



Original Equipment  
Manufacturer Representative



## Articmaster

## Testimonials

“We were replacing 1-2 Compressors per-month in our data centers, but over the last year that the Articmaster has been installed, we haven’t replaced a single one.”  
- Switch & Data

“Energy reduction went down well over 20% at Nasa’s Ames Research Center”  
- AMB Engineering

“Articmaster is one of the Finest Energy Savings Devices”  
- HVAC Insider Magazine

“The Supply air was 8-degrees colder and the unit cycled 6 hours less in a 24-hour period”  
- DGS / Secretary of State Media Vault

“Savings on 16 package units exceeded guaranteed savings and the ROI was less than 8 months”  
- Lockheed Martin

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# Articmaster

Increases cooling capacity by 16 - 20%

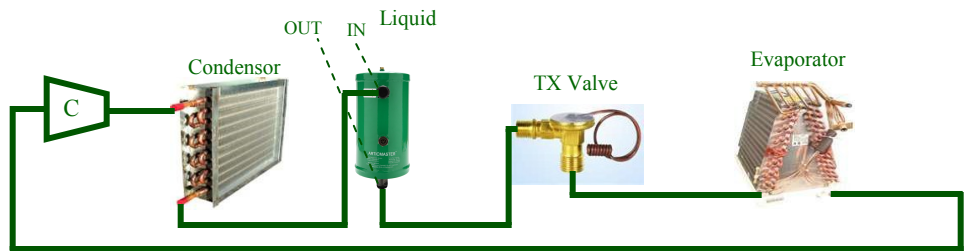
## Articmaster Science Data

**What is it?** The Articmaster is a patented device that employs complex principles (such as fluid mechanics, vortex, refrigerant turbulence, and thermodynamics) to optimize refrigerant efficiency and reduce energy consumption.

**How does it work?** The Articmaster is a condenser control unit. It controls the amount of refrigerant held in the condenser for heat rejection. The hotter it gets, the less refrigerant is held back in the condenser. The colder it gets, the more refrigerant is held back in the condenser. Refrigerants work most efficiently within a narrow band of pressure and temperature. The Articmaster allows the refrigerant level in the condenser to adjust and remain closer to the most efficient band of temperature and pressure.

The chief function of the Articmaster is to increase the capacity of the condenser. This increased capacity enhances the condenser’s ability to reject or dissipate heat, which in turn reduces compressor’s load and lowers energy demand.

**How is it installed?** The Articmaster is installed in the refrigerant liquid line between the condenser and the expansion device. The install does not affect any other part of the system such as the compressor or the electricals. The schematic for installation would look like this:



The cylindrically-shaped tank is mounted perpendicular to the roof, approximately six inches (~15 cm) above the top of the top-most condenser coil. This orientation serves several purposes:

- ◆ It increases the effective condensing volume of the condenser coils
- ◆ It uses gravity to drain the tank and impart a spin to the liquid refrigerant
- ◆ The Articmaster dissipates gas bubbles in the refrigerant.

The Articmaster is designed in such a way to cause the liquid refrigerant entering it to rotate. Under the force of gravity, the rotating mass of refrigerant is drained through a fixed impeller. The impeller amplifies the rotational effect, increasing the refrigerant’s velocity and volume. The resulting vortex provides a propulsive force and ensures that the force of the sub-cooled liquid stream is sufficient to preclude the formation of flash gas and supply the expansion device with a “wetter, colder stream” than would otherwise be the case. This wetter, colder stream decreases the enthalpy of the refrigerant entering the evaporator and results in an increase in cooling capacity.

Acceleration in cooling enables the temperature set point to be reached more quickly. This translates into lower suction pressure and less superheat, which, in turn, reduces head pressure (compression ratio) and results in a decrease in the demand for electricity. The colder evaporator coil also pulls more moisture from the air resulting in improved dehumidification and a longer period for the air conditioner to remain in the off cycle. Humidity in the air is a source of latent heat, and the Articmaster’s ability to improve removal of moisture from the air is a factor in its efficiency improvement performance.

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## Summary

1. The Articmaster increases the condensing volume of the condenser coils and is totally predicated on pressure and temperature. Approximately twenty percent increase can be expected, resulting in improved heat rejection and improved sub-cooling.
2. The Articmaster releases sub-cooled liquid through the liquid line with enough force to eliminate flashing, thereby boosting the capacity of the expansion device; and
3. The Articmaster separates and dissipates gas bubbles, delivering a colder, denser refrigerant to the evaporator.

As explained above, Articmaster only addresses the efficiency of the Refrigeration cycle and does not disrupt any other part of the system.

## Science behind Articmaster:

Pressure  $\propto$  Temperature and Pressure  $\propto$  Current

When the High pressure delivery line of the condenser is broken and is connected to a relatively large vessel, there will be pressure drop, which means that there will be temperature drop and current draw will be less.

The pressure drop will bring down the flow of the refrigerant and this has to be compensated. The pressure drop is compensated by:

- a. Gravity –  $mgh$  – mass x gravity x height, Articmaster is mounted about 6" above the condenser.
- b. The whirlpool effect delivers the liquid refrigerant at a greater velocity, the kinetic energy that is equivalent to  $\frac{1}{2}mv^2$ .
- c. Also, due to the centrifugal force created by the whirlpool will push the vapor to the periphery, thus separating the vapor from the liquid.

Due to the above, the liquid refrigerant gains momentum and travels at greater velocity towards the Tx valve.

By the introduction of Articmaster into the high pressure circuit, it relieves the discharge pressure of the compressor, thereby drawing less current. It compensates the pressure drop by using the gravitational force, kinetic energy and vapor separation and these does not require electrical energy.

As a secondary effect, the temperature of the liquid refrigerant drops due to the drop in pressure. This increases the heat absorption efficiency of the refrigerant at the evaporator side.

The combination of the above two effects of reduced pressure and temperature makes the HVAC system to operate in a very narrow band of pressure and temperature.

Hence, Articmaster is able to achieve the energy savings by making the refrigerant to reject more heat at the condenser side and absorbing more heat at the evaporator side.

## Optimization System Benefits:

- Average Efficiency increase of 20% to 30%
- Increased Capacity of Condenser
- Increased Refrigerant performance
- Cooler Supply Temperature
- Reduction in Compressor Cycles
- Reduction of Head Pressure
- Reduction in Amp Draw
- Decreased run time of equipment
- Reduced equipment failure
- Does not void HVAC warranty

