



**EVAPACK® SERIES**  
EVAPORATIVE PAD ADIABATIC HUMIDIFIERS

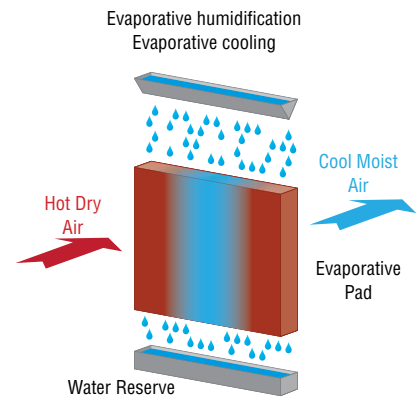




# Armstrong® How the EVAPACK® Series Works

## Simple, natural and efficient process

Armstrong EVAPACK® Series converts ordinary tap water to water vapor using an adiabatic process. Dry air passes through a corrugated bank of wetted cells media made from non-organic wet fibers. EVAPACK® series uses the sensible air heat to evaporate the water. The air is cooled and humidified.



## Adiabatic process into psychrometric chart

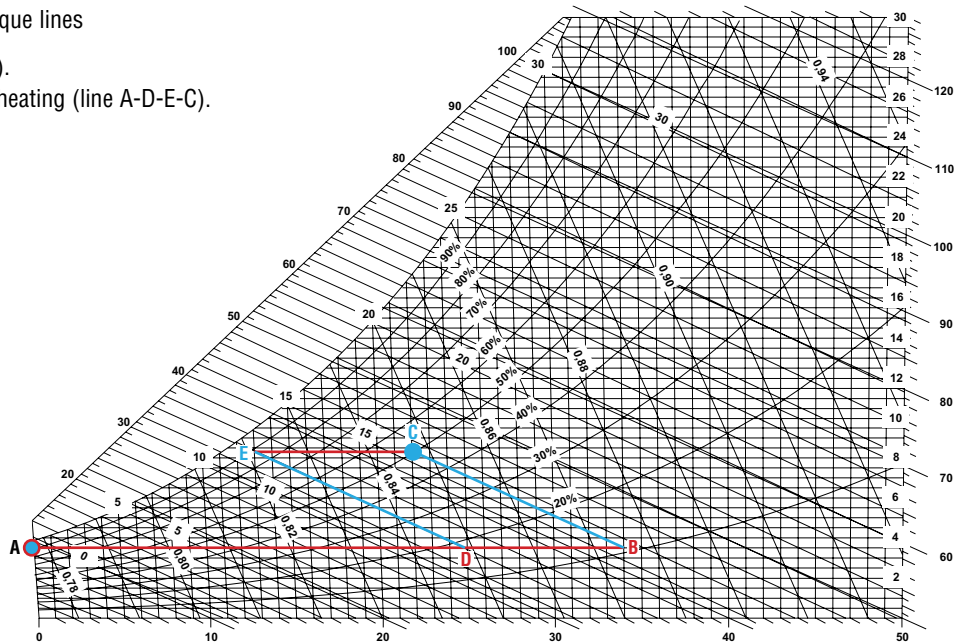
Usually there are two usual psychrometric design processes for evaporative humidification.

Sensible heating: red horizontal lines

Evaporative humidification: blue oblique lines

Heating + humidification (line A-B-C).

Pre-heating + humidification + post heating (line A-D-E-C).



Both processes have humidity ratio ( $\Delta x$ ) increase: from  $X_{in}$  (A) to  $X_{out}$  (C).

The Saturation Efficiency ( $\eta$ ) or Cooling Efficiency is expressed in % and corresponds to the ratio between the entering dry bulb temperature and exiting dry bulb temperature over the wet bulb depression:

$$\eta = \text{Real cooling} / \text{Ideal cooling} = (T_{in} - T_{out}) / (T_{in} - T_{wb})$$

with:

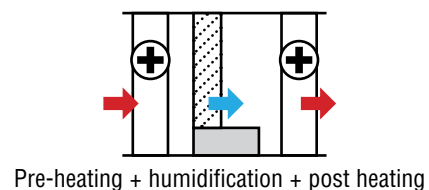
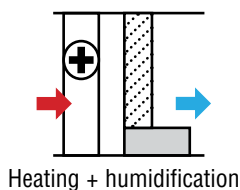
- $T_{in}$  is the inlet air dry bulb temperature,
- $T_{out}$  is the outlet air dry bulb temperature,
- $T_{wb}$  is the wet bulb temperature.

For the humidification process B-C: the pad efficiency is smaller, and its thickness is thinner.

For the humidification process D-E: the pad efficiency is higher, and its thickness is bigger.

## Typical configurations

Direct evaporative humidification adds humidity to the supply air.



Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.

# EVAPACK® Series Features and Benefits

## Plug and Humidify

### Easy and fast installation

The EVAPACK® humidifier water connections are on the side. Installation is quick, simple, and easy.

Compact design with a maximum footprint of 600 mm.

EVAPACK® works with different type of water: potable water, reverse osmosis or soft water.

Draining and over flow connections: 40 mm.

### Low and easy maintenance

The EVAPACK® humidifier cassettes are accessible by the side or by the front for big sizes. This reduces the requested replacement space. The cassette maintenance is made in seconds.

EVAPACK® humidifier water pump, water level detector, manual gate valves are on the service side, easily accessible for a simplified maintenance.



### Easy cleaning

All EVAPACK® elements are easy to disassemble, to clean and to reassemble.

### Customized Design

EVAPACK® humidifier is available for air handling units or ducts applications.

Dimensions are customized according to your applications.

Tailor made sizing.

From approximately 0,36 m<sup>2</sup> to 9.00 m<sup>2</sup> in one piece assembly. Multiple EVAPACK® humidifiers can be combined for larger sections.

## Efficient

### Low energy consumption

EVAPACK® humidifiers use the heat present in the air for humidifying and cooling.

### Optimized water contact surface

EVAPACK® has been designed to get the highest air/water contact surface. Up to 12% more than traditional evaporative pads.

### High efficiency and low pressure drop

EVAPACK® has been designed to maximize the efficiency and minimize pressure drop.



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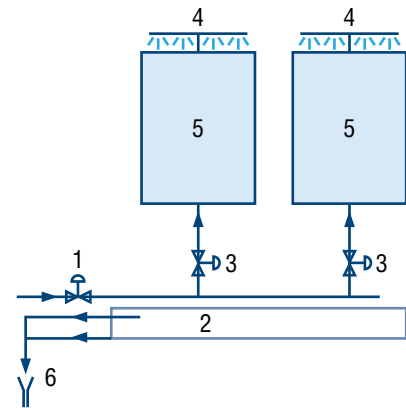


# EVAPACK® Direct Water Series configuration and components

## Direct water configuration (DW)

EVAPACK® is supplied with the following standard components:

- Water basin with draining and overflow piping,
- EVAPACK® evaporative cassettes (composed of EVAPACK® evaporative pad and cassette frames in stainless steel AISI 304),
- Side and top frames in stainless AISI 304,
- Irrigation piping,
- Dispersion manifold (s) with calibrated orifices,
- Manual adjustment gate valve (s).



## Options for DW configuration

- High efficiency integral droplet separator in PP material (requested for VDI 6022 hygienic configuration),
- Solenoid inlet water valve,
- Filling water pretreatment by U.V. Lamp with 50µm and 5µm water filters,
- Air relative humidity sensor,
- Air temperature sensor,
- Multiple stage control with solenoid valves (up to 5 stage control),
- Water level detector (high water level Alarm).

Note: the electrical options need our EVAPACK® control panel to work.

## Operation sequences

- A. Water enters from the water supply (1) and arrives to the dispersion manifold (4). The water flow is adjusted with a manual gate valve (3).
- B. The calibrated orifices deliver the water evenly over each media pad (5).
- C. Dry air passes through a corrugated bank of wetted cells media (5). Air is cooled and humidified.
- D. The excess water washes the EVAPACK® evaporative pad and is eliminated (with minerals) from the water basin (2) through the draining connection (6).

This DW configuration is recommended with high hardness supplied water (to increase the pad life time) or with reverse osmosis water (to reduce the RO water consumption).

(For any additional information, please consult EVAPACK® I.O.M.)

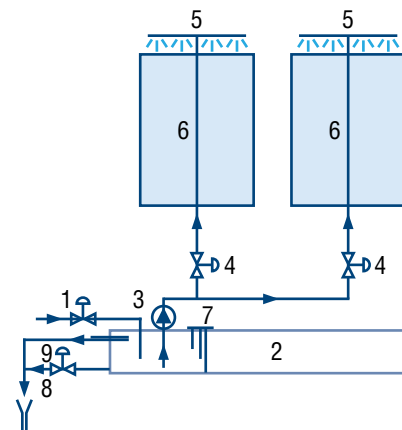
# EVAPACK® Recirculated Water Series configuration and components



## Recirculated water configuration (RW)

EVAPACK® is supplied with the following standard components:

- Water basin with draining and overflow piping,
- EVAPACK® evaporative cassettes (composed of EVAPACK® evaporative pad and cassette frames in stainless steel AISI 304),
- Side and top frames in stainless AISI 304,
- Irrigation piping,
- Dispersion manifold (s),
- Water pump,
- Manual adjustment gate valve (s),
- Water draining valve,
- Solenoid water filling valve,
- Water level sensor.



Note: All the electrical devices need our EVAPACK control panel to be used.

## Options for RW configuration

- High efficiency integral droplet separator in PP material (requested for VDI 6022 hygienic configuration),
- Filling water pretreatment by U.V. Lamp with 50µm and 5µm water filters,
- Water high temperature alarm,
- Air relative humidity sensor,
- Air temperature sensor,
- Multiple stage control with solenoid valves (up to 4 stage control),
- Water conductivity sensor

## Operation sequences

A. Water enters into the basin passing through the filling valve (1). The water level detector (7) controls the basin (2) filling, the pump (3) starting-up and the fill valve opening.

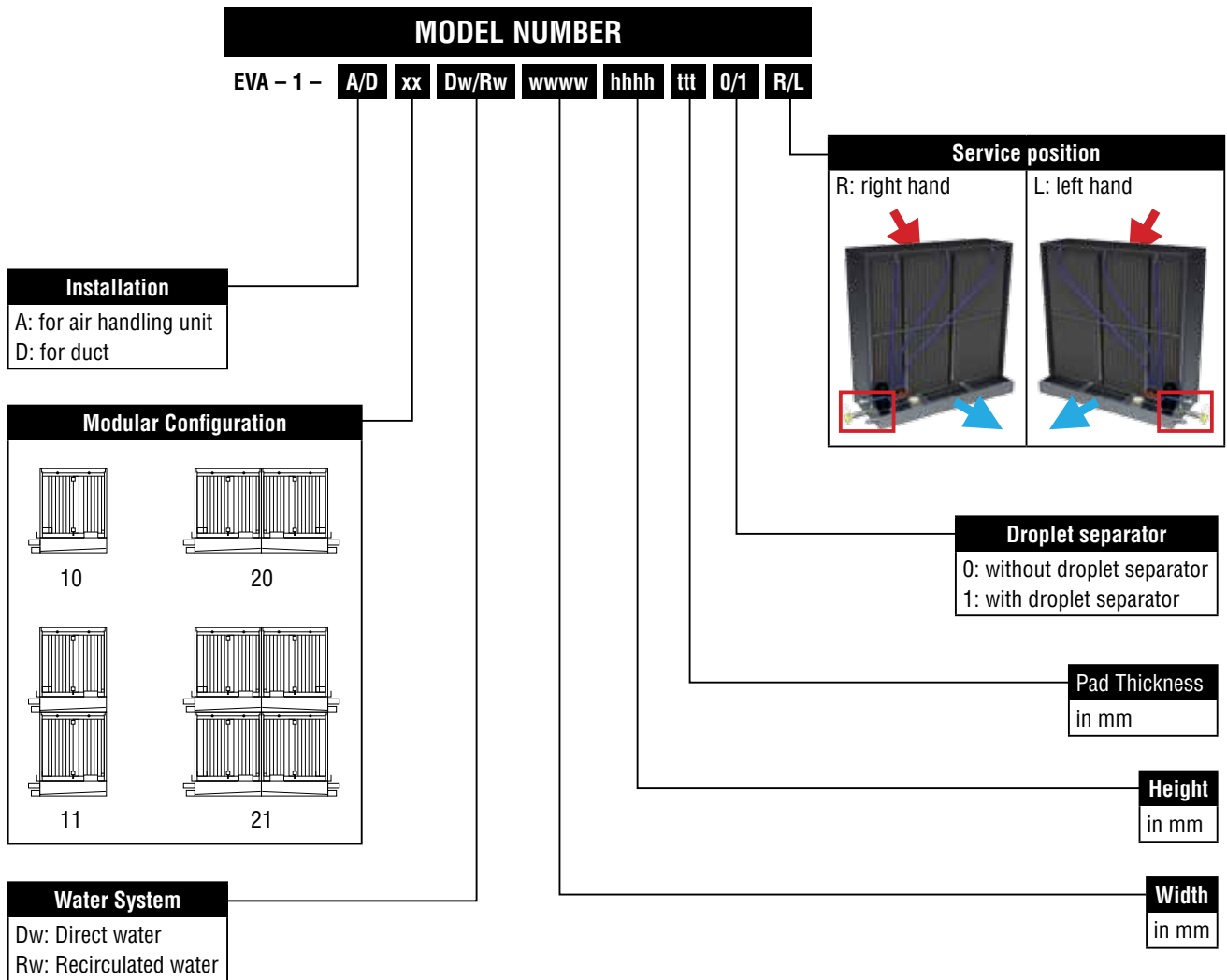
B. The recirculation water pump (3) supplies water to the different dispersion manifolds (5). The water flow of each cassette (6) is adjusted with a manual gate valve (4). Calibrated orifices deliver the water evenly over each media pad (6).

C. Dry air passes through a corrugated bank of wetted cells media (6), is cooled and humidified.

D. The excess water washes the evaporative pad and falls (with minerals) into the water tank.

E. The excess of minerals is drained by the draining valve minimizing the water consumption and the media scaling.

This configuration is recommended when the available supplied water has a low or medium hardness. (For any additional information, please consult EVAPACK® I.O.M.)



**EVAPACK® series selection data**

- Maximum length of the installation section
- Maximum height of the installation section
- Process airflow
- Inlet air conditions
- Requested outlet air conditions
- Application
- Maximum acceptable pressure drop

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# EVAPACK® Evaporative pad

The EVAPACK® evaporative pad is an inorganic pad made of fiberglass sheets.

## High degree of wetting

Special impregnated glass fibre material that allows for high moisture absorptive capability, ensuring continuous humidification.

## Rigid

The media has a corrugated and compact structure. No rigidity loss. No fiber loss in the air flow.



## Safe

None harmful substances. Complies the Directive Restriction of Certain Hazardous Substances (RoHS) 2011/65/UE (2002/95/CE).

## Hygienic

Fulfills the requirements from the VDI 6022, Part 1 (04/2006) in microbial inertness and is suitable for use in HVAC-systems relating to this examination of microbial inertness.

## Fireproof

Non-combustible Euro Class "A1" according to EN ISO 1716:2011 and UNE EN ISO 1182:2011

## Versatile

EVAPACK® evaporative pad accepts any potable water, soft water and reverse osmosis water. It can be used in all industrial and comfort applications.

## Free of odor

from chemical and organics.

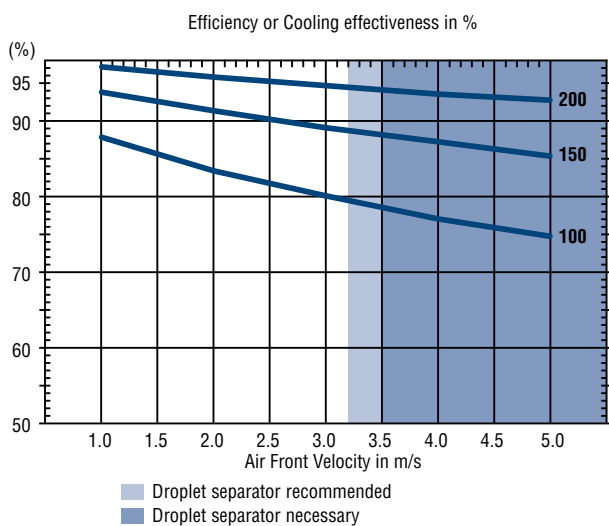
## Efficient

The EVAPACK® evaporative corrugation flute angle configuration has been designed to maximize the efficiency and minimize pressure drop.

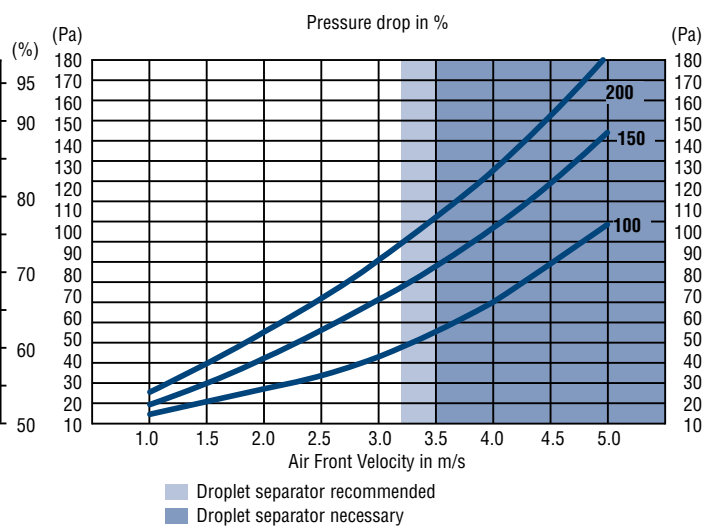
### EVAPACK® media pad performance charts based of the pad thickness

Optimal Saturation

Very low pressure drop



(\* ) maximal air front velocity recommended: 4,5 m/s.



(\* ) maximal air front velocity recommended: 4,5 m/s.

Remark: Other EVAPACK® pad thicknesses are available, please consult Armstrong or your local representative.

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## Basic control for RW configuration system

### Water pump

Pump is protected against running dry according to DIN EN 13053-6.8.3.3  
 The pump has a thermic protection which can switch off the pump in case of overheating and gives a alarm signal to the control panel.  
 It is also protected by the water level detector.

### Water level detector

Two water control levels:  
 1- The low water level:  
 When the water level is below the low level, the pump is stopped.  
 2- The high water level:  
 When the water reaches the high level, the filling valve is closed.



### Drain Valve

The control panel can switch on/off the drain valve.  
 The drain valve controls basin emptying and the water deconcentration (or bleed-off).  
 The deconcentration cycles can be adjusted by timer or by evaporated volume method.

### Multiple stages control

With a RH sensor and solenoid valve (s), the EVAPACK® control panel can adjust the water distribution on the pad cassettes. Up to 4 stage control.

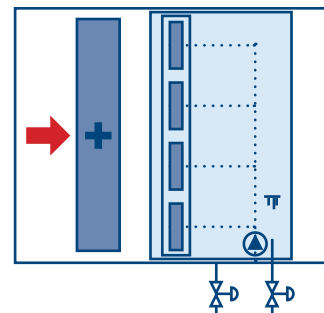
### Stages watering control with by-pass damper

With a RH sensor and solenoid valve (s), the EVAPACK® control panel can adjust the water distribution on the pad cassettes and a proportional motorized damper.

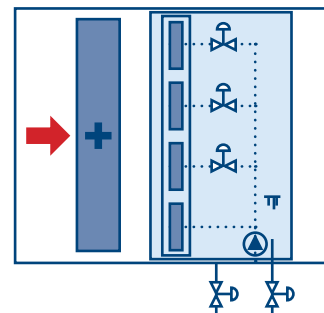
### Other optional controls

Filling water pretreatment by U.V. Lamp with 50µm and 5µm water filters,  
 Air relative humidity sensor,  
 Air temperature sensor,  
 Water temperature sensor,  
 Water conductivity sensor.

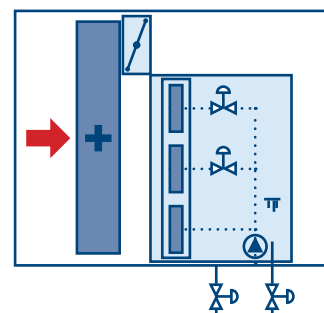
Basic control for RW configuration system.



Multiple stages control for RW configuration system.



Multiple stages control for RW configuration system with by-pass damper.





# EVAPACK® Series certifications



## Safe

Any harmful substances. Complies the Directive *Restriction of Certain Hazardous Substances* (RoHS) 2011/65/UE (2002/95/CE). Based on independent tests carried out by SGS Consumer Testing Services (IAS accredited).



## Safe

No fiber loss in the air flow from EVAPACK® evaporative pad . Based on independent tests carried out by SP Technical Research Institute of Sweden.



## Hygienic

All the non-metallic parts fulfils the requirements from the VDI 6022, Part 1 (04/2006) in microbial inertness and is suitable for use in HVAC-systems relating to this examination of microbial inertness. Based on EN ISO 846 independent tests carried out by IHL BERLIN Institute for Hygiene.



## Fireproof

EVAPACK® evaporative pad is non-combustible according to Euro Class "A1". Based on EN ISO 1716:2011 and UNE EN ISO 1182:2011 independent tests carried out by Applus+ Laboratories.



Designed according to VDI 6022 Hygienic standards.

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# Notes

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