

Precision Airconditioning Solutions



When precision cooling
is critical to your business.



Precision Airconditioner

A comprehensive environment control system that offers you precise control over temperature, humidity and purity of air within the airconditioned space.

Blue Star's Precision Airconditioners (generally known as PACs or CRACs) come to you from India's No.1 airconditioning company with over 65 years of experience in the field of cooling. Our domain expertise in the field of airconditioning IT spaces is unrivalled. We hold the distinction of airconditioning over 70% of all IT spaces in the country today.

Blue Star's PACs are manufactured in a state-of-the-art plant under technical collaboration with world leaders, **Eaton Williams, UK**, making them by far the best choice for airconditioning business critical applications. Blue Star is also your best bet when it comes to project planning and execution. As an airconditioning major, one of our core competencies is project management. We excel at meeting and beating deadlines when it comes to AC installations. After purchase, Blue Star's robust service processes and the availability of genuine spare parts ensure 24x7 service support.

Little wonder then that industry leaders across the spectrum have chosen Blue Star PACs for their precision cooling requirements.





Application Spectrum

Blue Star's PAC is designed and developed for specific applications that need controlled cooling and 24x7 operation. Some of these applications are mentioned below:

Information Technology

Server Rooms, Computer Rooms etc.

Telecommunications

Internet Farms and Switch Rooms.

Data Centres

Medium and High Density Data Storage Racks.

Process Areas

Control Rooms, Electronic Manufacturing,
CD Manufacturing and Food Processing.

Environmental Control

Archive Storage, Museums, Libraries, Art Galleries, T & M
Laboratories, Textile Laboratories, Tobacco Storage etc.

Industrial

Petrochemical and Manufacturing Areas.

Clean Rooms

Medical and Pharmaceutical Facilities.



Technical Specifications for Precision Airconditioners - Chilled Water Models with EC Fan

Models	Unit	PCL-35 DV	PCL-50 DV	PCL-63 DV	PCL-80 DV	PCL-100 DV	PCL-120 DV
Total Cooling Capacity	kW	35	50	63	80	100	120
	TR	10	14	18	23	28	34
	kcal/hr	29863	42662	53754	68259	85324	102389
Net Sensible Capacity	kW	32	46	58	74	92	110
Sensible Heat Factor		0.92	0.92	0.92	0.92	0.92	0.92
Air Quantity	CFM	5500	9000	10420	14780	15000	16500
External Static Pressure	CMH	9340	15280	17691	25093	25467	28014
	PA	25	25	25	25	25	25
Net Weight	kg	342	342	412	520	850	925
Power Supply		380/420V-3PH-50Hz					
Overall Dimensions							
Width	mm	1300	1700	2050	2500	2500	2500
Depth	mm	880	880	880	880	880	880
Height	mm	1950	1950	1950	1950	1950	1950
Compressor		Scroll					
Humidifier Output	kg/hr	9	9	9	9	9	9
Heater Output	kW	10	10	15	22.5	22.5	22.5
Water Flow Rate	US GPM	25	36	45	57	72	85

All capacities stated at 7°C/12°C water inlet / outlet and room condition at 24°C/50% RH

Technical Specification for Precision Airconditioners - Chilled Water Models

Models	Units	PCL-25 DT/UF	PCL-35 DT/UF	PCL-45 DT/UF	PCL-60 DT/UF	PCL-75 DT/UF
Total Cooling Capacity	kW	25	35	45	60	75
	TR	7	10	13	17	21
	kcal/hr	21000	30000	39000	51000	63000
Sensible Cooling Capacity	kw	23	32	41	54	68
Sensible Heat Ratio		0.92	0.91	0.91	0.91	0.91
Air Quantity	CFM	3850	6000	7800	0200	12800
	CMH	6537	10187	13243	17317	21732
External Static Pressure	PA	25	25	25	25	25
Net Weight	kg	240	342	342	412	520
Power Supply		415 V-3 PH-50 Hz				
Dimensions						
Width	mm	800	1300	1300	1700	2050
Depth	mm	800	880	880	880	880
Height	mm	1950	1950	1950	1950	1950
Compressor		Scroll				
Humidifier Output	kg	9	9	9	9	9
Heater Output	kW	5	10	10	15	22.5
Water Flow Rate	US GPM	18	25	36	45	57

Note :

All capacities stated at 7°C/12°C water inlet / outlet temperatures and room condition at 24°C/50 % RH

* Specifications are subject to change due to continuous product development.

Controlling Dust and Humidity

Impurities in the air and high humidity levels are both endemic to most parts of India, and cannot be wished away. Critical applications therefore need airconditioning systems that can throw ultra-clean air into the space, filtering dust down to negligible levels, while controlling humidity to precise levels. Blue Star's PAC is designed precisely for such applications.



High Performance Filters

The PAC is equipped with high performance, woven media EU-4 filters which are located on the air inlet face of the cooling coil. They ensure filtration of impurities down to 10 microns, and have a 90% retention capacity. The filters are washable and therefore easy to maintain, and made of synthetic material, ensuring long life. A higher purity filtration system is also available as an option for even more stringent requirements. Five micron filters are also available as an option.

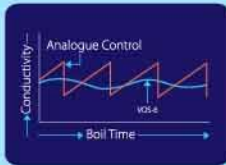


Precise Humidity Control

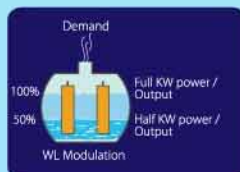
Blue Star's PAC uses the world-renowned VAPAC electrode steam generator to control humidity levels within the airconditioned space. VAPAC systems are known for their high levels of reliability, unparalleled precision and a wide range of customisable features that help fine tune the humidifier to suit varied demands.

The VAPAC Humidification System

The VAPAC system ensures that the PAC can make precise adjustments to control humidity effectively.



It comes with a powerful drain pump and water valve to deliver precise drainage and feed. The steam supply constantly keeps pace with the demand, and there is minimal disruption to steam production. This system also ensures accurate conductivity control.



This system uses water level modulation from 20-100% (current flow). The water level is varied so that the current is matched to the demand.



The VAPAC flow control management system makes fine adjustments to ensure humidification is maintained during changes in supply.

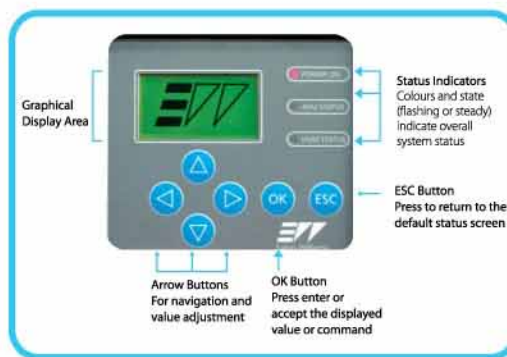


Easy yet Precise Control










Precision cooling systems are complex machines, and can be quite cumbersome to operate. They require hours of operator training to ensure proper use. With constant turnaround of personnel, this can prove to be an arduous task. What's more, these machines need constant monitoring and automatic adjustments to maintain precise conditions at all times. Blue Star's PAC has been specifically designed keeping this in mind, and is easy to operate with minimal training.

Microprocessor Controller

Every Blue Star PAC unit comes with a highly advanced, microprocessor based controller, fully compliant with EEC directives for electromagnetic compatibility (EMC) and BMS compatibility (optional). This not only helps in easy operation but also in maintaining continuous, real-time and precise control over conditions.



Controller Features

-  Password protected for authorised access
-  Local Area Network (LAN) ready to communicate with each other for up to 9 units
-  Auto Time Sharing ensures all units in the network run for an equal number of hours
-  Potential Free Contact facility is available for external fire alarm interlock to stop the unit in case of fire or smoke, and activate an alarm via the address system to intimate that the unit has tripped
-  Allows adjustment of temperature and humidity set points, range of control, alarm set points, remote alarm transmission ability and much more
-  Provision for humidifier controller interface board
-  **BMS** Remote Alarm Transmission and BMS connectivity optionally available
-  Wet Floor Sensor sets off an alarm when moisture level is beyond tolerance
-  PC access software

High Energy Efficiency

Though airconditioning is essential for smooth functioning and high productivity of organisations, it also consumes the highest amount of power. Hence, it's vital that the AC system installed is highly energy efficient, thus reducing power consumption.

Blue Star has always taken the lead in introducing energy efficient technologies and designs to the Indian AC marketplace. Our PACs are no different. Every component, every system, and every process within the PAC is designed to squeeze the maximum out of every bit of energy it consumes to minimise overall power consumption dramatically.

Rapid Dehumidification

Quick dehumidification at optimal evaporating temperature, resulting in precise humidity control and energy savings.

Hot Gas Reheat

Efficient use of heat energy available in the refrigerant cycle to enhance supply air temperature and meet precise dehumidification needs, without using electric energy. A great energy saver.

Hot Gas Injection

Evaporator coil capacity modulation through hot gas injection to maintain precise inside design conditions. Eliminates frequent compressor ON/OFF, increases efficiency and enhances system life span. Available in select models.

U-tube Finned Heaters

High quality, imported, integrated spiral fin heaters operate in steps, through a PID-Controller, depending on the heat load. This saves power considerably.

Twin Compressor Circuit

Blue Star's PAC range has been developed to provide a flexible range of units. Standalone units offer a nominal capacity range from 35 kW to 120 kW with a twin compressor system, which not only regulates temperature more precisely but also saves power considerably by switching off one compressor at part load.

Condenser Fan Regulation

The condenser fan (in the ODU) uses a variable speed drive, which ensures periodical modulation based on the required level of operating pressure as the ambient temperature demands, thus saving power.

EC Fan Option

The electronically commutated (EC) fan offers increased energy saving, on an average as high as 30% even touching up to 50% in certain applications, over the standard DIDW fans.





A Wide Range

Even within the gamut of precision cooling applications, Blue Star understands that different applications require different solutions. Which is why the Blue Star PAC range includes as many as 42 distinct models, with varying capacities and options to ensure that you can always tailor a solution to meet your exact needs.

DX Air Cooled Range

The standard PAC range comes equipped with air-cooled condensers in a range of 9 models offering you capacities from 15 kW to 120 kW – a range wide enough to conveniently cater to cooling needs of any size. Intelligent combinations of units cater efficiently to even larger requirements.

Chilled Water Models

Blue Star's PAC range also offers you chilled water models, with capacities ranging from 25 kW to 120 kW, for applications where chilled water systems may be used.

EC Fan Option

The electronically commutated fan is a valuable option on all Blue Star PACs, offering you even higher energy-efficiency than the regular DIDW fan.

Capacity Slots

Blue Star PAC's are available in 15, 20, 30, 35, 50, 63, 80, 100 and 120 kW capacities in the aircooled range and 25, 35, 45, 50, 60, 63, 75, 80, 100, 120 kW in the chilled water range.

R407C Option

You can choose to order your PAC with the advanced and environmentally friendly R407C refrigerant option.

Flexibility in Configuration

Depending on the location and layout of the space to be airconditioned, the system must allow flexibility in configuration, allowing both upflow and downflow possibilities. The upflow configuration is the automatic choice when a site does not offer a raised floor. The air is then distributed through ducts or outlet plenums. The downflow configuration is chosen when there is a raised floor available to distribute air from the bottom. Blue Star's PAC is designed to allow both configurations. For downflow models, where room height is restricted, the PAC can be mounted on the floor recessing below the false floor.



Out Door Condensers

The outdoor units are available with options for side throw and top throw to suit the site conditions. Optional higher capacity condenser selection at 43°C and 46°C are also available. These feature-packed outdoor units are designed to ensure both power saving and reliability.

Features:

- Variable speed fan operation to operate as per operating pressures
- Polyester powder coated housing
- Blue fin coated hydrophobic aluminium fins
- Inner grooved imported copper pipes
- Weather proof motor fan
- Separate isolator for site repair and maintenance
- Optional higher capacity condenser section at 35°C, 43°C, 46°C



Low Noise Design

Most sensitive airconditioning applications that require precise cooling of the nature the PAC provides also need the AC system to operate silently and with minimal vibration levels. Blue Star's PAC is designed for quiet and low vibration operation.

Low Noise and Vibration

Blue Star's PAC is designed with double skinned insulated doors and panels that make sure that your airconditioned area is free of noise and vibration. They also prevent heat ingress through the body of the machine. The air seal at the doors also ensures minimum air leak. All units are fan driven and designed for low noise. Further, all moving components are mounted on rubber gaskets, making the unit quiet.

Ensuring Long Life

Investments on precision cooling equipment must be well protected by ensuring that the product and all accessories are designed for long life and trouble-free service over its lifetime. As most of the applications like data centres run 365 days or 8760 hours a year, Blue Star has taken special care to build in high reliability and ruggedness into the PAC.

Corrosion-resistant

PAC outdoor units are built to withstand extreme weather conditions. The housing is polyester powder coated to prevent corrosion.

Electrically Secure

Electrical equipment exposed to the outside meet IP54 standards to ensure protection from the environment.

Ensuring Safety

Airconditioning critically sensitive spaces has implications beyond just precision cooling. The AC system must be designed to ensure safety of both the system itself and its surrounds, both to ensure reliable 24x7 operation as well as to prevent untoward accidents. Blue Star's PAC is intrinsically designed for safe operation and incorporates many safety features.

Static Differential Pressure Control

This helps to monitor the pressure drop across the filters and trigger an alarm. This also activates the alarm when the panel door is open, and stops the entire unit.



Fire Retardant Insulation

Flexible open cell polyurethane foam post treated with flame retardant, particulate filled polymeric bonding agent; offers non-flammable fire performance.

Alarms and Controls

Each compressor circuit is protected by high pressure and low pressure safety switches which automatically switch off the compressor and activates an alarm in case of any problem. Alarms also protect the system against overload, airflow failure, high heater temperature, dirty filter and low humidifier water levels.

Ease of Maintenance

Critical airconditioning systems must necessarily be easy to service and maintain, to ensure peak performance at all times and to turnaround quickly in case of a rare failure. Blue Star's PAC is designed for real ease of maintenance.

Easy Accessibility and Serviceability

All components within the PAC can be accessed from the front and no side or back access is required. Full-height hinged doors ensure easy access. Fan motors are mounted on an adjustable base to provide correct tensioning of the wedge belt. This ensures a faster change of belt and running of the fan, without any wear and tear of the wedge belt. All electrical components are equipped with separate MPCBs and contactors. Electrical motors exposed to the outside meet IP-54 standards for protection from the environment, adding to their reliability. Imported Kruger fans ensure long life and maintenance-free operation, being dynamically balanced and fitted with integrated self-aligning mechanisms and permanently lubricated ball bearings.



Chilled Water PAC

Blue Star's Chilled Water Precision Airconditioners are ideal for precise control of temperature, humidity and filtered air. These units can operate on the centralised chiller and can easily be integrated into the building management system. All the units are fitted with a three-way modulating valve. Its non-spring return is designed to offer high static pressure PN-40, multistep control manual override, wide operating temperature range, and wide selection flexibility of kW's.



Technical Specifications for Precision Airconditioners - Chilled Water Models with EC Fan

Models	Unit	PCL-35 DV	PCL-50 DV	PCL-63 DV	PCL-80 DV	PCL-100 DV	PCL-120 DV
Total Cooling Capacity	kW	35	50	63	80	100	120
	TR	10	14	18	23	28	34
	kcal/hr	29863	42662	53754	68259	85324	102389
Net Sensible Capacity	kW	32	46	58	74	92	110
Sensible Heat Factor		0.92	0.92	0.92	0.92	0.92	0.92
Air Quantity	CFM	5500	9000	10420	14780	15000	16500
External Static Pressure	CMH	9340	15280	17691	25093	25467	28014
	PA	25	25	25	25	25	25
Net Weight	kg	342	342	412	520	850	925
Power Supply		380/420V-3PH-50Hz					
Overall Dimensions							
Width	mm	1300	1700	2050	2500	2500	2500
Depth	mm	880	880	880	880	880	880
Height	mm	1950	1950	1950	1950	1950	1950
Compressor		Scroll					
Humidifier Output	kg/hr	9	9	9	9	9	9
Heater Output	kW	10	10	15	22.5	22.5	22.5
Water Flow Rate	US GPM	25	36	45	57	72	85

All capacities stated at 7°C/12°C water inlet / outlet and room condition at 24°C/50% RH

Technical Specification for Precision Airconditioners - Chilled Water Models

Models	Units	PCL-25 DT/UF	PCL-35 DT/UF	PCL-45 DT/UF	PCL-60 DT/UF	PCL-75 DT/UF
Total Cooling Capacity	kW	25	35	45	60	75
	TR	7	10	13	17	21
	kcal/hr	21000	30000	39000	51000	63000
Sensible Cooling Capacity	kw	23	32	41	54	68
Sensible Heat Ratio		0.92	0.91	0.91	0.91	0.91
Air Quantity	CFM	3850	6000	7800	0200	12800
	CMH	6537	10187	13243	17317	21732
External Static Pressure	PA	25	25	25	25	25
Net Weight	kg	240	342	342	412	520
Power Supply		415 V-3 PH-50 Hz				
Dimensions						
Width	mm	800	1300	1300	1700	2050
Depth	mm	800	880	880	880	880
Height	mm	1950	1950	1950	1950	1950
Compressor		Scroll				
Humidifier Output	kg	9	9	9	9	9
Heater Output	kW	5	10	10	15	22.5
Water Flow Rate	US GPM	18	25	36	45	57

Note :

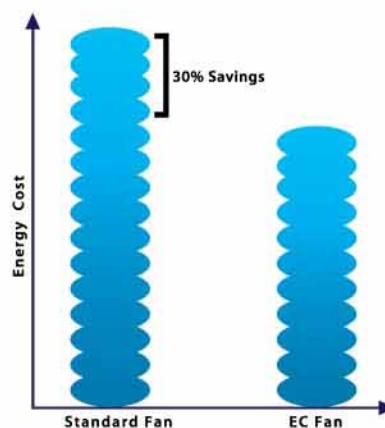
All capacities stated at 7°C/12°C water inlet / outlet temperatures and room condition at 24°C/50 % RH

* Specifications are subject to change due to continuous product development.

EC Fan Technology

At the heart of our innovative cooling products is the EC technology. EC stands for Electronically Commutated - innovative commutation without wear and tear. The EC motor is similar to the direct current shunt-wound motor except that the magnetic field is generated by permanent magnets inside the rotor.

Compared to conventional AC motors, our EC motors need an average of 30% less energy, which rises to even 50% in certain applications. What's more, they can be easily controlled, are maintenance free, offer outstanding efficiency and have considerably longer service life. In addition to this, the variable speed range possible with EC technology makes a wide range of individual models a thing of the past, making life much easier. In terms of pressure build-up, air performance and low noise, the EC fans meet the most stringent specifications.



Technical Specifications for Precision Airconditioners - Air Cooled DX Models with EC Fans

Description	Units	PCX352DVR-1	PCX502DVR-1	PCX632DVR-1	PCX802DVR-1	PCX1002DVR-1	PCX1202DVR-1
Total Cooling Capacity	kw	35	50	63	80	100	120
	TR	10	14.2	18	23	28.4	34
	kcal/hr	29865	42662	53750	68260	85320	102390
Sensible Cooling Capacity*	kW	33	47	59	74	93	112
Sensible Heat Ratio	SHF	0.94	0.94	0.94	0.93	0.93	0.93
Air Quantity	CFM	5500	9000	10420	14780	15000	16500
	CMH	9340	15280	17690	25093	25467	28014
External Static Pressure	PA	25	25	25	25	25	25
Net Weight	kg	530	652	785	840	860	880
Shipping Weight	kg	730	872	985	1090	1110	1130
Power Supply		415V-3PH-50Hz AC					
Overall Dimensions							
Width	mm	1300	1700	2050	2500	2500	2500
Depth	mm	880	880	880	880	880	880
Height	mm	1950	1950	1950	1950	1950	1950
Compressor							
Quantity	no.	2	2	2	2	2	2
Type		Scroll					
Humidifier Output	kg/hr	9	9	9	9	9	9
Heater Output	kW	7.5	7.5	7.5	7.5	7.5	7.5

All capacities stated at 7°C/12°C water inlet / outlet and room condition at 24°C/50% RH

Technical Data for Outdoor Condenser Units - Air Cooled

Description	Units	PCD-352F	PCD-502F	PCD-633F	PCD-402F	PCD-502F	PCD-633F
Quantity	nos.	1	1	1	2	2	2
Dimensions							
Height	mm	690	920	920	760	920	920
Width	mm	1980	1980	2215	1980	1980	2215
Depth	mm	470	470	470	470	470	470

Models with eco-friendly refrigerant available as an option.

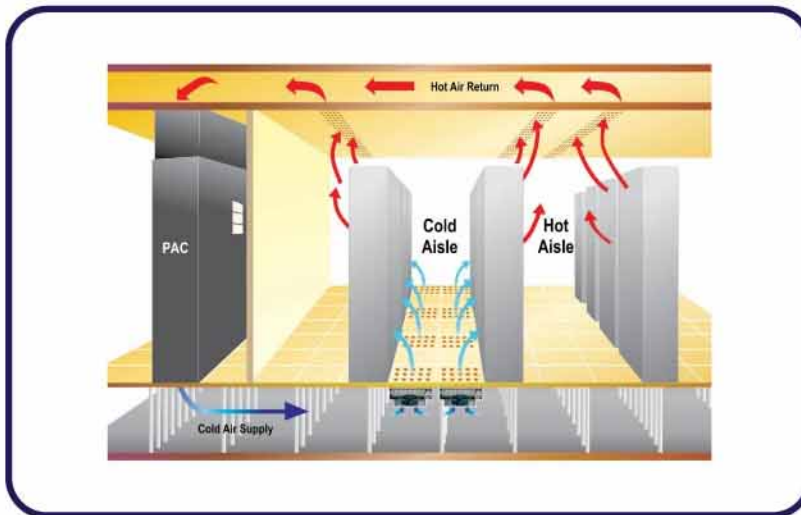


High Density Cooling Solutions

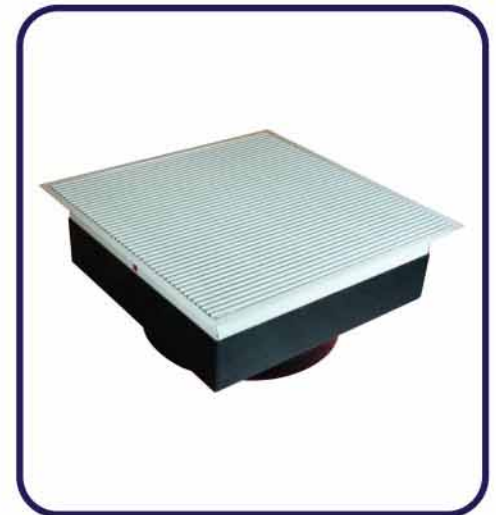
Active Vent Tile System

The Active Vent Tile System (AVTS) is a dynamic system designed for high density loads. The Blue Star AVTS panel fits exactly into a 600 mm x 600 mm floor panel. The AVTS can deliver five times more cool air from the same size panel thus avoiding hot spots. The airflow is modulated according to the load profile monitored by the multiple sensors positioned on the rear side of the server racks. All these features make the AVTS ideal for high density servers in data centres or conventional high density server rooms.

These systems are integrated to ensure optimum operation of the servers. The operating temperatures and under-floor pressures are constantly monitored to ensure that the overall operating parameters of the system is well maintained. This results in high energy efficiency as well as system reliability.



Typical Data Centre Layout



Active Vent Tile

Technical Data

Dimension (L x W)	600 mm x 600 mm
Power Supply	230V - Single Phase - 50Hz
No. of Fan Motors	1 EC Axial Flow Fan
Power (Max)	400 watts
Output Airflow (CFM)	1000 CFM to 2500 CFM
Display Controller	LED
Control	Microprocessor Control

Rear Door Heat Exchangers (RDHx)

Blue Star also brings world renowned Eaton Williams make state of the art "Rear Door Heat Exchangers" designed to provide an environment for high heat density servers IT equipment.



Technical Specification for Precision Airconditioners - Air Cooled DX Models

Description	Units	Models								
		PCX-151 DTS/UFS	PCX-201 DTS/UFS	PCX-301 DTS/UFS	PCX-352 DTS/UFS	PCX-502 DTS/UFS	PCX-632 DTS/UFS	PCX-802 DTS/UFS	PCX-1002 DTS/UFS	PCX-1202 DTS/UFS
Total Cooling Capacity	kW	15	20	30	35	50	63	80	100	120
	TR	4.3	5.7	8.5	10	14.2	18	23	28.4	34
	Kcal/hr	12800	17065	25600	29865	42660	53750	68260	85320	102390
Sensible Cooling Capacity*	kW	14	19	28	33	47	59	74	93	112
Sensible Heat Ratio		0.93	0.95	0.93	0.94	0.94	0.94	0.93	0.93	0.93
Air Quantity	CFM	2600	3300	5100	6000	8600	10750	14000	17000	18900
	CMH	4400	5600	8670	10200	14600	18260	23750	28860	32000
External Static Pressure	PA	50	50	80	80	100	100	100	100	100
Net Weight	kg	250	270	530	530	652	785	840	860	880
Power Supply		415V - 3 PH - 50 Hz								
Overall Dimensions										
Width	mm	800	800	1300	1300	1700	2050	2500	2500	2500
Depth	mm	800	800	880	880	880	880	880	880	880
Height	mm	1950	1950	1950	1950	1950	1950	1950	1950	1950
Compressor										
Quantity	No.	1	1	1	2	2	2	2	2	2
Type		Scroll								
Humidifier Output	kg/hr	9	9	9	9	9	9	9	9	9
Heater Output	kW	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5

Technical Specification for Outdoor Condenser Units - Air Cooled

Description	Units	Models								
		PCD-151F	PCD-201F	PCD-301F	PCD-352F	PCD-502F	PCD-633F	PCD-402F	PCD-502F	PCD-633F
Quantity	Nos	1	1	1	1	1	1	2	2	2
Dimension										
Height	mm	690	690	690	690	920	920	760	920	920
Width	mm	970	970	1980	1980	1980	2215	1980	1980	2215
Depth	mm	470	470	470	470	470	470	470	470	470

Note :

The above selection is based on 35°C ambient conditions with indoor conditions 24°C at 50% RH

Selection can be given for: ~20/22°C indoor conditions at 50% RH

~43 & 46°C ambient condition

* Specifications are subject to change due to continuous product development.

** Models with eco friendly refrigerant available as an option.



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