

## SyCool® Split



## SyCool® Split Data Center Cooling System

### ADVANTAGES

- Split system eliminates duct penetrations
- No water consumption
- High efficiency economization
- Factory optimized controls

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## Data Center Cooling System

Munters SyCool Split provides an efficient cooling solution for new and retrofit installations where access to a suitable water supply may be limited, expensive or unreliable.

A simplified version of the system is schematically shown in Figure 1, right. The system is available in 400 kW blocks of cooling capacity. Thermosyphon heat exchangers move heat from the data center to ambient through the evaporation of liquid refrigerant in the SyCool CRAH, and condensing of the same refrigerant in the SyCool condenser. The CRAH is connected to the condenser with refrigerant piping allowing up to 500' of separation (subtract 12.5' for each elbow). As long as the condenser receives air cooler than the CRAH, heat is exchanged passively for "free cooling" of the data center.

SyCool thermal effectiveness is nominally 70%, which greatly exceeds that of competing refrigerant based economizer systems. For example, with air delivered to servers at 75°F and a 20°F delta T across the servers, SyCool achieves 100% free cooling when the ambient dry bulb temperature is 67°F or lower (operating at 75% load). As ambient temperature rises, SyCool transitions from passive to active by staging/modulating compressors located in the condenser section. Data center heat is rejected by the thermosyphon, passively or actively without the need for diverting valves, allowing seamless transition from economizer to active cooling. As the ambient temperature approaches the temperature from the servers, SyCool finally loses free cooling capacity. **The high heat exchange effectiveness coupled with the ability to economize simultaneously with active refrigeration, yields best in industry economizer capture efficiency as depicted in Figure 2, shown on reverse.**

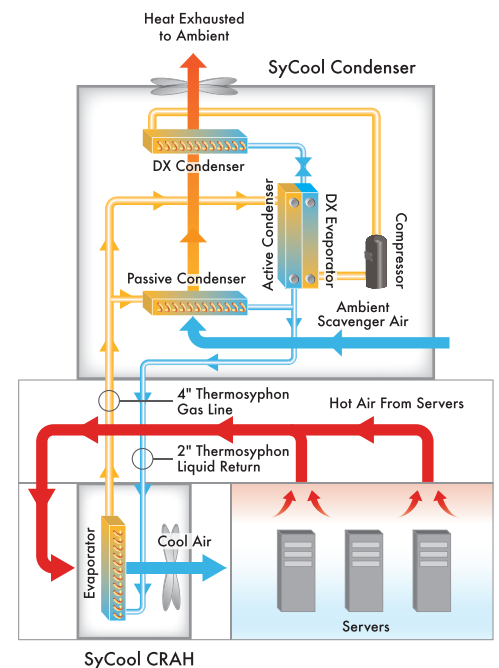
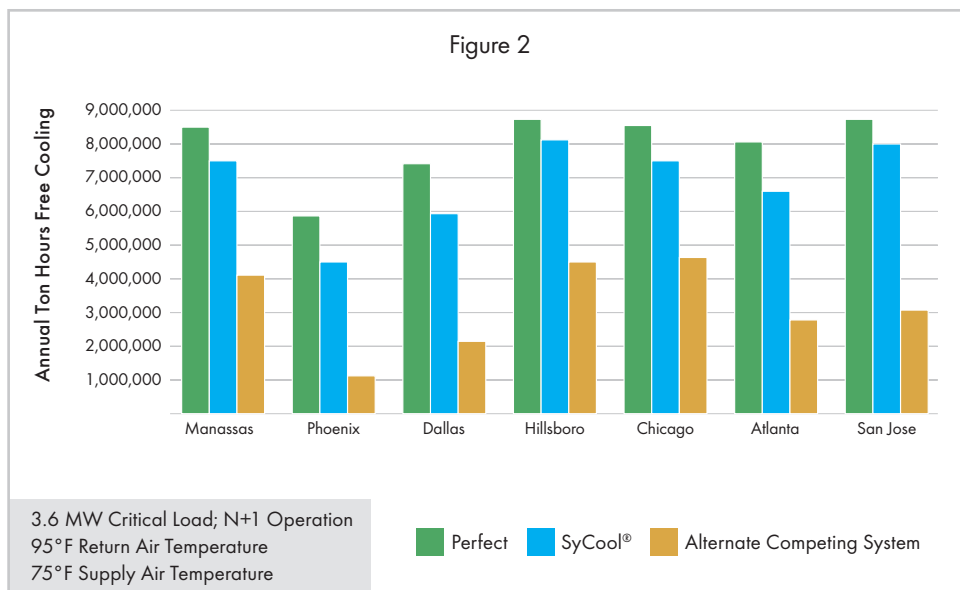


Figure 1

Note: 400 kW system consists of two passive circuits in series. Only one passive circuit shown in above schematic for simplicity.

## Economizer Capture Efficiency

Economizer Capture Efficiency demonstrates economizer cooling achieved relative to maximum available, providing a means to compare the annual economizing potential of various cooling systems. As shown in Figure 2, SyCool technology captures close to 90% of the available free cooling for the cities shown. Maximizing free cooling helps to minimize the mechanical PUE of the cooling system. This characteristic combined with low fan energy, results in SyCool consuming about 50% of the annual cooling energy of the primary competing waterless technology.



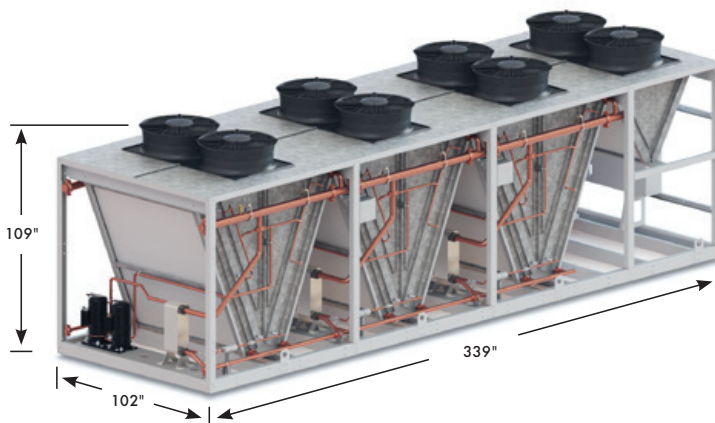
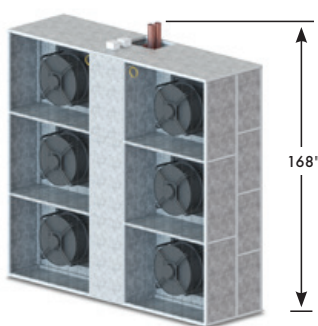
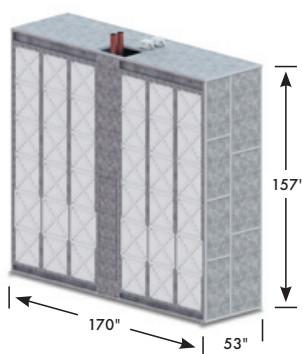
## Other SyCool Features

**Multi-story compatible:** SyCool Split is designed for up to 500' of equivalent straight pipe length between the CRAH and condenser, solving the design challenge of achieving high efficiency cooling with multiple story data centers.

**Scalable blocks of capacity:** SyCool 400 kW condensers coupled with 400 kW CRAHs offer "plug and play" building blocks.

**High density applications:** SyCool CRAH systems configured side-by-side along both sides of the white space perimeter can achieve over 56 kW of cooling capacity per lineal foot of wall. This cooling capacity can accommodate densities of over 400 watts per square foot, depending on operating parameters. SyCool CRAH units flood the room with low exit velocity air, ensuring that all servers receive the cooling required.

**Low pressure refrigerant piping:** SyCool refrigerant lines operate at low pressure and do not require oil management traps such as traditional split refrigeration systems. Each 400 kW system will require two 4" gas lines and two 2" liquid lines. Type "L" copper pipe combined with Victaulic connections may be used, reducing installed cost compared to copper with brazed piping joints.



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