APPLICATION STUDY:
ULT CONDENSING UNIT

SECOP

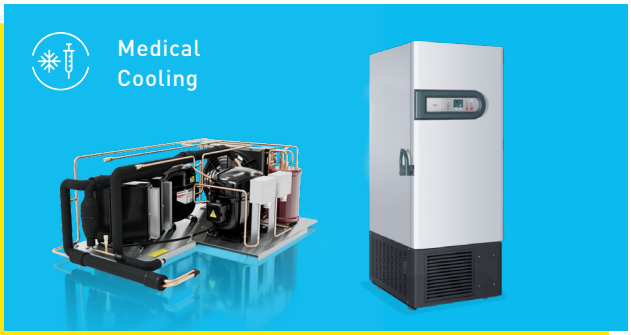
Date: May 2025

SUMMARY

Project: MS18UVULTM in ULT-Two-Stage Cascade

Sector: Medical

Task: Retrofitting a professional ultra-low temperature (ULT) freezer with a green, efficient and electronic controlled variable-speed drive (VSD) R290/R170 compressor.



STORY

Use case: WHO certified cooling (e.g. vaccines)

Starting condensing unit configuration (CDU)

Compressor: Two-stage fixed-speed drive hermetic compressors
Refrigerant: R290/R170
Displacement: 2x 27.8 cm³
Height: 234 mm
Weight: 2x 18.5 kg

Requirements

- → Improve robustness limitation
- → Leverage performance with better temperature stability
- → Reduce power consumption
- → Reduce/eliminate downtime
- → Prepared to fulfill future WHO/PQS standard

Background

The medical sector needs ULT refrigeration for safely storing, transporting, and handling of highly sensitive substances including vaccines. Standard fixed-speed drive (FSD) compressors overload and run outside of approved limits. Loads are much more extreme than in standard cooling. A much shorter lifetime of compressors ensues.

Challenges

Convert from a two-stage FSD compressor CDU to a two-stage VSD compressor CDU allows for significant optimization of the unit's efficiency. Achieve optimal robustness for more reliable operation.
Reduce energy consumption and optimize performance in an ULT environment.

OUTCOME

Solution:
From two-stage fixed-speed to two-stage variable-speed

Change from a FSD compressor to an electronically controlled °CCD compressor (MS18UVULTM) while also optimizing capillary tubes and refrigerant charge for better energy efficiency. The variable-speed °CCD compressor creates better temperature stability, better efficiency, and lower risk for capillary tube blockade. Moreover, its support for the Door-Opening Recovery system ensures swift temperature restoration, preserving sample integrity and reducing energy consumption.

Results: MS18UVULTM achieves WHO standard.

-35 % to -40%
Energy Consumption

Reduced ULT CDU dimensions

-23 % volume
Variable-speed compressor size vs. two-stage FSD

THE BENEFITS

Biomaterial and Medical Storage	Energy Efficient	Long Product Lifecycles	Natural Refrigerants	Premium controllers	Variable-Speed Efficiency
Precise control and setting of target temperature	Meets the EnergyStar standard	Maximum robustness and reliability	R290/R170 green refrigerant	High level controls and settings	Optimal energy consumption and performance

TAKE-AWAYS

- **Secop** has developed the technology for an **ultra-low temperature stationary cooling system**, that can efficiently and effectively be retrofitted in medical grade cooling devices
- Secop's new **MS18UVULTM** is the only electronics controlled AC compressor which fulfills the requirements of **WHO-certified vaccine refrigerators**
- Ideal solution for storage of **mRNA-based** COVID-19 vaccines
- It permits temperature levels: **-20 °C down to -86 °C**. Precise cooling and control of target temperature
- Electronic controls featuring intuitive interfaces and easy access to information with easy customization via **Tool4Cool®**
- **Reliable** long-lasting systems with low TCO life cycle and maximum **robustness**
- **Reduced condensing unit dimensions** enhance machine room flexibility, enabling optimized cabinet controller unit placement and improved service accessibility.
- Learn more about the MS18UVULTM https://lmy.de/yEarh

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Direct Link

ABOUT SECOP

Secop is the expert for advanced hermetic compressor technologies and cooling solutions in commercial refrigeration.

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Produced by Secop | May 2025