GemCool

PC SERIES

AIR COOLED CONDENSING UNITS
HIGH EER, DESIGNED FOR GCC
72 - 660 MBH

GUIDE SPECIFICATIONS

PC series of condensing units are designed taking harsh GCC conditions in consideration. Units are made to work on high ambient temperatures, high evaporator temperatures and highly corrosive conditions. The temperature difference between the ambient air and condensing temperature is kept to 11oC to ensure robustness. Emphasis is placed on installing quality components to maximize efficiency, longetivity and minimize power consumption. PC units can be used in a variety of applications ranging from supermarkets to multi storey buildings. They can be used for fresh air or recirculating air applications. Single or multiple PC units can be used with one indoor unit.

CABINET

The cabinet is made for 2mm thick 275 GSM GI sheet which is powder coated to a thickness of 50 microns for high corrosion protection and attractive appearance. Cabinet is reinforced with several interconnecting channels to form a rigid structure. Cabinets are made with flanges to allow smooth and noise free operation of condenser fans. A tapered base is installed beneath the unit to facilitate easy lifting and installation. Cabinet comes with several access panels to perform swift maintenance. All access panels are gasketed to make it air tight and reduce vibration and noise. Glands are used to prevent direct contact between wires and cabinet. All steel components of the unit are fabricated from a CNC punch press to obtain tight tolerances and highly accurate measurements.

PIPING

Piping between various components is achieved by using thick and rigid copper pipes and joints. All pipes are brazed using best practices to minimize leaks and ensure rigidity. Rubber braced fasteners are used to secure pipes to the cabinet to reduce vibration and start up stresses. Filter driers and solenoid valves are installed inline to protect components and reduce installation time. Service valves are installed as standard to allow quick pipe attachment and easy refrigerant recovery if required. Sensors are brazed to pipes to allow accurate measurements and quick replacement. Shut off valves allow isolation of compressor to change any installed component. Pipes are terminated outside body with capped and labeled ends to allow swift installation. Pipes are flushed with various agents to remove brazing by products. Pipes are tested for 36 hours with high pressure to ensure long term service. Pipes are charged with holding pressure of refrigerant or nitrogen to ensure no leaks before installation. All suction pipes are insulated to prevent any heat transfer.

CONDENSER FANS & MOTORS

Condenser fans are installed on the cabinet in a top discharge configuration. All condenser fans are selected to give required air flow even at partially blocked coil conditions. All condenser fans feature high efficiency, high power IP44 motors. Condenser fans can be removed without requiring any cabinet disassembly. Noise criteria is carefully considered while selecting the fans and motors. Models over PC 40 feature powder coated aluminum blade propeller type fans driven by totally enclosed air over (TEAO), 6 pole high ambient temperature motors. Motors feature class F insulation and IP 55 weather protection. Fans are individually balanced and are low noise application. Motors are mounted on isolators to minimize transmission of vibrations. Steel columns used solely

to mount motors further reduce vibration transmission to the body.

CONDENSER COILS

Condenser coils are fabricated of 3/8" OD copper tubes. Fins are made of aluminum and are pressure bonded to the tubes through mechanical expansion. Fins are selected to provide maximum contact area while minimizing air pressure drop. Fin spacing used is 14 fins per inch to allow easy cleaning and prevent dust and debris accumulation. Coils are encased in galvanized steel. Headers are made of seamless copper brazed to the tubes. Coils are securely fastened to the cabinet to prevent any damage. Cabinets are structured to eliminate and reduce any coil borne loads. Airflow is restricted to the fins of the coil to maximize efficiency. Coils are selected to meet the condensing requirements of the system at high ambient conditions. All coils are rigorously tested for leaks after fabrication and installation. Flushing with various agents is done to remove any debris left in the pipes leaving it completely residue free. All coils are tested at pressures of 700 psi (48 bar) to eliminate leaks. Coils for models over PC 10 are heresite coated as standard.

COMPRESSOR

Copeland® Scroll compressors are used in PC series condensing unit. Each compressor is selected to satisfy given capacity at high ambient conditions. The combination of high efficiency compressors and fans leads to a high EER (approximately 11). Each compressor in models over PC 40 comes installed with a crankcase heater. Vibration isolators prevent transmission of noise and vibration to the body and surroundings. Vibration absorbers are added inline to compressor piping to absorb pipe vibrations and compressor start up pressure.

STANDARD UNITS

Models below PC 10 have a variety of safety features which have been incorporated. High pressure and low pressure controls are attached in the corresponding piping per compressor. Phase protectors ensure phase stability and protect internal components in case of phase variance. Overload protectors are pre-wired to the compressors to cut power in case of excess intake of current. All compressors have inbuilt motor protection circuits. Timers have staggered values to prevent simultaneous inrush of current in case of multiple compressors. Control panels are incorporated in the body for easy access. Wiring diagrams are affixed to the control panels for ease of installation. Models over PC 35 feature soft starters to prevent high mechanical stresses at startup.

FRESH AIR UNITS

Models over PC 10 used in fresh air applications have additional special controls for protection and monitoring of the compressor. A microprocessor programmable logic controller with inbuilt display controls all aspects of the compressor operation. Any non standard condition encountered by the controller will trigger an alarm and halt compressor operation to prevent damage.

GUIDE SPECIFICATIONS (contd.)

Sensors integrated into the system continuously gather data from the operating environment and send them to the controller. The controller is responsible for the following –

- Monitor the low and high pressure sides of the system and shut down in case of abnormal behavior.
- Monitor the airflow in the evaporator unit and shut down in case of no air flow.
- Measure the inlet and outlet air conditions and suction temperature.
- Turn off condenser fans based on pressure measurements to allow operation in low ambient or low demand situations.
- Prevent compressor short cycling
- In case of multiple compressors, activate stages of cooling based on demand. Alternatively, deactivate stages of cooling in case of lower demand.
- Interface with room thermostat and control unit based on user input.
- In case of fire, shut down full unit immediately.

TECHNICAL DATA

Unit Model		PC 06	PC 08	PC 10	PC 12	PC 15	PC 18	PC 20	PC 25	PC 30	PC 35	PC 40	PC 50	PC 60
PERFORMANCE														
Nominal Cooling Capacity	MBH	83,000	94,000	124,000	140,000	154,000	175,000	248,000	280,000	298,000	364,000	476,000	596,000	728,000
@ 95°F and 45°F SST	kW	24.3	27.5	36.3	41.0	45.1	51.3	72.7	82.1	87.3	106.7	139.5	174.7	213.4
Power Source	V/Ph/Hz	380V / 3φ / 50Hz & 460V / 3φ / 60 Hz												
Refrigerant		R22 / R407c												
Suction ODF	Inch	3/4	1-1/8	1-3/8	1-3/8	1-5/8	1-5/8	1-3/8 x 2	1-3/8 x 2	1-5/8 x 2	1-5/8 x 2	1-5/8 x 2	1-5/8 x 2	1-5/8 x 2
Liquid ODF	Inch	1/2	5/8	5/8	5/8	3/4	3/4	5/8 x 2	5/8 x 2	3/4 x 2	3/4 x 2	7/8 x 2	7/8 x 2	7/8 x 2
Unit Depth	mm	1,030	1,030	2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300	3,100	3,100
Unit Width	mm	885	885	1,100	1,100	1,100	1,100	2,100	2,150	2,150	2,150	2,150	2,150	2,150
Unit Height	mm	1,090	1,090	1,225	1,225	1,225	1,225	1,225	1,700	1,700	1,700	1,700	1,700	1,700
Unit Weight (without charge)	kg	206	271	288	331	389	429	556	587	643	735	1,193	1,499	1,626
COMPRESSORS														
Type		Scroll												
Qty		1	1	1	1	1	1	2	2	2	2	2	2	2
Rated Load Current (Each)	Amps	14.3	15.6	19.2	22.1	26.5	30.0	19.2	22.1	26.5	30.0	33.6	41.4	54.3
Locked Rotor Current (Each)	Amps	100	95	118	118	140	174	118	118	140	174	225	272	310
CONDENSER COIL														
Type		Plate Fin bonded with inner grooved Copper Tubes												
Number of Circuits		1	1	1	1	1	1	2	2	2	2	2	2	2
Face Area	ft^2	20.1	20.1	31.2	31.2	31.2	31.2	35.3	35.3	35.3	35.3	73.8	73.8	98.4
Number of Rows		3	4	2	3	3	4	3	3	2	3	3	4	4
Fins Per Inch		14	14	14	14	14	14	14	14	14	14	14	14	14
CONDENSER FAN														
Type		Propellor												
Quantity		1	1	2	3	2	3	4	4	4	4	4	6	6
Number of Fan Blades		5	5	5	5	5	5	5	5	5	5	5	5	5
Diameter	mm	630	630	630	630	630	630	800	800	800	800	800	800	800
CONDENSER FAN MOTOR														
Type		Integrated motor with thermal protection, insulation grade B						IP55 3 phase, weather proof insulation grade F						
Power Source	V/Ph/Hz	220V/1φ/50Hz/60Hz						380-420V/3φ/50Hz/60Hz						
Quantity		1	1	3	3	3	3	4	4	4	4	4	6	6
Motor Power	Watts	870	870	870	870	870	870	1,500	1,500	1,500	1,500	1,500	1,500	1,500
RPM		1,300	1,300	1,300	1,300	1,300	1,300	950	950	950	950	950	950	950
Full Load Amps (Each)	Amps	1.8	1.8	1.8	1.8	1.8	1.8	3.3	3.3	3.3	3.3	3.3	3.3	3.3

COOLING CAPACITIES

Unit Model	Saturated Suction Temp °F	Air temperature entering condenser °F							
		85		95		105		115	
		MBH	Power (kW)	MBH	Power (kW)	MBH	Power (kW)	MBH	Power (kW)
PC 06	35	63.0	5.5	60.0	6.0	56.0	6.6	51.5	7.4
	40	69.5	5.6	66.0	6.1	62.5	6.7	58.0	7.4
	45	76.5	5.6	72.5	6.2	68.5	6.8	65.0	7.4
	50	84.0	5.7	79.0	6.3	75.0	6.9	71.5	7.5
PC 08	35	75.1	5.9	70.7	6.6	65.4	7.5	59.3	8.4
	40	83.3	5.9	78.7	6.6	73.3	7.5	67.1	8.4
	45	92.2	5.9	87.3	6.6	81.7	7.4	75.3	8.3
	50	102.0	5.9	96.5	6.6	90.6	7.4	84.0	8.3
PC 10	35	98.3	9.1	92.4	10.1	85.8	11.0	78.7	12.3
	40	109.5	9.2	103.0	10.1	96.0	11.0	88.4	12.3
	45	121.0	9.2	114.5	10.2	107.0	11.1	98.9	12.3
	50	134.0	9.3	127.0	10.2	119.0	11.1	110.0	12.3
PC 12	35	112.5	10.0	106.0	11.0	98.2	12.1	89.5	12.5
	40	125.5	10.0	118.0	11.0	110.0	12.1	101.0	12.5
	45	139.0	10.1	131.5	11.0	122.5	12.2	113.0	12.5
	50	153.5	10.1	145.5	11.0	136.0	12.2	126.0	12.5
PC 15	35	123.0	11.0	114.0	12.1	104.5	13.4	94.6	14.9
	40	138.0	11.0	128.5	12.1	118.5	13.4	108.0	14.9
	45	154.5	11.1	144.5	12.2	133.5	13.4	122.0	14.9
	50	172.5	11.1	161.5	12.2	150.0	13.4	138.0	14.9
PC 18	35	143.5	12.6	134.5	13.9	124.5	15.4	113.5	17.2
	40	160.0	12.7	150.5	14.0	140.0	15.5	128.0	17.2
	45	177.5	12.8	167.5	14.0	156.0	15.5	143.5	17.2
	50	196.5	12.9	185.5	14.1	173.5	15.5	160.5	17.2
PC 20	35	196.6	18.2	184.8	20.2	171.6	22.0	157.4	24.5
	40	219.0	18.4	206.0	20.2	192.0	22.0	176.8	24.5
	45	242.0	18.4	229.0	20.4	214.0	22.2	197.8	24.5
	50	268.0	18.6	254.0	20.4	238.0	22.2	220.0	24.6
PC 25	35	225.0	20.0	212.0	22.0	196.4	24.2	179.0	25.0
	40	251.0	20.0	236.0	22.0	220.0	24.2	202.0	25.0
	45	278.0	20.2	263.0	22.0	245.0	24.4	226.0	25.0
	50	307.0	20.2	291.0	22.0	272.0	24.4	252.0	25.0
PC 30	35	246.0	22.7	228.0	24.9	209.0	27.4	189.2	30.4
	40	276.0	22.8	257.0	24.9	237.0	27.4	216.0	30.4
	45	309.0	22.8	289.0	25.0	267.0	27.5	244.0	30.4
	50	345.0	22.9	323.0	25.0	300.0	27.5	276.0	30.4
PC 35	35	287.0	25.9	269.0	28.5	249.0	31.5	227.0	35.0
	40	320.0	26.0	301.0	28.6	280.0	31.6	256.0	35.0
	45	355.0	26.2	335.0	28.7	312.0	31.6	287.0	35.1
	50	393.0	26.4	371.0	28.8	347.0	31.7	321.0	35.1
PC 40	35	382.0	32.0	358.0	35.4	332.0	40.0	306.0	42.0
	40	426.0	32.2	400.0	35.6	372.0	40.2	344.0	44.4
	45	472.0	32.4	444.0	35.8	414.0	40.2	384.0	44.5
	50	522.0	32.4	492.0	36.0	460.0	40.4	428.0	44.6
PC 50	35	480.0	41.4	446.0	45.6	412.0	50.6	378.0	56.6
	40	536.0	41.8	500.0	45.8	462.0	50.8	424.0	56.6
	45	596.0	42.2	556.0	46.0	516.0	50.8	476.0	56.6
	50	660.0	42.4	618.0	46.4	576.0	51.2	532.0	56.8
PC 60	35	584.0	48.4	548.0	53.6	506.0	59.4	462.0	66.4
	40	652.0	48.8	612.0	53.8	570.0	59.6	522.0	66.6
	45	728.0	49.2	684.0	54.0	636.0	59.8	588.0	66.6
	50	808.0	49.6	760.0	54.4	710.0	60.0	658.0	66.8

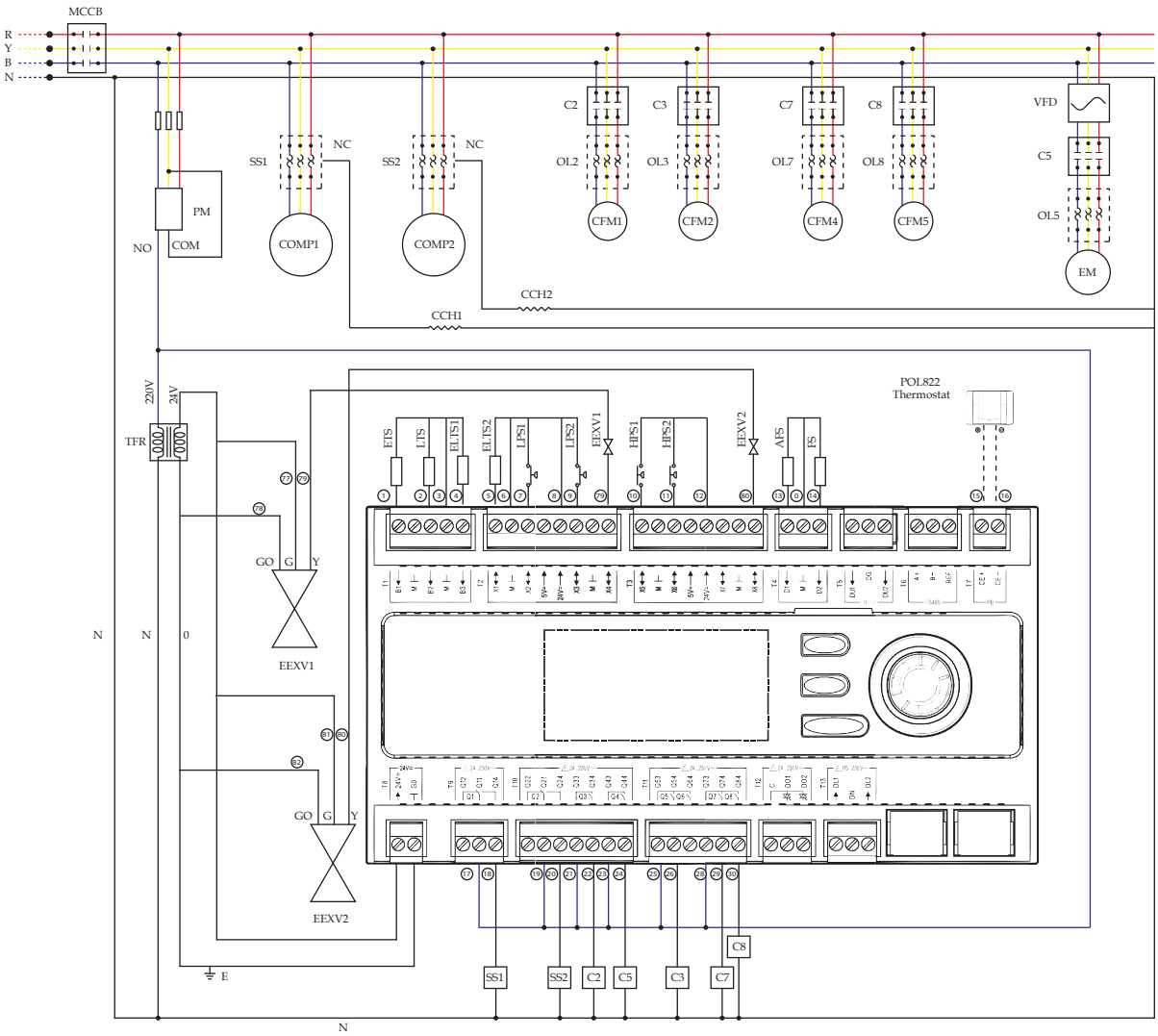
NOTES:

1) All cooling capacities are at voltage of 380-420V and 50 Hz capacities.

2) Power includes compressor and condenser fan motor power consumption.

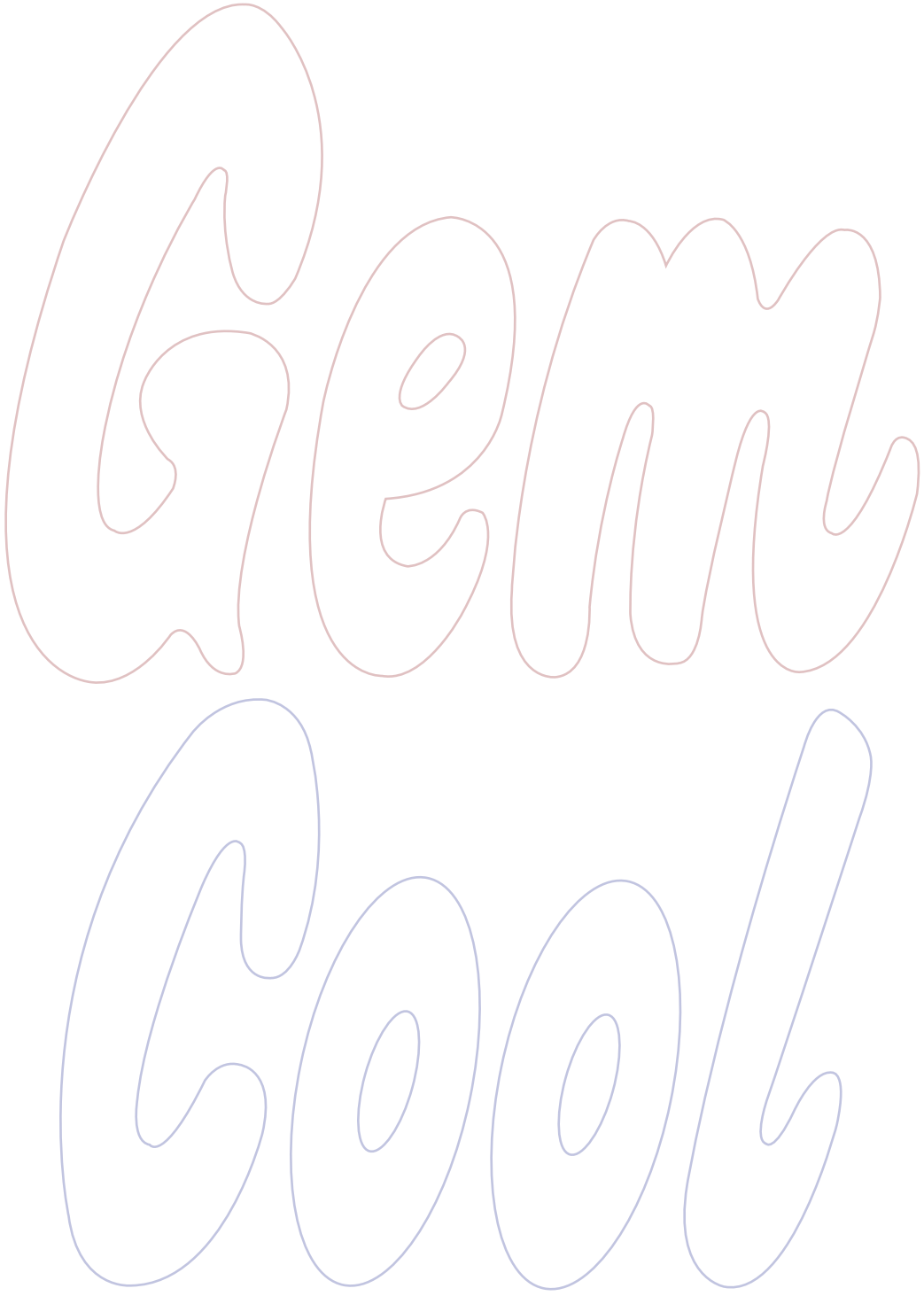
SAMPLE CONTROL PANEL DRAWING

Below is a sample control panel drawing for a PC unit incorporating a micro procesor control. This model has 2 compressors and 4 condensor fans. Thermostat, crankcase heater and fire control are included as well. Additional components like VFD can be incorporated as shown in this diagram. Further details such as contactor ratings and part numbers of controls are put in the final drawing.



AFS	Air Flow Sensor
CCH	Crank Case Heater
COMP	Compressor
CFM	Condensor Fan Motor
C	Contactor
EEXV	Electronic Expansion Valve
EM	Evaporator Motor
ETS	Entering Air Temperature Sensor
FS	Fire Sensor
HPS	High Pressure Sensor
LPS	Low Pressure Sensor
LTS	Leaving Air Temperature Sensor
MCCB	Main Circuit Breaker
OL	Overload
PM	Phase Monitor
SS	Soft Starter
TFR	Transformer
VFD	Variable Frequency Drive
——	Factory Wiring
-----	Field Wiring

GemCool



GEMCOOL CORPORATION

Sharjah Airport Free Zone, Sharjah / Emirates Industrial Zone, Umm Al Quwain
Tel: +9714 223 2420
Fax: +9714 227 8011
Email: info@gemcool.net
Web: http://www.gemcool.net

Rev 3 27/06/17