# Phoenix EC

1000 - 12000

## Hybrid Heat Recovery Ventilation System

- Hybrid system - dual heat recovery methods for expelled room air
- UK building regulations compliant for both residential and non-residential pools
- Dual function dehumidifying and expelled room air heat pump
- Full rate fresh air ventilation with 'Cross Flow' heat recuperator
- 'Blue-EC' ultra efficient digital inverter fan system
- 'Auto fan' intelligent air recirculation fan management
- Active heat recycling into room air and pool water via dehumidifier
- Room air and pool water integral support heating provision
- Central ventilation with room air recirculation
- Fully compliant with 'Eco-Design' Directive (ERP) 2015

Heatstar
Energy Technology Systems

Engineered with Excellence, Specified with Confidence.

# Phoenix EC

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**Ideal for all newly designed indoor swimming pools where a higher level of demand is anticipated, the Phoenix provides effective humidity control, active heat recovery, full rate fresh air and both air and pool water heating – all from a single, easily installed unit.**

## Purpose Designed for Building Regulation Legal Compliance

All newly designed UK projects need to comply with the minimum standards stipulated by Part F of the latest building control regulations. The Phoenix is purpose designed to exceed these strenuous standards and ensure legal compliance.

**- Heat recovery efficiency: How much heat is saved from the room air expelled to outside**

With regard to the minimum heat able to be recovered from the expelled room air via a heat recovery facility, this must now be at least 70% for domestic applications and at least 50% for non-domestic and be rated against the standard BS EN 308:1997. The regulation stipulates 'dry' heat recovery efficiency, therefore eliminating any allowance for any additional latent recovery contribution through the condensing of moisture contained within the expelled air, which would be less easy to monitor for compliance.

**- Specific Fan Power**

This is an assessment of the amount of power necessary to move a pre-determined quantity of air and, for this type of system, building control regulations stipulate a maximum of 1.5 W/(l/s.)

**- Fan Power Control**

For non-domestic applications, the regulations stipulate that all fans with a power of 1.1kW or greater must be equipped with a variable speed control and that they must be able to operate and 1/4 power with the same efficiency as at 100% power.

## Hybrid dual energy recovery system - 'Enhanced' heat recovery

The Phoenix is able to out perform alternative equipment formats because it combines two different technologies to achieve unrivalled heat recovery performance.

The expelled warm room air is first passed through the dehumidifying heat pump to enable 'active' heat extraction and then through a large 'Cross Flow' multi-plate heat recuperator, where remaining heat within the air is passively conducted, via a series of adjoining plates, directly to the incoming colder fresh air.

The combined effect of utilising both the active heat extraction by the dehumidifying heat pump and the passive heat recovery of the recuperator, can 'enhance' the heat saved from the expelled air to over 90% dry and over 140% if also including allowance for latent recovery.

## Dual function dehumidifying and expelled room air heat pump

The pool room air is re-circulated through the Phoenix by the integral fan. Inside the unit the humid room air is passed through the cold refrigerated coil matrix of the dehumidifying heat pump where, upon contact, the excess humidity condenses to cold water, thus the air is dehumidified and de-energised prior to being returned back to the room and/or expelled to outside via the recuperator.

The warm, moisture laden pool room air is rich in energy and the heat pump is able to absorb both 'Sensible' (dry heat) and 'Latent' (steam-like energy present within the airborne water vapour). This absorbed heat, together with ALL the electrical energy used to operate the dehumidifying heat pump, is then recycled back into either the pool room air OR the pool water. Active energy recycling efficiencies of up to 380% are possible through this process.

Control over where the heat recycled by the heat pump is placed is completely automatic, with the system giving priority to establishing the optimum pool room air temperature prior to transferring the available heat into the pool water.

This ideal method of heat recycling control is possible as the Phoenix features full capacity heat recycling coils both for the air and the pool water. Therefore, 100% control is achieved over where the heat is placed, ensuring maximum energy efficiency and preventing unnecessary overheating

## Expelled room air heat recovery via the 'Cross Flow' recuperator

The ability of the Cross Flow heat recuperator to provide genuine heat recovery from expelled room air actually increases as the outside fresh air becomes colder, so the system is able to maintain it's outstanding heat recovery efficiency, even during cold winter weather, and therefore always exceeds the minimum efficiencies stipulated by UK Building Regulations.

During those periods when the dehumidifying heat pump is not called upon to function, the 'Cross Flow' recuperator always remains fully available, enabling efficient expelled room air heat extraction to still continue.

## 'Blue EC' Ultra-efficient digital inverter fan system

Against the consideration that the permanent operation of an air fan motor may represent the largest consumer of energy within an indoor pool, the Phoenix employs a very special type of digital fan to offer the best possible energy efficiency and, so, the lowest operating cost of any such system. The digital fan uses a directly driven, backward curved, centrifugal impellor, which features a DC motor coupled to an AC inverter.

## 'Intelligent' Auto-Fan – Why run the fan at full power when you don't need to?

The Phoenix features 'auto-fan' technology, whereby the speed and power of the air recirculation fan is managed automatically to enable significant energy savings whenever there is low demand for dehumidification or air heating.

For a domestic pool equipped with a surface cover, there will typically be long durations of low demand and the energy saved by 'auto-fan' would be very considerable. Additionally, when the fan is operating on low power, ventilation air noise in the pool room can also be reduced.

## Fully adjustable air re-circulation air flow

The air flow rate provided by the fan system can be adjusted on-site to precisely match the exact requirement of the pool room.

## Illuminated fan window

Another unique feature is the blue LED illuminated Perspex window, enabling the special energy saving EC fan, and it's managed speed of rotation, to be observed at will within the plant room.

## Perfect pool room air quality

The Phoenix always provides a modulated level of fresh air dilution to achieve an enhanced impression of freshness and to prevent any build up of chemical odours. A slightly negative air pressure is also achieved to help prevent the pool room atmosphere migrating into adjoining areas, or compromising vapour barriers. The 'dual' process of heat extraction is retained to maintain efficiency.

## Variable mode humidity control

The Phoenix maintains humidity control in stages, subject to activity within the pool, thereby automatically combining the high efficiency of a dehumidifying heat pump supported by the swift and assured effect of introduction of dryer fresh air. If a rise in pool room humidity continues beyond the immediate control of the dehumidifier, the Phoenix automatically increases the rate of introduction of dryer fresh air.

## Close-Control precision fresh air ventilation management

As the quantity of air omitted to atmosphere has an increased relevance to the overall energy usage of the application, the expelled air volume is precisely regulated by the combined effect of a motorised air damper and the automated power of the exhaust air fan.

## Integral support heating provision

To ensure that the optimum pool room air and pool water temperatures are always achieved, during periods when the heating requirements exceed the heat recycled and introduced by the dehumidifying heat pump, supplementary heat emitters are incorporated within the Phoenix.

These heat exchanging coils transfer heat piped from a separate heat source, typically a fuel or heat pump boiler, into the pool room air or pool water. For installations where a separate heat pump boiler is used, special up-rated emitters and fan systems are used to compensate for the lower heating circuit temperature. If there is no boiler available, then direct electric heat emitters are also offered as an option.

A high capacity pool water heat emitter is used to ensure a swift initial warm-up period for the pool from cold and, for salt water pools, special titanium coils are available.

The Phoenix features a 'heat demand' signal which can be used to activate the heat source and which also incorporates a pool water overheat safety feature.

## Central Ventilation - perfect air distribution and air curtain effects

Positioned out of sight within the pool equipment room, the Phoenix is able to be connected to an air duct channel, enabling central ventilation around the pool room for optimum condensation control.

The duct channel would feature air outlet grilles, positioned at strategic points around the room, to provide coverage to all areas and to discharge air directly over surfaces prone to condensation, such as glazing, creating an air curtain effect. The duct channel can be located either overhead or concealed under the floor. In addition, ducts would also be required to take fresh air to the Phoenix and also to exhaust some pool room air to outside.

Although the duct work would normally be designed and installed by a specialist ducting contractor, Heatstar are pleased to advise on this aspect as necessary.

## Room air 'free cooling' provision

Free cooling to the pool room air, utilising the introduction of outside fresh air, is a standard feature on all Phoenix models.

To maintain energy efficiency, the dehumidifying heat pump can continue to provide active heat recycling from the pool room air into the pool water and so contribute a level of mechanical cooling.

## Digital control panel

All functions of the Phoenix are completely automatic with the actual temperatures, conditions and system status clearly displayed upon the control panel.

Once the desired temperatures are set on the intuitive and easy-to-use controller, the integral sensors and processors accurately self-govern the various modes of operation. The controls permit the pool room temperature to automatically be reduced to a 'set back' to save energy when the pool is not in use, via a link to the pool surface cover or other switch facility.

The controls feature robust digital technology and are specifically selected for assured long term operation and serviceability within the equipment room atmosphere. Various optional BMS interfaces are also available.

## Pre-packaged for easy installation

To reduce installation work and complexity to a minimum, the Phoenix is offered as a completely pre-assembled package, incorporating all heating coils, controls and motorised heating valves, providing dehumidification, heat recovery, air heating, pool water heating and fresh air ventilation, all from a single, easily installed unit. Therefore, the Phoenix would usually only require an electricity supply and simple pipe connections to a boiler, pool water filtration circuit and waste water drain.

## Total flexibility of configuration

Each Phoenix unit is tailored to the precise individual requirements of the application, obviating the need to under or oversize performance aspects or tolerate inappropriate equipment room layout.

Dehumidification rates, air flows and heating duties are all selected individually to give a completely balanced, highly effective system, operating at ideal efficiency.

Therefore, whether the pool room is a large conservatory or a small basement, the Phoenix will always be the perfect uncompromised approach.

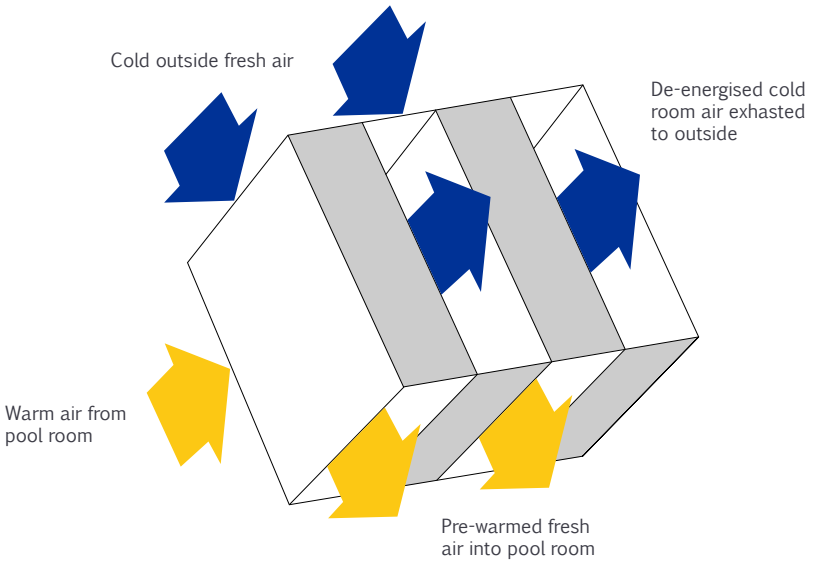
The unit can be configured to be vertical or horizontal and the position of the control panel, pipes, air duct spigots and maintenance access can also all be orientated during manufacture to accommodate the ideal equipment room layout.

Even special 'weatherproof' models are available for external positioning.

## High efficiency orbital scroll compressor

The refrigeration compressor which drives the heat pump uses a special 'orbital scroll' design, manufactured in the UK by Copeland, offering the best possible operating efficiency.

## ‘Cross Flow’ heat recuperator




A recuperator is a ‘passive’ device that has no moving mechanical parts and consumes no power in order to function. It relies upon air being passed through it by operation of the fan systems.

The recuperator is a series of many channels. Expelled warm pool room air is passed through a channel and cold fresh air is drawn in through an adjoining channel.

Energy is transferred from the warm side into the cold side through thermal conduction via the partitioning ‘plate’ that separates the two air channels. The opposing air paths are not mixed within the device.

## Phoenix EC standard performance specifications

| | Type | 1000 | | 2000 | | 3000 | | 4000 | | 6000 | | 8000 | | 12000 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max |
| **Air recirculation fan duty** | M³/Hr. | 1500 | 3500 | 1800 | 3500 | 2000 | 3500 | 2500 | 7000 | 3500 | 7000 | 5000 | 14000 | 7000 | 14000 |
| Maximum external resistance | Pa | 150 | | 150 | | 150 | | 250 | | 250 | | 250 | | 250 | |
| Variable speed control range | % | 0 | 100 | 0 | 100 | 0 | 100 | 0 | 100 | 0 | 100 | 0 | 100 | 0 | 100 |
| **Expelled / fresh air fan duty** | M³/Hr. | 900 | 3000 | 900 | 3000 | 900 | 3000 | 1400 | 5000 | 1400 | 5000 | 2800 | 10000 | 2800 | 10000 |
| Maximum external resistance | Pa | 50 | | 50 | | 50 | | 100 | | 100 | | 100 | | 100 | |
| Variable speed control range | % | 0 | 100 | 0 | 100 | 0 | 100 | 0 | 100 | 0 | 100 | 0 | 100 | 0 | 100 |
| **Fan type** | | ‘Blue EC’ backward curved, direct drive, electronically commutated, brushless DC motor | | | | | | | | | | | | | |
| **Dehumidification** | | | | | | | | | | | | | | | |
| Dehumidifying heat pump | L/Hr. | 4.5 | | 6.3 | | 7.6 | | 9.3 | | 15.3 | | 18.6 | | 30.6 | |
| Fresh air induction: Summer | L/Hr. | 5.6 | 18.6 | 5.6 | 18.6 | 5.6 | 18.6 | 8.7 | 30.9 | 8.7 | 30.9 | 17.3 | 61.9 | 17.3 | 61.9 |
| Fresh air induction: Winter | L/Hr. | 9.2 | 30.7 | 9.2 | 30.7 | 9.2 | 30.7 | 14.3 | 51.2 | 14.3 | 51.2 | 28.7 | 102.5 | 28.7 | 102.5 |
| **Room air heating potential** | | | | | | | | | | | | | | | |
| Dehum heat pump recycled heat | kW | 6.6 | | 9.2 | | 11.1 | | 13.6 | | 22.4 | | 27.2 | | 44.8 | |
| LTHW coil | kW | 9.8 | 22.9 | 11.8 | 22.9 | 13.1 | 22.9 | 16.3 | 45.7 | 22.9 | 45.7 | 32.7 | 91.4 | 45.7 | 91.4 |
| **Pool water heating potential** | | | | | | | | | | | | | | | |
| Dehum heat pump recycled heat | kW | 6.6 | | 9.2 | | 11.1 | | 13.6 | | 22.4 | | 27.2 | | 44.8 | |
| LTHW coil | kW | 13.2 | 46.2 | 13.2 | 46.2 | 13.2 | 46.2 | 26.4 | 68.6 | 26.4 | 68.6 | 68.6 | 137.9 | 68.6 | 137.9 |

Rated conditions

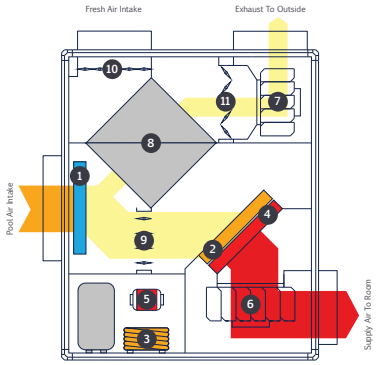
Pool air: 30˚C/60% R.H. Pool water: 28˚C

Ambient: 7˚C/100 R.H. Winter: 28˚C/45% R.H. summer

LTHW: 70˚C Flow/50˚C return

# Phoenix EC modes of operation

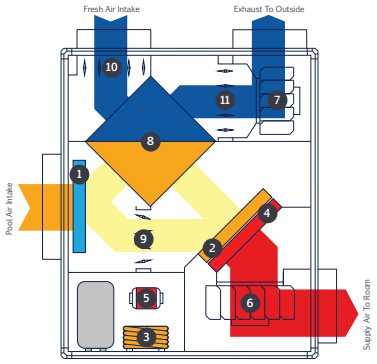
## Pool unoccupied




The Phoenix uses controlled fan power and the ability to re-circulate the pool room air to reduce ventilation to a minimum, saving unnecessary heat loss and electrical energy.

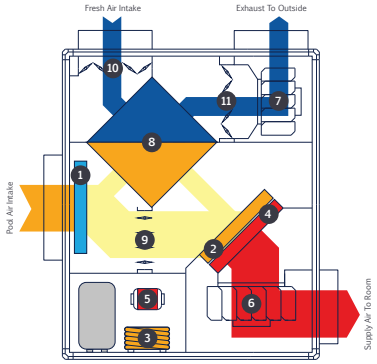
Should a surface cover be used on the pool during this period, the Phoenix can reduce energy consumption further by maintaining a lower 'set back' pool room air temperature.

## Increased usage




The Phoenix automatically increases introduction of dryer fresh air in line with the demand for humidity control. The expelled pool air is again first passed through the dehumidifying heat pump and then through the 'Cross Flow' multi-plate heat recuperator.

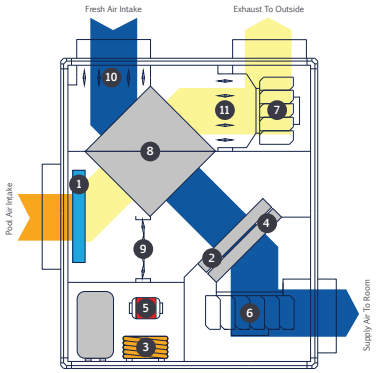
## Light usage




The Phoenix automatically provides dilution with fresh air to maintain air quality.

To limit ventilation heat loss, the expelled pool air is first passed through the dehumidifying heat pump to enable active heat recycling and then through the 'Cross Flow' multi-plate heat recuperator.

## Free air cooling




If the pool room air exceeds the maximum pre-set temperature, the Phoenix automatically increases the rate of introduction of cooler fresh air to help dissipate the excess heat.

The dehumidifying heat pump can also provide mechanical cooling to the re-circulated air and maintains energy efficiency by utilising the recycled heat to supplement heating of the pool water.

Key:
1__Heat pump 'cooling' evaporator coil
2__Heat pump 'heating' room air condenser coil
3__Heat pump 'heating' pool water condenser coil
4__Support room air heat emitter
5__Support pool water heat emitter
6__Room air re-circulation digital fan
7__Room air exhaust digital fan
8__Expelled room air 'Cross Flow' multi-plate heat recuperator
9__Room air re-circulation automated control damper
10__Fresh air induction automated control damper
11__Expelled room air automated control damper

# Phoenix EC installation

**Key:**

1: Pool air intake

2: Supply air duct to pool hall (overhead or underfloor)

3: Fuel or heat pump boiler

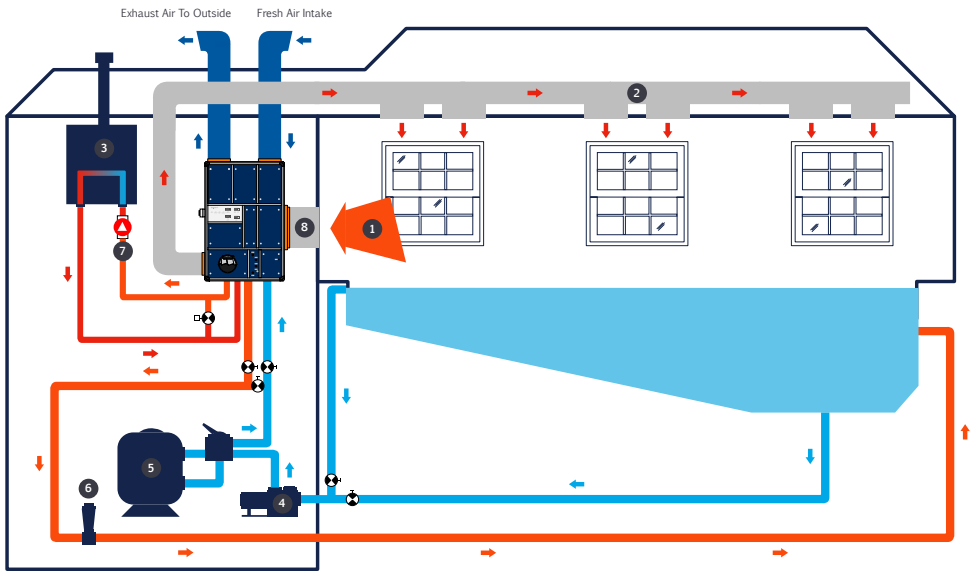
4: Pool water pump

5: Pool water filter

6: Chemical introduction

7: Boiler water pump

8: Attenuator (where utilised)



## Highest quality construction

The Phoenix is designed and constructed to the highest possible standard and all components have been especially selected for use within corrosive swimming pool environments.

For maximum strength and durability, the units are constructed from a 50mm thick anodised aluminium skeleton frame. All access panels are formed from galvanised steel, with a tough PVC coating to prevent corrosion, fixed via chrome latches.

All air heat exchange coils feature 'gold' epoxy coating to protect against corrosion.

The heat pump utilises zero ozone depletion eco refrigerant and is completely hermetically sealed to guard against leakage.

## Energy Related Product Directive compliance (ERP)

The European Union Directive for 'Energy Related Products' is now in force and encompasses sweeping legislation which impacts upon ventilation product engineering, efficiency and performance rating. The Phoenix is so energy efficient that, not only does it comply with the new directive, but it actually even exceeds the more stringent regulations proposed for the future.

## Rigorous testing procedures

Prior to every new Phoenix unit leaving the Heatstar factory, it is first subjected to a thorough procedure of testing and appraisal within Heatstar's own climatic chamber to ensure that all aspects meet the required quality and performance standards. Individual certificates of testing are provided.

## Free commissioning

All Phoenix units are commissioned free of charge within the UK by experienced Heatstar technicians to ensure correct installation and optimal performance.

## Factory supported warranty and maintenance

The Phoenix comes with the assurance and peace of mind of a comprehensive, on-site warranty within the UK. Also available are extended warranty options and the benefit and assurance of future routine servicing by Heatstar's own technicians to ensure minimal maintenance costs, a very long operating life and that the Phoenix is always able to obtain optimum efficiency.

## Free system design service

Heatstar offer a free, computer-aided system design facility providing accurate and precise equipment selections, installation schemes and economic assessments. Heatstar's highly experienced team of experts are available for consultation on all related aspects, without charge or obligation.

## Why chose Heatstar?

Heatstar is a specialist British manufacturer and the renowned leading authority for the application of environmental control technology for indoor swimming pools. Heatstar have pioneered the innovation, design and development of modern, highly energy efficient, systems and are specified with total confidence by the UK's leading pool building experts.

A flag-bearer for energy-efficiency for over three decades, Heatstar continue to play a huge part in making swimming pools role models for energy savings and reduced carbon emissions.

Heatstar have been producing pre-packaged climate control units like the Phoenix longer than any other company and this experience is evident throughout the product range. Through the years, over 10,000 Heatstar systems have been supplied within the UK and also exported to numerous Countries.

When investing in equipment of this nature, confidence and assurance in the brand are important considerations. Needless to say, the performance, quality and, very importantly, the long-term reliability and durability of Heatstar and their products systems have been demonstrated beyond question.

## Contact us

Contact Heatstar for detailed specifications and a full analysis of your swimming pool heating and environmental control requirements.

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