



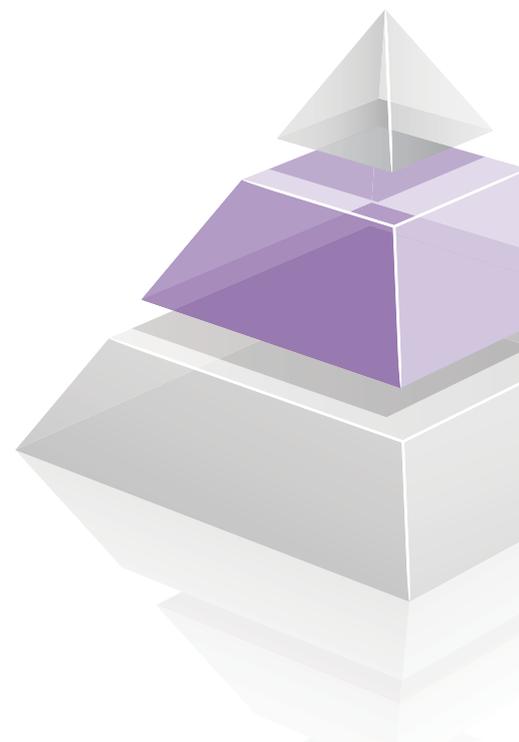
## Introduction to Ecodan® Air Source Heat Pumps

Heat pumps are an established, continually developing technology and the primary solution for heating many buildings around the world.

In 2007 Mitsubishi Electric evolved heat pump technology to produce Ecodan, an air to water heat pump, which is now one of the most advanced and efficient heating systems available today.



Air Conditioning | Heating  
Ventilation | Controls



### Introduction to Ecodan® Air Source Heat Pumps

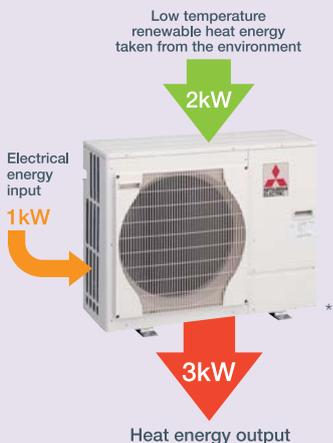
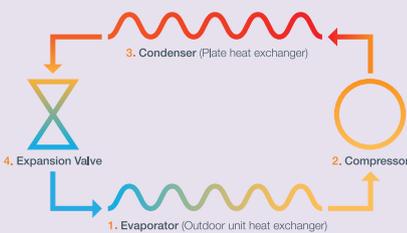


#### How does an Ecodan® Air Source Heat Pump Work?

Heat pumps take electrical energy and low grade heat energy from the outdoor air to heat refrigerant which in turn heats water for domestic use and space heating.

The operation of a heat pump is similar to a refrigerator - but in reverse.

This process is known as the vapour compression cycle and the following is a more detailed explanation.



\*1 As independently tested by BSRIA based upon BSEN14511 Part 3 standard rating conditions. Due to the method of operation, the performance of heat pumps will vary based upon the temperature of the heat source and the requirements of the heat delivered. The BSEN14511 testing relates to the heat pump performance only and not the entire heating system.

How can you measure the performance of Ecodan?  
The best way to measure the performance of Ecodan is through a seasonal co-efficient of performance (SCOP), as this indicates the average annual efficiency of the system.

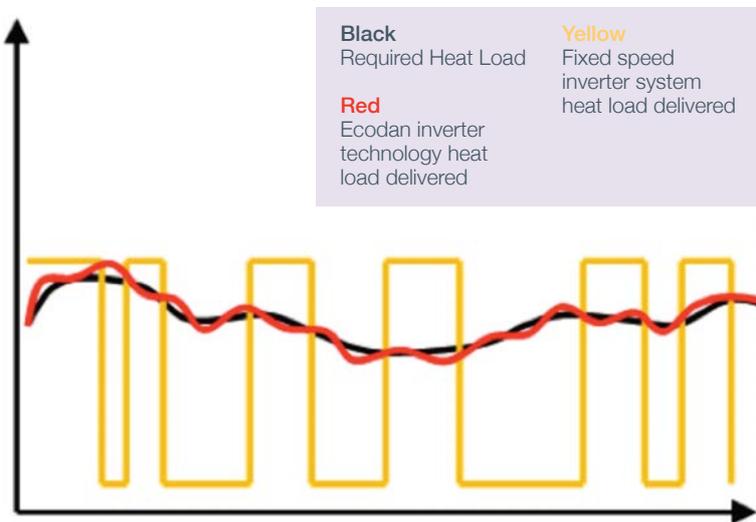
The Coefficient of Performance (COP) tells you at a particular moment in time how much power you are getting out of the system, in comparison to how much power you are putting in.

$$\frac{\text{Power Out (kWh)}}{\text{Power In (kWh)}} = \text{COP}$$

#### How is Ecodan different from other Air Source Heat Pumps?

Ecodan uses inverter-driven heat pump technology to harvest and upgrade free, renewable energy from the outdoor air to deliver heating and hot water. Inverter driven heat pumps offer significant energy savings over fixed-speed heat pumps because they regulate the heat output to exactly match the household requirements and therefore consume only the energy needed. Inverter technology also allows Ecodan to be highly adaptable for a wide range of applications without the need for a buffer tank.

Below is a diagram showing how the Ecodan inverter driven system can modulate to achieve the required room temperature (and required heat load) in comparison to a fixed speed air source heat pump.



The Ecodan air source heat pump is a hermetically sealed, standalone unit. This means that no refrigerant pipework needs to be brought in to the building, and a refrigeration engineer does not need to be on site during installation. This can reduce both installation costs and time.

At only 45dBA\*2, Ecodan is one of the quietest air source heat pumps on the market. In recognition of this Ecodan has been awarded the Quiet Mark. Quiet Mark is the international mark of approval from the UK Noise Abatement Society, and the Ecodan range are the only air source heat pumps to have this accreditation to date.



\*2 A 5kW system at 1m distance.



#### How does Ecodan perform year round?

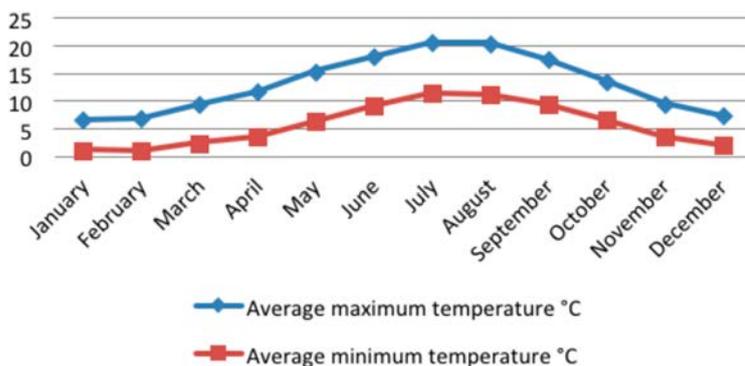
The performance of any air source heat pump varies throughout the year, depending upon the weather conditions of the season. Therefore it is important to know the seasonal coefficient of performance. The seasonal coefficient of space heating performance for the Ecodan range is approximately 3.4 - this is dependent upon a well installed, commissioned and operated system using a 45°C flow temperature or below. The seasonal coefficient of hot water heating performance for the Ecodan range is 2.3 - this is dependent upon the correct cylinder being fitted in conjunction with the Ecodan system.

More specifically, how does Ecodan perform in cold weather conditions? Ecodan performance at low temperatures is part of what makes it unique, benchmarking it above other heat pumps on the market. Below is a graph for each Ecodan system indicating the system performance at different outdoor temperatures.

#### Performance (at varying outdoor temps)

	Outdoor Temperature (°C)			
Water (Flow) Temperature 35-55°C	-15°C	-7°C	2°C	7°C
5kW System	3.5	4.5	5.0	5.0
8.5kW System	6.10	8.00	8.5	9.00
14kW System	11.00	14.00	14.00	14.00

#### Average UK Temperatures



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