Source:JASE-W Japanese Smart Energy Products & Technologies
https://www.jase-w.eccj.or.jp/technologies/index.html

						S5	renewable energy
O-04	Keywords	Y2	device	Z4	electricity	L	Technical Service

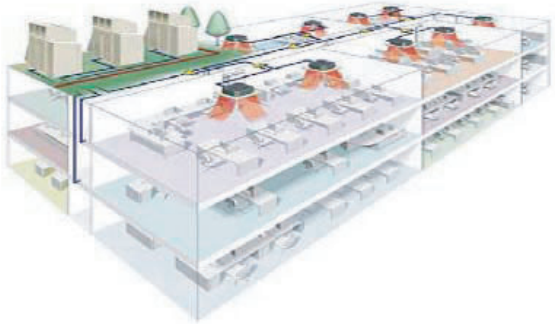
Heat Pump & Thermal Storage Technology Center of Japan

Commercial Heat Pump Air Conditioning System (Multisystem Air Conditioner for Highly-Efficient Buildings)

Features

◆ The multisystem air conditioner for highly-efficient buildings is a heat pump air conditioning system comprising a single external unit connected to multiple internal units. The external unit can also be connected to other external units to form a large single unit, thereby linking multiple internal units together. The system is energy-efficient and is suitable for use in large office buildings, hotels and public facilities requiring independent temperature control in each room.

◆ Various models have been developed including a cooling and heating switching model, simultaneous cooling and heating model, ice thermal storage model, replacement (for cooling and heating switching models), and heat pumps for cold regions; latent heat and sensible heat separation air conditioning systems (humidity control external air processing unit); and water-cooling methods.

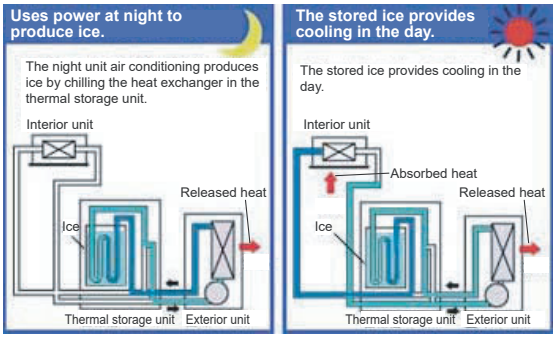


Basic Concept or Summary

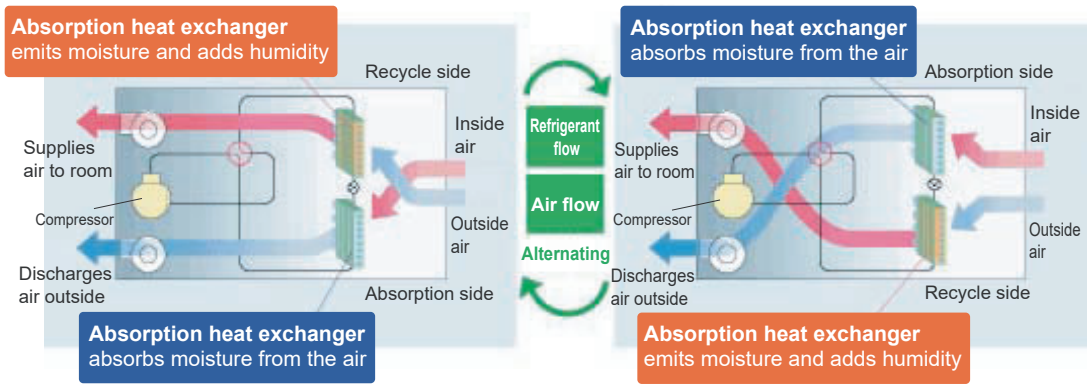
- For cooling and heating commercial buildings using the heat pump principle.
- Unlike central systems that use water pipes, the system uses refrigerant pipes to utilize direct heat pump cycles between internal and external units.
- Since the internal unit and the external unit come in a set, the system can be handled as fitting rather than a fixture. As a result, designing and arranging for equipment materials are simple, and energy saving performance is less subject to installation conditions.
- Due to the wide variety in product line, there are equipment to suite each type of building and use (refer to the information below).

1: Heat pump for cold regions
When the outside air temperature falls below a certain level, the workload on conventional compressors increases and the operational efficiency drops. In contrast, high heating heat pumps are designed for application in cold regions, enabling highly efficient heating even with outside temperatures of -25 °C.

2: Ice thermal storage air conditioning system (Eco Ice)
The Ice thermal storage air conditioning systems makes use of less expensive nighttime electricity to store energy in thermal storage tanks in the form of ice and then uses the cold energy for air conditioning during the day. This system minimizes variations in thermal load by catering to daytime air conditioning loads using stored cold heat. Suppressing peaks in air conditioning loads this way helps to keep heat source equipment capacity low, enhance system efficiency and improve air conditioning economy.



3: Latent heat and sensible heat separation air conditioning system (humidity control external air processing unit)
There was a limit to the level of energy saving and comfort that could be attained from cooling by lowering the temperature and humidity at the same time (humidity was left to chance). Coefficient of performance (COP) can be improved by raising the evaporation temperature of the refrigerant flowing through the heat exchanger in the internal unit. However, this will reduce the temperature difference between the air and the refrigerant, lower the dehumidification performance and, consequently, not alleviate discomfort from high humidity. The independent humidity & temperature control air conditioning system combines an external regulator which can adjust humidity as required, and a highly-efficient multisystem air conditioner for buildings mainly for temperature management. This new system is thus capable of regenerating and absorbing humidity even at low temperatures and supplying continuously powerful humidity control while significantly cutting energy consumption to create a comfortable living environment.

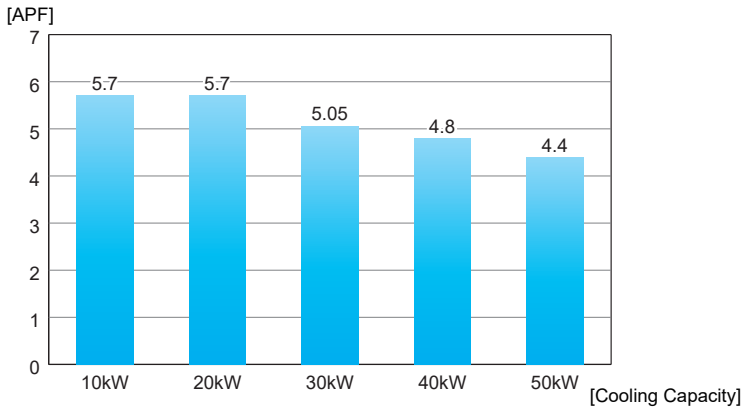


Effects or Remarks

◆ Commercial Heat Pump Air Conditioning System (High-performance Building Multi-Function Air Condition)

<Example of standard energy consumption efficiency for top-runner Building Multi-function Air Conditioners (indoor unit individual control)>

*Target years are each year after 2015
*APF (Annual Energy Consumption Performance Factor = Total Required Annual Air Conditioning Capacity/Power Consumption per Model for the Period



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