

Your Guide To Purchasing Air Conditioners

Jaicrest AIR

58 Penshurst Street

WILLOUGHBY NSW 2068

sales@jaicrest.com.au

www.jaicrest.com.au

Contents

- Introduction – Never mind the price, enjoy quality!
- What size do I need?
- What is the cooling / heating load?
- Inverter or fixed speed?
- R22, R407c or R410a?
- What type of indoor unit do I need – Wall, Floor, Ceiling or Ducted?
- What is involved in the Installation?
- What additional features are worth having (paying for)?
- Summary
- Sellers Credentials
- Key Points

Introduction

There are hundreds of different types, sizes & brands of air conditioner available in the Australian market place today. Discounting the Evaporative Coolers (which are not true air conditioners as such), small air conditioners can be grouped into the following categories:-

Portable – like a small fridge on wheels

Split – “Proper” air conditioners, usually in two halves – an “indoor” half connected by copper pipes to an “outdoor” half.

Portable air conditioners are at the budget end of the air conditioning market place. Their use is quite limited due to their bulk to duty/efficiency ratio and high noise levels. They are, however, an excellent “value for money” solution for providing localised, spot cooling in commercial environments or where noise isn’t an issue.

Split air conditioners are where cooling starts to get viable for domestic use – sleek indoor units coupled with compact and quiet outdoor units mean that the prospect of home air conditioning is now a reality.

The Asian market crash of ten years ago, coupled with an excess of the Chinese manufacturing capacity has led to massive price reductions of all consumer items within Australia in recent times. Fridges, freezers, televisions / DVD players and power tools etc. can now be bought for a fraction of their cost 5 years ago. This also applies to air conditioners. In order to keep up with continued price reductions, many Japanese manufacturers have shifted production from Japan to Thailand,

ABSOLUTE COMFORT

Malaysia, Indonesia, Korea and China – albeit in factories co-owned by the Japanese and operated by Japanese management.

It is difficult to make sweeping generalisations about brand names and countries of manufacture and so on. However, as a rule, it is fair to say that one probably wouldn't buy a car if it had a Chinese brand name that nobody had ever heard of. Although most people probably wouldn't hesitate to buy a Honda/Toyota/Nissan (if that's what they wanted) made in a Chinese factory operating a Japanese manufacturing system and quality control procedure. There is a good reason for this. Japanese manufacturers have a "Brand Reputation" to protect. Their goods are, typically well-made and have a good standing within their product market place.

The same can be said of air conditioners. If the brand is one you have never heard of or the manufacturer (not the importer) doesn't have an Australian based support system, be very careful with your money! Apply the same brand purchase rules that you would for any other expensive purchase i.e. car, top end Hi Fi or computer.

You get what you pay for in air conditioning just like any other market place.

What size do I need

In air conditioning, **SIZE MATTERS!!**

Too small and your cash has been completely wasted.

Too large and your system will be give big temperature swings, cost too much to run & probably be too noisy.

It is important to select the machine that best matches the cooling and/or heating LOAD in the room you will use it.

What is the cooling/heating load?

Cooling

The total cooling load is simply the **sum of the heat gains** within the space or room. These are calculated as follows :-

Solar heat gain through windows +
Solar gain via external walls/flat roofs etc. +
Gains from electrical appliances (Computers/TV's/Lights) +
Gains from occupants +
Gains from infiltration (of warm air) +
Any other gains – Hot meals, big cookers and so on.

It goes almost without saying that anything you can do to reduce the heat gains, will reduce the size (and cost) of your system.

How can you reduce the gains?

The easiest heat gains to reduce are :-

- Solar gain from windows – reduce by using blinds, curtains or solar control window film
- Solar gains from walls/roof structures – reduce by using insulation
- Lighting/electrical gains – reduce by using low energy type lighting systems

Heating

As you would expect, the heating load is figured as a direct opposite of the Cooling load. Your air conditioner needs to defeat any heat being lost through walls, windows, ceilings & vent systems – The heat losses.

For newer buildings (less than 3 years), the heat losses are generally figured (for domestic heating) to be around 32 watts per CUBIC metre. As a rule, you may want to add between ten and twenty percent to the final sum to allow for warmer overall indoor temperatures/extreme outside cold spells.

So, a room measuring 6 metres long by 4 metres wide with a ceiling height of 2.5 metres might need:-

$6\text{m} \times 4\text{m} \times 2.5\text{m} \times 32 \text{ watts} = 1,920 \text{ watts}$ or 1.9 kW to keep warm.

Add the 10% cold weather loading and that takes us to 2.1kW or so.

For older houses, use a figure of 50 watts per CUBIC metre for your heating calculations.

i.e. $6\text{m} \times 4\text{m} \times 2.5\text{m} \times 50 = 3,000 \text{ watts}$ or 3 kW.

ABSOLUTE COMFORT

Many Air Conditioners have their cooling duty incorporated into their model numbers in either BTU's or kW, hence a Daikin FTXS25L has a nominal cooling duty of 2.5kW. A Fujitsu ASY-9F has a cooling duty of around 9,000 BTU's/h.

For the record, the conversion factors are :-

$$\begin{aligned} \text{kW to BTU's/h} &= \text{kW} \times 3,412 & 2.5 \text{ kW} &= 2.5 \times 3,412 = 8,530 \text{ BTU's/h} \\ \text{BTU's to kW} &= \text{BTU's} \times 0.000293 & 9,000 \text{ BTU's} &\times 0.000293 = 2.63 \text{ kW} \end{aligned}$$

Fortunately, good heat pump air conditioners always give more heating than cooling when used in heat mode. This is because heat pumps (air conditioners that can work backwards) are an extremely efficient method of providing heat – a modern heat pump will give around four times **MORE** heat than the electricity it absorbs.

A modern, small wall mounted heat pump will give over 4 kW of heat output whilst absorbing only 1 kW of electricity.

Use the above figures for guidance only!

Some typical gain figures for various types of occupancy are detailed below:-

Area	Watts /Sqm floor area	Translated to BTU's/h
Open office	125 watts	426
Small office	150 watts	512
Living room	110 watts	375
Bedroom	90 watts	307

These are “Guess-timate” figures based on our experiences

Inverter or Fixed Speed?

The next decision you have to make is whether to buy an Inverter Air Conditioning System (has a compressor that speeds up/slows down according to load) or a traditional Fixed Speed system.

Fixed speed systems are like your fridge or gas furnace – they are either cooling/heating or not cooling/heating; “stop / start” principle

Inverter air conditioning systems generate more or less power by speeding or slowing the compressor as the room temperature dictates. They also have the added advantage of only ever using as much power as they need to do the job, giving extremely lower operating costs by as much as 35%.

Another advantage of inverter systems is that many of the internal components are Direct Current (DC) operated. As DC motors generate more torque than their AC equivalents, this means that the motors are smaller and quieter than those on a fixed speed AC system. Also, inverter systems have, by default, an electrical soft start mechanism which means no “dimming” lights on compressor start up.

The obvious downside to Inverter systems is that their complexity = more cost. They are typically 30- 40% dearer than their fixed speed counter parts.

R22, R407c or R410a?

R407c and R410a are the international code numbers for two different types of refrigerant gas used in air conditioning. Both are environmentally friendly refrigerants but R410a is the newer, more efficient of the two. If you get the choice, always go for system that uses R410a as the refrigerant.

An older refrigerant, R22, is outlawed in Australia for use in new equipment. Never, ever buy a "new" air conditioning system that uses this refrigerant – it is illegal for the seller to offer it & probably illegal for you to buy it!

Soon, the use of R22 will also be outlawed in existing equipment, which means the gas will be discontinued & unavailable shortly after that.

What type of indoor unit do I need?

There are five main formats of air conditioner indoor unit :-

- **Cassette** - like you see in the ceiling of your Office, local bank or petrol station
- **Wall mount** - does what it says on the can! Most common type
- **Floor mount** - same as wall mount but low on the wall near the floor
- **Ducted** - hidden away from view, in the roof cavity or underfloor space
- **Under Ceiling** - used when there is insufficient ceiling void / wall space.

ABSOLUTE COMFORT

Cassettes & under ceiling units don't really have a place in a domestic environment – these are generally commercial units and are manufactured in commercial sizes.

The most popular residential air conditioning type is the wall mounted indoor system. This is generally because they are the cheapest and are made in the duties / capacities / dimensions more applicable to residential room sizes.

Floor mounted units have a place in areas where a wall mounted unit is less appealing and are especially effective in heating.

Ducted systems are very popular in Australia – typically where one system is used to air condition an entire home or several rooms at once or zoned to operate multiple areas as required. A ducted indoor unit could be mounted in a roof space, false ceiling and or underfloor of a residence.

What's involved in the installation

“much more than you would think”

Using a **wall mounted system** as a benchmark, the installation procedure is as follows :-

- Identify a wall within the room to be conditioned – ideally an external wall.
- Identify a location for the outdoor unit that is within the maximum permitted piping distance.
- Mount the indoor unit back plate; use this as a template for the pipework hole to outside.
- Outside, mount the pipework support system – cable tray/trunking/clips
- Draw in the insulated pipework – use a flaring tool on the pipework ends
- Connect the flare connections – two outside, two inside
- Pressure test the pipework to 400 PSI (27 Bar) with Nitrogen – use no other gas for this operation!
- Install the air conditioner drain system/pipe
- Evacuate the refrigerant pipework with a deep vacuum pump to below 400 microns
- Install mains electrical wiring and interconnecting control wiring
- Remove the vacuum pump – do not allow the vacuum to be broken within the pipework during this operation.
- Open the outdoor unit refrigerant valves
- Test the electrical installation
- Run the unit in heating & cooling modes and check gas pressures with gauges.
- Test the drain system for leaks by adding water until visible at drain outlet
- Job complete – typically 4-8 hours when done correctly depending on pipe run.

What additional features are worth paying for?

The first must have would be to go for a revers cycle system (heat pump) rather than cool only unit. Heat pumps cost very little over & above a cool only unit, the extra money would soon be recovered in energy savings.

The next most worthwhile feature is an upgrade to an inverter controlled compressor if funds allow. They offer increased comfort by varying the air outlet temperature together with lower running costs and noise levels. Always compare internal noise levels on any prospective purchase, particularly if you are going to use the system in a bedroom. Look for a system that has a "Sleep Mode" and offers noise levels down to 20- 22 dba – Any noise level above 32 dba would likely require a TV to be turned up to compensate!

All air conditioners have filters which remove dust from the air – also, when in cooling mode, air conditioners remove many pollens - they stick to the cold damp surface inside the unit and run off through the condensate water drain. Some units now incorporate special electronic filters called electrostatic or plasma filters. These filters charge high voltage plates located downwind of the standard filters. The plates attract & retain particles as fine as cigarette smoke & viruses, and can be a real bonus for allergy sufferers. Electrostatic/plasma filters are a worthwhile option if you have a hay fever or allergy sufferer in the house.

Another feature gaining popularity on residential air conditioners are built in ionisers. These devices incorporate negative ion generators and emit negative ions (anions) into the airstream. These ions are claimed to enhance well-being.

Summary

As with any purchase, common sense should be applied to buying an air conditioning system & you should apply the same brand selection criteria you would any other domestic appliance purchase.

- Is the brand well established? Daikin, Mitsubishi, Panasonic, Actron, Fujitsu, Panasonic etc.
- Does the manufacturer have an Australian office for spares & support?
- What is the manufacturer's length of warranty on parts and labour?
- Does the manufacturer carry out warranty repairs?

Seller's Credentials

Another purchasing factor is to consider the **SELLER'S** credentials;

- Do they know about air conditioning?
- Are they licenced and fully insured?
- Do they use sub-contractors or employ their own staff?
- Is air conditioning the **CORE** of their business?
- Can they offer you a choice of leading brands?
- How long have they been in business?
- Can they support the product they are selling?

All these criteria should be considered before you part with your hard earned cash!

Key Points

- If a seller can't tell you the efficiency of the system he is selling you – look elsewhere!
- If the brand is some "No Name" far eastern one with no Australian office – look elsewhere!
- Don't part with your cash without a sensible warranty from a seller that has been in business long enough to support that warranty

Disclaimer:

While every care has been taken in preparing this document, JAICREST AIR accepts no responsibility for decisions or actions taken as a result of any data, information, statement or advice, expressed or implied, contained within. To the best of our knowledge, the content was correct at the time of publishing.

Any references to legislation are not an interpretation of the law. They are to be used as a guide only. The information in this publication is general and does not take into account individual circumstances or situations. Where appropriate, independent legal advice should be sought.