CO2 HEAT PUMP DESICCANT DEHUMIDIFIER [chris]

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EXTENDED ABSTRACT

Nowadays, The desiccant dehumidifier is known as one of the effective application to prevent condensation in a low temperature environment between -5 degC and +10 degC as typified by large scaled cold storage room, because condensate water and freezing don’t come up in the dehumidifier. However, the market of the desiccant dehumidifier doesn’t have been accelerative growth, because some additional heat source of steam or electric heater etc. is required for regenerating the absorbent the desiccant dehumidifier in the cold storage room has no excess heat for heating. “chris” makes it possible to dehumidify in low temperature circumstances with more energy-saving operation applying a heat pump using carbon dioxide as regeneration heat source.

The desiccant humidity using the CO2 Heat Pump is the desiccant unit, in which the heating side (70-80 degC) of a heat pump is used as a desorption source of the heat. In addition, the cooling side is used to remove the adsorption heat. The outline of the package is shown in Fig.1 and 2. The air flow rate of dehumidification is from 3000 to 8000 m³/h.

![Flow diagram of the outline](image1.png)

![Picture of the package](image2.png)

In Fig.3 shows the power consumption comparison with the conventional desiccant dehumidifier system uses an electric heater. The heat pump performs heating for regenerating the absorbent and cooling for dry air dehumidified by desiccant wheel. Therefore, energy consumption achieves 28% reduction than the conventional desiccant dehumidifier system uses an electric heater under the condition of same capacity of dehumidification. Additionally, this dehumidifier keeps stable operation by the combined control of capacity of compressor and air flow rate of regeneration under condition of the heating and dehumidifying load fluctuation of heating.

With the dehumidifier and engineering know how, remarkably effective as below are achieved in low temperature circumstances as typified by cold strage room, food processing plant, ice arena.

1. Preventing Condensation : “chris” makes it possible to dehumidify in low temperature circumstances with more energy-saving operation by applying a heat pump
2. Sanitary Circumstance : Since it is possible to dehumidify in low temperature circumstances, “chris” also prevents build up of mold and rust.
3. Supplying low temperature and dry air : “chris” uses a heat pump which performs cooling and heating by itself

REFERENCES