FLOW, POWER, NOISE LEVELS, CONSUMPTIONS AND DIMENSIONS

<table>
<thead>
<tr>
<th>Model*</th>
<th>CO2 flow (kW)</th>
<th>Thermo power (kW)</th>
<th>CO2 Pressure loss (bar)</th>
<th>Instant consumption (l/h)</th>
<th>Noise level @10m (dBA)</th>
<th>Electrical consumption (A)</th>
<th>Dimensions B / A / H (mm)</th>
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<tr>
<td>Alchemist 5000-19 S.R.</td>
<td>6,0</td>
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<td>2231 / 1615 / 1732</td>
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<td>25</td>
<td>3,60</td>
<td>2,80</td>
<td>2231 / 1115 / 1233</td>
</tr>
</tbody>
</table>

* Available also other dedicated solutions

Data valid for the following conditions:
- T in CO2 (°C) 38
- P in CO2 (bar) 94
- ΔT subcool. (°C) 4
- T amb (°C) 35
- H.R. (%) 40

WHERE TO USE ALCHEMIST

- High savings kWh of produced frigorific energy
- Plug & Play solution, with integrated control system
- Easy and simple access for maintenance
- Compact design, modularity and easy installation
- EC Plug fan technology
- Available software to have ROI & VAN

MAIN ADVANTAGES

- Main advantages

HFC frigorific circuits retrofitting
In combination with new HFC or HFO chillers
Transcritical plants with CO2

ALCHEMIST Series
Adiabatic subcooler for CO₂
Alchemist is a simple and compact PATENTED product, designed to increase chillers’ power and seasonal energy efficiency, specifically for refrigeration. Alchemist has been developed by MITA cooling technologies for commercial refrigeration (food-storage), a particular and demanding sector, focused on efficiency and reliability.

The adiabatic subcooler designed by MITA increases the efficiency in the commercial refrigeration, without alteration to general plant configuration. It’s ONLY necessary to interchange fluid coming from condensers and to design Alchemist electrical and water connections.

When installing the adiabatic subcooler? In all the cases where there is a refrigeration system for super-markets. Available a range for Commercial Refrigeration, CO2 plants (R744) Refrigeration capacity from approximately 50 [kW] to 500 [kW] depending on the needs and the size of the shop.

Alchemist combines the adiabatic cooling physical principle, together with the refrigerant fluid subcooling. The adiabatic cooling consists in air temperature reduction through humidification. Adiabatically treated air subcools the liquid coming from chilled condenser circulating inside the machine’s coils.

Alchemist is a plug & play product that, in comparison with machine’s coils.

The PATENTED Alchemist Series is fully automated and managed by an operator panel integrated with the possibility of remote management: just set the subcooling temperature you wish to obtain and the system will self-adjust optimising energy and water consumption.

There are two operating ways: dry and adiabatic.

Dry operation: external air is drawn in and conveyed to the finned coils.

The humidification process is deactivated, no water is present and the humidifier pack is dry.

The subcooling readings by temperature probes modulate fan speed to optimise power consumption.

Adiabatic operation: external air is drawn in and passed through the humidifier pack (protected inside the machine).

The adiabatically cooled air (therefore at a lower temperature than the external air) is conveyed to the finned coils thus increasing the frigorific fluid subcooling.

The subcooling readings by temperature probes modulate fan speed and adiabatic cycles to maximize power/energy consumption.

ADIAEBATIC SUBCOOLING

The NEW ALCHEMIST SERIES

• Support structure made of press-fitted galvanized metal sheets and subsequently protected by a RAL 7016 Epoxy paint cycle.

• Heat exchange coil arranged inside the cooler, made of copper pipes and aluminium fins. Angle between coil, diameter of plane, thickness and pitch of fins are designed to offer the best heat exchange performance with reduced fluid and airflow pressure drops.

• Flocked PVC humidifier pack. The geometric configuration allows the use of untreated water. The particular flocked pack design, as opposed to other types of adiabatic packs, requires spraying only for short periods at long intervals of time: this minimises the power and optimises water consumption. The adiabatic pack is easily accessible and removable for cleaning.

• The unit does not require special maintenance.

• System provides for the direct use of mains water. Generally, the quantity of water is minimal and limited to the summer season at a preset threshold. This topic has been given particular attention both in the choice of components in direct contact and in the management of the water itself: no accumulations, no stagnation.

• Temperature probes for measuring external air, refrigerant, humidified air temperature inside the machine.

• Aluminium air inlet grille (removable in an easy way), for the adiabatic section protection: avoiding direct penetration of light and water splashes during the wetting cycles.

• EC Plug Fan

• Command and control panel of the various functions of the cooler, with the possibility of data transmission via MODBUS TCP/IP.

• Wetting water collection gutter in stainless steel AISI 304, accessible and cleanable. The machine is totally accessible in a simple, fast and safe way.

SPECIFICATIONS

The unit is totally accessible, in a simple, fast and safe way.
Alchemist is a plug & play product, designed to increase chillers’ power and seasonal energy efficiency, specifically for meatworks. Alchemist has been developed by MITA cooling technologies for commercial refrigeration (food-storages), a particular and demanding sector, focused on efficiency and reliability.

The adiabatic subcooler designed by MITA increases the efficiency in the commercial refrigeration, without alteration to general plant configuration. A unique system consisting of an internal control system that can manage and operate the plant. It's ONLY necessary to intercept the fluid coming from condensers and to design Alchemist electrical and water connections.

When installing the adiabatic subcooler? In all the cases where there is a refrigeration system for supermarkeets. Available a range for Commerical Refrigeration, CO2 plants (R744). Refrigeration capacity from approximately 50 [kWf] to 500 [kWf] depending on the needs and the size of the shop.

Attention both in the choice of components in direct contact and in the management of the water itself: no accumulations, no stagnation.

Alchemist combines the adiabatic cooling physical principle, together with the refrigerant fluid subcooling. The adiabatic cooling consists in air temperature reduction through humidification. Adiabatically treated air subcools the liquid coming from chiller condenser circulating inside the machine's coils. Alchemist is a plug & play product that, in comparison with other evaporative/adiabatic solutions used for increasing efficiency, maintains the existing chiller configuration and plant layout.

The PATENTED Alchemist Series is fully automated and managed by an operator panel integrated with the possibility of remote management. It's only necessary to intercept the subcooling temperature you wish to obtain and the system will self-adjust optimising energy and water consumption.

The subcooling readings by temperature probes modulate fan speed to optimise power consumption. The subcooling readings by temperature probes modulate fan speed and adiabatic cycles to maximise power/energy consumption.

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SPECIFICATIONS

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The subcooling readings by temperature probes modulate fan speed to optimise power/energy consumption. The subcooling readings by temperature probes modulate fan speed and adiabatic cycles to maximise power/energy consumption.
### OPERATIONS

**Adiabatic subcooling:**

Adiabatic subcooling is a process where the liquid refrigerant is cooled in the adiabatic section of the chiller condenser, typically before it enters the expansion valve. This reduces the temperature of the refrigerant, improving the efficiency of the refrigeration cycle and reducing the temperature of the condenser water. The subcooled refrigerant then enters the evaporator, where it absorbs heat from the process or space it is cooling.

- **Example:**
  - When using R744 as the refrigerant in a commercial refrigeration system, adiabatic subcooling can be used to cool the refrigerant to a temperature below the saturation temperature at the condenser pressure, typically around 5°C lower. This improves the refrigeration efficiency and reduces the power consumption of the compressor.

**Dry operation:**

Dry operation is a mode of operation where the adiabatic humidifier pack is removed or closed off, allowing the air to pass through the system without humidification. This is typically used in situations where the humidity level of the air is not a concern, such as in industrial processes or in areas with high humidity.

- **Example:**
  - In a food-processing facility, dry operation might be used to cool the air without adding moisture, ensuring consistent product quality.

**Humidification process:**

The humidification process involves the introduction of water vapor into the air stream to increase the humidity. This is typically done in commercial refrigeration systems to maintain the desired humidity levels in the conditioned space.

- **Example:**
  - In a pharmaceutical plant, maintaining a specific humidity level is crucial for preventing moisture-related issues in sensitive materials.

**Adiabatic subcooling:**

Adiabatic subcooling involves the cooling of the refrigerant fluid by adiabatic processes, typically in the condenser section of the chiller. This reduces the temperature of the refrigerant, improving the efficiency of the refrigeration cycle.

- **Example:**
  - In a cold storage facility, adiabatic subcooling can help maintain the low temperatures required for refrigeration.

**Adiabatic operation:**

Adiabatic operation refers to the process where the adiabatic humidifier pack is used to cool the air by transferring heat to the air stream. This is typically done in situations where the humidity control is critical, such as in data centers or in the pharmaceutical industry.

- **Example:**
  - In a data center, adiabatic operation can be used to cool the air without the need for mechanical cooling, reducing energy costs.

**The new Alchemist Series**

The Alchemist Series is a plug & play solution designed to increase energy efficiency for various applications. It is a PATENTED product that integrates with existing chiller configurations, allowing for energy savings without requiring major system alterations.

- **Example:**
  - In a large commercial building, the Alchemist Series can be installed to retrofit an existing chiller system, improving efficiency and reducing energy costs.

**Magnetic valve:**

A magnetic valve is a type of valve that uses a magnetic field to control the flow of refrigerant. It is typically used in commercial refrigeration systems to modulate the flow of refrigerant, improving the efficiency of the system.

- **Example:**
  - In a supermarket refrigeration system, a magnetic valve can be used to modulate the flow of refrigerant to the evaporator, improving efficiency and reducing energy consumption.

**Power consumption:**

Power consumption refers to the energy consumption of the system, typically measured in watts or kilowatts.

- **Example:**
  - In a commercial refrigeration system, power consumption is a critical factor in determining the efficiency and cost of operation.

**Adiabatic cooling:**

Adiabatic cooling is a process where the temperature of the air is reduced without the transfer of heat to or from the surroundings. This is typically done by passing the air through a humidifier pack.

- **Example:**
  - In a greenhouse, adiabatic cooling can be used to cool the air, reducing the need for mechanical cooling systems.

**Flocked PVC humidifier pack:**

A flocked PVC humidifier pack is a type of humidifier that uses a flocked material to increase the surface area for water evaporation. It is commonly used in commercial refrigeration systems to maintain the desired humidity levels.

- **Example:**
  - In a pharmaceutical plant, a flocked PVC humidifier pack can be used to maintain the humidity levels necessary for the production process.

**Aluminium air inlet grille:**

An aluminium air inlet grille is a protective component of the chiller system, designed to prevent debris from entering the system and damaging the internal components.

- **Example:**
  - In a commercial refrigeration system, an aluminium air inlet grille can be used to prevent dust and debris from entering the system, reducing the risk of mechanical failures.

**Temperature probes:**

Temperature probes are sensors used to measure the temperature of the air or fluid in the system.

- **Example:**
  - In a commercial refrigeration system, temperature probes can be used to monitor the temperature of the refrigerant, ensuring it remains within the desired range.

**Remote management:**

Remote management refers to the ability to control and monitor the system from a distance, typically using online monitoring systems.

- **Example:**
  - In a large commercial building, remote management can be used to monitor the performance of the chiller system and take corrective actions as needed.

**Heat exchange coil:**

A heat exchange coil is a component of the chiller system used to transfer heat from one medium to another, typically in the form of water.

- **Example:**
  - In a commercial refrigeration system, a heat exchange coil can be used to transfer heat from the refrigerant to the cooling water, improving the efficiency of the system.

**Command and control panel:**

A command and control panel is a device used to control and manage the operation of the chiller system.

- **Example:**
  - In a commercial refrigeration system, a command and control panel can be used to set the desired temperature and humidity levels, and to monitor the system's performance.

**Optimised energy efficiency:**

Optimised energy efficiency refers to the process of improving the energy efficiency of the system, typically through the use of advanced control algorithms and system configurations.

- **Example:**
  - In a commercial refrigeration system, optimised energy efficiency can be achieved through the use of variable speed drives and advanced control algorithms, reducing energy consumption.

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- Plug & Play solution, with integrated control system
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- Compact design, modularity and easy installation
- EC Plug fan technology
- Available software to have ROI & VAN

**WHERE TO USE ALCHEMIST**

HFC frigorific circuits retrofitting

In combination with new HFC or HFO chillers

Transcritical plants with CO₂

**FLOW, POWER, NOISE LEVELS, CONSUMPTIONS AND DIMENSIONS**

**ALCHEMIST Series**

Adiabatic subcooler for CO₂
**FLOW, POWER, NOISE LEVELS, CONSUMPTIONS AND DIMENSIONS**

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<tr>
<th>Model*</th>
<th>CO2</th>
<th>Thermal power (kW)</th>
<th>CO2 Pressure loss (bar)</th>
<th>Noise level @10m (dBA)</th>
<th>Electrical consumption (A)</th>
<th>Dimensions (B / A / H) (mm)</th>
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</thead>
<tbody>
<tr>
<td>Alchemist 5000-19 S.R.</td>
<td>5000</td>
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<td>0,6</td>
<td>2,80</td>
<td>2231 / 1615 / 1732</td>
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<td>2231 / 1115 / 1233</td>
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</tr>
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Data valid for the following conditions:

- T in CO2 (°C) 38
- P in CO2 (bar) 94
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