LOWENCO

ADVANCED ULT ARCHITECTURE TAILORED FOR PHARMA

Modular Large-Scale ULT System

APRIL_2026

WHY PRECISION ENGINEERING MATTERS

in ultra-low temperature storage

Pharmaceutical companies require reliable cold storage systems capable of maintaining consistent product temperatures.

LOWENCO's solutions range from Large Scale Storage Units (LSSU) to high-capacity Large Scale Blast Units (LSBU), delivering exacting performance with built-in scalability and advanced control systems.

Scan QR code and take a tour in a LSSU

Replace up **to 42** upright freezers

Common setup with many upright freezers.

700 ft³/ 19,82 m³

One modular large-scale unit can replace up to 42 single upright freezers. A smarter space-saving and energy-efficient alternative to ULT storage which improved reliability.

ENGINEERED FOR ENGINEERS:

Built to solve pharma's toughest cold storage challenges

Fast and flexible:

With in-house engineering, design, production, installation, commissioning and aftersales, we can quickly respond to project-specific modifications and needs.

Redundancy by design:

Dual refrigeration plants with complete mechanical and electrical redundancy.
The communication system is controlled via Siemens PLC to eliminate single points of failure.

Pull down/thaw time:

The LSBU goes from +25°C to -70°C in 36 hours with accuracy and safety.
(We also operate at -80°C).

Temperature control:

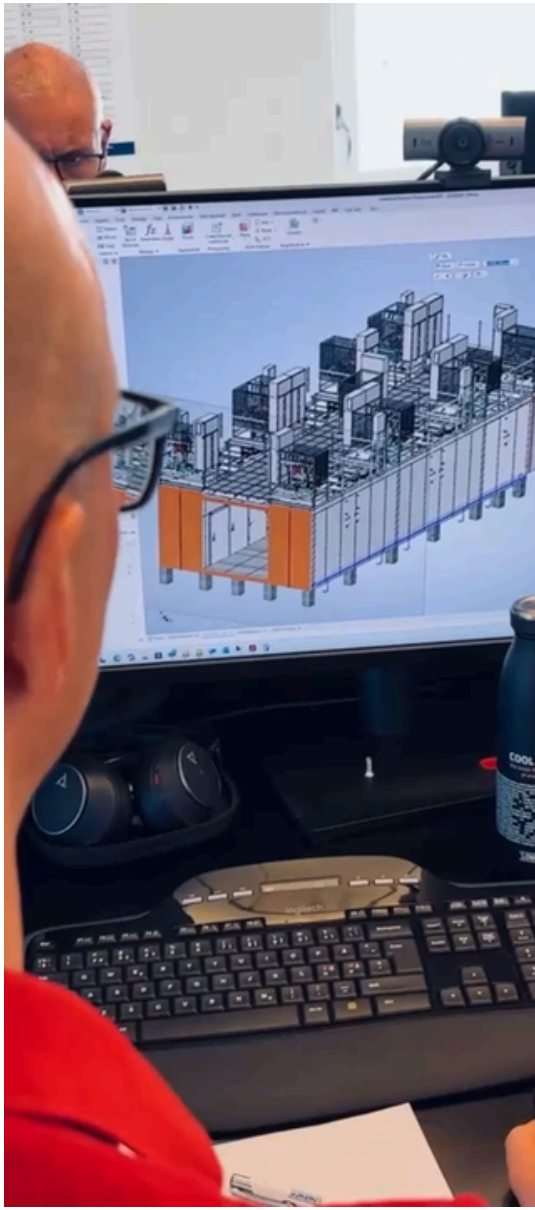
±1°C temperature uniformity across storage product.

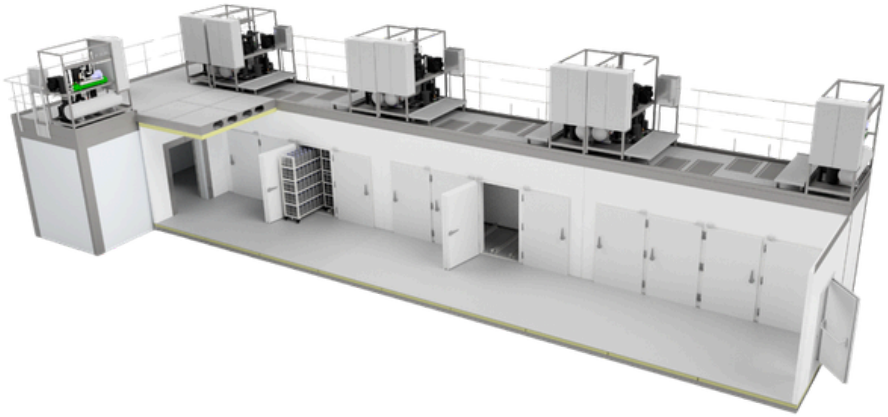
Modular flexibility:

Configurable units tailored to existing buildings and scale needs. With temperature flexibilities between storage units.

Built for engineering needs:

Developed to support efficient installation, simplify validation by reducing efforts to a single unit rather than multiple individual upright freezers, and ensure easy access for routine maintenance, all managed externally via our tech space.





INSIDE THE DESIGN:
Advanced system architecture tailored for pharma

LSSU – Large Scale Storage Unit

- **Operating temperature:** From -20°C to -80°C
- **Storage capacity:** Up to 4.800 L depending on the product type
- **Configuration:** Tailored design of systems depending on temperatures, safety and client- or legislation-specific requirements
- **Control system:** Siemens ET200SP 1510 1PN depending on requirements with dual HMIs (anteroom and technical room)
- **Mechanical design:** System design depending on client utilities such as tower water, chilled water or drycooler
- **Redundancy:** Redundancy class N+1 for full redundancy
- **Function:** Self-detecting defrost sequence for minimizing heat / electrical load
- **Compressor frequency:** Controlled via inverters to match system load and safety thresholds

COLD STORAGE SOLUTION DESIGNED AS A COMPLETE & CONTROLLED ENVIRONMENT

Our turnkey solution brings together:

- **Cooled ante-room (2-8°C)** → Controls humidity and air exchange to protect the ultra-low temperature area from moisture ingress, reducing ice buildup and improving system efficiency
- **Cooled corridor (-25°C)** → Creates a temperature buffer that prevents shock to the ultra-low zone when doors open, protecting both product and equipment
- **Integrated freezer & blast setup (-80°C)** → Allows seamless transfer from blast freezing to long-term storage without handling risks or temperature excursions
- **Reach-in freezers with trolley storage** → Products are stored on trolleys, eliminating the need for manual lifting or reaching to the back - ensuring both **product safety** and **operator safety**

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WHY IT MATTERS:

Product integrity

Consistent protection from humidity, temperature spikes, and handling damage.

Operational efficiency

Smooth, single-flow handling without unnecessary manual movement.

Reduced risk

Every layer is engineered to protect against downtime, contamination, and compliance issues.

Energy efficiency

Pre-zones reduce strain on ULT systems.

Want to see how this works in real life?

Contact our sales team and take a virtual tour inside a fully implemented solution already safeguarding high-value medicines.

INSIDE THE DESIGN:
Advanced system architecture tailored for pharma

LSBU – Large Scale Blast Unit

- **Operating temperature:** From -20°C to -80°C
- **Blast capacity:** Up to 2.400 kg depending on product type
- **Configuration:** Tailored design of systems depending on temperatures, safety and client / legislation specific requirements
- **Control system:** Siemens ET200SP 1510 1PN series depending on requirements with dual HMIs (anteroom and technical room)
- **Mechanical design:** System design depending on client utilities such as tower water, chilled water or drycooler
- **Function:** Freeze/Thaw function – customized profiles available.
- **Compressor frequency:** Controlled via inverters to match system load and safety thresholds

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HIGHLIGHTED FEATURES:
Precision, redundancy, & control in every system

- **Temperature control:** Multiple temperature probes ensure continuous operation in case of failure
- **Manual and automated control:** Accessible at multiple user levels with full trending of temperatures, pressures, alarms and audit-trails. Manual operation is restricted to users with a LOWENCO system login
- **Power failure recovery:** UPS-backed PLCs with SD card memory and auto-restart functionality
- **Alarm system:** +150 alarms per LSSU, all easily accessible via Modbus TCP/IP communication. Moreover, hardwired signals available for both urgent and non-urgent alarms as a standard
- **Defrost logic:** Automated hot-gas defrost function for avoiding unnecessary heat load
- **Recovery logic:** After a door opening, system change, post defrost etc. Boost mode of refrigeration unit activates

HIGHLIGHTED FEATURES:

Precision, redundancy, & control in every system

System control:
PLC program is engineered to operate with the lowest energy consumption without compromising reliability.

Sustainable design:
Every design is based on the philosophy for long lifetime operating at ultra-low temperature – preventive maintenance through our SLA concept.

Material handling:
Trolleys are designed to fit in both blast and storage unit, for minimizing material handling between the two processes - an electrical mower is optional for easy mowing.

Personnel safety:
Freezers are designed as a reach-in, not walk-in. All maintenance can be done from the separate tech-space. Portable crane solution for heavy lifting in tech-space (optional) Electrical mower of trolleys (optional).

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ECOVADIS GOLD MEDAL 2025

Top 5% sustainability performer

LOWENCO has completed the EcoVadis Scorecard, and has been awarded a Gold Medal.

EcoVadis medals recognize companies that have completed the EcoVadis assessment process and demonstrated a relatively strong management system that addresses sustainability criteria, as outlined in the EcoVadis methodology.

FLEXIBLE MATERIAL HANDLING:

Modular trolleys for optimized workflow

Trolleys are fully customizable to accommodate different container types such as bottles, bags, CryVault containers and pallets – all dimensioned to fit the freezers.

Designed for maximum flexibility and optimized to ensure the highest possible utilization of each freezer.

SMART DESIGN

that lowers costs and CO_2 emissions

LOWENCO's LSSU systems are engineered with sustainability and cost-efficiency in mind. Compared to traditional ultra-low temperature freezers, our LSSUs consume significantly less energy per Wh/kg1/day, contributing to both environmental and financial performance.

Scan QR code to see our LSSU product video

Key features

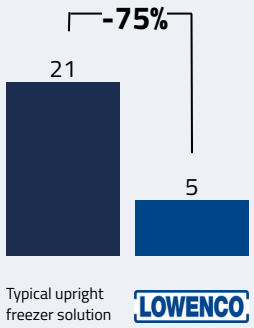
The LOWENCO LSSU has a small footprint, low energy and cost - combined with top reliability and service.

Test comparison:

1 LSSU vs. 35 uprights (equal storage volumen).

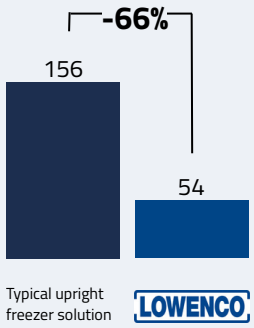
Smallest footprint

M_2 /tonne1



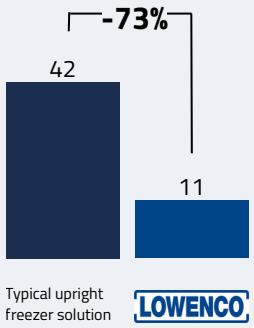
Low power consumption

Wh/kg1/day



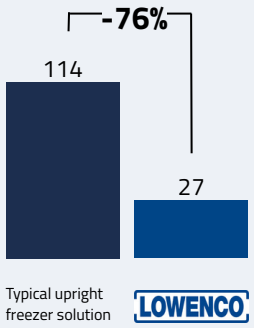
Strong sustainability profile

CO_2 emissions: kg CO_2 /kg1/year



Low total cost of ownership

EUR/year/kg1 product stored



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ABOUT LOWENCO
& contact

At LOWENCO, we specialize in ultra-low temperature storage solutions engineered for the pharmaceutical and biotech industries.

Founded in 2013, we pioneered modular freezer technology with our first prototype in 2014 and have since grown into a team of 120+ specialists serving leading pharma and biotech companies worldwide.

Our systems combine modular design, advanced control technologies and built-in redundancy to meet the most demanding operational and regulatory requirements, while consuming up to six times less energy than traditional solutions.

From initial design to long-term support, we are your single point of contact for precision, scalability and reliability.

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