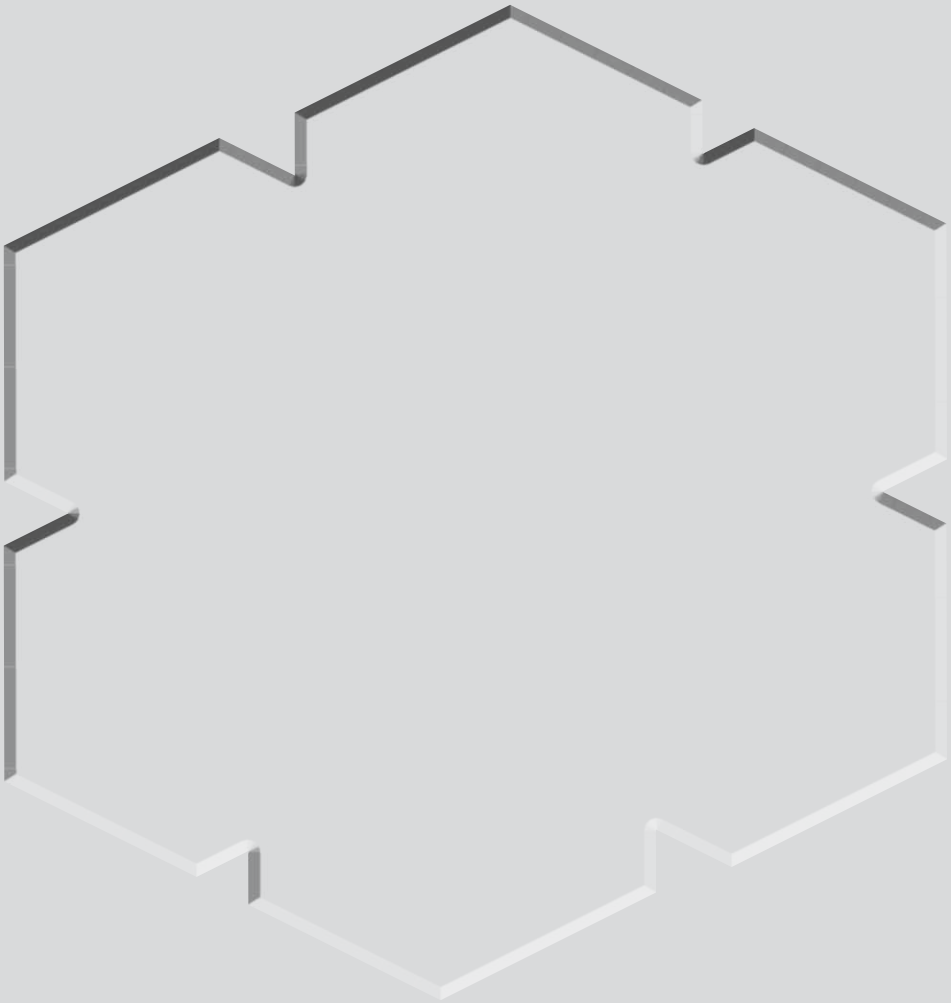
temperzone
QUALITY AIR CONDITIONING

Packaged Air Conditioning

Custom Build Solutions



Packaged Airconditioning Units - PA Range

custom build… customer driven

Custom Build
Customisation of Temperzone packaged units provides a high degree of flexibility and versatility to meet the requirements of the end user.

1. Customisation
2. Airflow distribution
3. Thermal stabilization
4. Dehumidification
5. Humidification
6. Air filtration
7. Noise attenuation
8. System operation

Customer Driven
The focus of engagement between Temperzone and our customers is to work with you to exceed the market expectations regarding innovation, energy efficiency and lifecycle cost optimisation.

Thermal Cube

Temperzone customers throughout New Zealand, Australia and even as far as the U.K., have had the pleasure of using one of the most versatile, adaptable, efficient and economical 'all in one' packaged air conditioning units on the market.

Temperzone engineers are proud to engage their innovative skills and introduce advanced technologies to benefit the customer and revolutionize the product.

Temperzone Custom Build PA Airconditioning units comply with all Regulatory Authority Standards in the countries of distribution at the time of manufacture.

These would include the local building codes as well as the Australian and New Zealand Minimum Energy Performance Standards (MEPS) when applicable.

Designed any which way

+ Mount in any location
+ Airflow in any direction
+ Any amount of fresh air
+ All colours
+ All protected
+ Stainless steel
+ Geothermal protection
+ Coil protection
+ Securing fasteners
+ Unique design features

1 Customisation

The customised packaged unit PA can be placed in various locations such as roof mounted, on the ground, in a carpark or even, with some extra features, in or half in a building. The airflow to and from the air conditioned space can pass though the PA customised unit from left to right or visa versa and can flow through the roof, the floor, the sides or the end of the unit without costing extra. Fresh outdoor air can also be introduced into the building via the PA unit.

Any colour can be specified for the PA unit to blend in with its surroundings or accentuate it as a feature by the choice of the custom powdercoating. All sheetmetal panels are powdercoated on the interior as well as the exterior for extended durability.

An option may be specified when the unit is subject to harsh corrosion to etchprime the panels prior to powdercoating. Another option for extreme durability is stainless steel draintrays, bulkheads and bases. Indoor and outdoor coils use an epoxy coated aluminium fin to give extra corrosion protection.

For areas with high geothermal activity and large quantities of sulphides in the atmosphere, special coil protection and pipe joint materials can be specified. The vulnerable air heat exchange coils visible on the outside of the unit may be protected by coil guards if vandalism is likely.

The PA unit has doors with stainless steel hinges and an allen key pull tight locking mechanism for easy but secure access to the vital components of the unit. All securing fasteners are stainless steel.

Unique design features may be incorporated into the customised PA unit to meet the customer's special requirements. These could be special adaptive plinths for mounting the unit, a hot water de-superheater to provide free hot water to the building, special base rails for transport and shipping or a unit designed for high ambient temperatures built to cope with a desert climate.

Customisation provides a high degree of flexibility and versatility to meet requirements set by the user.

2 Airflow Distribution

The customised packaged unit PA will supply the required quantity of air to the ducting of the building. The design airflow is based on a maximum face velocity on the refrigeration coil of 2.5 m/s and even lower for high humidity applications, to avoid condensate water being carried into the airstream on cooling cycle.

The unit can introduce the required amount of fresh air into the building envelope with a fixed set locking quadrant or modulate this quantity through the opposed bladed geared aluminium damper driven by a damper motor. Most units are specified with an economiser which will save ongoing cooling energy costs by enabling the full quantity of outside air to be introduced into the building when the outside air has significantly less heat content than the air in the building.

The driving force of the airflow traditionally is a standard centrifugal fan plus standard fixed three phase motor with belts and pulleys. A simple option for the standard fans is for the complete assembly to be spring-mounted with a flexible connection to the body of the unit to reduce vibration.

An innovation in air moving fans, introduced into customised package PA units as an option, is the highly efficient EC motor backward curved balanced plug fans. The EC motor is more than 90% efficient and has a fully integrated speed control enabling soft starting. The plug fan enables a simplified unit design as the fan position does not change when changing the configuration of the unit. Constant airflows can be achieved when controlled by an airflow pressure transmitter. The supply air exit velocities are reduced to the same as the return air thus eliminating the need for duct transitions. Commissioning and maintenance costs are reduced by eliminating pulley and belt adjustments or changes.

Traditional fibre fan belts wear and thus produce airborne particles which can be eliminated by specifying EC motor plug fans in industries where cleanliness is of utmost importance. The backward curved plug fans can generate higher static duct pressures than the standard forward curved centrifugal fans and should be used if high duct pressures are required.

The quantity necessary

+ Any quantity of airflow
+ Regulated or fixed fresh air
+ Economizer
+ Full fresh air possibility
+ Standard fans with or without springs
+ EC motor backward curved plug fans
+ No pulleys and belts
+ High efficiency
+ Integrated variable speed drive
+ Soft starting

The use of innovation to meet the variable airflow requirements brings value by optimising energy consumption.

Matching requirements

+ Full temperature control
+ Multiple steps of cooling
+ Multiple steps of heating
+ Variable digital control
+ Custom engineered refrigeration design
+ Zero Ozone depleting refrigerant 'R410A'
+ Electronic refrigerant control
+ Electronic system control
+ De-icing control
+ Fresh air pre heating
+ Boost heating

3 Thermal Stabilisation

The customised packaged unit PA will keep occupied zones of the building in a thermal equilibrium by cooling or heating air as it is moved through the unit.

Smaller units have a minimum 2 control steps in cooling and heating mode and up to 3 or 4 steps are available in the larger units.

Temperzone can match duty requirements with the units by even having mismatched sized compressors in the units to give variable steps of control.

The PA unit lends itself perfectly to accommodate the new technology of digital scroll compressors in cases where the supply air temperature needs to be controlled. This is required in a tempering full fresh air unit or a unit which supplies variable air volume (VAV) terminal space diffusers.

With the help of the temperzone custom engineering team for special applications, a unit can be matched by a selection of compressors, refrigerant coils and fans, to work efficiently at various design conditions.

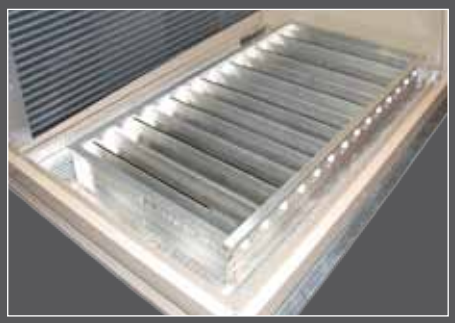
All PA units make use of the new zero ozone depletion refrigerant R410A.

The efficiency of the refrigeration system in cooling as well as in heating cycle is accentuated by the use of electronic expansion valves.

The de-icing of the outdoor coil in heating cycle is minimised by our stand alone electronic system control board (OUC) which not only ensures no cold draught is transferred to the occupied space but also includes safety cut outs and timers to protect the equipment when operating in adverse conditions.

Heating the space in low ambient conditions with a significant amount of cold fresh air entering the PA unit may require this air to be preheated to ensure proper operation of the air conditioning system. This can be done by fitting auxillary electric preheaters. Alternatively a preheat coil can be fitted after the air filters. This can be heated by external hot water or waste heat from a refrigeration plant.

Boost heating electric elements can also be fitted in the custom PA unit to increase the capacity of the unit in heating cycle for the colder climates.



The achievement of true thermal stabilisation balances the comfort needs of occupants with minimal environmental impact.

4 Air Filtration

The customised package PA units can be specified with a wide variety of air filtration options. In the general use of air conditioning, the EU4 grade of filtration is deemed to be sufficient. This can be either selected as a standard cardboard framed disposable 50mm deep pleated filter or the equivalent washable filter. The washable filters have an extruded aluminium frame and removable wire cage to support the filter medium. This filter medium can be washed many times and in due course replaced by new material.

For situations like cinemas and clean rooms a higher grade of filtration is required. The EU4 filter becomes a prefilter up stream of the 100mm deep disposable mircopleated EU6 filters.

Temperzone have also executed projects with PA units specified to include specialised carbon filters to remove odours from the airstream.

All filter sizes in the PA range are the industry module standard measurements.

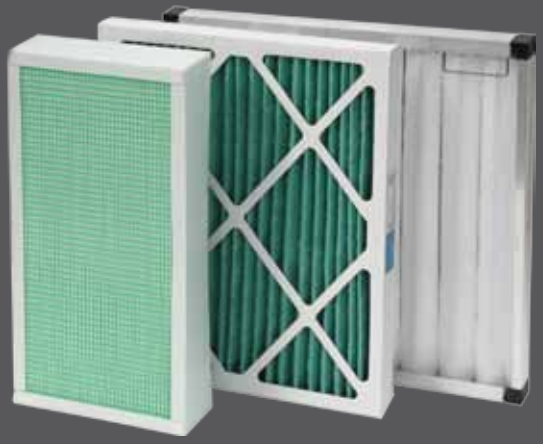
The nominal face velocity is 2.5 metres per second. This will reduce as the filters fill and the pressure across them increases. An optional manometer can be supplied to give an indication of when it is necessary to clean or replace the filters.

The filters in the PA units are downstream of the fresh air entry point, accessible through hinged doors and can be lifted out of the powdercoated rails. For the high-grade filters, special edge sealing pile is fitted to the rails to minimize air bypass.

Clean air is healthy air

+ Grade of filtration
+ Disposable and washable filters
+ EU4 standard
+ EU4 plus EU6 micropleat
+ Carbon filters
+ Standard sizes
+ Indicating manometer
+ Hinged access doors
+ Lift out filter rails

Appropriate filtration selection provides fresh clean air to suit the customer application.



Removing moisture

+ Moisture control
+ Dehumidification by cooling
+ Dew point temperature
+ Epoxy coils
+ Sloping draintrays
+ Reheat cycle
+ Electric reheat
+ Reheat coils

5 Dehumidification

Excess moisture and humidity in the conditioned space can be the cause of discomfort and promote the growth of mildew spores.

To use the air conditioning unit to remove the moisture from the air, the unit must be operating in cooling cycle. Also the temperature of the refrigeration coil fins must be well below the dewpoint of the air. The temperzone PA unit uses epoxy fins on the indoor coils to assist in the water shedding in high humidity conditions. The positive slope on the deep coil draintrays ensure no ponding of excess condensation.

If dehumidification is required but there is no cooling demand in the space, the air leaving the coil must be reheated to replace the sensible heat removed.

The custom PA units can dehumidify by operating half the systems on cooling cycle and the other half on heating cycle by the use of split coils. Also there is a possibility to use the airconditioning PA unit internal rejected heat by means of valves and a heat reclaim coil.

Alternatively, all systems could be on cooling while the air is reheated by electric elements.

For supermarkets, a more energy efficient solution may be found through the co-operation of the air conditioning and refrigeration trades e.g. the use of the refrigeration cabinet system free rejected heat for the heating of the air conditioning reheat coil.

In buildings where hot water is in abundance, this water may be used economically in the reheat coil.

Innovation and co-operation in achieving dehumidification provides a comfortable and high quality environment at minimised energy consumption.

6 Humidification

There is a requirement in some applications for the air not to dry out too much and the humidity in the conditioned space to be kept above a certain level e.g. 40% RH. This can be the case in buildings such as hospitals, museums, and computer electronics rooms.

The custom PA unit can be engineered to accommodate the humidifier and controls.

The humidifier will need a permanent water supply and drainage for the system flush cycle.

Control of the humidifier is either digital or proportional.

Adding moisture

+ Humidifier installation
+ Humidity control
+ Water supply and drainage

Optimum humidity has benefits in sensitive environments.

As quiet as possible

+ Breakout and radiated
+ Separate compressors
+ Acoustic materials
+ Quiet axial fans
+ Forward curved fans
+ Spring mount and flexible connections
+ Indoor acoustic thermal lining
+ Backward curved plug fans
+ Supply air sound power levels

7 Noise Attenuation

There are two distinct issues with noise with air conditioning units.

1. The breakout and radiated noise from the unit to the surroundings causing higher than acceptable noise at the property boundary or other specified point.
2. The noise into the building and occupied space through the ducting and grilles.

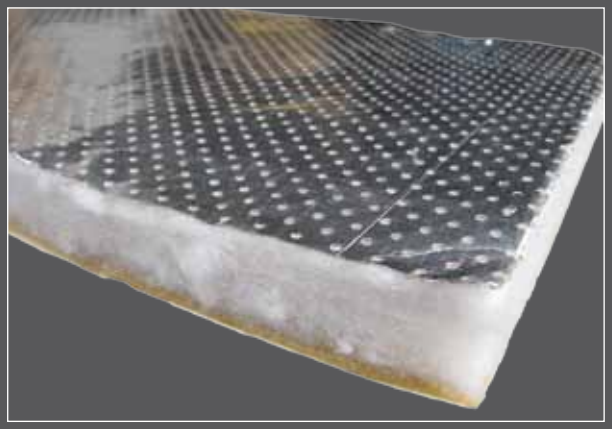
The temperzone customised package unit PA has two sections, both of which have the potential to create noise, the outdoor and indoor section of the unit.

The noise from the outdoor section is dependent on when the compressors and the outdoor air axial fans are operating. The compressors in the unit are in a separate compartment reducing the breakout noise to the environment significantly. This compartment can be lined with acoustic material for better noise attenuation. The axial fans on top of the unit can utilise various sickle blade designs which can reduce the radiated sound levels significantly. The PA unit can also accommodate an acoustic shield around the fans or the unit to enhance the noise attenuation.

The noise in the indoor section of the unit is generated by the supply air fan airflow and vibration. This noise can travel down both the return and supply air ducting to the occupied space. The standard forward curved balanced impeller fans typically cause insignificant vibrations. If this is still a concern, the fans can be spring mounted, but the flexible connection will increase the audible noise by interrupting the smoothness of the supply airflow. Exit airflow velocities are the largest noise source. The fan motor and belt drive generates noise as the belts wear.

The thermal lining of the supply and return air chamber can be replaced by acoustic/thermal insulation material to help reduce the noise transferred down the ductwork.

By using the EC motor backward curved plug fans in the units, the supply air outlet velocities are reduced to the same as the return air. The outlet noise levels are reduced significantly. Because the acoustic/thermal lining is now on the outlet pressure side of the fan, it serves to greatly reduce the supply air sound power level.



Appropriate noise attenuation in the unit can create a quiet internal and external environment and minimise installation costs and disturbance.

8 Operation

The customised PA airconditioning unit requires proper control from expert control system designers to work efficiently and effectively.

The controls will need to operate the components of the custom PA unit dependent on various factors like space and ambient temperatures, humidity or enthalpy. These components can include up to 4 compressors in cooling and heating cycle, (some which may be digital compressors), fans which could be EC motors with VSD drives as well as motorized dampers to control the fresh air quantity or quality.

Temperzone engages the services of control specialist suppliers and consultants when necessary.

Generally the unit is supplied to site without the main building temperature controller fitted. Room is left in the electrical control panel for the controls contractor to fit the space controller and terminals.

Temperzone can offer to fit the controller and temperature / humidity sensors into the unit at the time of assembly as a service to the controls contractor.

Only in rare cases will temperzone design, supply and fit an autonomous controller into a custom build PA unit because the majority of these large systems required site commissioning and integration with the Building Management System (BMS).

The packaged unit can be fitted with a variety of peripheral electrical control items as extras when required. These would include for example a mains power isolator.

The operation and safety features of the internal refrigeration circuits within every custom PA unit, is taken care of by a temperzone developed Outdoor Unit Controller (OUC) and associated circuitry. This includes controlling the operation of the compressors, outdoor fans, and outdoor de-icing dependent on various temperatures, pressures and timers. The OUC also indicates the system status and engages a fault relay when necessary. All compressors are protected by start run timers and from anti rapid cycling as well as control signal chatter and loss of refrigerant.

Totally controlled

+ Building environment control
+ Proprietary controls
+ Controls installation options
+ Sensor mounting
+ BMS integration
+ Outdoor unit controller

The ability to integrate controls to the customer's determination provides compatibility, safety and reduced complexity.

Temperzone CUSTOM PA UNITS Project requirements

Project Name	
Client	
Application: Comfort A/C or Process Cooling	
Cycle: Cooling only or Reverse Cycle	
Required AIRFLOW l/sec	
Required COOLING TOTAL DUTY kW	
Required COOLING SENSIBLE DUTY kW	
Required HEATING DUTY kW	
Design Summer Ambient Temperature °C	
Design Summer Ambient Humidity %RH	
Design Summer Indoor Temperature °C	
Design Summer Indoor Humidity %RH	
Design Winter Ambient Temperature °C	
Design Winter Outdoor Humidity %RH	
Design Winter Indoor Temperature °C	
Required Quantity of Summer Fresh Air l/sec	
Required Quantity of Winter Fresh Air l/sec	
Is an Economiser required	
Is Dehumidification cycle required	
Is Step Staging sufficient	
Is variable capacity needed (digital scroll)	
Does the Airflow vary (VSD, EC motor Plug)	
Is the Air Filtration standard EU4 or higher EU4+EU6	
Is the EU4 filter Disposable or Washable	
Is External Environment Noise an issue	
Is the Internal Fan Noise an issue	
Is the unit in a Corrosive Environment	
Are the Building Controls required	
Special Requests	

To help Temperzone to best meet your needs, we need as much of this information as possible.

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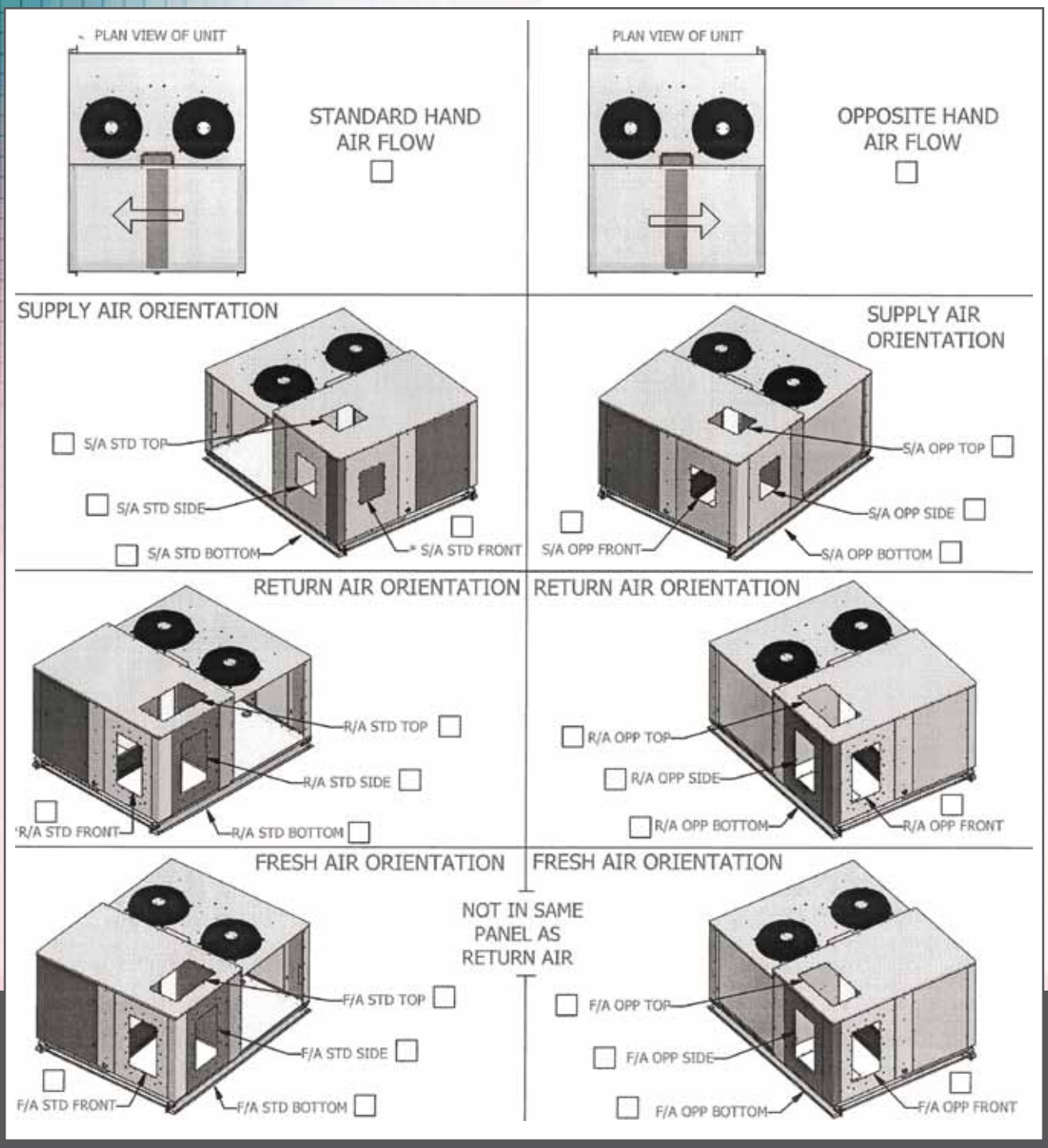
Typical Air Cooled Package Unit Handling



- ☐ Digital Scroll
- ☐ Centrifugal Fan Solid Mount
- ☐ Centrifugal Fan Spring Mount
- ☐ EC motor plug fans
- ☐ Return air damper
- ☐ Fresh air damper
- ☐ F/A fixed damper quadrant
- ☐ F/A and R/A damper quadrant
- ☐ Weatherhood
- ☐ Electric reheat
- ☐ Electric preheat
- ☐ Filters
- ☐ Disposable EU4 pleated 50mm
- ☐ Washable EU4 pleated 50mm
- ☐ Disposable Final EU6 micropleat 100mm

Tick or cross appropriate boxes.

Nominal Technical Summary PA Units

Model Reference	No. of Compressors	Nominal Cooling/ Heating Duty kW*	Nominal Airflow l/s	Nominal Electrical Mccb Amps	Nominal Weight kg	Size: Length x Width x Height in metres
PA 4900	4	180	9000	130	2500	4.5 x 2.3 x 2.1
PA 4800	4	175	8500	120	2300	4.0 x 2.3 x 2.1
PA 4600	4	140	8000	110	2100	4.0 x 2.3 x 2.1
PA 4100	4	128	7500	100	2100	4.0 x 2.3 x 2.1
PA 3800	3	126	7000	100	1600	3.0 x 2.3 x 2.1
PA 3600	3	104	6000	100	1500	3.0 x 2.3 x 2.1
PA 3100	3	96	5000	80	1500	3.0 x 2.3 x 2.1
PA 2801	2	84	4500	80	1200	2.7 x 2.3 x 1.8
PA 2601	2	70	4000	60	1100	2.7 x 2.3 x 1.8
PA 2101	2	62	3500	60	1100	2.7 x 2.3 x 1.8
PA 1801	2	53	3500	50	1000	2.4 x 2.3 x 1.8
PA 1601	2	44	3000	50	1000	2.4 x 2.3 x 1.8
PA 1501	2	50	2400	50	900	2.4 x 1.9 x 1.3
PA 1401	2	42	2200	40	800	2.4 x 1.9 x 1.3
PA 1201	2	35	2000	40	800	2.4 x 1.9 x 1.3
PA 1101	2	31	1800	30	800	2.4 x 1.9 x 1.3
PA 1001	2	26	1600	25	800	2.4 x 1.9 x 1.3

*Refer to PA Custom Product Data sheets for further details.

Materials and specifications subject to change without notice due to the manufacturer's ongoing research and development programme.

Temperzone customised packaged units are exported around the world.

INSIDE BACK COVER + POCKET

CARD SLOTS

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