

NaturaLINE

Many Innovations—One Exclusive Design

Although it bears resemblance to other refrigeration units in the Carrier Transicold family, closer inspection of the NaturaLINE™ design reveals some key distinctions. In order for CO₂ to work as a viable refrigerant, Carrier Transicold developed several new components to better control energy efficiency, capacity, power consumption and pull-down, including a wrap-around gas cooler coil, a new purpose-built multi-stage compressor with variable-speed drive and a flash tank.

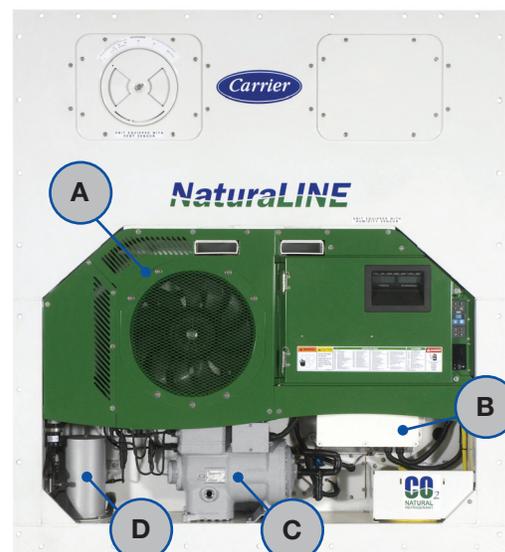
A. Gas Cooler – NaturaLINE technology replaces the condenser assembly found in conventional refrigeration units with a new heat exchanger called the gas cooler. The gas cooler's coil wraps around its fan, maximizing the heat-transfer surface area for greater efficiency in a design that is both compact and lightweight. The gas cooler makes the overall refrigeration system more versatile in responding to CO₂'s thermodynamic properties.

B. Variable-Speed Drive – A first for a Carrier container refrigeration unit, the electric motor that powers the compressor now runs at variable speeds. The custom-designed drive electronically adjusts the compressor's speed to provide the precise amount of cooling capacity to meet demand. This saves considerable energy compared to conventional units in which a compressor has only one speed – maximum – and refrigeration capacity is controlled via mechanical means.

C. Multi-Stage Compressor – The NaturaLINE design makes use of an exclusive new multi-stage compressor that maximizes capacity and minimizes power consumption. Purpose-built for the NaturaLINE application, the patented reciprocating compressor was developed by Carrier's Carlyle Compressor design center. New to container refrigeration are the NaturaLINE system's two stages of compression, which improve overall efficiency. The compressor also features a unique cylinder unloading capability, enabling it to save energy for light-load conditions by turning off one of its two cylinders.

D. Flash Tank – Also new to container refrigeration is the flash tank, which manages the flow and phase change of the refrigerant after leaving the gas cooler. For efficient cooling performance, the patented Carrier design enables final separation of CO₂ from its gas phase to the liquid state before entering the evaporator.

The NaturaLINE unit uses **two-speed fans** throughout – not just in the evaporator – offering greater versatility and energy-saving performance. The new gas cooler fan has an aerospace-inspired design that is larger than a traditional condenser fan, with blades tuned to provide greater airflow and efficiency. The **operating software** has also been reengineered to manage the unique NaturaLINE mechanical system, while still providing an easy-to-use control interface that works virtually the same as every other contemporary Carrier container refrigeration unit.



The NaturaLINE design with a front panel removed to reveal some of the key internal components.