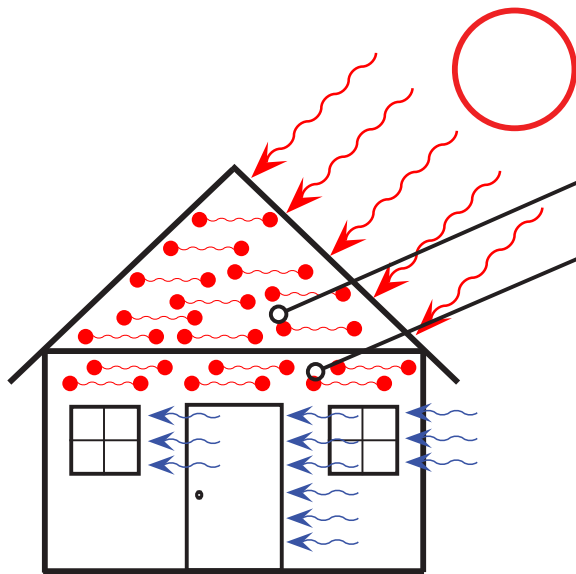


# Passive Ventilation

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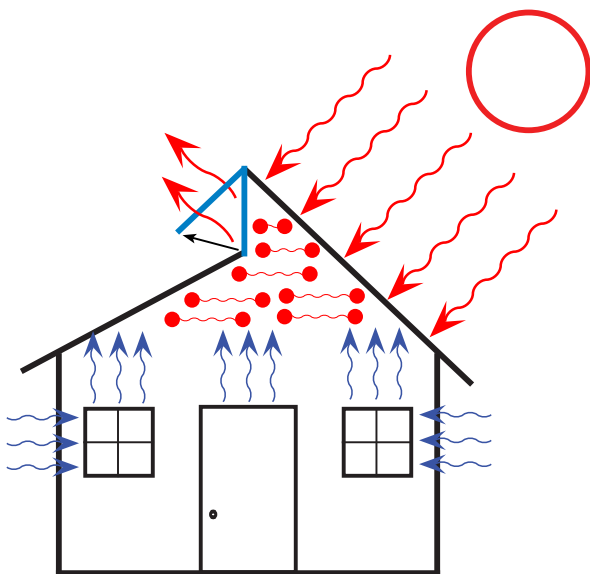
Conventional Dwelling (Flat Ceiling)

Build up of hot air in the ceiling cavity due to the sun's rays.

Build up of hot air above the windows and doors.

A cool breeze will not remove this air as the rising hot air is trapped.

The hotter the sun is the hotter the dwelling becomes.



High level operable windows give the hotter air a path to escape.

This air leaving the space will draw in the cooler air from outside through the low level openings, even if there is no breeze to move the air around.

## The Concept

Fortunately, there has been a greater interest in passive or natural ventilation in recent years. Unfortunately, much of the information that has been circulated has been very complicated, incomplete or just wrong. In its most basic form, passive ventilation is the promotion of air movement through a space using naturally occurring thermal convection currents.

*"Passive ventilation typically relies on using physical principles like the thermal updraft that naturally results from the tendency of warm air to rise and cool air to sink, and by the effect of cross ventilation, by creating unimpeded airflow through a building."*

[http://www.holcimfoundation.org/T1302/Passive\\_ventilation.htm](http://www.holcimfoundation.org/T1302/Passive_ventilation.htm)

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## The Concept cont.

As we all know hot air rises, how many of us have lived in a two storey home and not ever wanted to go upstairs in the peak of summer due to the heat! The reason that the air inside a home or office heats up is mainly due to the sun heating the roof or entering in through glass windows. In the case of the roof, the heat is then radiated back into the home, whereas the light entering through the window heats the air and the objects it hits. If there is no air movement, as in a house that is locked up all day, the effects are amplified, similar to your car on a summers day. How do we turn this negative into a positive? High level operable windows are the answer, louvres or awnings, these windows give the heat a path to escape (this rising air is called a convection current).

What passive ventilation does is that it uses these convection currents to create a flow of air through a space. With the hot air escaping through the high level windows cooler and fresher air would be drawn in through low level windows and doors. This can occur if a clerestory, saw tooth roof or similar design element has been incorporated in the early stages of design.

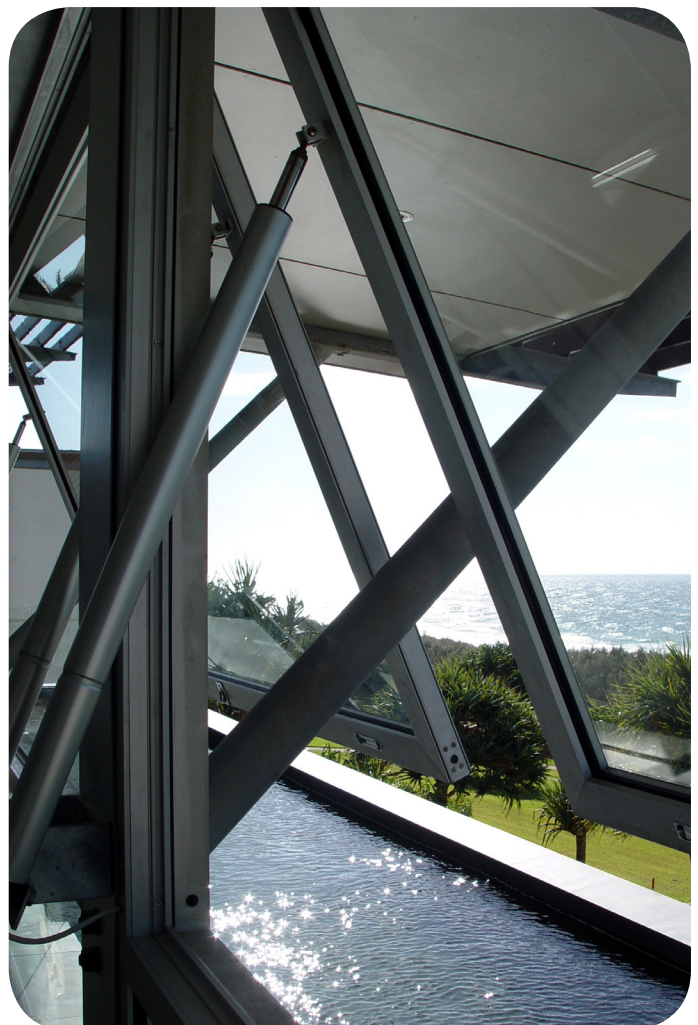
Unless the hot air escapes, the space in which it is trapped will not cool down. This is the limiting factor with ceiling fans, as all they do is move hot air around. The beauty of passive ventilation is that it creates its own air flow and is not reliant on any other natural process. Even if it is a still day outside, hot air inside will still rise and convection currents will create a cooling air flow inside your home, as long as you have high level operable windows to allow the heat to escape.

On a residential level, one of the highest costs for families is the cost of cooling in summer. With the use of passive ventilation principals a more environmentally friendly home is created and one that is cheaper to run.

Passive ventilation features to be incorporated into early design concepts:

- Design a pitched roof to create a passive airflow path
- Place multiple bays of operable windows high in this roof design
- Correct orientation of house and windows, wind direction and sun angle

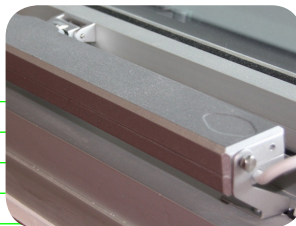
With our assistance, this same concept has also been incorporated in the Orion Springfield Town Centre. The designers used a 'Night Flush' system to expel the hot air that builds up overnight. Early in the morning operable high level windows are opened by the building management system to allow the hot air to escape prior to the mechanical air-conditioning starting. This 'Flush' reduces the internal air temperature so that additional strain is not placed on the air-conditioning to cool already over heated air, therefore saving on running costs, both electricity and maintenance, and helping the environment.



# Products

## Linco L2

Voltage	24v DC
Load Capacity - Push/Pull	250N/250N
Lock Force	600N
Current Under Load	0.6A max.
Stroke Length	<300mm
Stroke Speed at Full Load	6mm/sec
Operating Temperature Range	-15°C to 75°C
Limit Switch	FACTORY SET
IP Grade	IP32
Electric Overload Cut Off	BUILT IN



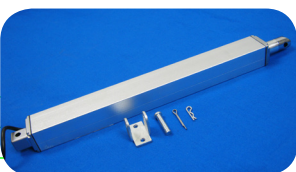
## Linco L2S

Voltage	24v DC
Load Capacity - Push/Pull	250N/250N
Lock Force	600N
Current Under Load	0.6A max.
Stroke Length	<300mm
Stroke Speed at Full Load	6mm/sec
Operating Temperature Range	-15°C to 75°C
Limit Switch	FACTORY SET
IP Grade	IP32
Electric Overload Cut Off	BUILT IN



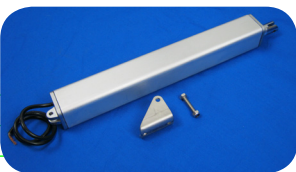
## Linco S100

Voltage	12v DC
Load Capacity - Push/Pull	150N/150N
Lock Force	2000N
Current Under Load	3A max.
Stroke Length	50mm<300mm
Stroke Speed at Full Load	15mm/sec
Operating Temperature Range	-26°C to 65°C
Limit Switch	Factory Preset
IP Grade	IP54
Electric Overload Cut Off	Built In



## Linco S200

Voltage	12v DC
Load Capacity - Push/Pull	500N/500N
Lock Force	3000N
Current Under Load	3A max.
Stroke Length	75mm<762mm
Stroke Speed at Full Load	15mm/sec
Operating Temperature Range	-26°C to 65°C
Limit Switch	Factory Preset
IP Grade	IP65
Electric Overload Cut Off	Built In



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# Projects

## Marcus Beach QLD 4753

Product: Force Actuators

With views like this how could anyone not want to take full advantage them?

Although from an airflow point of view there is little to be gained from opening beyond an angle of 60 degrees, what was requested for this home was a window that moved through 90 degrees to ensure the amazing beach vistas were as uninterrupted as possible.

An added challenge in this design was the large size of the windows. The windows required a very powerful motor to not only move through 90 degrees but also support the weight. To ensure there was no distortion of the windows with the movement it was necessary to use one actuator on each side of the individual windows.

The industrial nature of the overall design did allow the larger motors to look sympathetic to the whole. This was also an advantage when it came to our need to design a custom made bracket to allow an increased angle of the arms to lift the weight of the windows.



# Projects

## Clayfield QLD 4011

Product: Linco S200

Every now and then we get called upon to help out with a new idea.

At this project in Clayfield the design called for these high level double hung windows/doors to be electronically opened. This is the first time we have installed a project with this concept in our 30 years of operation.

What was required was to completely open the doors to allow as much air flow as possible and to create a space that blends the indoors with the outdoors. From the images above I hope you can see that that this has been wonderfully achieved.

When fully open the ground level and elevated doors allow almost 100% opening of the space they occupy. This creates wonderful air exchange from inside and outside providing the occupants of the home ideal thermal comfort.

The operation was achieved through the use of the powerful Linco S200 and specially designed mounting brackets to ensure the precise positioning and operation of the actuator.

As the doors have an interlocking design for security, delay timers were installed on both the opening and closing strokes of various motors to ensure that the doors locked correctly.

We are always up for a new challenge, so should you have a great idea and need our help to see it become reality feel free to call. We are happy to meet you in your office or onsite to see what can be achieved.



## Unique Window Services

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