EQUIPMENTS MENU

GOLDEN STAR™

SELF - CONTAINED AIR CONDITIONING UNITS 15 - 60 TONS

THE SAUDI FACTORY FOR CENTRAL A/C EQUIPMENT

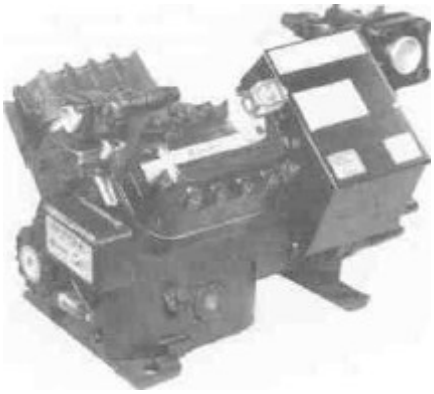
High efficiency...
Low noise...
Custom flexibility...
simple to install and maintain.

Goldenstar 1/5 thru 60 tons multistage cooling units are designed for energy efficiency, low noise, flexibility and low installation cost with integral electric heater. These packaged roof top air conditioning systems answer the requirement for economical air conditioning in supermarkets, shopping centres, restaurants, official buildings, industrial plants and similar low-rise buildings with large interior areas.

Cabinet

The corrosion resistant galvanized steel cabinet is finished by two coats of attractive enamel. The cabinet is fully insulated and mounted on steel channels to facilitate easy handling and installation.

Compressors



Goldenstar GPU employs the most advanced, energy efficient semi hermetic reciprocating compressors available today. They are precisely matched to specially circuited coils to reduce the compression ratio they must work against. This reduces both full and part-load energy requirements. Multiple compressors on multiple refrigeration circuits are used to provide the economies of an increased number of unloading steps and provide increased stand by protection.

Coils

The aluminum finned condenser and evaporator coils are formed of multiple rows of seamless copper tubing arranged in a staggered configuration. Fins are die-formed corrugated, high efficient type. Tubes are mechanically expanded to shoulder of each fin to ensure maximum heat transfer. Evaporator coils of multiple refrigerants circuits are arranged in two independent circuit with the latest interlaced refrigerant distribution system for optimum performance even at part-load conditions. All evaporator coils are rated in accordance to ARI standard.

Condenser Fan

Condenser air fan is of the propeller type, Aluminum blade with a direct driven motor. Motor is of definite purpose air over type with plastic water slinger on shaft for weather protection. Condenser fan is mounted for vertical discharge to keep the sound to a minimum. Condenser fans are cycled by pressure controllers to save energy and to operate the system efficiently on low ambient condition.

Indoor Air Fan

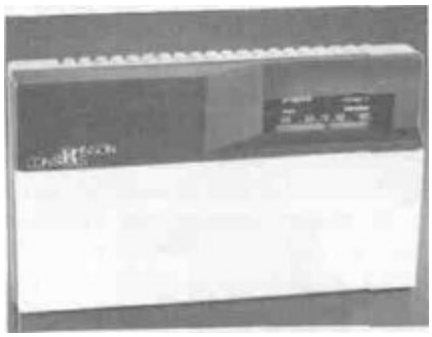
2 nos. forward curved, statically and dynamically balanced centrifugal blowers are used for the evaporator air. The fan is large enough to handle wide range of air volume in stable condition and low noise. The blower is belt driven using an adjustable pitch motor sheave for precise airflow selection.

Controls

The refrigerant system in each circuit have a high pressure switch, oil pressure switch, solid state motor protection and pump down/low pressure controls as standard.

Logic Board

Sensor



Thermostat

GPU 150 thru 440 models are controlled by purpose made microprocessor based thermostat for 2 stage cooling, two stage heating and system operation switch.

GPU-250,350,450,550 and 650 models are controlled by a solid state logic panel along with a space sensor, provide 4 stage cooling and 2 to 4 stage heating control. 5 minute lock out timer is an added feature to all models to prevent compressor re-start against thermostat jiggling.

Accessories

Economizer

The factory assembled economizer package provides free cooling on mid-season. Automatically control the dampers to admit outside air to satisfy the thermostat cooling demand. Compressors and outdoor fan remains in off position to save energy.

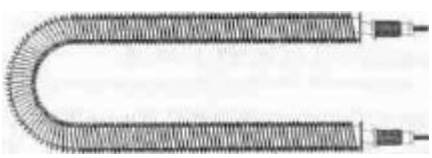
Roof Curb

For down-blow unit installation, field assembled roof curbs are available on all models.

Electric Heater

Optional electric heaters are factory installed complete with automatic thermal overload contactors and power terminals. Open coil or sheathed type elements are available. Heaters are available in various control steps or SCR controlled for 0-100% stepless modulation.

Open coil heater (HF)

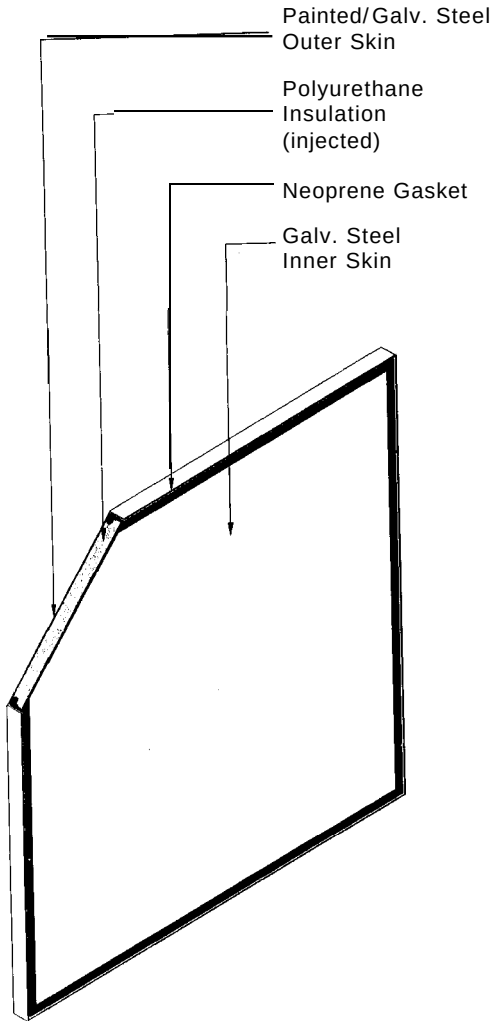


Sheathed Element (CHMS)

Bag filter

Extended surface media provides high Filtration of 60 to 65% efficiency in accordance with ASHRAE standard (52-76). Filter Frame permits use of filter up to 95% efficiency.

Double Skin Casing Construction



For clean room or high ambient applications, Evaporator Section with double skin casing construction is available. The thermal coefficient is 0.81 w/m K.

Following are the wall noise attenuation:

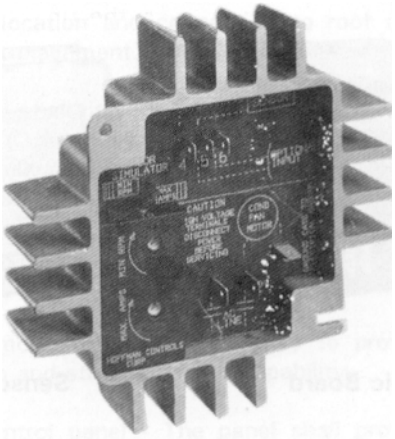
Frequency (HZ)	63	125	250	500	1k	2k	4k	8k
TL(dB)	15	18	21	39	38	49	55	49

Power Exhaust

Coupled with the economizer, up to 75% of the return air can be exhausted to eliminates over-pressurization of the building.

Head Pressure Control

The varying speed head pressure control is a solid state controller designed to operate outdoor temperatures down to -20ºF. The controller varies the speed of condenser fan motor to keep designed condensing temperature. Minimum and Maximum speed limit adjustment on controller will provide stable fan(s) operation.

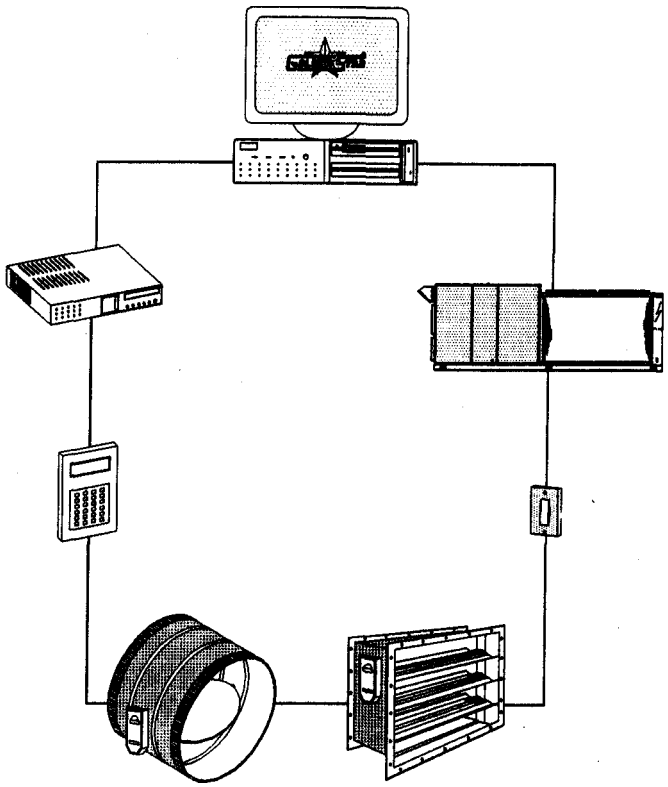


For single phase motor
(GPU-240,250,280,340 & 350)

For three phase motor
(GPU-150,180,440,450,550 & 650)

Return air fan

For high external static and or 100% economizer system return air fan is recommended to use with basic units. Return fan discharges air within the unit so that all of the air can be reconditioned and return to the building or exhausted when economizer system in operation. The return fan utilizes 2 forward curved fans driven by its own motor. Return fan energized with the supply fan and continue to run until the supply fan is de energized.

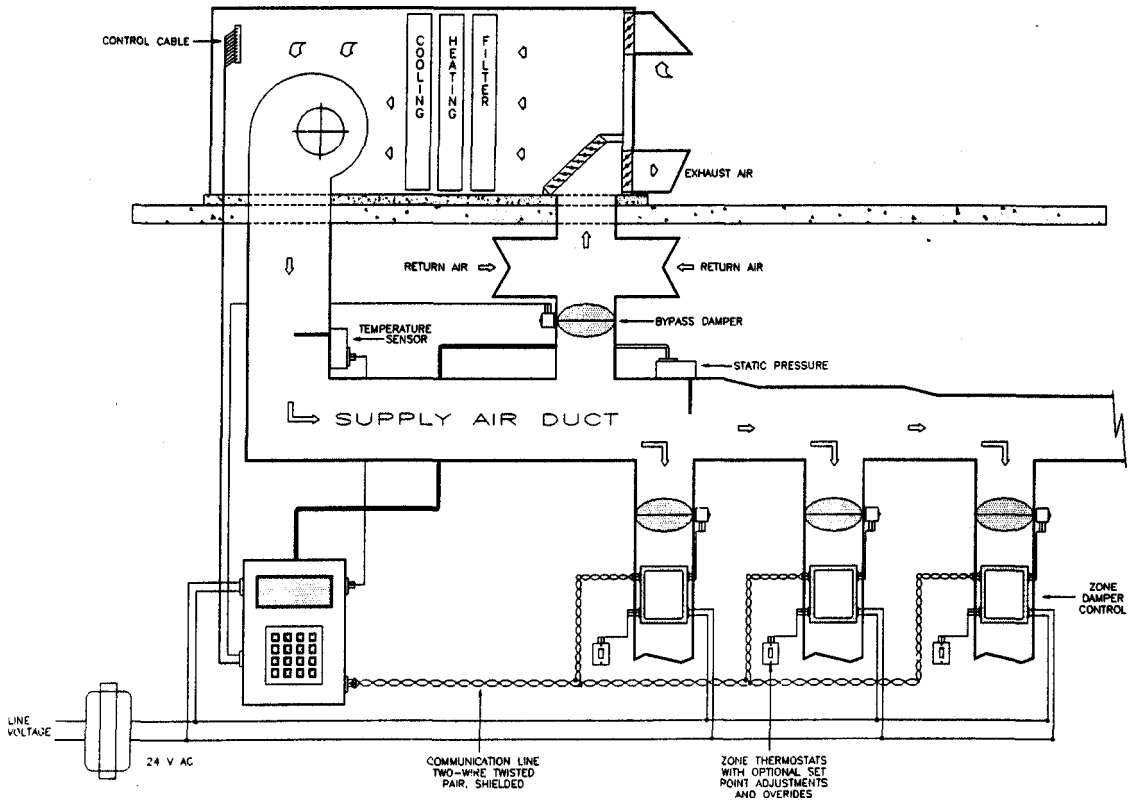


VT-VAV Zone control system

VT-VAV (Variable Temperature / Air) zone control system provides improved comfort through the use of individual area thermostat. Saves energy and money by allowing temperature setback in the unoccupied area while maintaining comfort in the occupied area.

VT-VAV System use the latest generation of solid-state microcomputer multi-zone system designed to enhance temperature control and energy savings. Powerful computerized logic panel monitors each zone thermostat and automatically selects the proper heating or cooling cycle as well as the correct number of stages. VT-VAV system available from 2 zone up to 16 zone in single machine. System monitor/controls up to 30 nos. machine loop.

Typical VT-VAV System



Physical Data

MODEL GPU		SINGLE REFRIGERANT CIRCUIT						DUAL REFRIGERANT CIRCUIT				
		150	180	240	280	340	440	250	350	450	550	650
Compressor (Reciprocating Semi-hermetic)	HP @ circ-1	15	20	25	30	35	40	7 1/2	15	25	25	30
	HP @ circ-2							7 1/2	15	20	30	30
	Crankcase Htr(watts)	65	100	100	100	100	200	65/65	65/65	100/100	100/100	100/100
	Oil charge (oz.)	128	120	120	136	144	220	128/128	128/128	120/120	120/136	136/136
Condenser Coil	Tube dia	3/8" ENHANCED										
	Rows	2	2	2	3	3	3	2	3	3	2/3	3
	Fins/Inch.	15	14	12	14	15	14	12	15	14	14	14
	Total area(ft^2)	25	27.8	37.8	37.8	48.9	55	37.8	48.9	55	44/44	88.9
Condenser Fan & Motor	Quantity	2	2	4	4	4	4	4	4	4	4	4
	Fan dia	26	26	24	24	24	26	24	24	26	30	30
	Motor HP	1	1 1/2	3/4	3/4	3/4	1 1/2	3/4	3/4	1 1/2	1 1/2	1 1/2
	Rpm	1 140	1140	1075	1075	1075	1 140	1075	1075	1 140	1 140	1 140
Indoor Air Fan & Motor (1)	Type	BELT DRIVE, CENTRIFUGAL, FORWARD CURVED										
	Size	AT12/9D	AT12/9D	AT15/11D	AT15/11D	AT20/15D	AT22/15D	AT15/11D	AT20/15D	AT22/15D	AT22/15D	AT22/15D
	Max.Rpm(std.)	1199	1295	1067	1084	826	770	1067	826	770	824	892
	Motor HP(std.)	3	5	5	7 1/2	7 1/2	10	5	7 1/2	10	15	20
	Max.Rpm(opt.)	1347	1308	1135	1167	1024	958	1135	1024	958	1071	1072
	Motor HP(opt.)	7 1/2	10	10	15	15	20	10	15	20	30	40
	Nom.Airflow(cfm)	6000	7500	8000	10000	12000	16000	8000	12000	17000	20000	22000
Evaporator Coil	Tube dia	1/2" 2" PLAIN TUBE										
	Rows	3	3	4	3	4	4	4	4	4	4	4
	Fins/Inch	14	14	12	14	12	12	12	12	12	12	12
	Total Area (ft^2)	13.1	16.25	18.75	23.43	26.38	33.3	18.75	26.38	33.3	41.66	47.2
Indoor Air filter	Type	2"THICK DISPOSABLE (STD.)										
	Qty/Size	4-20x20 4-20x12	8-20x20	8-20x20	8-24x20	4-24x20 4-20x20	12-20x20 3-12x20	8-20x20	4-24x20 4-20x20	3-12x20 12-20x20	6 24x20 6-24x24	16-20x20
	Type	2"THICK DISPOSABLE PLEATED (OPTIONAL)										
	Qty/Size	4-20x20 4-20x12	8-20x20	8-20x20	8-24x20	4-24x20 4-20x20	12-20x20 3-12x20	8-20x20	4-24x20 4-20x20	3-12x20 12-20x20	6-24x20 6-24x24	16-20x20
	Type	60-65 % EFF.BAG FILTER, 18"DEEP (OPTIONAL)										
	Qty/Size	4-20x20 4-20x12	8-20x20	8-20x20	8-24x20	4-24x20 4-20x20	12-20x20	8-20x20	4-24x20 4-20x20	12-20x20	6-24x20 6-24x24	16-20x20
Cooling capacity steps	%	0-67-100	0-50-100			0-67-100		0-25-50-75-100			0-23-45-73 100	0-25-50-75-100
Refrigerant	Type	R-22										
	Charge(lbs)	19	24	33	39	45	66	17/17	24/24	35/33	36/49	50/47
Operating Wt.(appx.)	lbs (2)	2072	2185	2601	2863	41 12	4647	291 1	4645	5002	5524	5870

Notes:-
1. For R/A fan or power exhaust fan data consult factory.
2. Operating weight only for base unit excluding electric

heater.

Accessory Component Pressure Drops (in.wg.)

ACCESSORY		FACE VELOCITY (FPM)						
		300	350	400	450	500	550	600
2-PLEATED FILTER	CLEAN	0.08	0.12	0.16	0.20	0.22	0.30	0.32
	FINAL	0.30	0.35	0.40	0.50	0.50	0.70	0.75
60-65% EFF.BAG FILTER	CLEAN	0.15	0.18	0.20	0.22	0.25	0.30	0.35
	FINAL	0.75	0.75	1.0	1.00	1.00	1.00	1.20
DUAL MIXING BOX		0.05	0.078	0.086	0.11	0.14	0.18	0.20
DISCH. PLENUM		0.024	0.032	0.047	0.055	0.067	0.078	0.095

Selection Procedures (with example)

1. **Determine Cooling and heating requirements at design conditions.**
   Given.
   Required Cooling Capacity (TC).... 265,OOOBtuh
   Sensible Heat Capacity (SHC)..... 190,OOOBtuh
   Required Electric Heating capacity (40kw)..... 136,520Btuh
   Condenser Entering Air Temp..... 95°F
   Indoor Entering Air Temp . . . . . 80°F edb, 67°F ewb
   Evaporator air quantity . . . . . 8000 cfm
   External Static Pressure. . . . . 0.6 in.wg
   Altitude . . . . . See level
   Electrical Characteristics (V-Ph-Hz) 230-3-60

2. **Select Unit based on required Cooling Capacity**
   Enter Cooling Capacities table at condenser entering temperature of 95°F. Unit GPU-240 at 8000 cfm will provide 273,000 total capacity and 198,000 sensible heat capacity at specified 80/67 (edb/ewb)°F entering air.

   Correct Cooling Capacity for altitude (for altitude other than sea level) using correction factors shown in altitude correction table.

   In the above example application is at sea level and therefore no correction required.
   Calculate entering and leaving indoor air temperature, using formulas given under cooling capacity table.

3. **Select heating capacity of unit to provide design condition requirement.**
   Enter heating capacity table, note that 40kw, 2 step heater is available for selected unit.

4. **Determine fan speed and power requirements at design conditions.**
   Enter fan performance table. Select fan Rpm and Bhp for 8000 cfm @ 0.6 in.wg. external static pressure. (accessories pressure drop to be added to external if any accessories required with base unit).
   Fan Rpm 835 Bhp 3.81 standard drive and motor will satisfy the requirement.
   Correct fan Rpm and Bhp for altitude if unit application is above sea level.

5. **Select unit that corresponds to power source available.**
   The Electrical data table shows that a 230-3-60 unit is available.

Cooling Capacities
GPU-150

Evaporator Air (CFM)	Edb	Ewb	85			95			105			115			120		
			TC	SHC	KW	TC	SHC	KW	TC	SHC	KW	TC	SHC	KW	TC	SHC	KW
5,000	86	72	206	131	14.3	201	129	15.7	193	128	17.2	179	122	17.4	170	120	18.3
	80	67	189	128	14.1	185	128	15.5	174	122	16.8	163	118	17.0	157	116	17.8
	74	62	170	125	13.9	167	122	15.2	160	121	16.4	150	1 17	16.6	145	114	17.4
6,000	86	72	209	143	14.3	205	141	15.8	195	138	17.4	182	134	18.9	177	131	19.9
	80	67	193	140	14.2	187	137	15.6	176	133	17.0	167	130	18.5	159	126	19.4
	74	62	174	135	14.0	170	132	15.3	162	129	16.6	151	125	17.9	147	122	18.9
7,000	86	72	211	154	14.3	208	154	15.9	201	151	17.4	191	147	18.9	180	144	20.0
	80	67	195	149	14.3	190	147	15.7	185	146	17.0	176	143	18.5	167	139	19.5
	74	62	180	147	14.1	176	144	15.4	167	141	16.7	159	137	18.0	154	134	18.9

Cooling Capacities (cont.)

GPU-180

Evaporator Air (CFM)	Evap.Air(ºF)		Entering Condenser Air (ºF)														
	Edb	Ewb	85			95			105			115			120		
			TC	SHC	KW	TC	SHC	KW	TC	SHC	KW	TC	SHC	KW	TC	SHC	KW
6,500	86	72	238	161	15.4	236	159	17.1	220	154	18.8	204	148	20.4	194	144	21.5
	80	67	227	159	15.2	212	154	16.8	203	150	18.3	188	145	19.8	178	141	20.9
	74	62	205	154	14.9	197	152	16.4	182	145	17.8	169	138	19.2	160	134	20.3
7,500	86	72	242	171	15.5	237	169	17.2	224	165	18.9	208	160	20.5	197	157	21.6
	80	67	229	171	15.3	224	168	16.8	206	162	18.5	192	155	19.9	182	153	21.0
	74	62	207	165	15.0	197	158	16,5	187	154	18.0	173	149	19.3	163	145	20.5
8,500	86	72	245	183	15.5	239	181	17.3	227	177	19.0	211	172	20.6	203	169	21.7
	80	67	232	182	15.3	227	179	16.9	210	174	18.5	195	166	20.0	184	164	21.2
	74	62	210	172	15.1	199	168	16.6	189	164	18.0	179	160	19.4	169	156	20.6

GPU-240

Evaporator Air (CFM)	Evap.Air(ºF)		Entering Condenser Air(ºF)														
	Edb	Ewb	85			95			105			115			120		
			TC	SHC	KW	TC	SHC	KW	TC	SHC	KW	TC	SHC	KW	TC	SHC	KW
7,000	86	72	296	182	19.9	285	177	22.0	273	173	24.1	260	167	26.3	245	162	27.7
	80	67	271	178	19.7	261	173	21.6	248	168	23.5	235	163	25.5	224	158	26.9
	74	62	248	174	19.2	235	168	21.1	225	163	22.9	214	158	24.8	201	152	26.2
8,000	86	72	313	209	19.9	299	201	22 2	283	196	24.3	270	191	26.6	256	188	28.0
	80	67	287	203	19.8	273	198	21.9	260	193	23.9	247	188	25.9	235	182	27,31
	74	62	264	198	19.5	251	193	21.4	239	188	23.2	228	182	25.1	210	173	26.6
9,000	86	72	320	221	20.0	306	216	22.2	295	212	24.4	278	208	26.7	261	201	28.1
	80	67	294	216	19.9	280	210	21.9	267	205	24.0	253	199	26.0	238	194	27.5
	74	62	264	205	19.6	256	202	21.5	243	198	23.4	233	195	25.2	219	189	26.7

GPU-250

Evaporator Air (CFM)	Evap.Air(ºF)		Entering Condenser Air (ºF)														
	Edb	Ewb	85			95			105			115			120		
			TC	SHC	KW	TC	SHC	KW	TC	SHC	KW	TC	SHC	KW	TC	SHC	KW
7,000	86	72	287	186	17.5	276	183	19.5	262	178	21.5	253	174	23.4	242	172	24.7
	80	67	262	184	17.4	248	177	19.3	239	174	21.1	229	171	22.9	216	165	24.2
	74	62	239	179	17.2	228	172	19.0	218	168	20.7	208	163	22.3	199	161	23.5
8,000	86	72	292	200	*17.5*	283	197	*19.5*	270	192	21.6	259	188	23.5	245	184	24.8
	80	67	269	195	17.4	256	190	19.3	244	186	21.2	231	181	23.0	222	177	24.2
	74	62	241	188	17.3	230	183	19.0	225	180	20.8	213	175	22.4	202	171	23.6
9,000	86	72	299	214	17.5	289	210	19.6	275	205	21.6	260	201	23.7	249	197	25.0
	80	67	273	207	17.5	261	203	19.4	251	198	21.2	237	194	23.1	227	192	24.4
	74	62	248	200	17.4	237	195	19.1	228	191	20.9	215	186	22.5	205	181	23.8

Cooling Capacities (cont.)

GPU-280

Evaporator Air (CFM)	Evap.Air(ºF)		Entering Condenser Air (ºF)														
	Edb	Ewb	85			95			105			115			120		
			TC	SHC	KW	TC	SHC	KW	TC	SHC	KW	TC	SHC	KW	TC	SHC	KW
9,000	86	72	357	232	24.5	340	227	27.0	326	221	29.5	305	214	32.3	290	211	34.1
	80	67	328	226	24.1	312	221	26.5	293	214	28.9	280	208	31.4	266	202	33.1
	74	62	292	218	23.8	282	214	25.9	270	208	28.1	256	203	30.4	240	197	32.0
10,000	86	72	363	247	24.5	346	241	27.1	332	235	29.7	308	227	32.5	291	222	34.2
	80	67	334	237	24.2	316	231	26.7	298	224	29.0	284	218	31.6	267	212	33.4
	74	62	295	228	23.9	287	226	26.0	275	220	28.2	261	214	30.5	246	208	32.2
11,000	86	72	366	257	24.6	349	251	27.2	335	245	29.8	315	239	32.6	297	233	34.3
	80	67	338	250	24.3	321	243	26.8	306	237	29.1	290	231	31.7	274	228	33.5
	74	62	304	241	24.0	292	236	26.2	278	230	28.4	264	223	30.7	249	217	32.5

GPU-340

Evaporator Air (CFM)	Evap.Air(ºF)		Entering Condenser Air (ºF)														
	Edb	Ewb	85			95			105			115			120		
			TC	SHC	KW	TC	SHC	KW	TC	SHC	KW	TC	SHC	KW	TC	SHC	KW
10,000	86	72	444	281	29.5	427	275	32.6	403	267	35.9	382	256	39.3	362	250	41.5
	80	67	406	275	29.0	382	266	32.0	366	259	35.0	349	253	38.1	331	246	40.2
	74	62	366	267	28.6	344	254	31.3	329	247	34.1	317	238	37.2	297	233	39.1
12,000	86	72	455	307	29.6	431	297	32.8	415	293	36.1	393	286	39.6	372	279	41.8
	80	67	417	296	29.2	393	288	32.2	378	280	35.3	361	274	38.5	342	267	40.6
	74	62	377	289	28.8	358	282	31.5	343	274	34.4	324	267	37.4	306	259	39.6
13,500	86	72	462	327	29.7	440	315	33.0	418	308	36.3	402	306	39.8	380	298	42.0
	80	67	425	314	29.3	405	306	32.3	385	299	35.4	364	291	38.7	344	284	40.9
	74	62	383	306	28.9	364	295	31.7	345	287	34.6	331	284	37.6	314	276	39.8

GPU-350

Evaporator Air (CFM)	Evap.Air(ºF)		Entering Condenser Air (ºF)														
	Edb	Ewb	85			95			105			115			120		
			TC	SHC	KW	TC	SHC	KW	TC	SHC	KW	TC	SHC	KW	TC	SHC	KW
10,000	86	72	444	281	28.6	427	275	31.7	405	267	34.8	382	256	37.7	362	250	39.8
	80	67	398	273	28.4	382	266	31.2	366	259	34.0	349	253	36.8	331	246	38.9
	74	62	366	267	27.9	348	259	30.7	329	247	33.2	312	240	35.8	302	235	37.8
12,000	86	72	455	307	28.6	431	297	31.8	415	293	34.9	393	286	37:9	372	279	40.0
	80	67	417	296	28.5	400	292	31.4	381	285	34.2	361	274	37.1	342	267	39.1
	74	62	377	288	28.2	388	282	30.9	343	274	33.5	315	261	36.2	306	259	38.3
13,500	86	72	462	327	28.6	440	315	31.9	422	313	35.1	400	305	38.1	385	299	40.1
	80	67	425	314	28.6	405	306	31.5	385	299	34.4	364	291	37.3	348	285	39.3
	74	62	383	306	28.3	364	295	31.0	349	292	33.6	333	284	36.4	318	277	38.3

Cooling Capacities (cont.)

CPU-440

Evaporator Air (CFM)	Evap.Air(ºF)		Entering Condenser Air (ºF)														
	Edb	Ewb	85			95			105			115			120		
			TC	SHC	KW	TC	SHC	KW	TC	SHC	KW	TC	SHC	KW	TC	SHC	KW
14,000	86	72	550	364	36.3	522	354	40.1	498	346	44.1	476	337	48.1	450	329	50.8
	80	67	503	359	35.8	471	342	39.4	447	333	43.1	426	325	46.9	406	317	49.5
	74	62	451	342	35.2	431	333	38.5	410	324	41.9	389	288	45.5	370	306	48.1
16,000	86	72	563	391	36.4	536	383	40.3	509	373	44.3	482	364	48.4	456	355	51.0
	80	67	505	377	36.0	480	363	39.6	456	355	43.3	439	352	47.2	420	344	49.6
	74	62	466	367	35.3	443	358	38.7	421	348	42.2	399	308	45.8	376	329	48.4
18,000	86	72	570	416	36.5	541	407	40.5	515	398	44.5	492	390	48.6	463	373	51.2
	80	67	517	402	36.1	499	395	39.7	472	385	43.4	446	371	47.4	429	368	49.9
	74	62	472	389	35.5	448	379	38.9	430	370	42.4	407	327	46.1	385	351	48.6

GPU-450

Evaporator Air (CFM)	Evap.Air(ºF)		Entering Condenser Air (ºF)														
	Edb	Ewb	85			95			105			115			120		
			TC	SHC	KW	TC	SHC	KW	TC	SHC	KW	TC	SHC	KW	TC	SHC	KW
15,000	86	72	571	386	35.4	542	372	39.4	521	368	43.3	493	359	47.2	467	350	49.8
	80	67	523	371	35.1	490	359	38.8	479	353	42.3	441	341	46.0	417	332	48.6
	74	62	473	363	34.6	472	361	37.8	430	344	41.3	407	335	44.6	385	325	47.1
17,000	86	72	582	407	35.5	554	398	39.5	527	389	43.4	499	380	47.4	471	371	50.0
	80	67	537	396	35.2	511	387	38.9	486	377	42.5	447	365	46.3	434	358	48.7
	74	62	483	382	34.8	464	379	38.2	436	362	41.6	413	353	44.9	390	347	47.4
18,500	86	72	594	430	35.5	564	420	39.6	535	410	43.5	506	401	47.5	477	391	50.1
	80	67	542	416	35.3	521	408	39.0	494	398	42.6	453	380	46.4	438	373	48.9
	74	62	493	402	34.9	468	392	38.3	444	381	41.7	420	371	45.0	396	361	47.6

CPU-550

Evaporator Air (CFM)	Evap.Air(ºF)		Entering Condenser Air (ºF)														
	Edb	Ewb	85			95			105			115			120		
			TC	SHC	KW	TC	SHC	KW	TC	SHC	KW	TC	SHC	KW	TC	SHC	KW
17,500	86	72	691	456	44.6	653	443	49.5	621	433	54.3	595	422	59.3	562	411	62.5
	80	67	629	448	44.2	599	432	48.7	574	426	53.1	546	415	57.8	519	404	61.0
	74	62	576	431	43.5	552	420	47.6	514	405	51.9	490	394	56.1	462	383	59.3
20,000	86	72	704	489	44.7	670	478	49.5	637	467	54.4	603	456	59.6	570	444	62.7
	80	67	648	476	44.3	618	465	48.9	587	453	53.4	556	442	58.1	525	430	61.4
	74	62	583	459,	43.7	,569	451	47.8	526,	435	52,2	498	423	56.5	471	411	59.7
22,500	86	72	712	520	44.7	684	510	49.6	659	501	54.6	612	487	59.8	583	477	63.0
	80	67	658	505	44.4	628	494	49.0	591	481	53.6	566	471	58.5	533	459	61.7
	74	62	591	486	43.8	577	478	48.1	547	466	52.3	511	451	56.8	488	440	59.8

Cooling Capacities (cont.)

GPU-650

Evaporator Air (CFM)	Evap.Air(ºF)		Entering Condenser Air (ºF)														
	Edb	Ewb	85			95			105			115			120		
			TC	SHC	KW	TC	SHC	KW	TC	SHC	KW	TC	SHC	KW	TC	SHC	KW
20,000	86	72	760	510	49.4	710	495	54.5	677	483	60.0	639	471	65.5	592	456	69.0
	80	67	690	496	48.8	644	480	53.8	622	469	58.7	586	457	64.0	544	436	67.6
	74	62	614	476	48.1	598	468	52.6	562	452	57.3	525	438	62.0	504	428	65.4
22,000	86	72	764	532	49.4	728	520	54.6	690	508	60.1	652	496	65.7	602	459	69.0
	80	67	704	525	48.9	651	500	53.9	636	499	58.8	602	487	64.2	554	445	67.6
	74	62	632	498	,48.2	601	486	52.9	570	473	57.5	539	460	62.3	**511**	430	65.4
24,000	86	72	782	563	49.4	742	550	54.7	702	531	60.2	664	519	65.8	624	500	69.3
	80	67	714	545	48.9	676	532	54.0	648	521	58.9	612	508	64.4	576	494	67.9
	74	62	648	526	48.3	614	513	53.0	582	499	57.6	550	486	62.6	524	480	66.1

Notes:

1. Direct interpolation is permissible. Do not extrapolate.

2. Ratings are based on 60Hz power. For 50Hz applications utilize the following correction factors:
   Total Capacity - multiply MBH by 0.85

   Electrical draw - multiply by 0.83

3. The following formulas may be used:

   tldb = tedb-(sensible capacity(Btuh)/(1.09 x cfm)

   tlwb = Wet-bulb temperature corresponding to enthalpy of air leaving evaporator coil (hlwb)

   hlwb = hewb - (Total capacity (Btuh)/(4.5 x cfm)

   where hewb = Enthalpy of air entering evaporator coil.

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

   Edb - Entering Dry Bulb
   Ewb - Entering Wet Bulb
   KW - Compressor Motor Power input
   SHC - Sensible Heat Cap. (1000 Btuh)
   TC - Total Cap. (1000 Btuh) Gross
   tldb - Air Temperature Leaving Dry Bulb
   tlwb - Air Temperature Leaving Wet Bulb.

Electric Heater Data

Heater KW	FLA (1)			Unit Model							
	208-230	380	460	150	180	240/250	280	340/350	440/450	550	650
20	56	31	25	X	X	X	X	X	X	X	X
30	84	46	38	X	X	X	X	X	X	X	X
40	111	61	50	X	X	X	X	X	X	X	X
50	139	76	63	X	X	X	X	X	X	X	X
60	167	91	76		X	X	X	X	X	X	X
70	195	106	88	-	X	X	X	X	X	X	X
80	222	122	101	-	-	X	X	X	X	X	X
100	278	152	126	-	-	-	X	X	X	X	X
120	333	183	151	-	-	-	-	X	X	X	X
140	389	213	176	-	-	-	-	-	X	X	X
150	417	228	188	-	-	-	-			X	X
Capacity steps (std)				2	2	2	2	4	4	4	4

1. FLA - Full Load amps. for heater only.
2. Standard heater availability shown. For other Capacities consult factory.

Fan Performance

MODEL	CFM	dBA	EXTERNAL STATIC PRESSURE (IN.WG)																			
			0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6		1.8		2.0	
			Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
150	4500	84.1	812	1.38	882	1.56	946	1.73	1015	1.93	1078	2.13	1139	2.33	1199	2.54	1257	2.75	1311	2.96	1366	3.19
	4750	85.0	819	1.50	886	1.71	948	1.88	1014	2.09	1076	2.29	1136	2.50	1195	2.71	1251	2.93	1305	3.14	1359	3.37
	5000	85.2	826	1.65	891	1.85	951	2.04	1015	2.26	1076	2.47	1134	2,68	1192	2.90	1247	3.12	1300	3.35	1353	3.57
	5250	85.8	835	1.79	898	2.00	956	2.21	1018	2.44	1077	2.65	1134	2.87	1190	3.10	1244	3.33	1296	3.55	1348	3.79
	5500	86.5	847	1.98	907	2.22	963	2.43	1023	2.67	1080	2.89	1135	3.12	1189	3.36	1242	3.59	1293	3.83	1344	4.00
	5750	87.1	856	2.12	914	2.36	968	2.58	1027	2.82	1083	3.06	1137	3.30	1190	3,54	1242	3.78	1292	4.02	1342	4.27
	6000	87.8	867	2.30	924	2.54	977	2,78	1034	3.03	1087	3.28	1140	3.53	1192	3.78	1243	4.03	1292	4.27	1341	4.53
	6500	89.1	893	2.68	946	2.96	996	3.21	1049	3.49	1100	3.76	1150	4.02	1199	4.29	1248	4.56	1295	4.82	1342	5.09
	7000	90.5	922	3.11	972	3.41	1018	3.69	1069	3.99	1117	4.28	1164	4.56	1211	4.85	1257	5.14	1302	5.42	1347	5.71
180	6000	87.8	871	2.31	926	2.56	982	2.81	1037	3.05	1090	3.30	1143	3.54	1194	3.79	1246	4.04	1295	4.29	1344	4.54
	6250	88.5	883	2.50	937	2.76	991	3.01	1044	3,27	1096	3.53	1148	3.78	1197	4.04	1248	4.31	1296	4.56	1344	4.82
	6500	89.1	896	2.70	949	2.97	1001	3.24	1052	3.51	1103	3.77	1153	4.04	1201	4.30	1251	4.57	1297	4,84	1344	5.11
	6750	89.8	910	2.91	961	3.19	1012	3.47	1062	3.75	1111	4.03	1159	4.30	1207	4.58	1255	4.86	1300	5.13	1346	5.41
	7000	90.5	925	3.13	974	3.42	1023	3.71	1072	4.01	1120	4.29	1167	4.58	1213	4.86	1260	5.16	1304	5.44	1349	5.73
	7250	91.2	940	3.36	987	3.67	1035	3.97	1083	4.28	1129	4.57	1175	4.87	1220	5.17	1266	5.47	1309	5.76	1353	6.06
	7500	91.9	955	3.61	1002	3.93	1048	4.24	1094	4.56	1140	4.87	1184	5.18	1228	5.48	1273	5.79	1315	6.10	1358	6.40
	8000	93.3	987	4.14	1031	4.48	1076	4.82	1119	5.16	1162	5.49	1205	5.83	1246	6.15	1289	6.49	-	-	-	-
	8500	94.6	1021	4.72	1063	5.09	1105	5.45	1147	5.82	1188	6.18	1228	6.53	1268	6.88	1308	7.24	-	-	-	-
240/250	6250	82.6	693	1.99	747	2.24	801	2.50	855	2.78	909	3.07	963	3.38	1015	3.69	1067	4.02	1118	4.35	1168	4.70
	6500	83.0	699	2.14	751	2.39	803	2.66	856	2.94	908	3.23	960	3.54	1010	3.85	1061	4.18	1111	4.53	1160	4.88
	6750	83.4	706	2.29	756	2.55	807	2.82	857	3.10	907	3.40	958	3.71	1006	4.03	1056	4.36	1104	4.71	1153	5,06
	7000	83.9	713	2.46	762	2.72	811	3.00	860	3.28	908	3.58	957	3.90	1004	4.22	1052	4.55	1099	4.90	1146	5.26
	7250	84.3	721	2.63	768	2.90	816	3.18	863	3.47	910	3.78	957	4.09	1003	4.42	1049	4.76	1096	5.11	1141	5.47
	7500	84.8	729	2.81	775	3.09	822	3.38	868	3.68	913	3.99	958	4.30	1003	4.63	1048	4.97	1093	5.32	1137	5.69
	8000	85.8	746	3.21	791	3.50	835	3.81	878	4.12	921	4.43	964	4.76	1006	5.09	1048	5.44	1090	5.80	1133	6.16
	8500	86.8	764	3.64	808	3.96	850	4.28	891	4.60	932	4,93	973	5.27	1012	5.60	1052	5.96	1092	6.32	1132	6.70
	9000	87.8	782	4.11	825	4.45	866	4.79	906	5.13	945	5.47	984	5.82	1021	6.17	1059	6.53	1097	6.90	1135	7.28
280	8500	86.7	754	3.57	799	3.89	842	4.21	883	4.54	924	4.86	964	5.19	1004	5.54	1044	5.89	1084	6.25	1124	6.62
	8750	87.2	763	3.79	808	4.13	850	4.46	891	4.80	931	5.15	969	5.46	1009	5.81	1048	6.17	1087	6.53	1125	6.91
	9000	87.7	773	4.03	817	4.38	858	4.73	898	5.07	938	5.41	975	5.75	1014	6.10	1052	6.46	1090	6.83	1127	7.21
	9250	88.3	782	4.27	826	4.64	867	5.00	907	5.35	945	5.70	982	6.04	1019	6.40	1056	6,77	1093	7.14	1130	7.52
	9500	88.8	791	4.52	835	4.91	876	5.28	915	5.64	953	6.00	989	6.35	1026	6.72	1062	7.09	1098	7.47	1134	7.85
	9750	89.3	800	4.79	844	5.19	885	5.57	923	5.95	961	6.31	996	6.67	1032	7.05	1068	7.43	1103	7.81	1138	8.20
	10000	89.8	808	5.05	853	5.48	894	5.88	932	6.26	969	6.64	1004	7.01	1039	7.39	1074	7.77	1108	8.16	1143	8.56
	10500	90.9	-	-	872	6.09	912	6.52	950	6.93	986	7.33	1020	7.72	1054	8.12	1088	8.52	1121	8.92	1154	9.32
	11000	91.9	-	-	889	6.73	931	7.20	968	7.65	1004	8.07	1037	8.48	1070	8.90	1103	9.31	1135	9.73	1167	10.15

Fan Performance (cont.)

MODEL	CFM	dBA	EXTERNAL STATIC PRESSURE (IN.WG)																			
			0.6		0.8		1.0		1.2		1.4		1.6		1.8		2.0		2.5		3.0	
			Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
340/350	9000	82.9	626	3.25	670	3.67	712	4.08	753	4.49	792	4.87	-	-	-	-	-	-	-	-	-	-
	9500	83.2	625	3.44	668	3.90	709	4.34	749	4.78	788	5.21	826	5.62	-	-	-	-	-	-	-	-
	10000	83.5	624	3.64	667	4.12	707	4.59	747	5.07	785	5.53	822	5.98	858	6.42	-	-	-	-	-	-
	10500	83.8	625	3.84	666	4.34	705	4.84	744	5.34	782	5.84	819	6.33	854	6.81	888	7.26	-	-	-	-
	11000	84.2	626	4.05	666	4.57	705	5.09	743	5.62	780	6.15	816	6.67	851	7.18	885	7.68	966	8.87	-	-
	11500	84.6	628	4.26	667	4.81	705	5.34	742	5.90	779	6.45	814	7.00	849	7.55	882	8.08	962	9.37	-	-
	12000	85.0	630	4.49	669	5.05	705	5.61	742	6.18	778	6.76	813	7.34	847	7.91	879	8.47	959	9.86	1034	11.18
	12750	85.6	635	4.85	672	5.43	708	6.01	743	6.61	778	7.22	812	7.83	845	8.45	877	9.05	955	10.56	1029	12.00
	13500	86.3	642	5.25	677	5.84	711	6.44	746	7.06	779	7.70	812	8.34	844	8.99	875	9.63	951	11.24	1024	12.83
440/450	13000	87.2	591	5.13	630	5.71	667	6.30	702	6.91	737	7.54	770	8.18	808	8.85	833	9.53	906	11.29	974	13.15
	13500	87.6	592	5.41	630	6.00	666	6.60	701	7.21	736	7.85	769	8.51	801	9.18	832	10.00	905	11,66	972	13.54
	14000	88.0	592	5.71	630	6.31	666	6.92	700	7.54	734	8.19	767	8.85	799	9.54	830	10.37	903	12.00	971	13.94
	14500	88.4	594	6.01	630	6.62	666	7.25	700	7.88	734	8.54	766	9.21	798	9.91	829	10.61	901	12.44	969	14.37
	15000	88.8	595	6.34	631	6.96	666	7.59	700	8.23	733	8.91	765	9.59	797	10.29	827	11.01	900	12.86	967	14.81
	15500	89.2	597	6.68	633	7.31	667	7.96	700	8.61	733	9.29	765	9.99	796	10.70	826	11.43	898	13.30	965	15.27
	16000	89.6	600	7.03	634	7.68	668	8.34	700	9.00	733	9.69	764	10.40	795	11.12	825	11.86	897	13.76	964	15.75
	17000	90.4	606	7.80	639	8.47	671	9.15	703	9.84	734	10.55	764	11.28	794	12.00	824	12.78	894	14.73	961	16.70
	18000	91.3	613	8.63	645	9.33	676	10,04	706	10.75	736	11.48	766	12.23	795	13.00	824	13.78	893	15.78	958	17.86

MODEL	CFM	dBA	EXTERNAL STATIC PRESSURE (IN.WG)																			
			0.75		1.0		1.25		1.5		1.75		2.0		2.5		3.0		3.5		4.0	
			Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
550	16500	90.0	628	7.89	670	8.73	704	9.48	749	10.47	787	11.30	824	12.31	895	14.23	962	16.25	1026	18.30	1085	20.52
	17000	90.4	631	8.29	671	9.15	706	9.91	749	10.92	787	11.83	824	12.78	894	14.73	961	16.77	1024	18.88	1084	21.08
	17500	90.9	633	8.71	673	9.58	707	10.35	750	11.38	787	12.31	824	13.27	893	15.25	959	17.31	1022	19.45	1082	21.67
	18000	91.3	637	9.15	676	10.00	709	10.82	751	11.86	788	12.80	824	13.78	893	15.78	958	17.86	1021	20.03	1080	22.27
	18500	91.8	640	9.60	679	10.51	711	11.30	753	12.37	788	13.32	824	14.31	892	16.34	957	18.45	1019	20.63	1079	22.90
	19000	92.2	644	10.07	682	1 1.00	714	11.81	756	13.23	790	13.86	825	14.86	892	16.92	957	19.05	1018	21.26	1077	23.55
	20000	93.2	653	11.08	689	12.04	719	12.88	759	14.00	793	14.99	827	16.03	892	18.14	956	20.32	1016	22.59	1075	24.92
	21250	94.3	665	12.44	699	13.45	728	14.33	766	15.50	798	16.53	831	17.60	894	19.79	956	22.04	1015	24.37	1073	26.77
	22500	95.5	678	13.93	711	14.99	739	15.91	775	17.13	806	18.21	837	19.33	898	21.58	957	23.91	1015	26.31	1071	28.77
650	19000	92.2	644	10.07	682	11.00	714	11.81	754	12.89	790	13.86	825	14.86	892	16.92	957	19.05	1018	21.26	1077	23.55
	19500	92.7	648	10.56	685	11.51	716	12.33	756	13.43	791	14.41	826	15.43	892	17.52	956	19.68	1017	21.91	1076	24.23
	20000	93.2	653	11.08	689	12.04	719	12.88	759	14.00	793	14.99	827	16.03	892	18.14	956	20.32	1016	22.59	1075	24.92
	20500	93.6	657	11.61	693	12.59	723	13.44	761	14.58	795	15.60	828	16.64	893	18.78	955	20.99	1016	23.28	1074	25.64
	21000	94.1	662	12.16	697	13.16	726	14.03	764	15.18	797	16.21	830	17.28	894	19.45	956	21.69	1015	24.00	1073	26.39
	21500	94.6	667	12.73	701	13.75	730	14.64	767	15.81	800	16.86	832	17.94	895	20.13	956	22.40	1015	24.75	1072	27.16
	22000	95.0	672	13.32	706	14.36	734	15.26	771	16.46	803	17.52	834	18.62	896	20.85	957	23.15	1015	25.52	1072	27.95
	23000	96.0	683	14.56	716	15.65	743	16.59	778	17.83	809	18.93	840	20.06	900	22.34	959	24.70	1016	27.13	1071	29.62
	24000	96.9	695	15.90	726	17.03	753	18.00	787	19.28	817	20.42	846	21.58	905	23.94	962	26.36	1017	28.84	1072	31.38

Fan Performance (cont.)

Optional fan motor and / or drive required.

Notes:

1. Fan performance is based on wet coils, 2 inch pre-filter, standard electric heater and casing losses. If any accessories used, add accessories pressure drop to external pressure before using fan performance table.

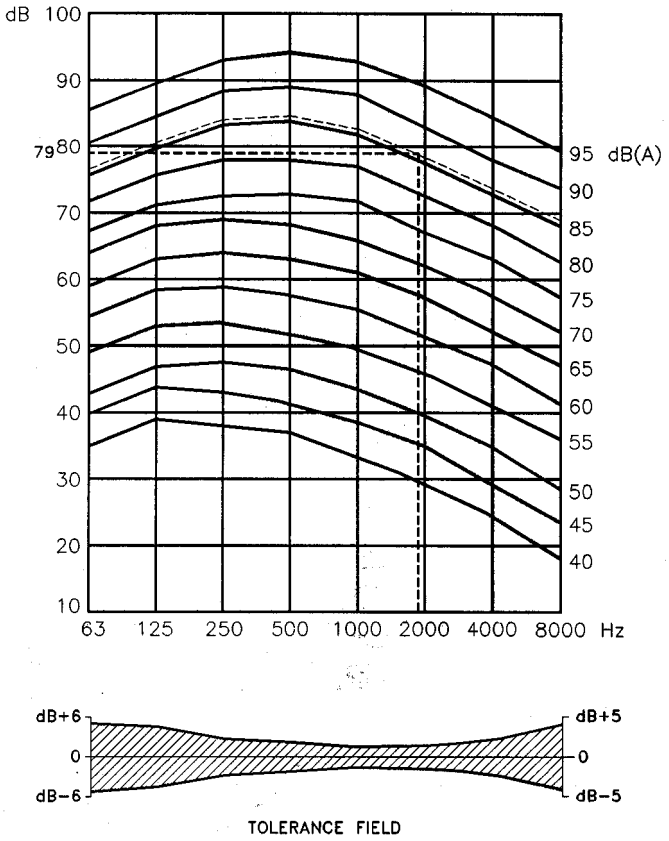
2. For power exhaust or return air fan performance consult factory.

3. Sound pressure value shown in performance table is the estimated pressure level at 1 meter from fan only. Use spectrum chart and dB correction factor for sound power level at various frequencies.

4. Example:
   Calculate the sound power level of packaged unit model GPU-250 operating with 8000 CFM at 1.4 inch.wg. external static pressure.
   From fan performance table of GPU-250, 8000 CFM, read base sound pressure value as 85.8 dBA.
   Convert dBA value to spectrum using spectrum chart and correct for 1.4" external static pressure.

   Total sound power (SLw) will be sum of (1) & (2) and accurate to the tolerance value shown in sound spectrum chart.

SOUND SPECTRUM CHART



Frequency (Hz)	63	125	250	500	1K	2K	4K	8K
Spectrum(dB) (1)	76	81	83	84	82	79	74	69
Correction (2)	+3	+3	+3	+3	+3	+3	+3	+3
SLw (1+2)	79	84	86	87	85	82	77	72

dB Correction factor for external static pressure

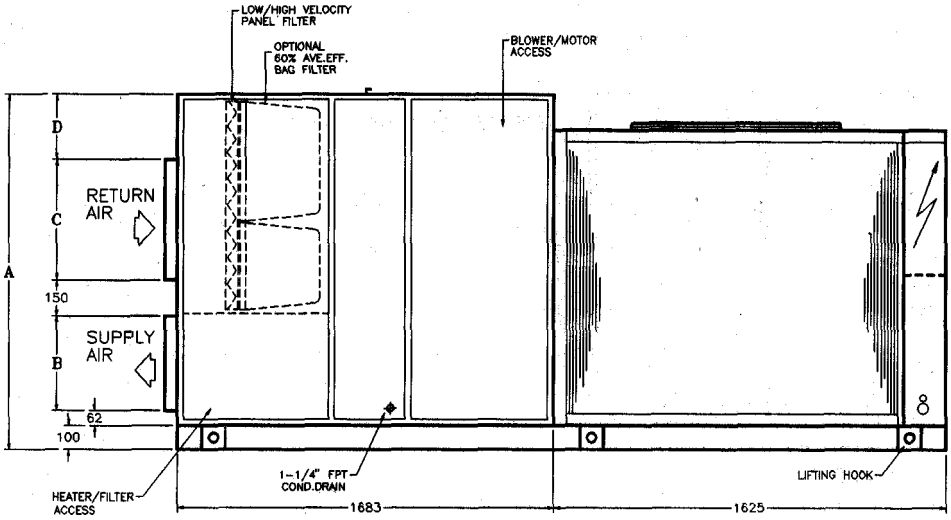
EXTERNAL STATIC PRESSURE (Inch.Wg)																
0.2	0.4	0.75	0.8	1.0	1.2	1.25	1.4	1.5	1.6	1.75	1.8	2.0	2.5	3.0	3.5	4.0
-14	-8	-2.5	-2.0	0	1.6	2.0	3.0	3.5	4.0	5.0	5.1	6.0	8.0	9.5	11.0	12.0

Altitude correction multipliers

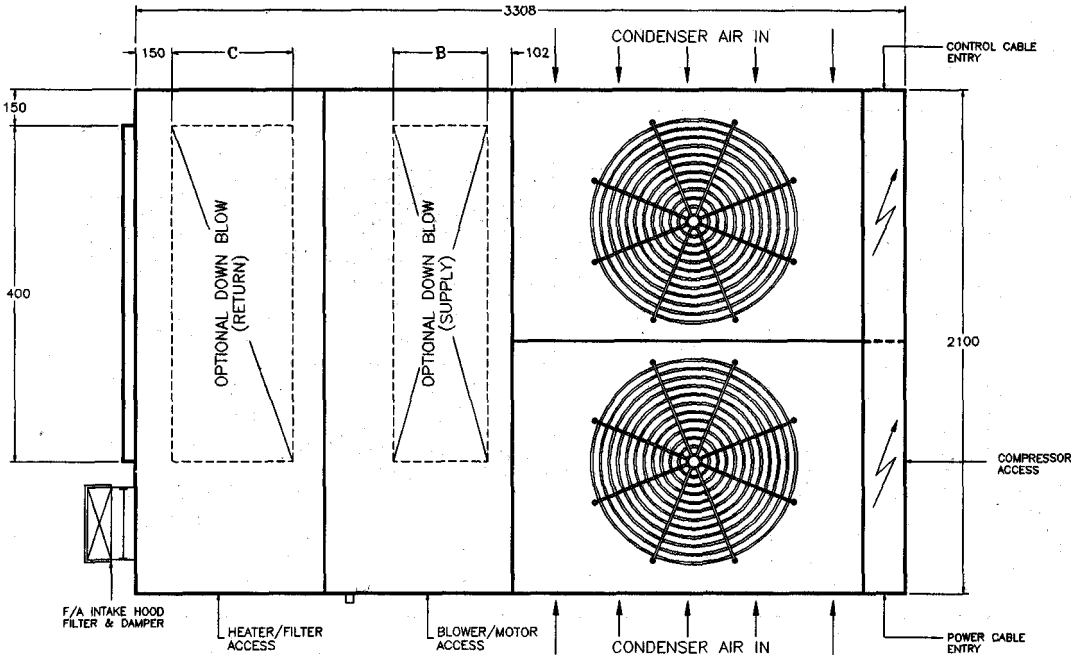
To be applied to rated performance to determine performance at other than sea level

ALTITUDE ABOVE SEA LEVEL-FT	0	2000	3000	4000	5000	6000	7000
Cooling Capacity	1.00	0.98	0.97	0.96	0.95	0.93	0.92
Evaporator Blower RPM	1.00	1.04	1.06	1.09	1.12	1.15	1.19
Evaporator Blower BHP	1.00	1.07	1.12	1.18	1.25	1.33	1.41

Base unit dimensions
Model GPU-150/180



ELEVATION



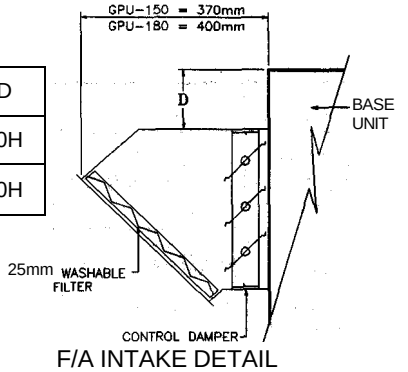
PLAN

UNIT MODEL	A	B	C	D	F/A HOOD
QPU-150	1305	341	450	202	300Wx450H
QPU-180	1465	391	500	262	300Wx500H

ALL DIMENSIONS ARE IN MILLIMETERS

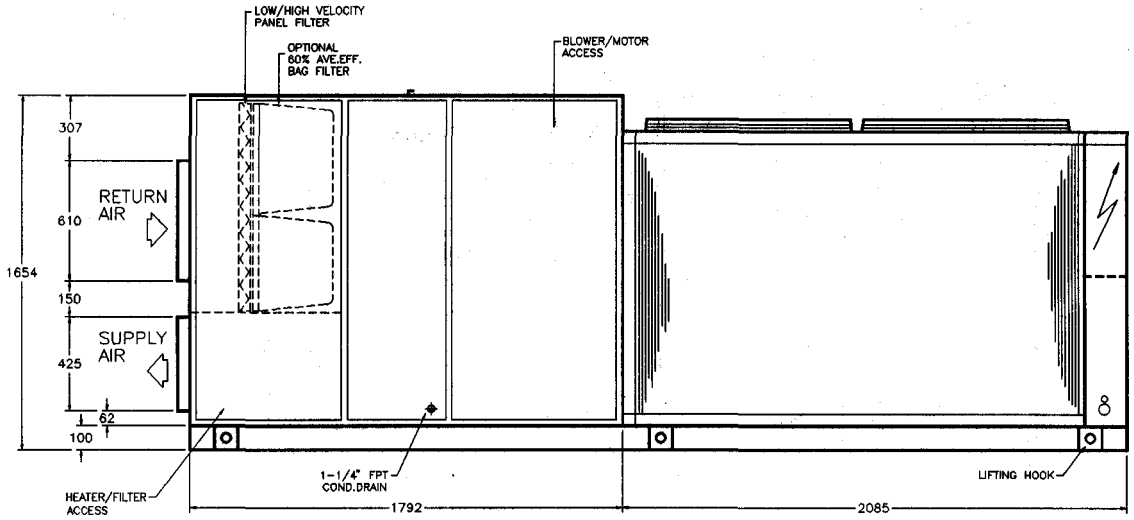
SERVICE CLEARANCE

a. CONDENSER AIR INTAKE = 1 1500mm
b. CONTROL PANEL =1000mm
c. F/A INTAKE = 1000mm
d. TOP = DON'T RESTRICT CONDENSER FANS.

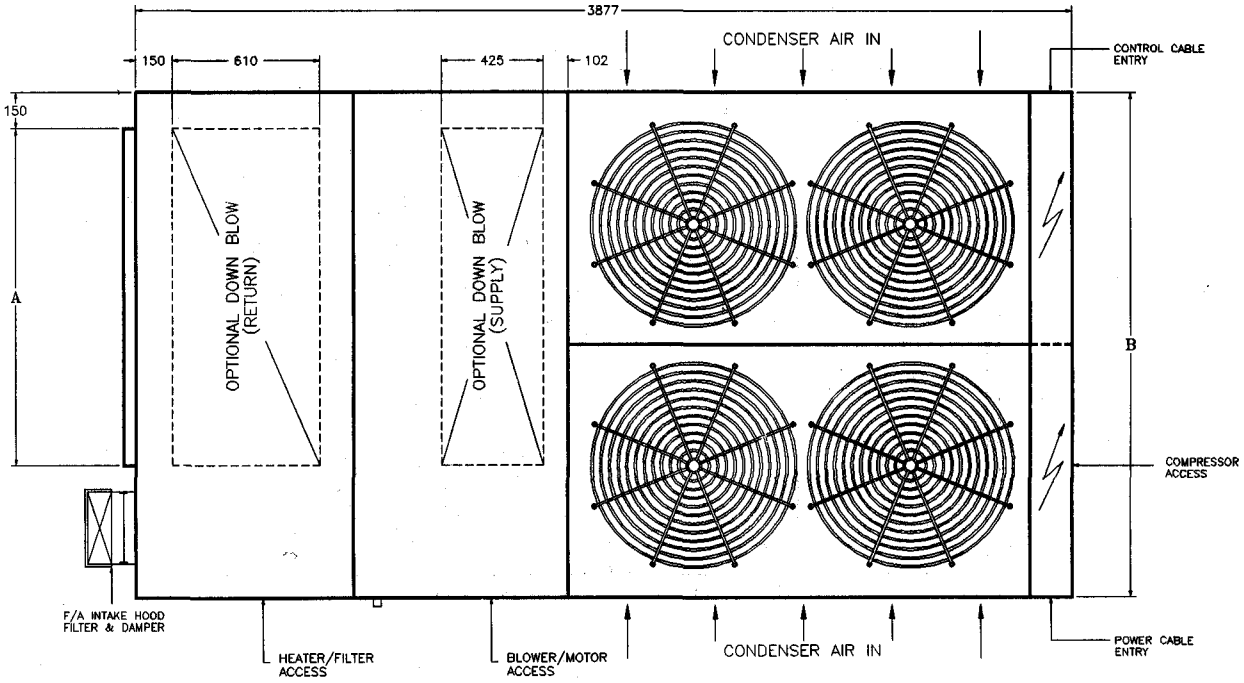


F/A INTAKE DETAIL

Base unit dimensions
Model GPU-240/280



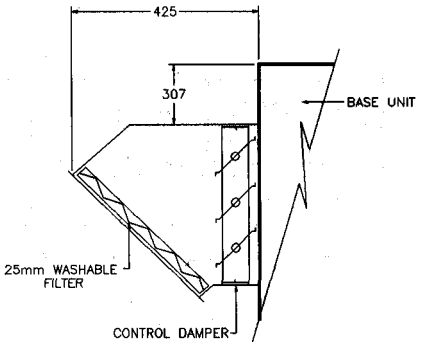
ELEVATION



UNIT MODEL	A	B	F/A HOOD
GPU-240/250	1400	2100	300Wx610H
CPU-280	1675	2540	400Wx610H

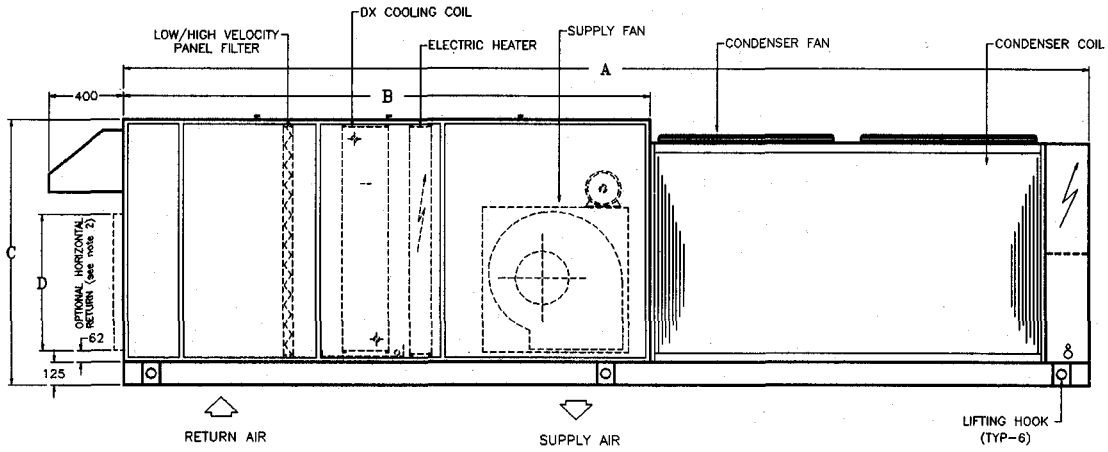
SERVICE CLEARANCE

a. CONDENSER AIR INTAK	= 1600mm
b. CONTROL PANEL	= 1000mm
c. F/A INTAKE	= 1000mm
d. TOP	DON'T RESTRICT CONDENSER FANS.

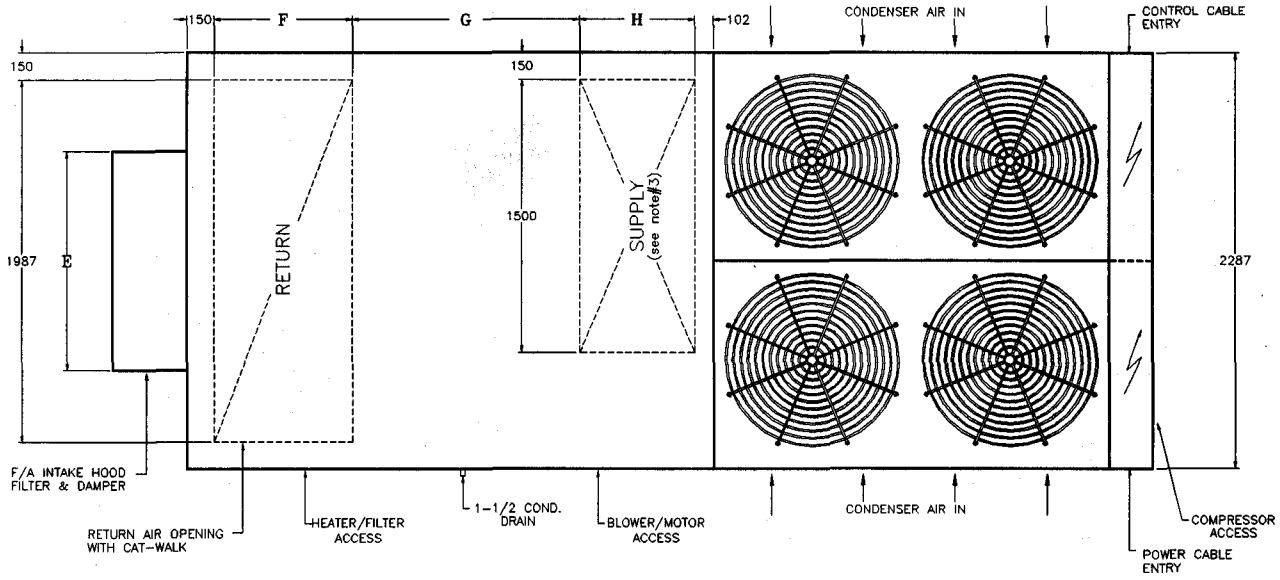


F/A INTAKE DETAIL

Base unit dimensions
Model GPU-340/350 & 440/450(Down Blow)



ELEVATION



PLAN

UNIT MODEL	A	B	C	D	E	F	G	H
GPU-340/350	5262	2875	1455	750	1200	750	1244	629
GPU-440/450	6110	3468	1722	850	1500	850	1671	695

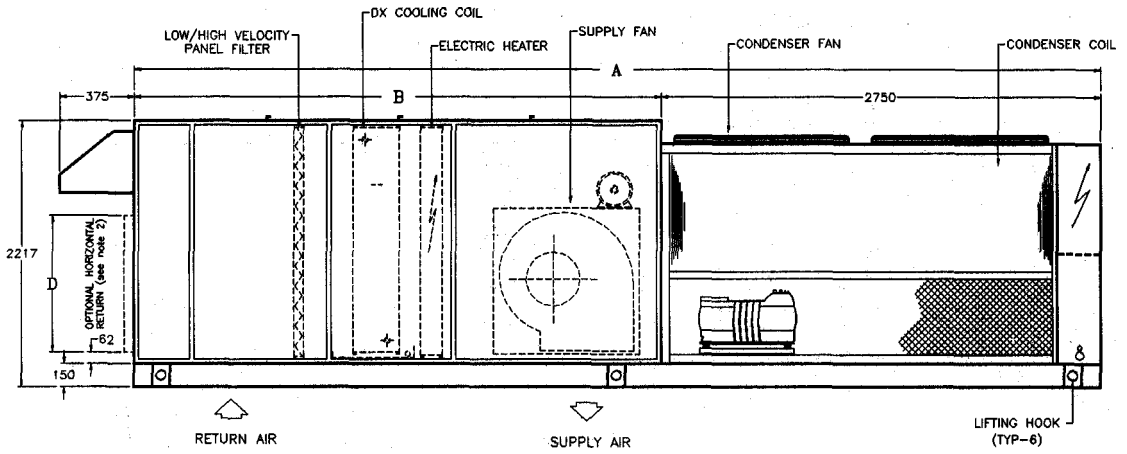
ALL DIMENSIONS ARE IN MILLIMETERS

NOTES:
1. FOR ECONOMIZER SYSTEM HOOD SUPPLIED FOR 100% FRESH AIR.
2. FOR ECONOMIZER SYSTEM WITH POWER EXHAUST, HORIZONTAL RETURN NOT AVAILABLE.
3. TOP SUPPLY AIR DISCHARGE POSITION IS AVAILABLE.

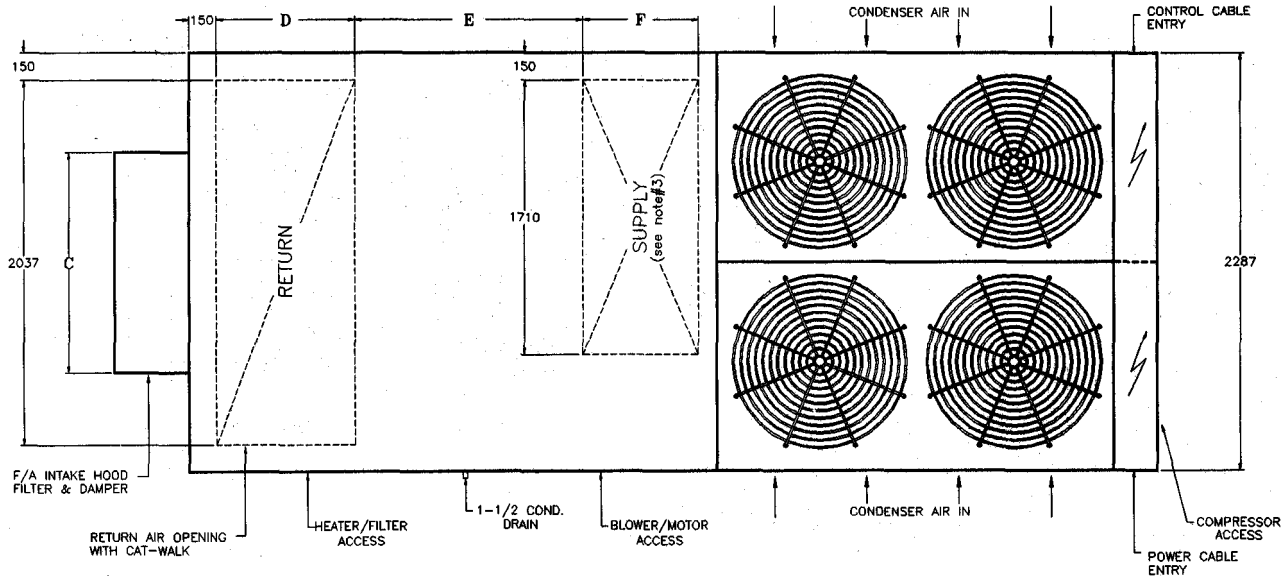
SERVICE CLEARANCE

a. CONDENSER AIR INTAKE - 1500mm
b. CONTROL PANEL - 1000mm
C. F/A INTAKE = 1000mm
d. TOP - DON'T RESTRICT
CONDENSER FANS

Base unit dimensions
Model GPU-550/650



ELEVATION



PLAN

UNIT MODEL	A	B	C	D	E	F
GPU-550	5930	3180	1800	873	1305	750
GPU-650	6260	3510	2000	900	1533	825

ALL DIMENSIONS ARE IN MILLIMETERS

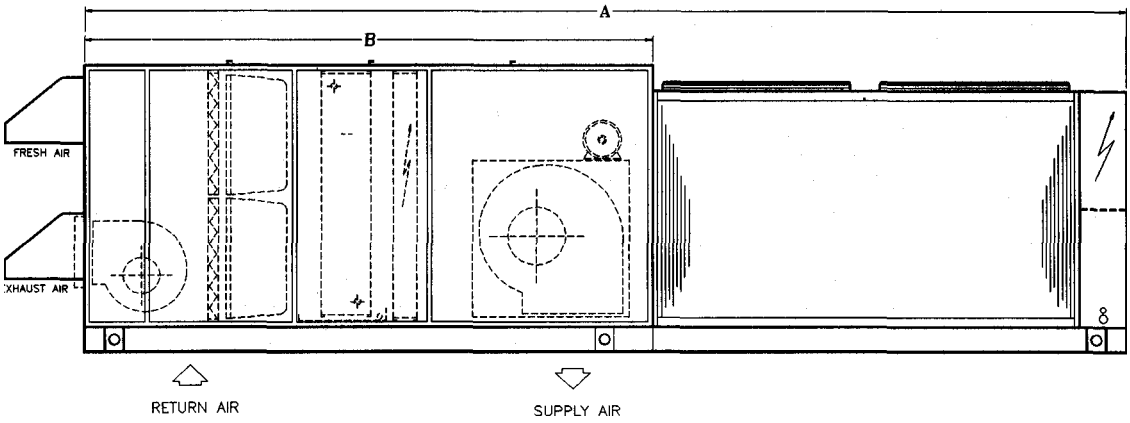
NOTES:
1. FOR ECONOMIZER SYSTEM HOOD SUPPLIED FOR 100% FRESH AIR.
2. FOR ECONOMIZER SYSTEM WITH POWER EXHAUST, HORIZONTAL RETURN NOT AVAILABLE.
3. TOP SUPPLY AIR DISCHARGE POSITION IS AVAILABLE.

SERVICE CLEARANCE

a. CONDENSER AIR INTAKE = 1500mm
b. CONTROL PANEL = 1000mm
c. F/A INTAKE = 1000mm
d. TOP = DON'T RESTRICT CONDENSER FANS.

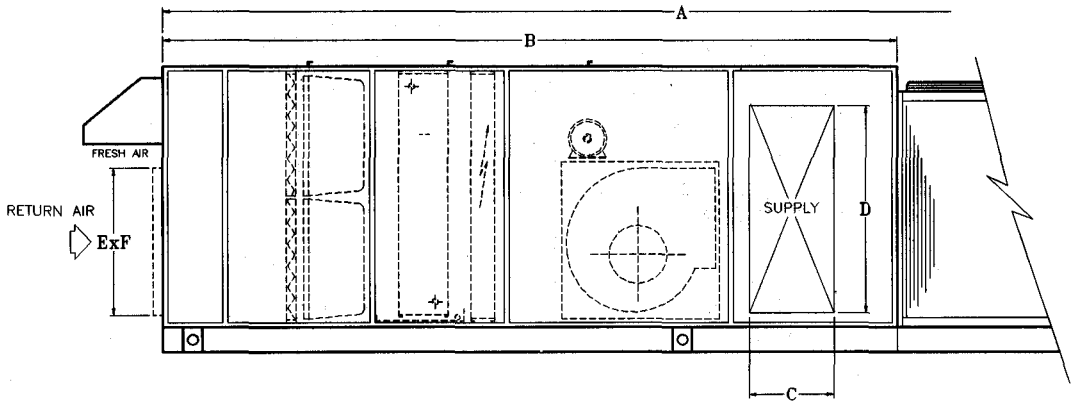
Optional evaporator section arrangement
Model CPU-340 thru GPU-650

O UNIT WITH 60-65% AVE. EFF. BAG FILTER
AND POWER EXHAUST FAN



UNIT MODEL	QPU-340/350	QPU-440/450	GPU-550	GPU-650
A	5562	6410	6230	6560
B	3175	3768	3480	3810

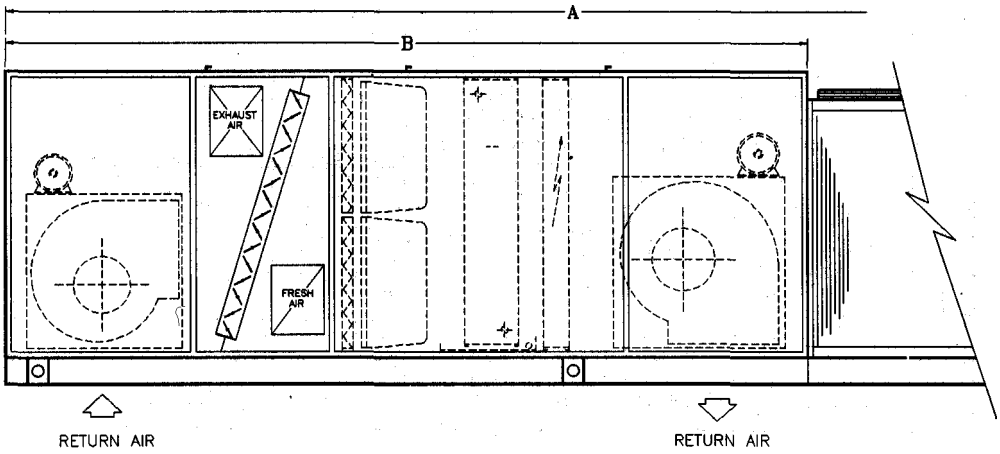
o UNIT WITH HORIZONTAL RETURN/SIDE DISCHARGE



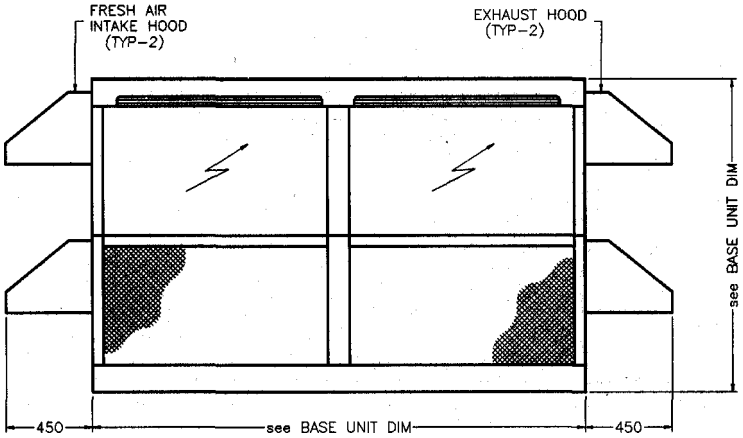
UNIT MODEL	QPU-340/350	GPU-440/450	QPU-550	GPU-650
A	6462	7310	7210	7540
B	4075	4668	4460	4790
C	750	750	825	900
D	1200	1400	1750	1750
E	750	850	873	900
F	1987	1987	2037	2037

NOTES;
1. SUPPLY DUCT OPENING AT LH SIDE, REFER TO RETURN DUCT.
2. SUPPLY AIR POSITION AVAILABLE WITH VERTICAL DISCHARGE,
FOR SUCH APPLICATION "A" DIMENSION AS SAME AS BASE UNIT.

O UNIT WITH RETURN AIR FAN/100% ECONOMIZER

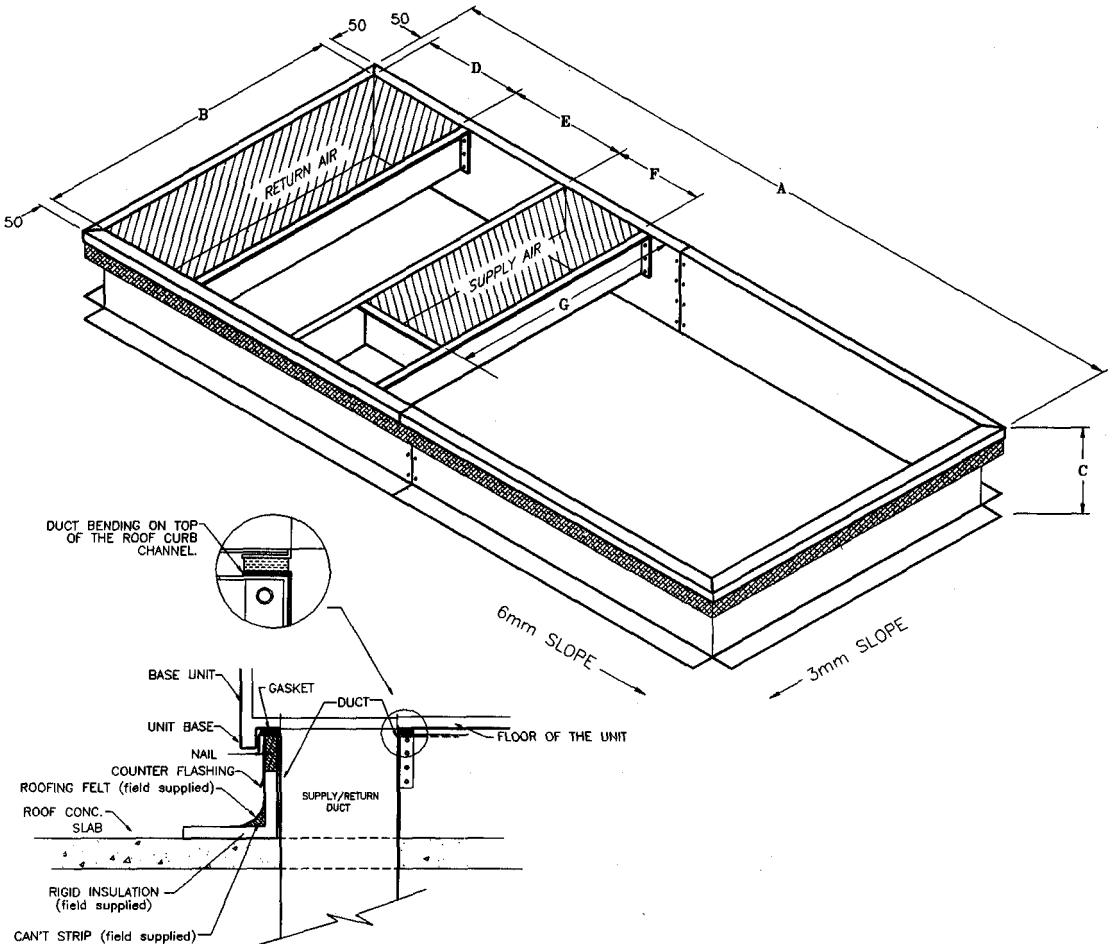


UNIT MODEL	GPU-340/350	GPU-440/450	GPU-550	GPU-650
A	6762	7910	7810	8140
B	4075	5268	5060	5390



NOTES:
1. OPTIONAL SUPPLY AIR POSITION AVAILABLE IN VERTICAL AND RETURN AIR HORIZONTAL.

Accessory dimensions
Base unit Roof Curb



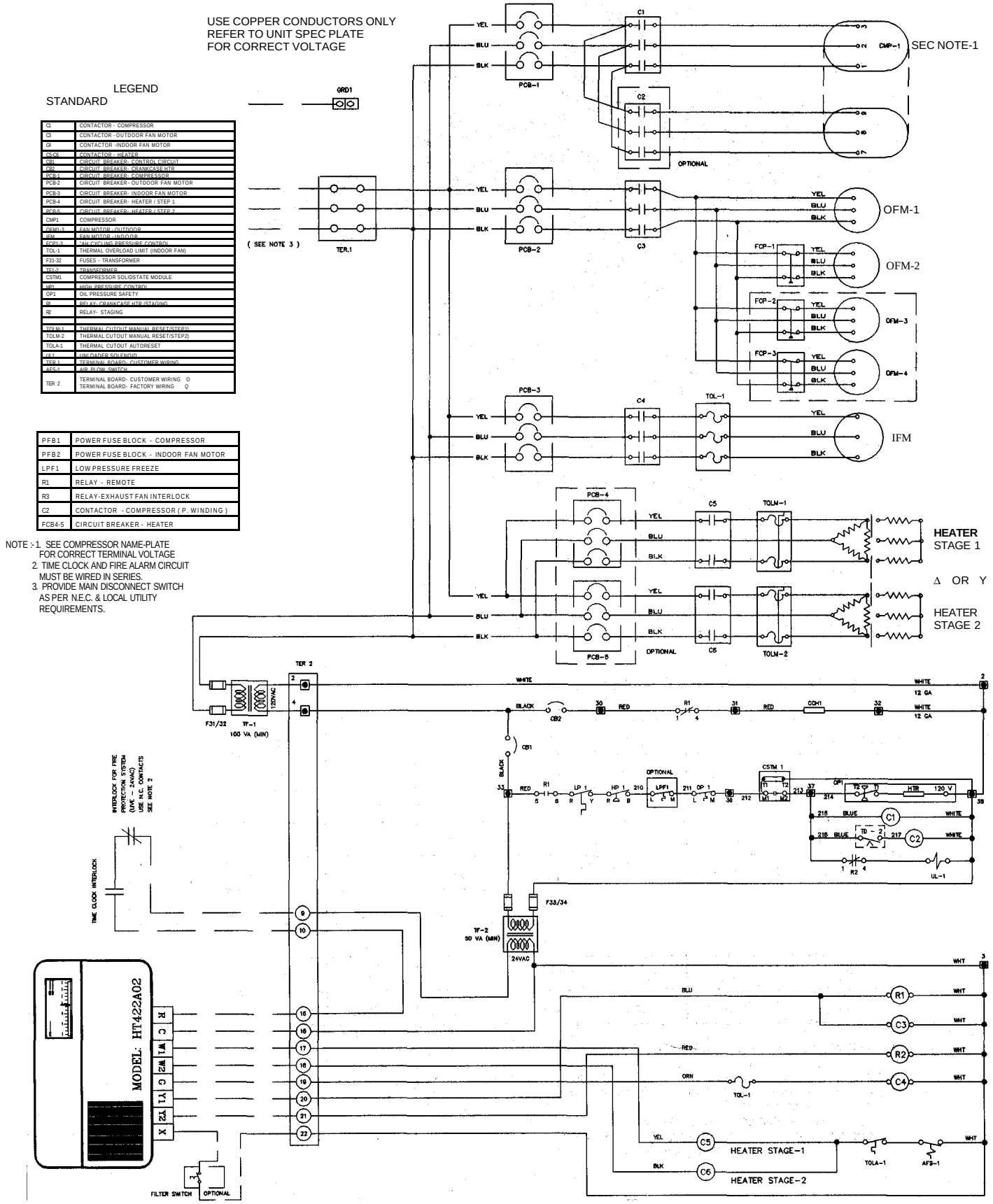
DETAILS OF ROOF-CURB FIXING

UNIT MODEL	A	B	C	D	E	F	G
150	3008	1800	305	450	640	341	1400
180	3008	1800	305	500	540	391	1400
240/250	3577	1800	305	610	505	425	1400
280	3577	2240	305	610	505	425	1675
340/350	4962	1987	350	750	1244	629	1500
440/450	5810	1987	350	850	1671	695	1500
550	5630	1987	350	873	1305	750	1710
650	5960	1987	350	900	1533	825	1710

ALL DIMENSIONS ARE IN MILLIMETERS

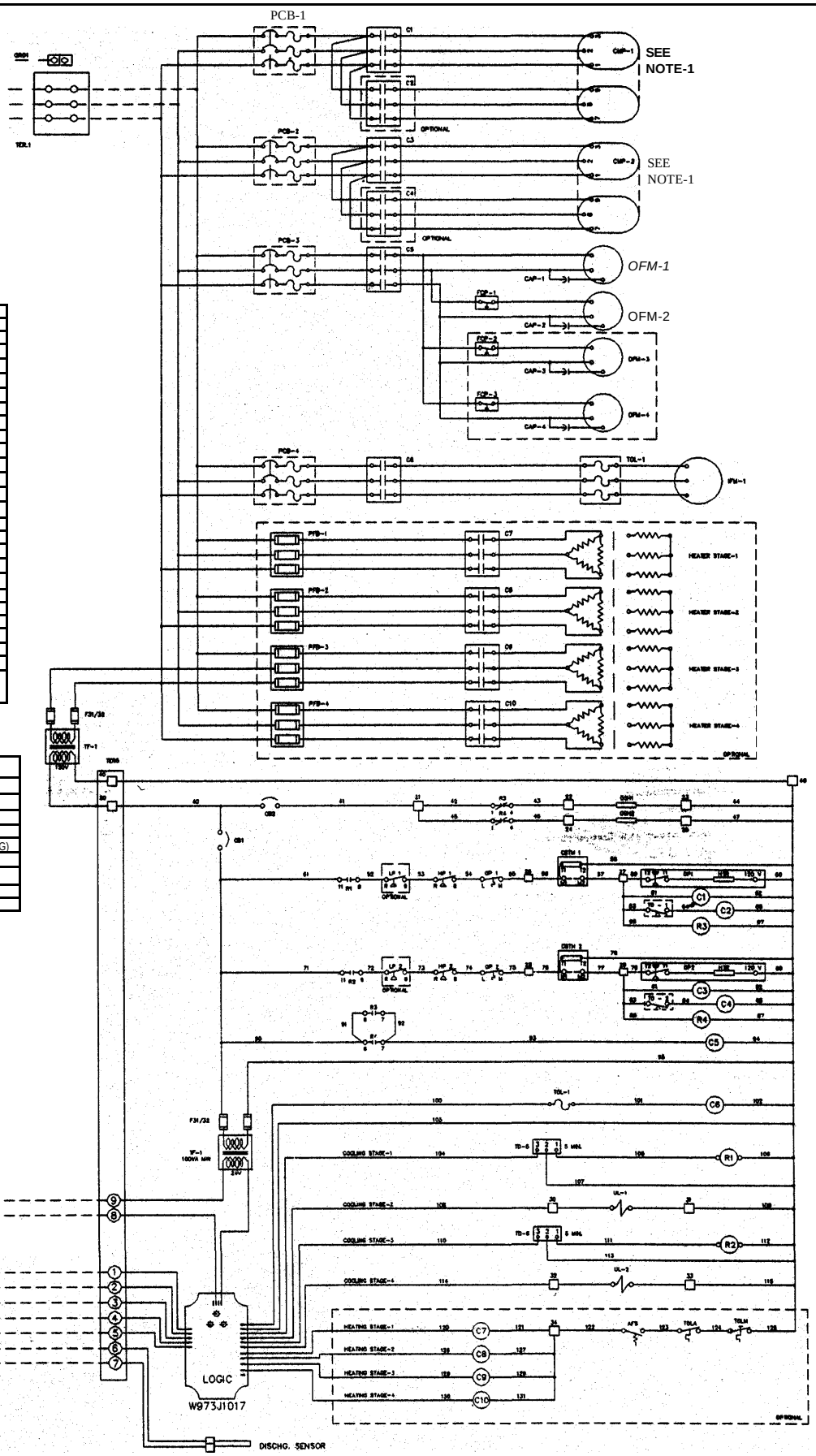
NOTES:
1. FOR PROPER CONDENSATE DRAIN, INSTALL ROOF CURB WITH SLOPE AS SHOWN.
2. ROOF CURB SHIPPED LOOSE FOR FIELD ASSEMBLY.
3. CONSULT FACTORY FOR ROOF CURB DIMENSIONS WHEN EVAPORATOR SECTION ACCESSORIES ARE USED.

TYPICAL POWER/CONTROL WIRING DIAGRAM
MODEL: GPU 150 - 440
220-380-460V/3Ph/50-60Hz



TYPICAL POWER / CONTROL WIRING DIAGRAM
MODEL : G. P. U. 250 TO 650
FOUR STAGE COOLING / FOUR STAGE HEATING
POWER SUPPLY : 220-380-460V/3PH/50-60HZ

USE COPPER CONDUCTORS ONLY
REFER TO UNIT SPEC PLATE
FOR CORRECT VOLTAGE



LEGEND

STANDARD

C1-C2	CONTACTOR - COMPRESSOR
C5	CONTACTOR - OUTDOOR FAN MOTOR
C6	CONTACTOR -INDOOR FAN MOTOR
C7-10	CONTACTOR - HEATER
CB1	CIRCUIT BREAKER - CONTROL CIRCUIT
CB2	CIRCUIT BREAKER - CRANKCASE HTR
PCB3	CIRCUIT BREAKER - OUTDOOR FAN MOTOR
PFB1-4	POWER FUSE BLOCK - HEATER
CMP1-2	COMPRESSOR
OFM1-4	FAN MOTOR - OUTDOOR
IFM-1	FAN MOTOR - INDOOR
FCP1-3	FAN CYCLING PRESSURE CONTROL
CAP1-4	FAN CAPACITORS
TOL1	THERMAL OVER LOAD LIMIT-INDOOR FAN
UL1-2	UNLOADER SOLENOID
F31/1-32	FUSES- TRANSFORMER
TF1-TF2	TRANSFORMER
CSTM1	COMPRESSOR SOLID-STATE MODULE
HP1-2	HIGH PRESSURE CONTROL
AFS	AIRFLOW SWITCH
OP1-2	OIL PRESSURE SAFETY
TOLM	THERMAL CUTOUT MANUAL RESET
TOLA	THERMAL CUTOUT AUTORESET
R1-2	RELAY - STAGING
R3-4	RELAY - CRANKCASE HEATER
PCB1-2	CIRCUIT BREAKER - COMPRESSOR
TER 5	TERMINAL BOARD - CUSTOMER WIRING TERMINAL BOARD - FACTORY WIRING

OPTIONAL

HGS1	HOT GAS SOLENOID
TD5	TIME DELAY 5 MINUTE
PCB5-8	CIRCUIT BREAKER - HEATER
TD-5/6	TIMER, LOCKOUT (5 MIN, DELAY)
PFB1-2	POWER FUSE BLOCK - COMPRESSOR
C2-C4	CONTACTOR - COMPRESSOR (P. WINDING)
LPFI	LOW PRESSURE FREEZE
TD1-2	TIME DELAY PART WINDING

NOTE :-1. SEE COMPRESSOR NAME PLATE FOR CORRECT TERMINALS

2. REMOTE ON/OFF SWITCH WIRE IN **SERIES** (PILOT DUTY POWER 115V) F REMOTE SWITCH IS HOT USED JUMPER TERM. **8 & 9.**

Electrical Data

MODEL GPU	VOLTAGE	TYPE OF START	COMPRESSORS				CONDENSER FAN MOTORS			EVAPORATOR MOTOR		MIN. CIRCUIT AMPA-CITY	RECOM-MENDED MAX. FUSE SIZE
			1#		#2					HP (STD.)	FLA		
			RLA	LRA	RLA	LRA	RLA EACH	QTY	FLA TOTAL				
150	208/230	A/L	59.6	275	-	-	4.2	2	8.4	3	9.0	91.8	125
	380		32.8	180	-	-	2.5	2	5.0	3	5.5	51.5	75
	460		29.0	138	-	-	2.1	2	4.2	3	4.5	45.0	60
180	208/230	A/L	66.0	308	-	-	7.0	2	14.0	5	13.2	109.7	150
	380		38.9	189	-	-	5.0	2	10.0	5	8.0	66.6	90
	460		33.6	173	-	-	3.5	2	7.0	5	6.6	55.6	75
240	208/230	A/L	82.2	428	-	-	3.2	4	12.8	5	13.2	128.7	175
	380		58.6	251	-	-	2.0	4	8.0	5	8.0	89.3	125
	460		40.6	206	-	-	1.6	4	6.4	5	6.6	63.8	90
280	208/230	A/L	94.0	470	-	-	3.2	4	12.8	7 1/2	21.6	151.9	200
	380		71.4	289	-	-	2.0	4	8.0	7 1/2	13.07	110.3	150
	460		45.0	235	-	-	1.6	4	6.4	7 1/2	10.8	73.5	100
340	208/230	A/L	107.0	565	-	-	3.2	4	12.8	7 1/2	21.6	168.2	225
	380		84.1	365	-		2.0	4	8.0	7 1/2	13.07	126.2	175
	460		55.0	260	-	-	1.6	4	6.4	7 1/2	10.8	85.9	125
440	208/230	A/L	142.0	594	-	-	7.0	4	28.0	10	26.6	232.0	300
	380		96.6	365	-	-	5.0	4	20.0	10	16.1	156.8	200
	460		70.0	315	-	-	3.5	4	14.0	10	13.3	114.8	150
250	208/230	A/L	41.0	215	41.0	215	3.2	4	12.8	5	13.2	118.2	150
	380		-	-	-	-	-	-	-	-	-	-	-
	460		20.0	106	20.0	106	1.6	4	6.4	5	6.6	58.0	75
350	208/230	A/L	59.6	275	59.6	275	3.2	4	12.8	7 1/2	21.6	168.5	200
	380		32.8	180	32.8	180	2.0	4	8.0	7 1/2	13.07	94.8	125
	460		29.0	138	29.0	138	1.6	4	6.4	7 1/2	10.8	82.4	100
450	208/230	A/L	66.0	308	82.2	428	7.0	4	28.0	10	26.6	223.3	300
	380		38.9	173	58.6	251	5.0	4	20.0	10	16.1	148.2	200
	460		33.6	173	40.6	206	3.5	4	14.0	10	13.3	111.6	150
550	208/230	A/L	82.2	428	94.0	470	7.0	4	28.0	15	39.0	266.7	350
	380		58.6	251	71.4	289	5.0	4	20.0	15	28.6	191.4	250
	460		40.6	206	45.0	235	3.5	4	14.0	15	19.5	130.3	175
650	208/230	A/L	94.0	470	94.0	470	7.0	4	28.0	20	51.0	290.5	400
	380		71.4	289	71.4	289	5.0	4	20.0	20	30.8	211.4	275
	460		45.0	235	45.0	235	3.5	4	14.0	20	25.5	140.7	175

Notes:

1. A/L: Across line start. Optional partwinding start available on all models except GPU-250, 380 volts.
2. Rated Load Amps comply with compressor motors continuous current rating and N.E.C. Article 440-52,b,2.
3. Minimum circuit ampacity is per N.E.C. Section 430-24.
4. For 50Hz power supply data, consult factory.
5. Minimum circuit ampacity is based on standard evaporator motor.

VOLTAGE TOLERANCES:

208V; Min= 187V, Max = 229V 230V; Min= 209V, Max = 253V 380V; Min= 342V, Max =418V 460V; Min= 414V, Max = 506V.

Sequence of Operation

(Base Unit)

System Selection

System thermostat has Cool/Heat/ Automatic and fan On/Auto Selection.

Fan Selection

- **Place fan selector switch into the ON position. The fan will turn ON and run continuously.**

- **Place fan selector switch to Auto position. Fan will activate whenever the system turns ON for heating or cooling.**

System Automatic change over

Thermostat incorporates an automatic change over feature with built in 2º dead band. When the Cool / Automatic / Heat Switch is placed into the Automatic position the thermostat will automatically switch between heating and cooling based on room temperature.

Cool mode

When space temperature increases above thermostat set point, Relay Rl energize (provided the system stopped more than 5 minutes from the last call for cooling, Lockout time) start the compressor together with first stage condenser fan. Crank case heater de-energize. If head pressure reaches to set points of condenser fan cycling pressure switches additional fan start to maintain system discharge pressure.

A further increase in space temperature Relay R2 energize the second stage of cooling. (GPU-250 through 650 has 4 stages of cooling controlled by solid state Logic in the same manner of 2 stage cooling system)

As the space temperature reaches the set point, the Relay R2 de-energize stop the second stage cooling. A further drop in temperature Relay Rl de-energize and stop the compressor. At any time HP/LP/Oil pressure switches trip, system cannot restart until reset them manually.

Heating mode

In heating mode, if space temperature drop below thermostat set point, first stage of heating energize provided safeties such as air pressure switch, thermal cutout(s) etc., in its normal position.

A further decrease in space temperature, second stage heating energize to maintain thermostat set point. (GPU-250 through 650 has 4 stages of heating controlled by solid state Logic panel)

As . space temperature increases, the sequence reverses.

Operating Sequence with Economizer

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 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 62ºF, 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.

SELF - CONTAINED AIR CONDITIONING UNIT
SERIES GPU (15 - 60 TONS)

Guide specifications

Unit shall be a one piece air-cooled cooling and electric heating and shall be mounted on a full perimeter roof curb. Standard unit shall include a manual outdoor air inlet. Unit shall be Goldenstar model GPU_____or approved equal.

Total cooling capacity of unit shall be Btuh or greater and sensible heat capacity shall be ____ Btuh or greater at conditions of_____cfm evaporator air entering unit at _____Fº wet-bulb, _____ Fº dry-bulb and condenser entering air temperature of ____ Fº dry-bulb.

Unit compressor(s) shall be serviceable semi-hermetic with crankcase heater(s) and suitable vibration isolators. Compressor(s) shall be of low sound discuss type with solid state motor protection.

Fan and motors - indoor blowers shall be forward-curved, centrifugal, belt-driven type capable of delivering cfm at in wg. external static pressure. Motor pulley shall be adjustable pitch. indoor blower motor shall be hp with permanently lubricated bearings. Outdoor fan shall be of the propeller type, with direct-driven permanently lubricated motor of hp or less. Outdoor fans shall be discharged upward.

Unit cabinet shall be constructed of galvanized steel, bonderized and coated with baked enamel finish. Cabinet interior shall be insulated with 1º thick neoprene-coated fiberglass/Double skin with polyurethane insulation. Cabinet panels shall be easily removable for service to all operating components. A condensate drain for the indoor coil shall be provided.

Controls - The cooling system shall be protected with high pressurestat, low pressurestat, loss-of-charge protection and current and temperature sensitive overload devices.

Heat exchanger shall be tubular in design and constructed of corrosion-resistant copper tubings and aluminum fins.

Unit electrical connections - Cabinet shall contain suitable openings for routing of all utility connections. The base unit shall contain a terminal strip in the control compartment to allow for terminal-to-terminal connection of room thermostat and field installed accessories.

Unit shall be provided with integral Lock Out Timer circuit to prevent compressor short cycling as a result of a rapid change in thermostat setting. Also, automatically prevents compressor restart for at least 5 minutes after shutdown.

Maximum dimension - Width in.,Depth in., height inches.

Accessories and option

The following factory-installed options (FIOP) or field installed accessories (accessory) shall be provided.

Roof curb shall be of the same manufacturer as unit. Dimensions shall be provided to allow for easy duct location and connection to roof curb prior to unit placement.

Economizer shall include return air (R.A.) and outside air (0.A.) dampers, outdoor air filter and hood, and fully modulating electric control system with adjustable mixed air thermostat. Control shall be capable of introducing up to 100% outdoor air. The control changeover from mechanical cooling to economizer operation shall be fully automatic.

Alternate motor and drive assembly to provide ,control cfm and static pressure capability.

Remote control panel - The panel shall provide central control of heating, cooling, indoor fan and outdoor air damper. Indicator lights for unit functions shall be provided.

Micro processor based thermostat assembly shall provide staged heating and cooling, automatic changeover and fan control.

Head pressure control - A solid-state outdoor air fan speed control to permit unit to operate down to -2OºF shall be provided.

Unit shall be provided with Micro computer control 'for VT-VAV System. No. of controlled zone to be not less than shown in schedule.

Unit shall be provided with DDC controls for energy management system and where multiple units are installed; the unit must be capable of interworking to facilitate staging and changing operating priority under fault conditions.

Two-position damper - allowing remote closure of 25% outside air opening when unit shuts down shall be provided.