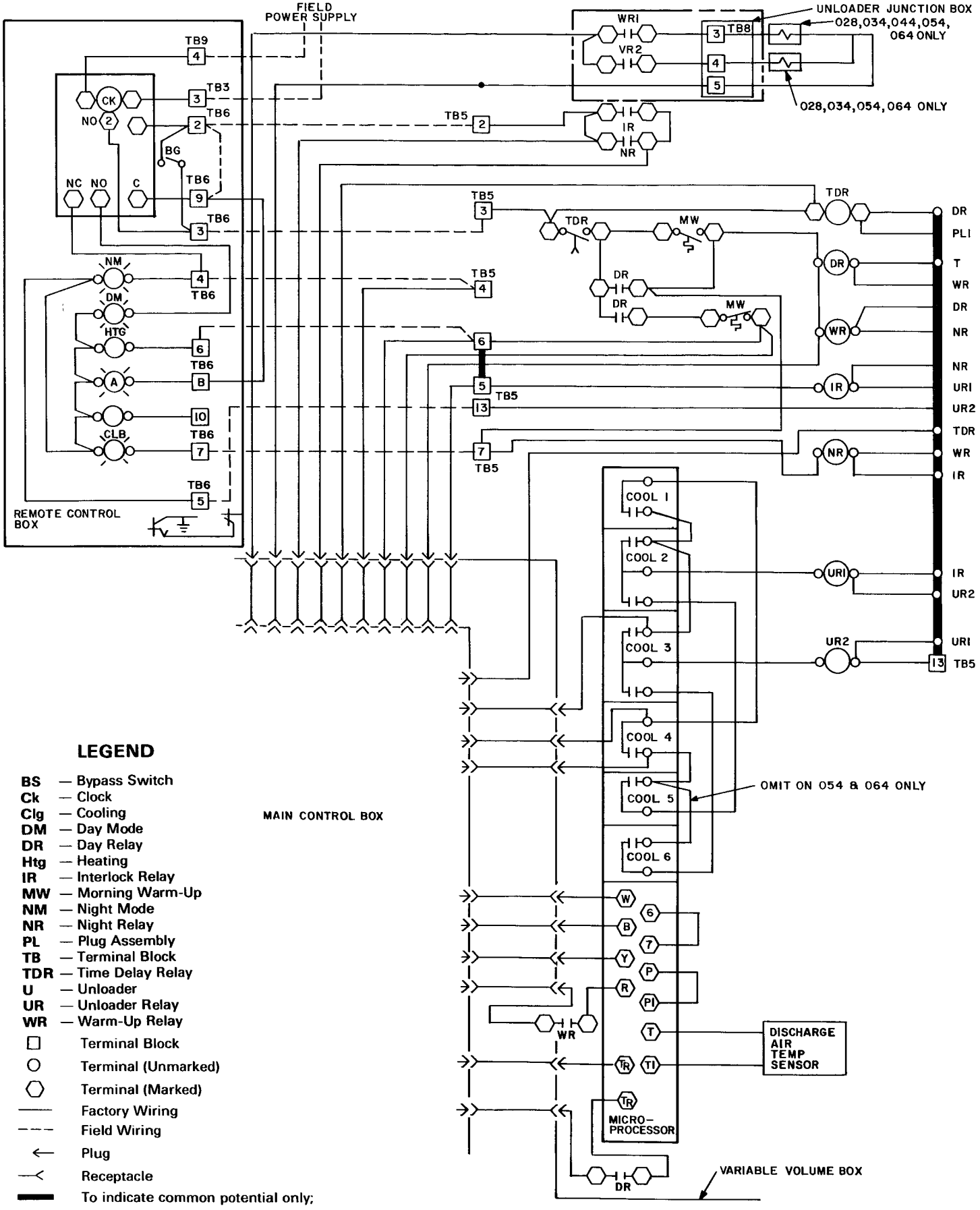
Indoor fan motor circuit breakers — These manually reset circuit breakers protect against fan motor overload.

Electrical data

UNIT 50DF	NOMINAL V/PH/HZ	VOLTAGE RANGE		COMPR NO. 1		COMPR NO 2		OUTDOOR FAN MOTORS		INDOOR FAN MOTOR		HEATERS		POWER SUPPLY	
		Min	Max	RLA	LRA	RLA	LRA	Qty	FLA	Hp	FLA	KW	FLA	Min Ckt Amp	MOCP
024	208-230/3/60	187	254	80 0	345	—	—	2	7 6 (ea)	7 5	24 2	—	—	138	200
										7 5	24 2	30-37	83-92	138-146	200-200
	460/3/60	414	508	37 0	172	—	—	2	3 3 (ea)	5 0	6 6	—	—	60	90
										7 5	11 0	—	—	63	100
										5 0	6 6	37	46	67	90
										7.5	11.0	37	46	72	100
	575/3/60	518	632	30 0	120	—	—	2	2 7 (ea)	5 0	5 6	—	—	49	70
										7 5	9 0	—	—	52	80
028	208-230/3/60	187	254	63 5	266	43 0	191	2	7 6 (ea)	7 5	24 2	—	—	160	225
										10 0	30 8	—	—	167	225
										7 5	24 2	45-55	125-138	187-203	200-225
										10.0	30.8	45-55	125-138	195-211	225-250
	460/3/60	414	508	27 5	120	19 3	86	2	3 3 (ea)	7 5	11 0	—	—	71	90
										10 0	14 0	—	—	74	100
										7 5	11 0	55	69	100	110
										10 0	14 0	55	69	104	125
	575/3/60	518	660	22 0	96	15 0	69	2	2 7 (ea)	7 5	9 0	—	—	57	70
										10.0	11 0	—	—	59	80
034	208-230/3/60	187	254	63 5	266	63 5	266	3	7 6 (ea)	10	30 8	—	—	197	250
										15	46 0	—	—	222	250
										10	30 8	45-55	125-138	197-211	250-250
										15	46 0	45-55	125-138	214-230	330-330
	460/3/60	414	508	27 5	120	27 5	120	3	3 3 (ea)	10	14 0	—	—	86	110
										15	21 0	—	—	93	110
										10	14 0	55	69	104	125
										15	21 0	55	69	113	150
	575/3/60	518	660	22 0	96	22 0	96	3	2 7 (ea)	10	11 0	—	—	69	90
										15	17 0	—	—	75	90
044	208-230/3/60	187	254	80 0	345	80 0	345	3	7 6 (ea)	15	46 0	—	—	249	300
										20	53 5	—	—	263	300
										15	46 0	60-73	166-184	265-288	350-350
										20	53 5	60-73	166-184	283-305	350-350
	460/3/60	414	508	37 0	172	37 0	172	3	3 3 (ea)	15	21 0	—	—	115	150
										20	27 0	—	—	121	150
										15	21 0	73	92	142	175
										20	27 0	73	92	149	200
	575/3/60	518	632	30 0	120	30 0	120	3	2 7 (ea)	15	15 4	—	—	93	110
										20	20 0	—	—	98	125
054	208-230/3/60	187	254	117 0	506	78 5	345	4	7 6 (ea)	20	60 0	—	—	312	400
										25	75 0	—	—	327	400
										20	60 0	75-92	208-230	335-362	400-450
										25	75 0	75-92	208-230	354-382	500-500
	460/3/60	414	508	53 0	253	36 0	172	4	3 3 (ea)	20	27 0	—	—	141	175
										25	34 0	—	—	148	200
										20	27 0	92	115	178	200
										—	—	92	115	187	250
	575/3/60	518	632	42 5	176	28 6	120	4	2 7 (ea)	20	22 0	—	—	113	150
										25	27 0	—	—	118	150
064	208-230/3/60	187	254	119	506	119	506	4	6 6/6	25	75	—	—	370	400
										30	88	—	—	383	450
										25	75	75-91 5	208-230	370-382	500-500
										30	88	75-91 5	208-230	383-398	500-500
	460/3/60	415	508	53	253	53	253	4	3 0	25	34	—	—	166	200
										30	40	—	—	172	200
										25	34	91 5	115	187	250
										30	40	91 5	115	194	250

FLA — Full Load Amps
Hp — Nominal Horsepower
LRA — Locked Rotor Amps
MOCP — Maximum Overcurrent Protection
RLA — Rated Load Amps

Typical wiring schematic

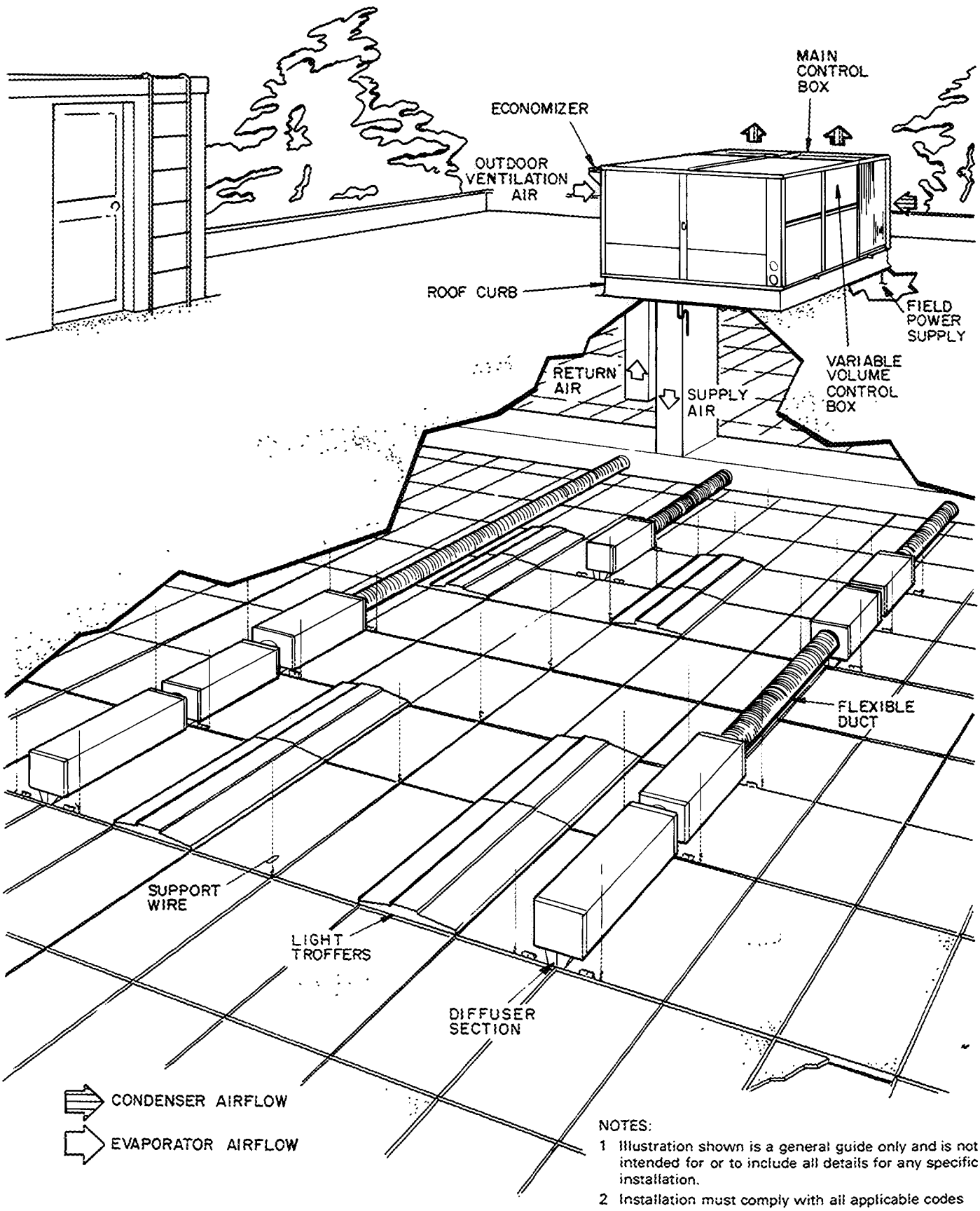


LEGEND

BS — Bypass Switch
Ck — Clock
Clg — Cooling
DM — Day Mode
DR — Day Relay
Htg — Heating
IR — Interlock Relay
MW — Morning Warm-Up
NM — Night Mode
NR — Night Relay
PL — Plug Assembly
TB — Terminal Block
TDR — Time Delay Relay
U — Unloader
UR — Unloader Relay
WR — Warm-Up Relay

□ Terminal Block
○ Terminal (Unmarked)
⬡ Terminal (Marked)
—— Factory Wiring
– – – Field Wiring
← Plug
—≺ Receptacle
▬ To indicate common potential only; not to represent wire

Typical piping and wiring

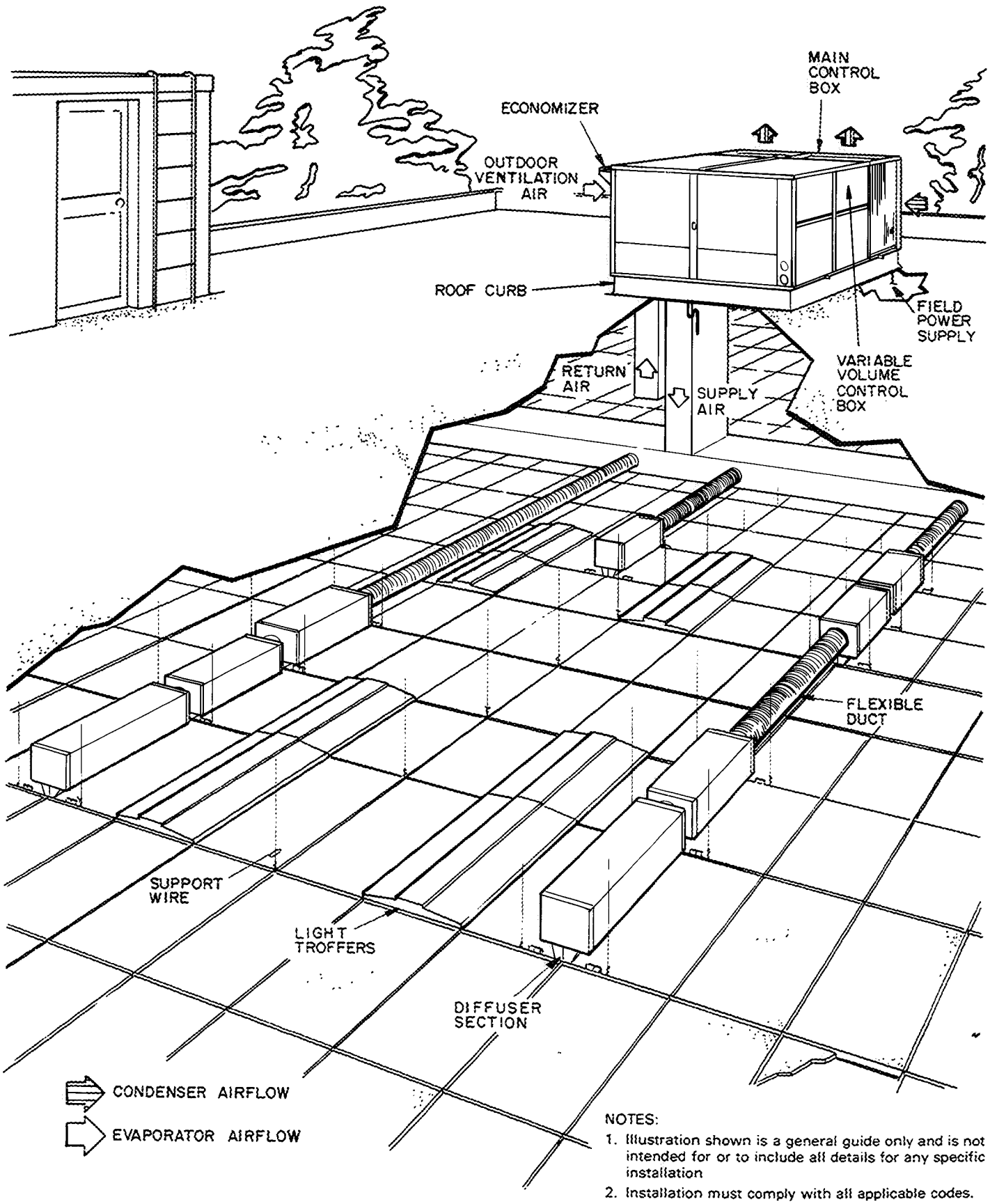


NOTES:

1 Illustration shown is a general guide only and is not intended for or to include all details for any specific installation.

2 Installation must comply with all applicable codes

Typical piping and wiring



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2. Installation must comply with all applicable codes.

50DF Modu-Pac®

Guide specifications

Unit shall be of a one-piece air-to-air electric cooling unit and shall be mounted on a full-perimeter roof curb. Unit shall be UL listed and carry UL label.

Total cooling capacity of the unit shall be ____Btuh or greater, sensible capacity shall be ____Btuh or greater and the leaving dry-bulb temperature shall be ____F at conditions of ____cfm evaporator air entering unit at ____ F wet-bulb, ____ F dry-bulb and condenser entering air temperature of ____ F dry bulb.

Unit cabinet shall be constructed of galvanized steel, bonderized and coated with baked enamel

Refrigeration system — The unit shall contain serviceable hermetic compressor(s) with service valves, vibration isolation, crankcase heater(s), sight glass(es) and filter-drier(s). Electric unloaders, providing steps of ____ %, ____%, and ____%, shall be factory installed to provide close control of leaving air dry-bulb temperature regardless of load variations Compressors shall be of same manufacture as unit.

Hot gas bypass to the evaporator shall be factory installed to permit unit operation down to minimum airflow. Evaporator coil shall always have the full face active to assure proper treatment of all air flowing thru unit

Controls — The variable volume control network shall be factory installed and wired in the unit and contain:

- *Microprocessor* which shall:

— provide precise control of capacity staging.

— contain an adjustable set point for discharge air temperature

→ — contain a control memory function effectively "remembering" the previous 50 minutes of system operation and maintaining a stable, average discharge temperature based on the previous 50 minutes of operation.

— contain the ability to program a reset of discharge air temperature in accordance with temperature readings transmitted from conditioned space. This reset function shall be adjustable in both amount of reset and point at which reset is initiated on a preprogrammed schedule.

— contain a control band adjustment (2-16 F) to tune control system to specific applications

- *Morning warmup thermostat* containing 2 stages of control for demand oriented discriminant energy usage: First stage of thermostat shall shut down electric heaters (if provided). A "dead-band" shall exist between first stage and second stage of thermostat. In the "dead-band" zone, indoor air fan runs but cooling mode will not energize until return air temperature exceeds the adjustable set point of second stage of morning warmup thermostat. At call for cooling, the morning warmup thermostat shall switch control of unit to microprocessor.

- *Remote control panel* containing a 7-day clock and 6 system status lights.

The clock shall enter system into DAY (OCCUPIED) or NIGHT (UNOCCUPIED) modes as preprogrammed. Remote control panel shall contain a 5-hour bypass timer to provide air conditioning during normally unoccupied hours.

Coils shall be aluminum plate fins mechanically bonded to copper tubes. They shall be of an intertwined design for equal circuit loading and full active coil on part load operation to assure proper treatment of conditioned air.

115-volt convenience outlet shall be sized to handle a small power load or service light.

Modulating outdoor air control package (Economizer) shall provide "free cooling" with outside air The package shall:

- contain low leak dampers rated at 3% at 3-in. wg static pressure.
- contain spring return motor to close dampers during power failure.
- use 100% outside air during integrated (simultaneous) economizer cooling and mechanical cooling.
- utilize discharge air sensor and enthalpy changeover for damper control.
- contain adjustable outdoor air thermostat to lock out mechanical cooling when outdoor air is below its setting

→ **Pre-installed tracks** shall be provided to accommodate field-installed hydronic coils. (Unit without electric heat)

Fans and motors — The indoor air fans shall be of the forward-curved centrifugal Class I type, belt driven by a ____hp motor. The outdoor air fan(s) shall be of the propeller type, each directly driven by a 1-hp inherently protected motor

Safety controls — Cooling system shall be protected by: fusible plug, low and high pressurestat, compressor motor overloads, and a timing device which will prohibit the compressor motor from being subjected to a starting current more than once every 5 minutes.

Unit connections — Power wires in the unit shall be powered by single-point terminal connections All utility connections shall be routed thru bottom of unit within curb perimeter. Alternate openings in sides of unit shall also be provided

Dimensions — The unit casing shall have width of not more than ____in., length of not more than ____in , and height of not more than ____inches

Motor and drive to provide higher fan output when job requirements exceed standard fan capacity shall be provided.

Bag filters with 50% efficiency (NBS Dust Spot Test) shall be provided. Bag filter rack shall accept filters of up to 95% efficiency.

Roof Curb — Roof curb shall be of same manufacture as unit, shall support unit and provide a watertight enclosure to protect ductwork and utility services Curb design shall comply with National Roofing Contractors Association requirements.

Static pressure control shall consist of a self-locating damper assembly and motor/regulator assembly and shall permit bottom or side connection discharge and shall include a duct transition for connection of field ductwork.

Head pressure control — An indoor air fan speed control to permit unit to operate down to -20 F shall be provided.

Number One Air Conditioning Maker

Division of Carrier Corporation

Carrier Parkway • Syracuse N Y 13221