

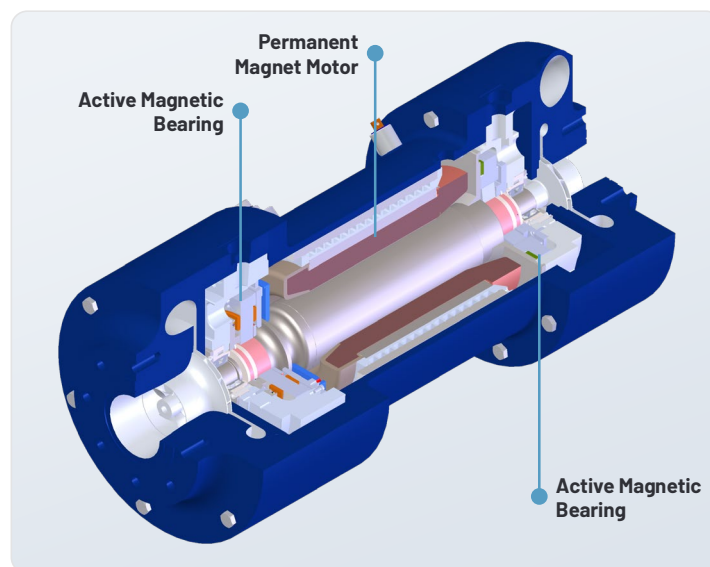
HIGH LIFT OIL-FREE COMPRESSOR

High-Capacity Compression for High-Ambient Cooling

Sapphire Technologies develops and manufactures high-capacity, oil-free compressors for the modern energy economy. Sapphire's high lift compressor is engineered for air-cooled data center requirements, where increasing rack densities and power draw require reliable, efficient cooling at scale. The magnetic-bearing centrifugal compressor is built to deliver more cooling tonnage per kilowatt of input power and has a high-capacity, broad operating envelope for demanding ambient conditions.

Two-stage centrifugal impellers are driven by a high-speed permanent-magnet motor riding on non-contact active magnetic bearings. Backup bearings protect the rotor through power interruptions and transient events, supporting reliable operation through demanding start, stop, and restart conditions. There is no oil: no oil-management system, no oil fouling, and no oil-related performance degradation over the life of the compressor.

At 300 tons per unit, three machines deliver the roughly 1,000 tons a large-frame air-cooled chiller needs while preserving flexibility one or two large compressors cannot match. Wide turndown capability keeps operation stable and efficient across a broad compressor map. The compressor holds full rated capacity through 125°F ambient and operates from -40°F to 140°F, where most compressors lose capacity and efficiency as conditions move far off design.



High capacity per machine. At 300 tons from a single oil-free machine, fewer compressors are needed per chiller, reducing system count, footprint, piping runs, and installed cost per ton.

High-ambient performance. The compressor delivers 100% rated capacity through 125°F ambient, operates at 0.76 kW/ton nominal, and holds 0.98 kW/ton at extreme ambient, so chiller efficiency and PUE survive the peak-heat hours that break conventional compressors.

Reliability engineered in. Active magnetic bearings, backup bearings, and active feedback deliver advanced rotor protection and rapid restart without the oil circuits, oil maintenance, or oil-related degradation associated with conventional compressor architectures.

Clean power, simple installation. An onboard liquid-cooled active front-end drive supports IEEE 519 compliance without external filters, and a wide operating envelope reduces the need for external heaters, suction isolation, and modulating discharge valves that competitors require.

High Lift Compressor Specifications

CAPACITY & PERFORMANCE

Capacity, Nominal ¹	300 ton
Efficiency, Nominal ¹	0.82 kW/ton
Maximum Pressure Ratio	5+

DRIVE & MOTOR

Drive	Liquid-cooled, onboard active front-end
Harmonics	IEEE 519 compliant
Continuous Speed, Max	25,000 rpm
Motor	High-speed permanent magnet

MECHANICAL

Compressor Type	Oil-free, two-stage centrifugal
Bearings	Active magnetic, frictionless
Backup Bearing	Hybrid ceramic
Mechanical Envelope ²	16.5 in dia × 36.3 in L
Max Allowable Working Pressure	350 psig
Capacity Control	Variable speed

REFRIGERANT & ENVELOPE

Refrigerant	R-515B (A1, non-flammable)
Global Warming Potential	292
Ambient Operating Range	-40 to 140°F
Full-Capacity Ceiling	125°F ambient
Leaving Water Temperature, Max	115°F
Cold-Weather Protection ³	4 kW stator heating
Heaters / Isolation / Discharge Valves	Not required

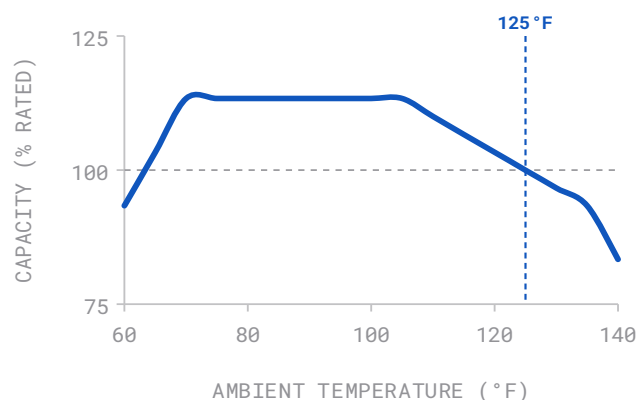
INTERFACES

Suction / Discharge Interface	4 in / 3 in flange
Power Connections	Hermetic feed-through studs
Bearing Connections	Hermetic feed-through

More cooling per square foot: Fewer compressors. Simpler systems. Stable performance in extreme heat.

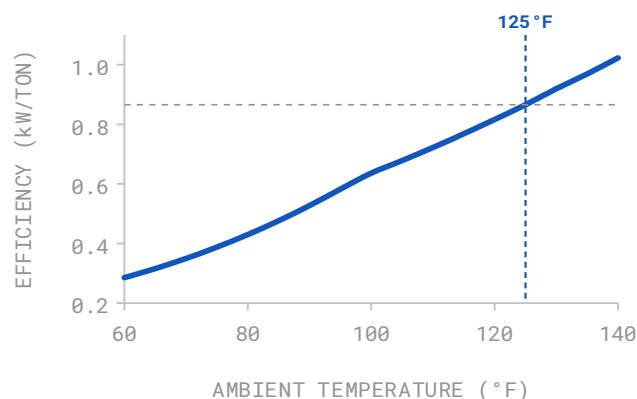
Capacity vs. Ambient Temperature

PERCENT OF 125°F RATING, 65°F LEAVING WATER TEMPERATURE



Efficiency vs. Ambient Temperature

COMPRESSOR PACKAGE, 65°F LEAVING WATER TEMPERATURE



¹At AHRI 550/590 standard rating conditions.

²Cylinder envelope without connectors and crossflow pipe, length inlet to inlet.

³Stator heating maintains rotor readiness; no external enclosure required.