**Triple Effect Absorption Chiller-heater**

**Features**

**Heat Source Equipment for Air Conditioning**

- **Freon Free:** Absorption chiller-heaters contain “water” as refrigerant and Freon gas which has high global warming potential is not used.

- **Low Electricity Consumption:** Absorption chiller-heaters provide chilled water by means of natural gas combustion, which contributes to significant reduction of electricity consumption.

- **The world’s First Triple Effect Absorption Chiller-heater:**
  - In 1968, we commercialized the world’s first double effect direct fired absorption chiller-heaters.
  - In 2005, we commercialized the world’s first triple effect direct fired absorption chiller-heaters.
  - Natural gas consumption is further reduced by upgrading from double effect type to triple effect type.

- **The highest COP in the world**
  - 1.6 (Higher Heating Value basis)
  - 1.7 (Lower Heating Value basis)

- **Application for gas engine co-generation system is also available.**

**Basic Concept or Summary**

Construction of the triple effect absorption chiller-heater (Image)

- The triple effect absorption chiller-heaters have three generators and lithium bromide solution is generated in three steps.

- The triple effect absorption chiller-heaters have been developed by combination of a double effect steam fired absorption chiller as a base machine and a once-through boiler as a new high temperature generator.
### Effects or Remarks

#### Grand Reduction in CO₂ Emission

For example, in the case of cooling capacity 651 kW (185 RT), annual CO₂ emission can be reduced by approximately **140 tons** compared with conventional types.

#### Maximum Efficiency COP1.7

Being equipped with the new solution circulation inverter control (the patent is being applied for) as a standard function, the maximum efficiency **COP1.7** is achieved in the partial load area where the system is most frequently used.

- The energy consumption is lower by 38% compared with double effect type (COP = 1.0) which is commonly operated now.
- The COP in the partial load area can be improved by the optimum inverter control for solution pumps.
- Total motor output is only “6.5 kW in the case of 185 RT”.
- Awards received
  - February 2006: The Japan Institute of Energy Progress Prize (Technology Division)
  - June 2006: The 8th Electric Load Leveling Equipment, System Award
  - January 2007: The 17th Energy Conservation Grand Prize
  - January 2007: The Energy Conservation Center, Japan, Chairman Prize
  - June 2008: The Japan Gas Association Technology Prize of FY2008

### Installation in Practice or Schedule

- **Domestic**
  - Delivered mainly to factories, hospitals, general buildings, etc.
  - Number of deliveries: 18 units

- **Overseas**
  - Based on the deliveries in Japan, overseas sales activity is under way.

### Contact

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