

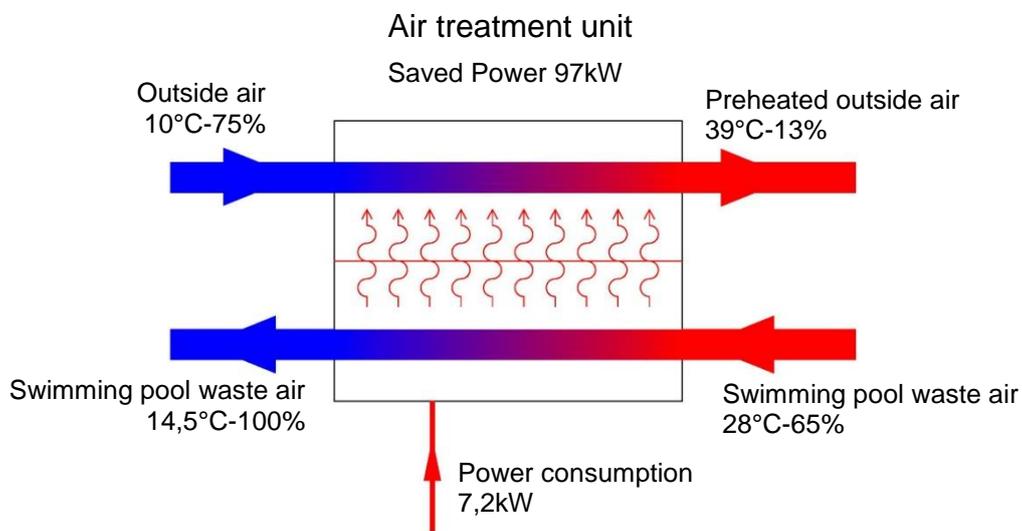
EnerDry

HIGH EFFICIENCY POOL DEHUMIDIFIER AND CONDITIONER WITH HIGH HEAT RECOVERY RATES

Calculation of savings (for illustrative purposes)

Operating scheme

Note: power rates refer to 10,000 m³/h of air and can vary according to the project. Costs and savings are calculated on annual basis.



	10°C	28°C	39°C
Saved thermal power/energy 97kW		61kW	36kW
Electric Power Consumption 7.2kW		No consumed power	7,2kW
C.O.P. 13.5WW			
Saved thermal energy costs € 37.000		€23.000	€14.000
Electric consumption costs €6.000		Zero electricity costs	€6.000
Savings €31.000		€23.000	€8.000

The diagram shows that **the economic saving (energy at zero costs)** covers 100% of outside air heating costs and an important part of the requirements for dispersion.

ENERDRY: operating principles

ENERDRY is a custom-made heat pump conditioning and dehumidifying system for swimming pools.

ENERDRY is an integrated system characterized by

- two high efficiency fan sections of air supply and air intake
- two filtering sections consisting of pre-filters and rigid bag filters
- pre-dehumidifier in cross-flow with high heat recovery rates (> 95%);
- high efficiency heat pump section (C.O.P.>6) (if set out in the project, modular heat pumps connected in a cascade system)
- software for control and regulation to obtain the best performance and the highest energy savings, climate control/stabilization and dehumidification.
- wired electrical panel, probes, actuators, control valves and auxiliary equipment.
- a condensing burner is available upon request to obtain 105% efficiency and the absence of hot water transmission losses.
- air quality probe upon request
- additional component for the use as heating pump is available upon request. It allows the use of the refrigerating circuit when the dehumidification mode is off. The obtained thermal energy warms up pool water or sanitary water. The unit can run most of the year.

Enerdry is completely autonomous, even if can be equipped with a communication interface connected with the installations control system. The unit maintains the desired level of humidity

with zero heat and electricity costs

Enerplus Italia srl ensures **that the pool dehumidification will be at no cost.**

The control system of ENERDRY units

- measures the external temperature and the energy needs of the environment to efficiently maintain the indoor climate and, if necessary, starting the free-cooling operating mode.
- controls excessive humidity by activating a partial or total cold air recirculation coming from the heat pumps evaporator (summer mode with closed windows in the pool).
- controls the heat pump working temperature obtaining the highest efficiency levels at maximum working rates.
- controls the possible drops in humidity levels to activate direct air recirculation in the pool thus avoiding unnecessary energy waste.
- at the presence of swimmers or audience maintains the minimum percentage of air renewal required by law.
- chooses the most convenient air to be heated and introduced in the pool.
- sets the possible presence or absence of people to start the night mode so as to allow the most convenient air handling solutions.

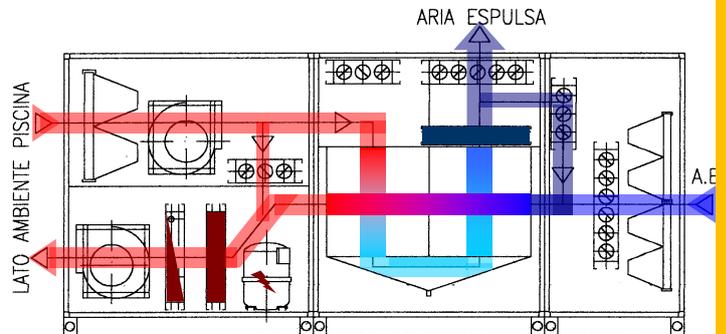
Functional description

Enerdry regulates the swimming pool indoor climate according to the system operating conditions and its configuration.

The unit sets automatically according to the outdoor and indoor climate conditions and the customers' settings ensuring the lowest energy consumption rates.

The system can manage situations such as high outdoor temperature and humidity and increased evaporation rates of pool and showers (depending on the presence/absence of swimmers and audience in the pool) autonomously and in real time.

The unit sets the different operation modes thanks to a powerful data processor that elaborates the information sent by the sensors on the machine. The processor acts on dampers, ventilators, compressors, heat exchangers and on the coil for hot water. In this way it is possible to obtain an absolute control of all the components.

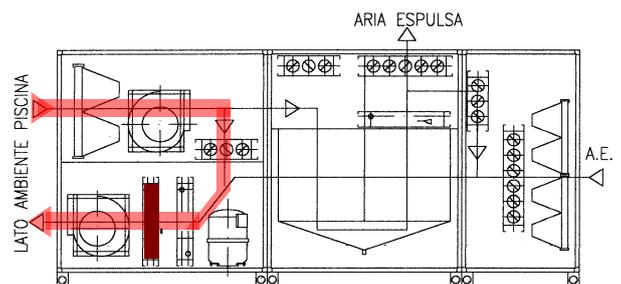


Possible configurations:

RECIRCULATION

Complete pool air recirculation (absence of people):

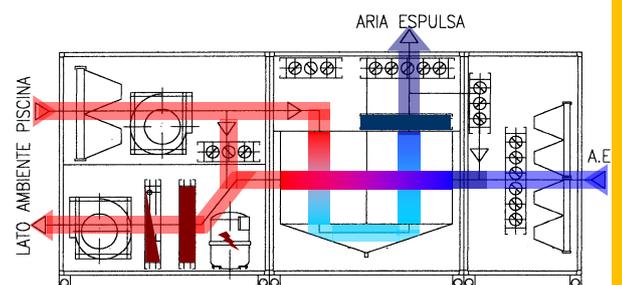
- heat pumps off
- starting of the system
- humidity maintained within the standards set by the user



DEHUMIDIFICATION

Partial air recirculation with outside air (with or without people in the swimming pool):

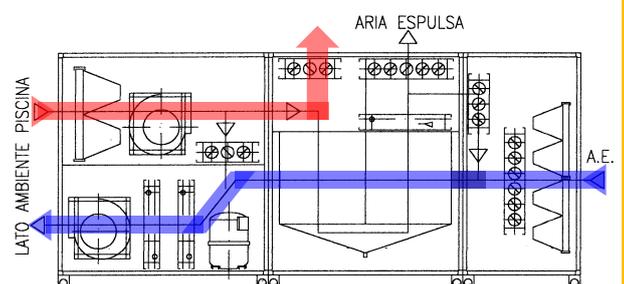
- use of heat pumps
- use in winter and mid-seasons
- external air with low humidity rates (financially convenient)
- humidity above the set threshold



FREE-COOLING

 (very hot pool environment)

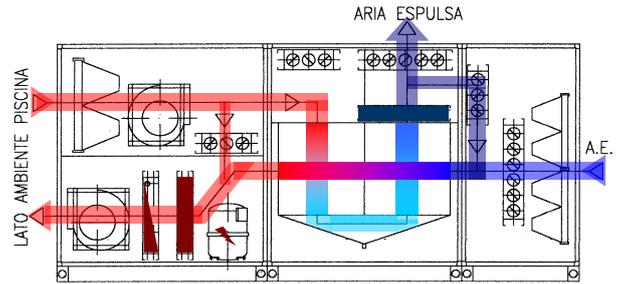
- heat pumps off
- high outside temperature (more than 20° in mid-seasons)
- functioning also with open windows



DEHUMIDIFICATION THROUGH HEAT PUMP

Partial air recirculation with dehumidification and air renewal as required by law (high external absolute humidity rates):

- use of heat pumps according to dehumidification needs
- pool windows closed with high external absolute humidity rates
- recirculation according to the levels of indoor and outdoor humidity



Technical description of components

Bearing framework

Depending on requested dimensions, ENERDRY can be assembled on site.

The frame is made of anodized aluminium profiles and assembled with aluminium/plastic angular joints. For outdoor installation, the units are designed to work exposed to rain.

The supporting basement is made of galvanized steel / aluminium profiles with bolted joints. In order to avoid corrosion caused by treated air, all the structural and supporting elements inside the unit are made of steel and, although zinc-coated, treated with epoxy or polyurethane paints.

The bearing framework is made of sandwich panels. The external part is made of hot dip galvanized steel sheet with a thickness of 0.5mm plastic coated with anti-UV treated PVC film whereas the internal part is a 0.7 mm thick polished aluminium sheet. Insulation is obtained with rigid polyurethane foam (density > 50kg / m, thickness 25 mm) of 2B fire class. For outdoor installation, panels are thick 45 mm.

The junction between the panels and the structure is realized with closed-cell PVC profiles to ensure a perfect resistance against air pressure and the absence of thermal bridges.

The following compartments are accessible for regular maintenance: two filtering sections, compressors compartment, electrical control panel if located on board of the unit, every servomotor and regulating valve and all the components subject to regulation, control and maintenance.

The panels used as doors are equipped with hinges and a quick opening system with certified key while the remaining panels are fastened with screws or gas springs to the structure.

If the unit is made of several sections, they will be coupled with bolts after the installation of rubber seals.

Under all devices and exchangers producing condensation there is an aluminium or plastic container with drain.

All sections are equipped with their own lighting system and power switch.

External dampers, recirculation and air expulsion

The dampers have aluminium frame and fins (opposed blades type), with self-lubricating nylon bushings and linkage made of galvanized steel to be connected with the electric actuator.

If the dampers have to modulate the air flow (not only the ON-OFF function) their dimensions allow a pressure loss equivalent to at least 10% of the total static pressure of the circuit served by them.

Filtering sections with bag filters

Filtering sections have a bearing framework made of the above-mentioned materials with inspection doors and pleated and bag filters. They are equipped with sockets and differential pressure probes.

Section of additional thermal exchange coils

The thermal exchange coils section has a bearing framework made of the above listed materials, copper tubes and aluminium fins, frame and headers of galvanized steel and flanged connections.

Thermal exchange coils are mounted on slide rails to ease all maintenance operations.

Water speed in the pipes is reasonably high so as to allow a good modulation in partial load conditions (approximately not less than 1.5 m / s at full load).

Maximum air speed through coils is 3 m/s; test pressure is 30 bar.

Thermal exchange coils are always downstream of filtering sections

Heat recovery section

The heat recovery section has a bearing framework (see above) with access panels and 2-phase crossed flow plate heat exchangers. The medium percentage of heat recovery for air renewal is 95%.

Heat pump section

The section containing heat pumps is realized with an external frame (see above) with access panels. The dehumidification system is made of heat pumps (eventually modular heat pumps connected in a cascade system) characterized by scroll compressors, direct expansion coils and condenser coils with copper tubes and aluminium fins. The refrigeration circuit will be equipped with all the necessary control and security systems. These systems ensure the large duration of the unit at maximum working standards.

Fan section air supply/air intake

The centrifugal fan is designed according to the dimensions required by the unit, it will be a plug-fan type (direct coupling of the motor and rotor) or a double inlet centrifugal fan with backward curved blades sized so as to obtain the lowest energy consumption and provided with elastic supports. The motor will be a high performance IP 55 motor, insulation class E. The motor speed is controlled by inverter which maintains a constant air flow.

Control software

The unit is equipped with a control and regulation software to obtain the best performance and the highest energy savings. Depending on the project, the control software decides if dehumidification is more convenient by using external air or heat pumps. The system analyzes the profile of the user characterized by the cost of electric energy and fuel, the climate in that specific area and other factors as, for example, required indoor temperature and humidity, working hours, etc.

Heat recovery unit for pool water and/or sanitary water heating

The unit can warm up pool water or sanitary water by using excess thermal energy produced during air treatment by using a condenser and a water circulation pump for pool or sanitary water.

Electric switchboard, regulation and control sensors/ actuators

The air-handling unit has its own electrical panel, sensors, actuators, regulating dampers and any other device for a complete and independent functioning.

EnerDRY Selection Tables

		Water (m ²)				
		10x5	16x5	16x7	16x12	25x9
		45	80	110	185	230
Pool air volume (m ³)	225	09.009	-----	-----	-----	-----
	400	16.009	16.016	-----	-----	-----
	550	22.009	22.016	22,022	-----	-----
	925	37.009	37.016	37.022	37.037	-----
	1,150	-----	46.016	46.022	46.037	46.046
	1,450	-----	58.016	58.022	58.037	58.046
	1,750	-----	70.016	70.022	70.037	70.046
	2,350	-----	-----	94.022	94.037	94.046

- Most common sizes
- Sizes upon request
- Special sizes upon request

		Water (m ²)						
		25x12	25x14	25x19	25x24	25x31	50x23	50x36
		290	350	470	600	775	1125	1800
Pool air volume (m ³)	3,000	120.058	120.070	120.094	120.120	-----	-----	-----
	3,875	155.058	155.070	155.094	155.120	155.155	-----	-----
	5,625	225.058	225.070	225.094	225.120	225.155	225.225	-----
	7,125	285.058	285.070	285.094	285.120	285.155	285.225	-----
	9,000	-----	-----	360.094	360.120	360.155	360.225	360.360

- Most common sizes
- Sizes upon request
- Special sizes upon request

Technical data EnerDry B155.094

Unit performance

- Saved power for air/pool and sanitary water **160 kW**
- Heat pump power consumption **10 kW**
- coefficient of performance (excluding fans) **16 W/W**
- dehumidification of pool environment for a total air volume of **154 kg/h**

9.400 m³/h outdoor environment 5°C-75% RH, indoor environment 28°C-65% RH

Fans

- constant air flow control **Electronic inverter**
- fan section nominal flow rate **15,500 m³/h**
- fan section nominal flow rate summer free-cooling mode **17,050 m³/h**
- installed power for supply fan **11 kW**
- medium power consumption supply fan **6.94 kW**
- installed power return fan **11 kW**
- medium power consumption return fan **7.47 kW**

Refrigerating circuit

- Scroll compressor freon R407C **1 n°**
- compressor installed power **12.5 kW**

Approximate size and weight

Weight: 3,900 kg

Length 6,300 mm – Width 2,300 mm – Height 2,500 mm