LATEST DORIN CO₂ TRANSCRITICAL COMPRESSORS

CASE STUDIES
INTRODUCTION

Carbon dioxide (R744 - CO₂) is nowadays considered one of the most attractive long-term solutions for commercial and industrial refrigeration applications, as well as for hot water heat pumps.

To meet the growing demand for CO₂ technology the Italian compressor specialist has developed a new semi-hermetic reciprocating compressor range and a new semi-hermetic reciprocating compressor model, both for CO₂ transcritical applications.

ABOUT THE SYSTEMS

CD-2S RANGE

The new CD-2S range offers the capability to work with extreme pressure ratios, permitting the use of typical CO₂ low temperature equipment without the need to implement a cascade or a booster arrangement, thus drastically cutting the risk of failure intrinsically present in any booster or cascade application.

The CD-2S range represents the latest, cutting-edge development for transcritical CO₂ compressors. These models can be used in a wide range of applications. They provide several operational benefits:

- The ability to handle large pressure differences produced by typical direct expansion low temperature systems configuration (T_{ev} = -35°C or -31°F), rejecting the heat directly to the ambient (up to 100 bar discharge pressure), thus providing an intrinsically safer installation. In fact, in a booster system, any failure occurring on the low pressure side will automatically be reflected into the high pressure side, and vice-versa.
- Issues related to stand-still conditions become obsolete, at least regarding compressors, as the compressors have Pss = 100 bar.
- Increased system efficiency of medium temperature equipment (T_{ev} = -10°C or 14°F) located in warmer areas by using the sub-cooling effect obtainable through a very simple inter-stage gas heat exchange with a gas cooler outlet. This could clearly boost the installation’s energy efficiency, making CO₂ a viable solution, also for warmer climates (e.g. Southern Europe).
• Safe operating of a CO₂ heat pump down to extremely low ambient temperatures (T_amb = -25°C or -13°F) with no need for additional electric heaters, thus boosting the equipment’s efficiency.

Main Characteristics
• Semi-hermetic reciprocating compressor
• Generous electric motor sizing
• Max. standstill pressure: 100 bar, top figure within competition products
• Displacement (m³/h at 50Hz): 11.6 – 15.1 m³/h
• Cylinders: 4
• Suitable for frequency control regulation, up to 75Hz

Advantages
• Room opening for LT applications with single stage compressor with no need for a booster / cascade arrangement: intrinsically safer installation
• Standstill pressure boosted to 100 bar, allowing:
  » Prolonged refrigerant containment during long-lasting standstill
  » Safer good preservation
• Extra-robust drive gear for extreme and proven reliability
• Multi-layer, self lubricating bearing for superb robustness against liquid slugging
• Silent and smooth operation in any operating condition
• Wide application envelope to suit all possible applications and systems
• Utmost reliability
• Utmost COP levels

CD5000M
With its 30.5 m³/h displacement, the new CD5000M is able to work in typical medium-low temperature applications and allow for the consistent decrease of the number of compressors assembled on racks, thus leading to consistent cost reduction for end-users.

CD5000M represents the last extension of the well known and appreciated CD400 range. At the time, the CD400 range already featured the largest CO₂ transcritical model commercially available on the market (namely CD4000H, 26.5 m³/h). With the introduction of CD5000M, DORIN has further strengthened its leading position in the market, allowing its business partners to provide the best solution for end users.

Main Characteristics
• Semi-hermetic reciprocating compressor
• Electric motor specifically sized for CO₂ applications
• Max. standstill pressure: 100 bar, top figure within competition products
• Displacement (m³/h at 50Hz): 30.5 m³/h
• Cylinders: 4
• Suitable for frequency control regulation

Advantages
• Possibility to reduce the number of compressors in typical rack systems
• Sensible cost reduction for end users
• Standstill pressure boosted to 100 bar, allowing:
  » Prolonged refrigerant containment during long-lasting standstill
  » Safer good preservation
• Extra-robust drive gear for extreme and proven reliability
• Multi-layer self lubricating bearing for superb robustness against liquid slugging
• Silent and smooth operation in any operating condition
• Wide application envelope to suit all possible applications and systems
• Utmost reliability
• Utmost COP levels