



# DATA CENTER LIQUID COOLING SYSTEM

BY PSH CLIMA

ENERGY SAVING AND HIGH  
EFFICIENCY. PUE **1,20 TO 1,24**  
WITH A REDUCED INVESTMENT



**PSH**  
CLIMA SOLUTION®



The Cooling System in a Data Center facility is critical in order to ensure proper operation and performance. For this reason, 'PSH Clima Solution' believes that the use of refrigerants such as R134a or CO2, which are harmless to electrical equipment, is very suitable in order to dissipate the heat generated in the Data Center. **This system is very efficient and can achieve a PUE (Power Usage Effectiveness) value between 1.20 and 1.24**, under normal conditions, depending on the size of the facility in a location in Spain. Even better values can be achieved in northern locations.

## PSH CLIMA SOLUTION



### Scheme OF SYSTEM

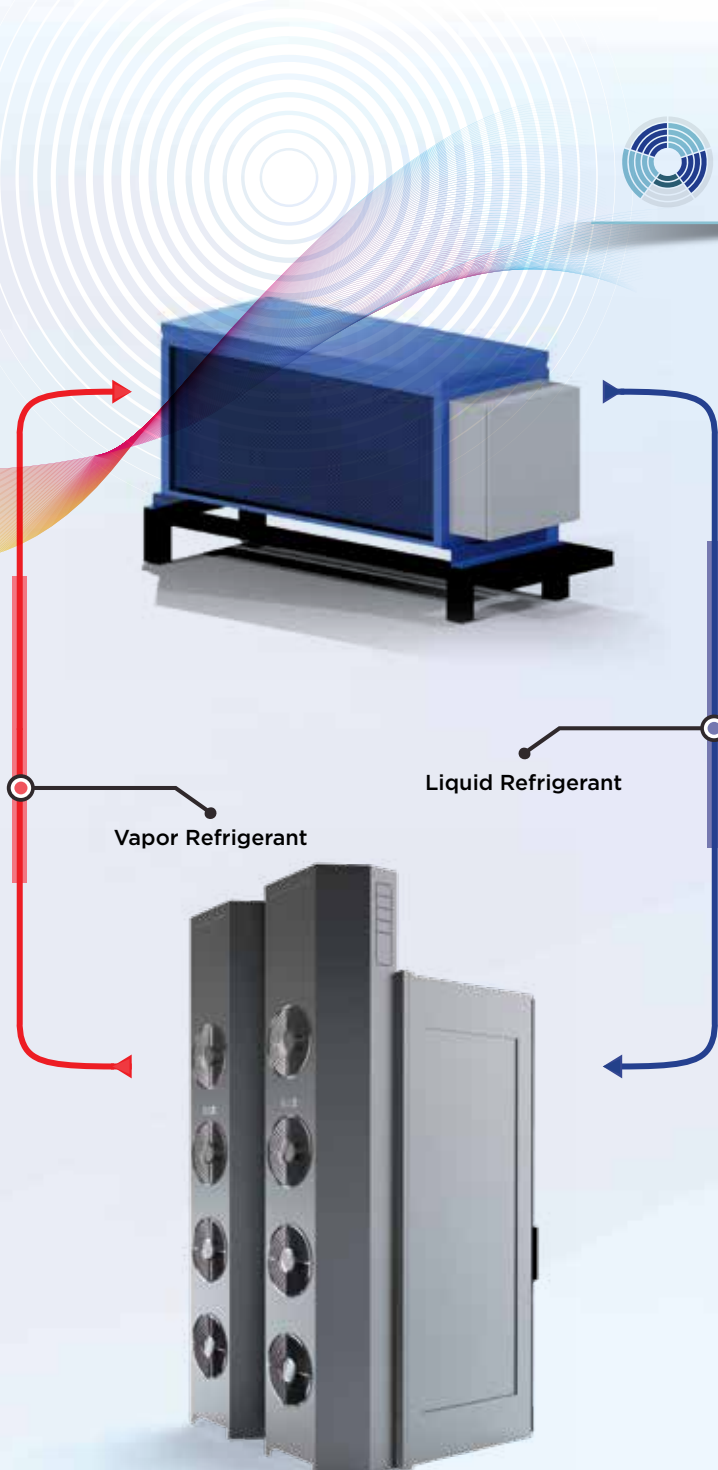
An Indoor Unit is screwed in the rear part of the racks. **This Indoor Unit is equipped with a battery in order to reduce the temperature of the output hot air.** Inside the battery the refrigerant turns into vapor. **Due to the location of the battery, which is very close to the hot point,** the hot and cold air do not get mixed and the thermodynamical process is very efficient.

**The temperature of the battery is similar to the ambient room temperature,** so the thermal load is neutralized.

**All this energy is transported through the refrigerant pipes until the heat is expelled** by an outdoor unit. In that unit vapor turns into liquid and the refrigerant completes the cycle by going back to the indoor unit.

Each Indoor Unit adapts itself to the specific load of each given moment, thus avoiding an excess or lack of cooling.

**The system independently controls and monitors temperature.**





## High EFFICIENCY

Our system is very efficient because:

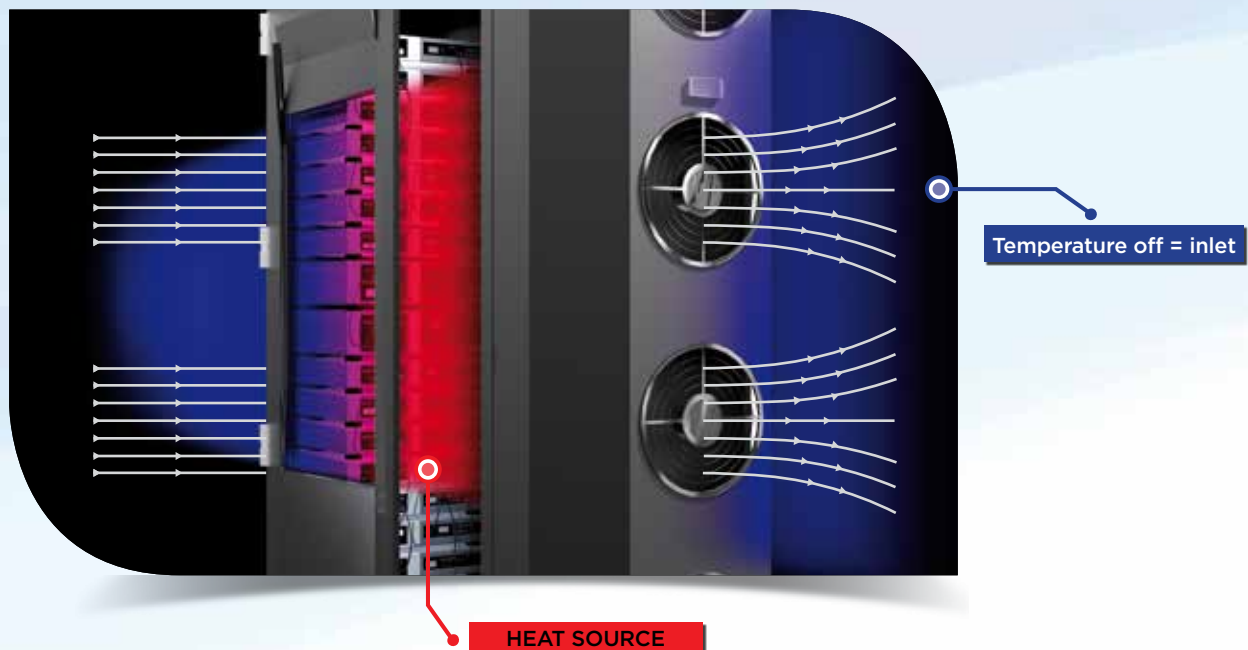
- Cooling is applied directly in the heat source.
- Use of refrigerant instead of water.
- Inverter technology which adapts capacity to the thermal demand and the outdoor conditions.
- 100% sensible.

## COMPATIBLE

The Indoor Units are equipped with a frame so that they can be adapted to all rack manufacturers and models in the market.

## NO Enclosure

As the battery is placed only 3 cm from the heat source, there is no need for a 'hot aisle' enclosure.



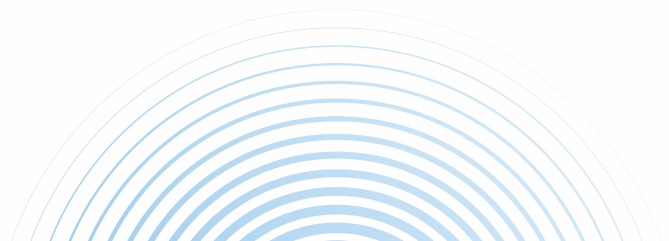
## NO Raised Floor

As the refrigerant pipes are in the upper side of the Indoor Units:

- There is no need for a raised floor in order to achieve proper air flow.
- The clearance of the raised floor can be used for other systems (electrical, etc.)

## HIGH Density

Different configurations are available which can reach between 15kW and 30 kW.







## SAFETY

The use of 'electronic friendly' refrigerant will prevent the electronic equipment from getting destroyed in the rare event of a refrigerant leak. Obviously, there is no need for a leakage protection as in Chilled Water systems.



## REDUNDANCY

There are many ways to ensure system redundancy, such as double battery Indoor Units, double refrigerant piping, etc. Furthermore, if any Indoor Unit is out of order, the neighboring units will cool the equipment of the one which is not working.



## SUITABLE FOR RE-POWERING OR UPDATING DATACENTER

The system is perfect in order to avoid 'hot spots' in the room just by placing one of our Indoor Units. In this way, one high density rack will not cause trouble to the whole DataCenter, increasing the energy consumption by changing the temperature setpoints of the entire room.

The systems are also very interesting when an increase of the Cooling Capacity occurs and the user does not want to remove the entire system. In that case, it is possible to install some Indoor Units in the higher density racks while the rest of the system will continue working with little interference.



## MODULAR AND SCALABLE

The system can be expanded by adding Indoor Units and Outdoor Units as they are needed. Energy consumption is almost linearly proportional to the refrigeration energy required.



## EASY MAINTENANCE

Most of the system components can be replaced while the system is working.



## Components OF THE SYSTEM



### PSH-D INDOOR Unit

The Indoor Unit is placed in the rear part of the rack, for all models and manufacturers. It neutralizes the thermal load generated by returning the air in the same conditions as inlet air in the rack.

Main features:

- Different refrigerants are available: R134a and CO2 (R744).
- Variable speed fans to adapt to the thermal load in order to optimize energy consumption.
- Redundancy options available upon request (battery, control...).
- 'Hot replacement' of the main components (fans, etc).
- Thermal capacity from 5 to 30 kW.

### PSH-UE OUTDOOR Unit

The Outdoor Unit is placed outside the building in order to expel all the heat into the atmosphere. The electrical cabinet and all of its equipment are included.

Main features:

- Different refrigerants are available: R134a and CO2 (R744).
- INVERTER technology.
- Floating condensation option in order to increase energy efficiency when outdoor conditions permit.
- Variable Speed Fan in order to optimize consumption of the condenser fan.
- Indoor and Outdoor versions.
- Redundancy in compressors, etc.
- Main variables such as pressure, alarm, temperature... are monitored.
- Cooling Capacity from 15 to 400kW.

### Remote Management AND MONITORING

It is possible to monitor the main variables of the system locally by means of a Building Management System (BMS) display. Our standard integration is via Ethernet through a server. In this case, it is possible to manage and control the system by means of a standard program such as Microsoft Explorer, Google Chrome... Different security levels are supported for users, maintenance, manufacturers, etc.



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