

# SUSTAINABLE COOLING SOLUTIONS

**SECCOP**



Stationary  
Cooling



Mobile  
Cooling



Medical  
Cooling



Variable-Speed  
Drive



Natural  
Refrigerants

# CONTENTS

Foreword	3
Secop Group – Who We Are	4
Secop Group – Vision, Mission and Values	5
Secop Group – Around The World	6
Natural Refrigerants	8
Variable-Speed Drive	9
Core Businesses and Products	10
The Secop Compressor Range	13
Product Portfolio – Stationary Cooling	14
Product Portfolio – Mobile Cooling	16
Product Portfolio – Medical Cooling	17
Product Portfolio – Condensing Units	18
Highlight – SLVE18CN	20
Highlight – KL-Series	21
Highlight – BD Nano-Series	22
Highlight – MP2UVULTM	23
History and Milestones	24
Beyond the Product	26
Contact	28

## A FOCUSED VISION AND A COMMITTED MISSION FOR SECOP GROUP

Dear Reader,

Despite the challenges of the market environment, the year 2020 marked a relevant pillar for Secop Group: the 10th anniversary of Secop brand. It has been a long journey for our company with various changes throughout the years, and in 2019 we began a reorganization in which we re-established the company's main focus to be fully committed to our core businesses: Stationary Cooling and Mobile Cooling.

Secop is an established and experienced player in the refrigeration business with a tradition of high quality, innovative solutions, application optimization, and customer service. Secop Group will continue to focus on these strengths and all the transformation steps seen from 2019 are part of a strategic plan to concentrate valuable resources and knowhow on the light commercial, mobile cooling and medical cooling segments, the core areas in which our experience, leading technology, and support can differentiate with premium solutions for our partners.

All the strategy steps we have planned and the structural changes we have implemented are proving to be effective in 2021 and beyond. The new Secop Group is fully operative and Secop team is committed to upholding our philosophy and focused on reaching our goals.



Dr. Jan Ehlers  
Chief Executive Officer



Michael Engelen  
Chief Financial Officer



Johannes Maerz  
Chief Operation Officer



Norbert Brath  
Chief Technology Officer

# SECOP GROUP: WHO WE ARE

Secop is the expert for advanced hermetic compressor technologies and cooling solutions in commercial refrigeration. We develop high performance stationary and mobile cooling solutions for leading international commercial refrigeration manufacturers and are the first choice when it comes to leading hermetic compressors and electronic controls for refrigeration solutions for light commercial and DC-powered applications.

Secop has a long track record of successful projects to adopt energy efficient and green refrigerants that feature innovative solutions for both compressors and control electronics.

Our Stationary Cooling business segment (AC-supply compressors for static applications) encompasses compressors for light commercial applications in food retail, food service, merchandisers, and special applications including selected residential applications.

Our Mobile Cooling business segment (battery-driven DC-supply for mobile applications) is the global leader in high-performance hermetic DC compressors for automotive, trucks, recreation vehicles, portable boxes, solar, and other mobile applications.

Our Medical Cooling business segment with its stationary and mobile solutions make us a reliable partner for leading companies supporting the development of a global ULT (ultra-low temperature) supply chain.



# IT ALL STARTS WITH THE RIGHT MINDSET



## Vision

Secop strives to be the first choice for partners searching for leading-edge refrigeration solutions and premium customer experience.



## Mission

Secop is committed to delivering advanced refrigeration compressors and controls, offering customers tailored sustainable solutions for light commercial, battery-driven, and special cooling applications.



## Values

- Perform with passion
- Deliver high quality
- Act with integrity
- Work with team spirit

“Secop is a strong brand that offers unique solutions with leading industry and operational expertise based on a tradition of high quality, innovation, application engineering, and customer service. With new solutions to support the medical industry and medical cold chain, Secop has contributed to fighting COVID-19. Some of the world’s leading manufacturers of medical cooling solutions have been relying on our products for many years. Our experience in such medical applications has helped us to also develop ultra-low temperature cooling compressors. Energy-saving and product life-extending measures, as well as a preference for natural refrigerants, make our solutions particularly sustainable and attractive to both users and manufacturers. With our structure, we aim to get to know our customers closely to better understand their need and view ourselves as a solution provider, solving specific problem together with the customer as our partner.”

Dr. Jan Ehlers  
Chief Executive Officer

# SECOP GROUP: AROUND THE WORLD

12

international partners for advanced developments

33

laboratories located in Austria, Germany, Slovakia, China, US, and Turkey

160

R&D engineers and technicians

440

patents globally

50+

countries with customer support



## Premium Customer Support

- Sales team aligned to customers
- Support in 50+ countries
- Customer service support in different regions
- Worldwide distribution network
- Application engineering worldwide support

## Locations, Footprint, and Figures Today

- Headquarters in Germany
- Production facilities in China and Slovakia

## Profile

Secop is a very well-established and experienced player with a tradition of high quality, innovation, and application engineering, and customer service.

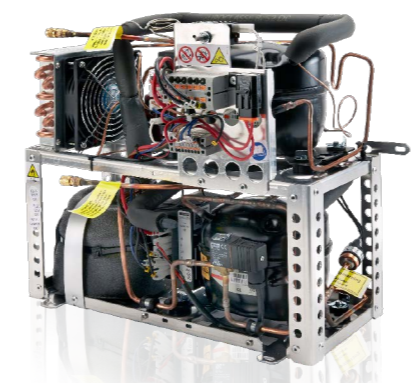
Secop was formerly known as Danfoss Compressors and is one of the founding fathers of modern compressor technology with years of experience that goes back to the beginning of the 1950s.

Since September 2019, Secop has belonged to ESSVP IV, advised by Orlando Management AG, a private equity firm with a long and successful track record in developing business in the industrial sector.



Germany	Italy	Austria	Czech Republic	Slovakia	Turkey	China	USA
Flensburg	Turin	Gleisdorf	Zlaté Moravce	Spišská Nová Ves	Çorlu	Tianjin	Atlanta
Sales	Sales	R&D	R&D	R&D	Laboratory	Sales	Sales
R&D		Laboratory	Logistics			R&D	Logistics
Laboratory			Manufacturing			Logistics	Laboratory
			Laboratory			Manufacturing	Laboratory

Since 2011, Secop has been committed to the UN Global Compact corporate responsibility initiative and its principles in the areas of human rights, labor, the environment, and anti-corruption.



**“Secop is a technology leader in battery-driven DC applications, commercial cooling solutions, and medical refrigeration. We continuously work on developing new products and delivering premium service to our customers. We also support the transition to new sustainable refrigerants, high energy efficient products and mobile cooling solutions including e-cars and medical applications”**

Norbert Brath  
Chief Technology Officer



# NATURAL REFRIGERANTS



Secop has been developing highly efficient compressors that use hydrocarbons (R290 and R600a) for more than 25 years. Our successful R290 compressor range has been updated with continuous releases of higher efficiency models for both LBP and MBP applications, specifically designed for merchandisers, food service, food retail, medical refrigerators, and ultra-low temperature freezers.

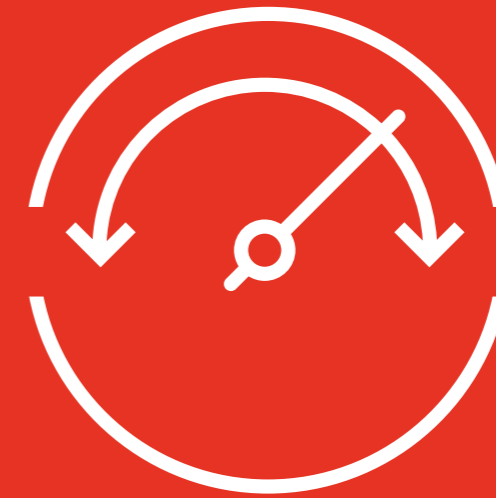
These DLE, NLE, SCE, and KLF compressors are tailored for commercial use and can be used to replace products made for high global warming potential (GWP) refrigerants such as R404A and R134a.

New 50/60 Hz compressor variants are designed to support regions that experience harsh and challenging environments and in which voltage fluctuations as well as high ambient temperatures need to be taken into

account, and when the ability to start under low voltage conditions without stalling is important.

Secop has been developing and promoting efficient low-GWP natural refrigerant solutions since 1993. The introduction of hydrocarbons R600a and R290 helps to protect the environment and updates commercial refrigeration systems with the latest generation of a highly efficient compressor technology.

# VARIABLE-SPEED DRIVE



Secop understands that operation at full capacity is extremely rare in most cooling applications, that's why we've built variable-speed controlling devices into the BD, DLV, NLV, and SLV/E series that automatically adapt the speed to your operating needs. This means compressors usually run at low speed, thus minimizing power consumption and greatly improving efficiency.

Our °CCD® electronic units also feature built-in overload and thermal protection that automatically restarts the compressor after a certain time. Compressors can be powered up with high starting torque (HST), making equalizing pressure in the system before starting the device unnecessary.

Tool4Cool® is a unique software tool that lets you configure Secop's Cool Capacity Drive (CCD®) variable-speed compressors precisely to your cooling systems.

From the 1998 when the first TLV variable-speed compressor was developed, Secop has continuously developed and optimized its variable-speed compressors and control electronics for commercial applications and for DC battery-driven solutions. Today, we offer a full range of variable-speed drive compressors from the small BD-Series for mobile cooling up to the S-Series for large food retail solutions, including a green hydrocarbon refrigerants range.

# CORE BUSINESSES AND PRODUCTS:



## Stationary Cooling

### The Recipe for Successful Solutions:

- 60 years of experience
- Unparalleled reliability
- Efficient solutions
- Hydrocarbon optimized range
- Premium variable-speed drive
- Global service



Our Stationary Cooling business segment (AC-supply compressors for static applications) encompasses compressors for light commercial applications in food retail, food service, merchandisers, medical, and special applications including selected residential applications.

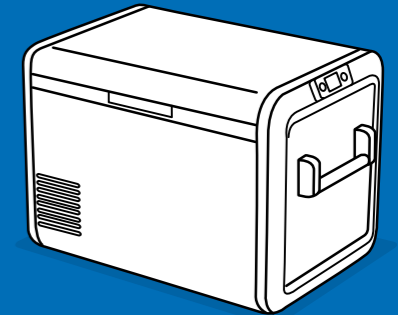
In AC (alternating current) applications, our T-, D-, N-, S-, G-Series compressors, for stationary biomedical appliances focused on natural refrigerants, enable cooling circuits in ULT freezers to reach temperatures as low as -86°C or are used in centrifugal coolers to process and preserve all types of vaccines, blood, plasma, and other temperature-sensitive biomedical goods.



## Mobile Cooling

### Refrigeration Anytime and Anywhere:

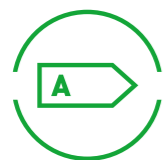
- DC-powered compressors
- Pioneer with 40 years of experience in battery-driven mobile refrigeration solutions
- Reliable solutions (automotive standards)
- High performance in compact size
- Premium control electronics



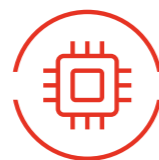
Our Mobile Cooling business segment (battery-driven DC-supply for mobile applications) is the global leader in high-performance hermetic DC compressors for automotive, trucks, recreation vehicles, portable boxes, solar, and other mobile applications.

In DC (direct current) applications, our BD Series compressors provide world-wide safe transport of sensitive biomedical goods. Our cutting-edge controls enable cooling solutions to be directly powered by solar panels (SDD, solar direct drive) in remote areas without stable electricity grids or are also used universally in AC/DC mode for both transport and storage.

**Integral to your success** These qualities make Secop an ideal partner for efficient cooling solutions: We are the first choice in leading-edge refrigeration solutions.



Energy Efficient  
"Green Solutions"



Premium Controllers  
for Compressors



Superior Product  
Quality and Reliability



Hydrocarbon  
Ready



Long Product  
Life Cycles

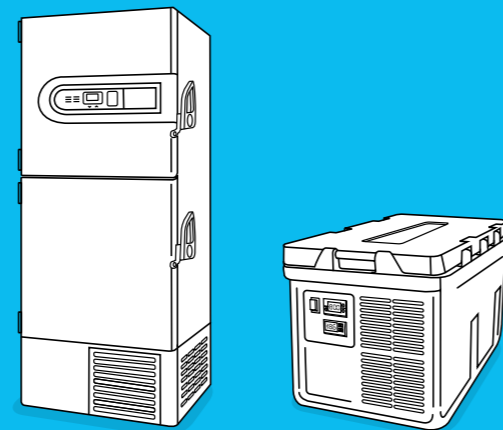


Variable-Speed  
Compressors



## Medical Cooling

Reliable Stationary and Mobile Solutions Supporting the Development of a Global Ultra-Low Temperature Supply Chain:



Our BD-Series compressors provide world-wide safe storage and transport of sensitive biomedical goods. They are also used universally in AC / DC mode for both transport and storage. Secop's active mobile ULT compressor solution is able to reach  $-70^{\circ}\text{C}$  to  $-86^{\circ}\text{C}$  and provides significant benefits including the prevention of wasted vaccines while also not generating carbon dioxide emissions that occur with passive dry ice cooling solutions.

Our T-, D-, N-, S-, G-Series compressors, for stationary biomedical appliances focused on natural refrigerants and also on electronic controlled solutions. Secop solutions enable cooling circuits in ULT freezers to reach temperatures as low as  $-86^{\circ}\text{C}$  while also providing solutions for standard temperature cooling levels of  $-20^{\circ}\text{C}$ ,  $+2^{\circ}\text{C}$  to  $+8^{\circ}\text{C}$  used in centrifugal coolers to process and preserve all types of vaccines, blood, plasma, and other temperature-sensitive biomedical goods.

# THE SECOP COMPRESSOR RANGE

## DC Compressors



BD Nano



BD Micro



BD-P



BD-T

## Fixed Speed AC Compressors



P-Series



T-Series



D-Series



K-Series



KL-Series



N-Series



F-Series



S-Series



G-Series

## Variable-Speed AC Compressors



DLV



NLV



SLV/SLVE

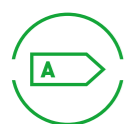
## Condensing Units



Capillary connection

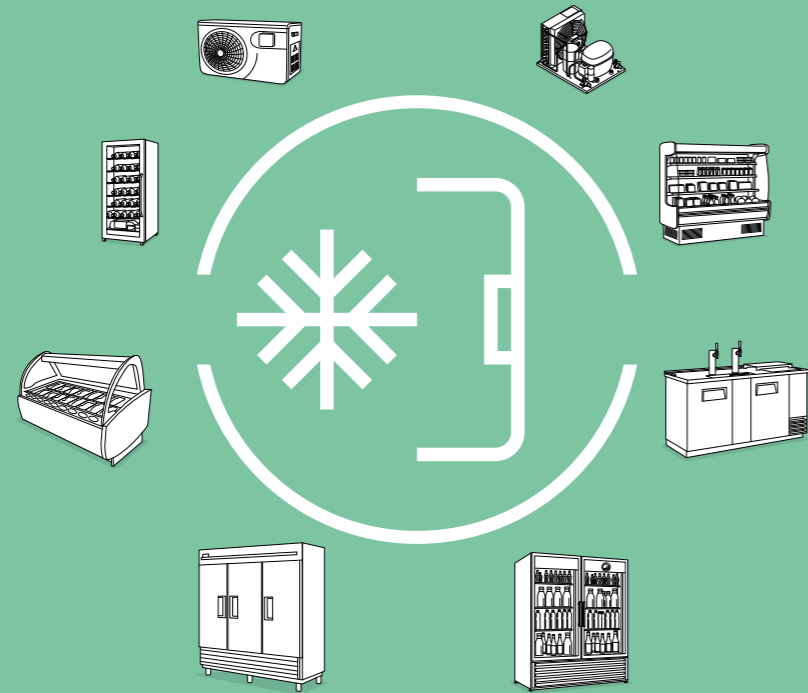


Valve connection



# STATIONARY COOLING

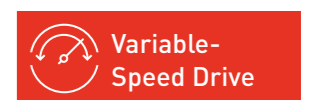
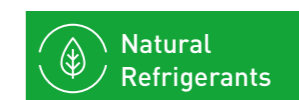
Refrigeration compressors and solutions for food retail, food service, medical, commercial freezers or coolers, beverage dispensers, special commercial equipment, and selected residential applications



Series	Displacement (cm <sup>3</sup> )	Cooling Capacity			Refrigerants
		LBP (W) ASHRAE	MBP (W) ASHRAE	HBP (W) ASHRAE	
DLV	4.0-5.7	184-448	224-796		R290
NLV	7.96-12.55	265-937	490-1677		R290
SLV/SLVE	15.28-17.7	403-1190	1200-2149		R290

Series	Displacement (cm <sup>3</sup> )	Cooling Capacity			Refrigerants
		LBP (W) ASHRAE	MBP (W) ASHRAE	HBP (W) ASHRAE	
P	1.41-2.50	25-59	66-126	130-192	R600a R134a
T	2.6-10.13	45-272	11-392	218-488	R600a R290 R134a R404A R513A R452A
D	4.0-10.14	62-382	324-678		R600a R290
K	5.6-12.5	92-260			R600a R134a
KL	4.0-7.7	200-395	401-704		R290 a R134a
N	6.13-14.65	127-766	320-1359	1122-1211	R600a R290 R134a R404A R513A R452A
F	6.23-11.15	120-332	296-514	516-950	R134a R404A R513A
S	10.29-20.95	167-1137	493-1868	923-2266	R290 R134a R404A R407C R513A R452A
G	21.2-33.8	1207-1912	1448-3363	2613	R134a R404A R513A

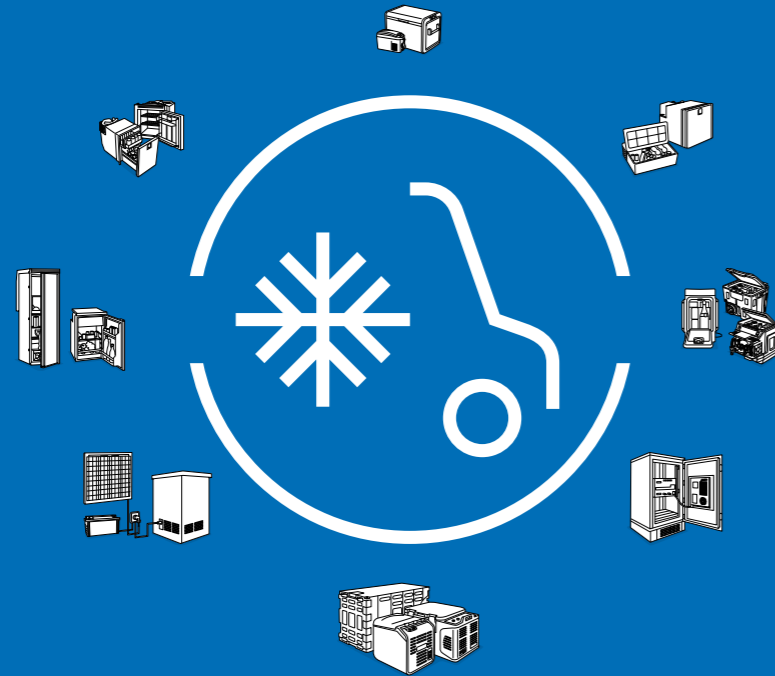
Secop stationary cooling compressors are available for all worldwide AC mains supply standards.





# MOBILE COOLING

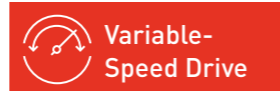
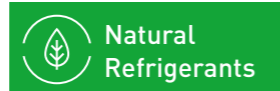
DC-powered or battery-driven compressors specifically designed for mobile cooling solutions: automotive (trucks, cars, bus), recreations vehicles, portable boxes, medical, solar, and special applications



Series	Displacement (cm <sup>3</sup> )	Cooling Capacity			Refrigerants
		LBP (W) ASHRAE	MBP (W) ASHRAE	HBP (W) ASHRAE	
BD Nano	1.42–2.60	28–69	63–139		R134a R1234yf R600a
BD Micro	1.41	13–34	42–94	83–173	R134a R1234yf
BD-P	2.0–3.0	29–71	65–223	115–390	R600a R290 R134a
BD-T	3.86–5.08	115–245	242–473	433–804	R134a R404A

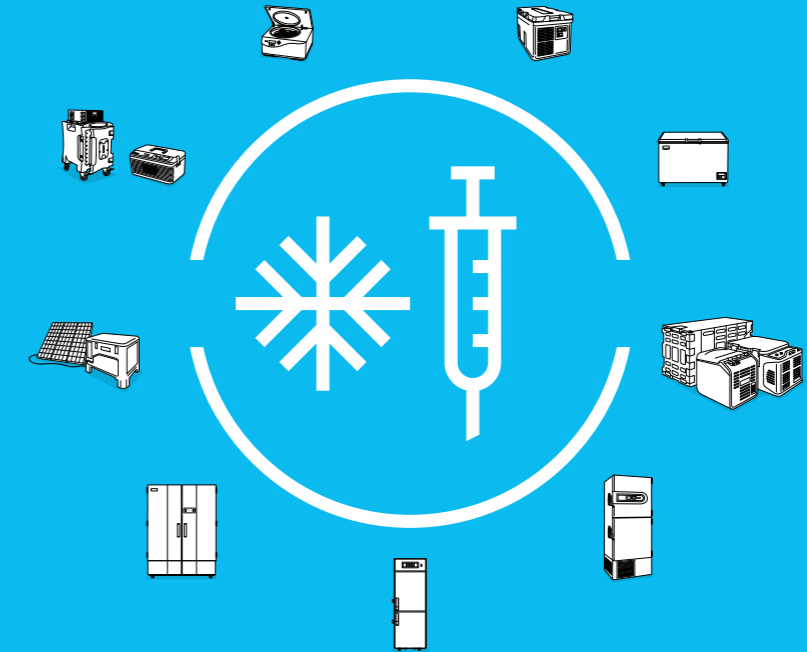
0–35    0–2000    0–3500    0–2750

Secop mobile cooling compressors are available for a variety of DC voltage ranges and certain controllers even feature an AC option for various mains supply.



# MEDICAL COOLING

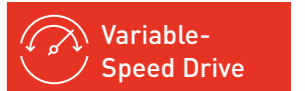
Refrigeration compressors and solutions for various vaccine and biomedical cooling requirements including ultra-low temperature models for stationary or mobile appliances providing world-wide safe storage or transport at different temperature levels



Applications	Evap. temp. range (°C)	Displacement (cm <sup>3</sup> )	Cooling Capacity (W)	Test Conditions	Refrigerants
Medical Refrigerators Freezers	+2 to +8 -20 to -30	1.41–20.95	14–1100	ASHRAE LBP	R290 R600a R134a R513A R1234yf R404A R452A
Biomedical Freezers	-30 to -60	3.89–20.95	79–648	EN 12900 LBP	R290 HC Mixture R404A R452A
Ultra-Low Temperature Freezers	-60 to -90	2.0–20.95	22–356	pe= -90 °C pc= -35 °C Tsuc= -20 °C Tliq= -35 °C Tamb= 32.2 °C	R170 HC-Mixture

0–35    0–1200

Secop recommends using 2-stage cascade systems for the temperature range from -60 °C to -90 °C. These have been developed for highest reliability and product safety at ultra-low temperatures.



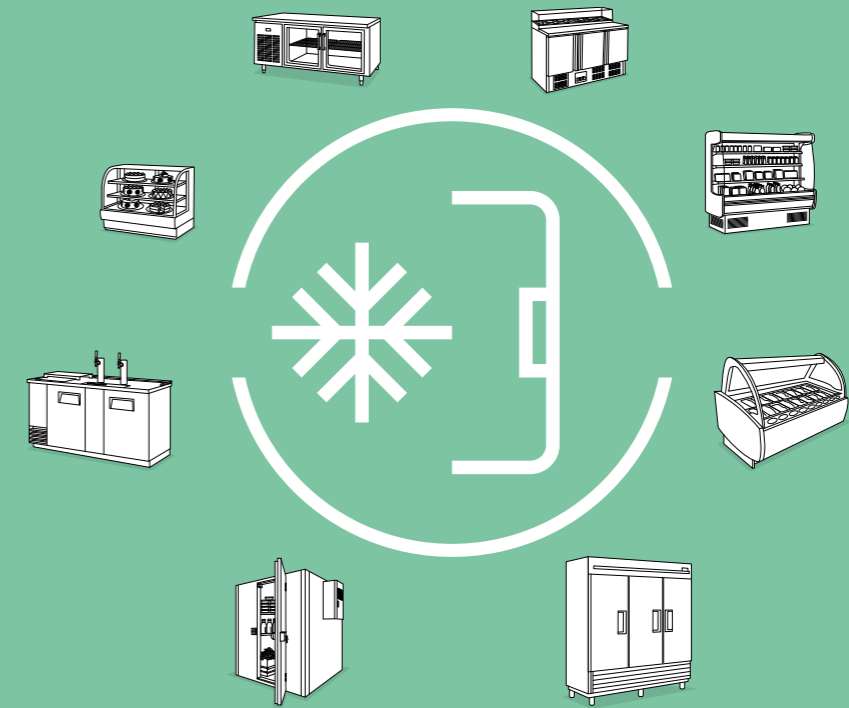


# CONDENSING UNITS

Perfect for installation in tight spaces with a precise, compact design, they allow easy conversion for new drop-in replacement refrigerants.

The range is designed and optimized to meet the European Ecodesign Directive.

With high precision manufacturing and 100% quality control of every single unit, they are made to operate in the most demanding environments under all operating conditions.



Cooling Capacity

Series	Displacement [cm <sup>3</sup> ]	LBP (W) EN 13215*	MBP (W) EN 13215*	Refrigerants
T D KL	3.9 – 7.7	184 – 422	239 – 700	R134a R513A R404A R452A R290
N	6.1 – 12.6	159 – 582	326 – 996	R134a R513A R404A R452A R290
S	10.3 – 21.0	590 – 944	752 – 1683	R134a R513A R404A R452A R449A R290
G	26.3 – 33.8	1275 – 1712	1372 – 1782	R134a R513A R404A R452A R449A

\*Tsubcooling=2K, Tsuc=20 °C, Tamb=25 °C, LBP: pe=-25 °C, MBP: pe=-10 °C

Natural Refrigerant

HC models are using our energy-optimized DLE, NLE, and SCE propane (R290) compressors with a very low GWP and maximum performance.

Alternative Refrigerants

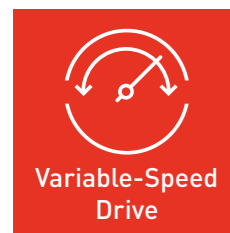
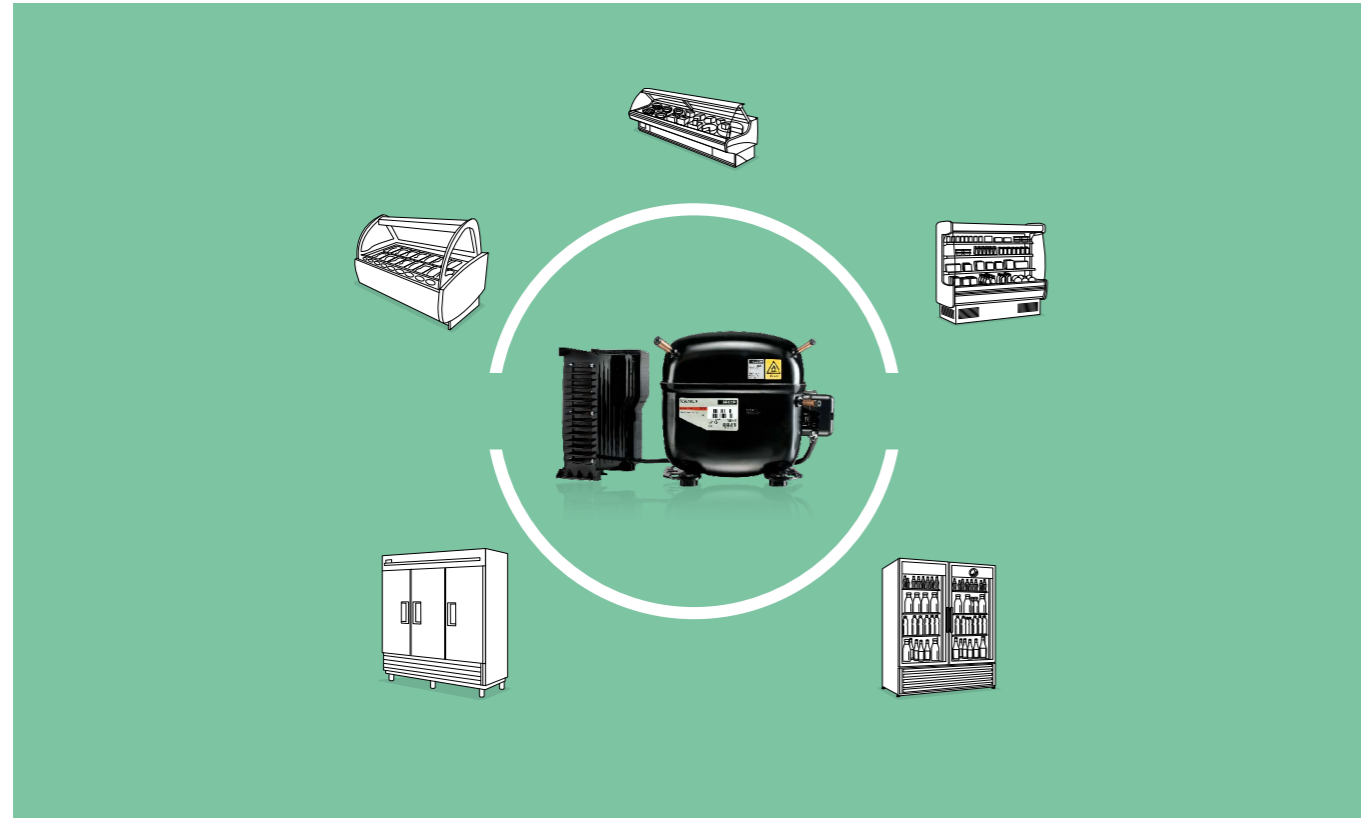
HFC models are approved for alternative refrigerants R452A and R513A while selected models are approved for R449A.

EU Sustainable Design

Secop's full range of condensing units is designed and optimized to meet the European Ecodesign Directive.

Natural Refrigerants

# HIGHLIGHT – SLVE18CN



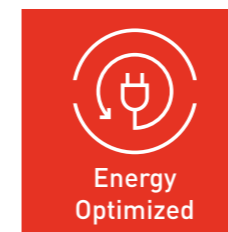
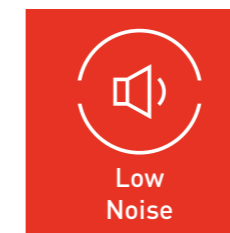
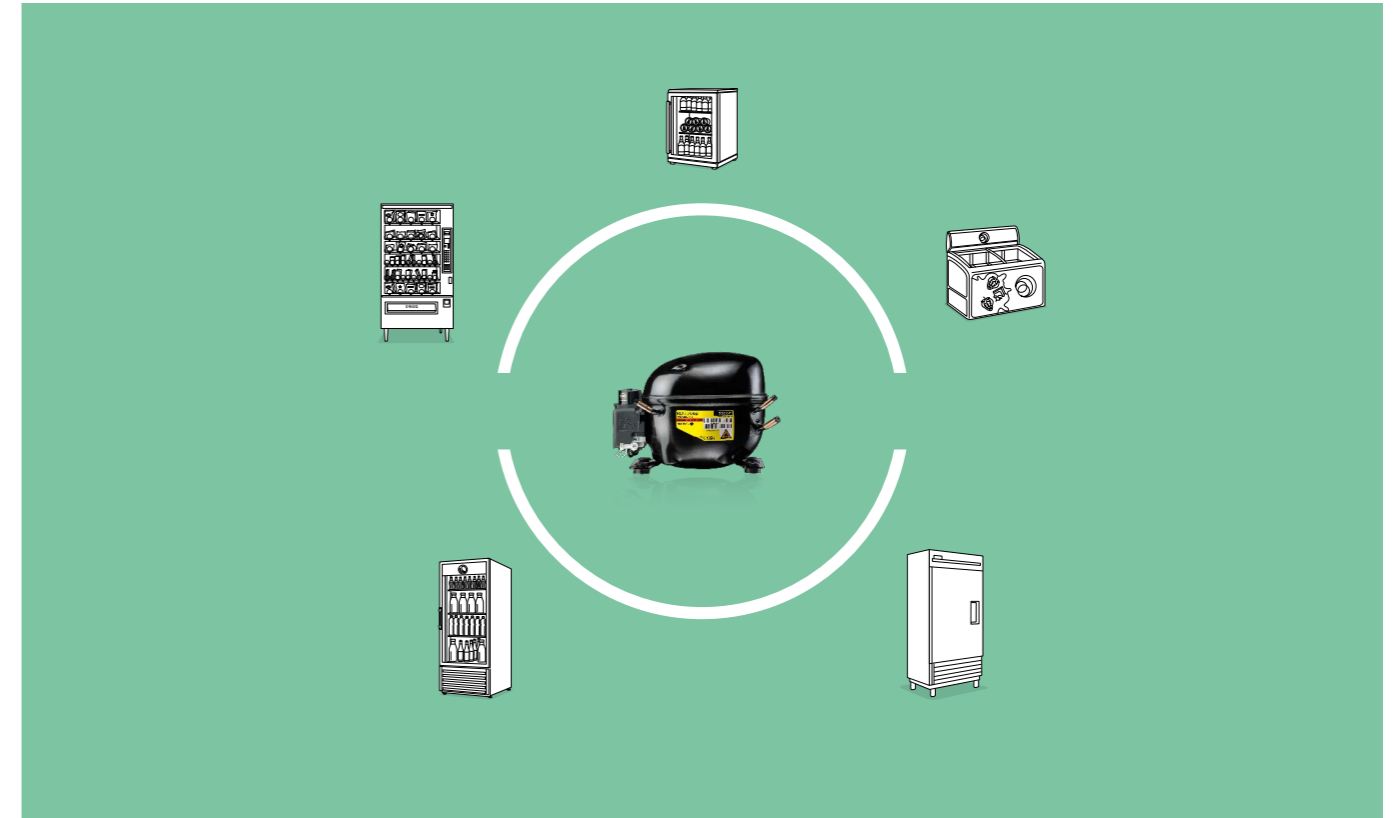
- Suitable for both LBP and MBP applications
- Achieves more than 2 kW cooling capacity and a COP of up to 2.25 (ASHRAE MBP)
- Able to operate continuously inside an evaporating temperature range from -45°C to +10°C
- Controller with automatic input detection and IP54 housing

Secop's new **SLVE18CN** propane variable-speed compressor – perfect cooling efficiency, tailor-made features and easy integration.

This energy-optimized 18 cc. compressor is the perfect choice for food retail, food storage, and other commercial applications.

It comes with our new °CCD® controller featuring speed control through Adaptive Energy Optimization (AEO), frequency signal, or serial communication.

# HIGHLIGHT – KL-SERIES



- High COP and top efficiency for light commercial applications with low GWP refrigerant propane
- Including a patented hermetic terminal plug designed to increase robustness for usage with flammable refrigerants
- Improved noise and reduced vibration, a new benchmark level for hydrocarbon refrigerants
- New terminal board design for additional interconnections

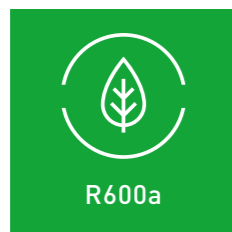
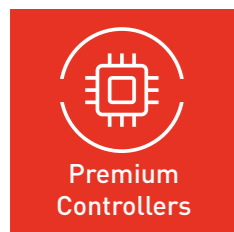
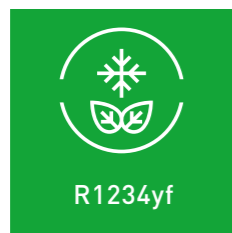
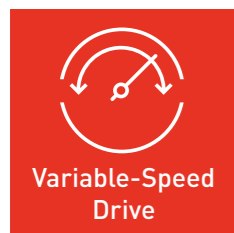
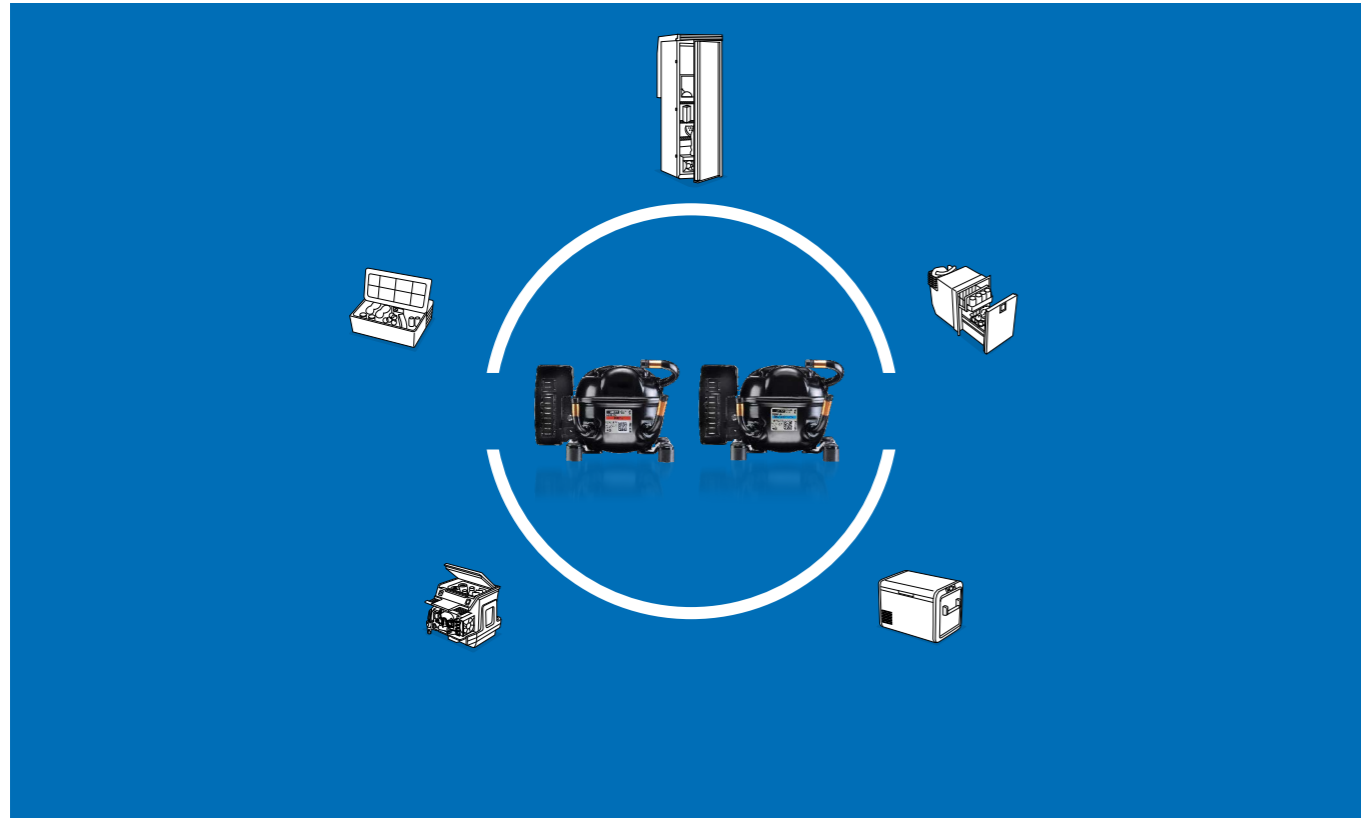
Secop's new **KL-Series** is based on the very successful K-Series with more than 50 million units installed.

The KL-Series was developed to offer a reliable, top performing, and cost-effective solution for the next generation of light commercial cabinets using environmentally friendly refrigerant propane and offering high energy efficiency.

A premium robust solution for food retail and food service applications.



# HIGHLIGHT – BD NANO-SERIES

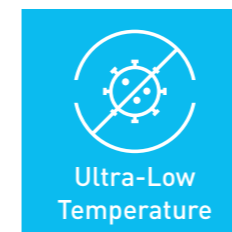
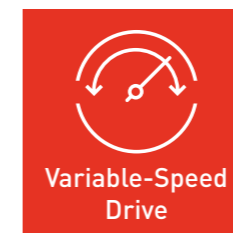
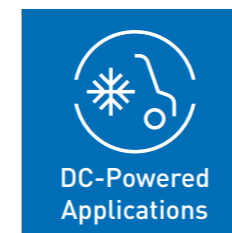
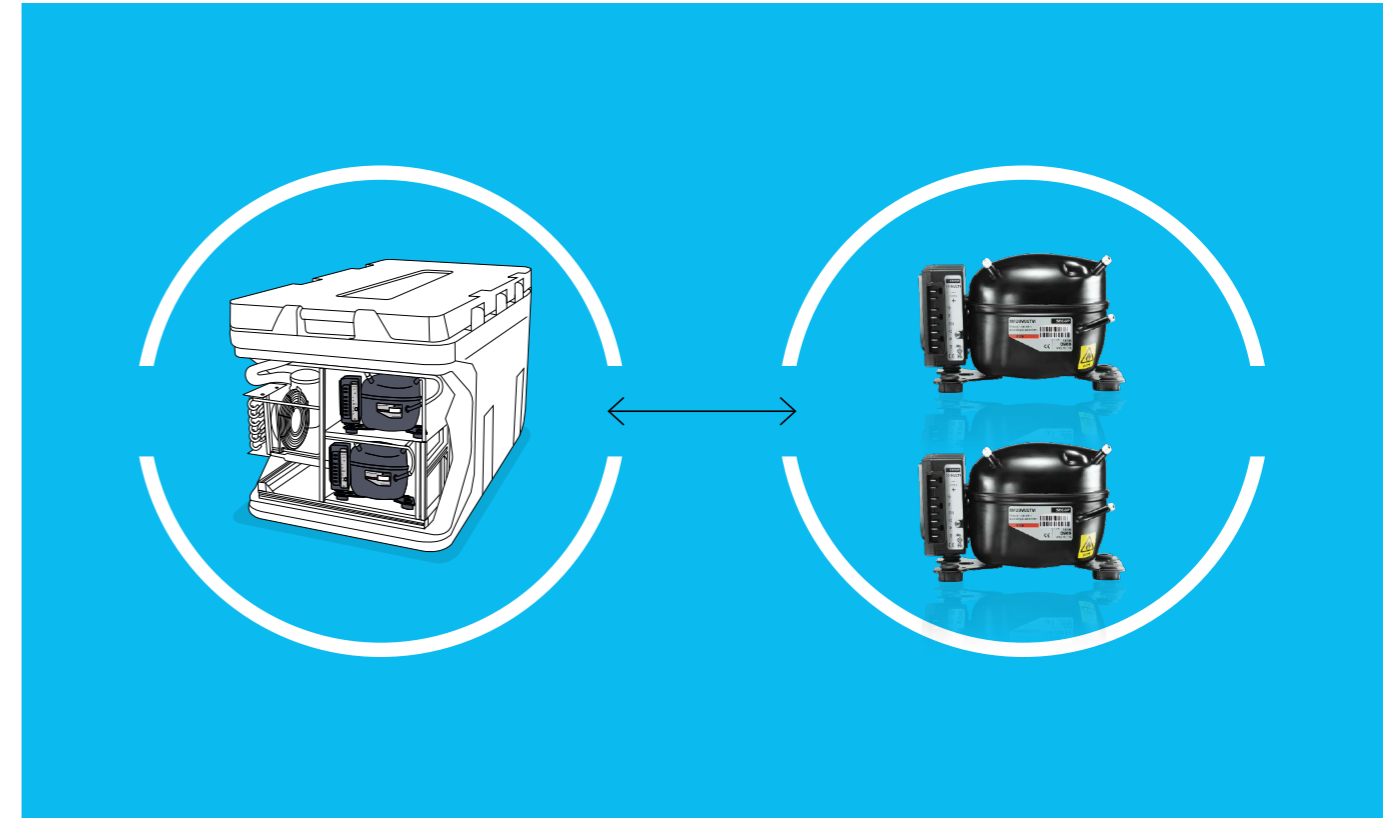


- Even more compact than a BD Micro compressor for more capacity in the cabinet
- Protection against electromagnetic interference (EMI)
- Greater energy savings, reduced total cost of ownership (TCO), and extending battery operation time
- Replaces larger compressors, thereby extending the range of applications
- Reduced noise and vibrations

Secop's latest innovation for mobile refrigeration is the new **BD Nano** compressor. The extreme compact BD Nano (40% shorter, 67% lighter in comparison – controller included) provides the same cooling capacity as much bigger BD35F/50F/35K compressors yet with unrivaled efficiency.

The BD Nano features some technical innovations such as a new mobile stability concept, an improved lubrication concept, miniaturized new mufflers, a compact housing, a miniaturized new motor, improved valves, and compact versatile controllers, among other things.

# HIGHLIGHT – MP2UVULTM



- Mobile solution which is able to reach -70 °C to -86 °C
- Ideal solution for mains voltage independent transport of mRNA-based COVID-19 vaccines with temperature control and no risk of wasting vaccine
- Precise cooling and control of target temperature
- Reliable long lasting systems with low TCO life cycle
- Electronically controlled variable-speed drive compressor

Secop has developed the technology for an ultra-low temperature cooling system. This system offers mobile operation even in high ambient conditions such as in tropical regions.

This solution with a **MP2UVULTM** compressor takes advantage of Secop's experience in medical applications, vaccine solar freezers, and mobile solutions and combines all of these areas of use.

Battery-driven active cooling systems for mRNA-based vaccines provide a lot of advantages compared to existing passive cooling.

# A LONG EXPERIENCE IN REFRIGERATION: 1956 → 2023



**1956**  
Founded in Flensburg, Germany



**1989**  
100 million compressors produced



**1998**  
Introduction of variable-speed compressor



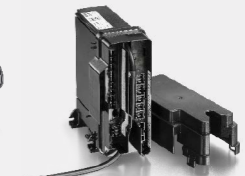
**2015**  
Energy-optimized DLE and NLE propane compressors



**2017**  
Introduction of NLV-CN variable-speed propane compressors for 220-240V, 50/60 Hz



**2021**  
Compressors for medical cold chain solutions



**2023**  
Modular electronic MP and XT controllers

**1977**  
Mobile cooling is introduced



**1993**  
Production of first natural refrigerant compressors is launched



**2010**  
BD Micro



**2016**  
Introduction of DLV-CN variable-speed propane compressors for 100-127V, 50/60 Hz



**2020**  
SLVE18CN  
The most powerful hermetic reciprocating variable-speed compressor on the market



**2022**  
KL-Series  
A new premium propane solution



BD Nano-Series  
next-generation mobile cooling compressors

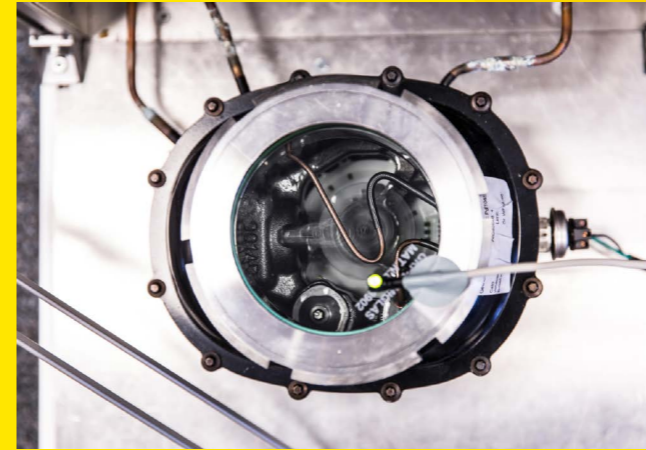
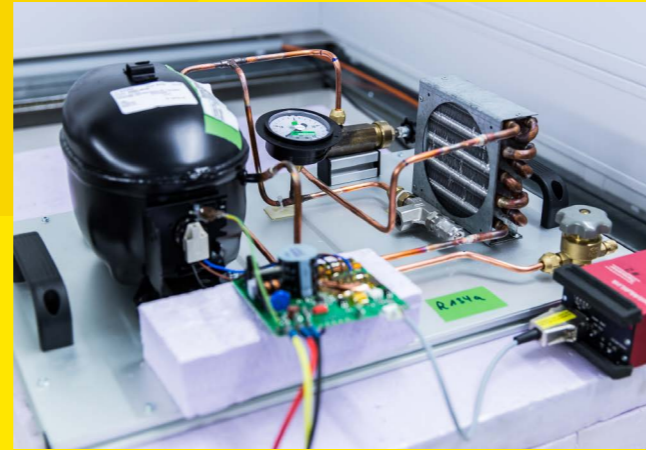


**"In everything we do, we are focusing on our customers and provide them with the best possible solutions. Key for us is working end-to-end across all departments to keep delivering high-end products and services to our customers. This applies to both of our business segments – stationary as well as mobile cooling."**

Johannes Maerz  
Chief Operation Officer



# BEYOND THE PRODUCT



## Committed to Quality Products

- Preventive quality tools (PPAP, APQP, FMEA ...)
- TS tools (SPC, product and process audits ...)
- Efficient quality control systems
- Field quality and application engineers

## Leading-Edge Application Engineering

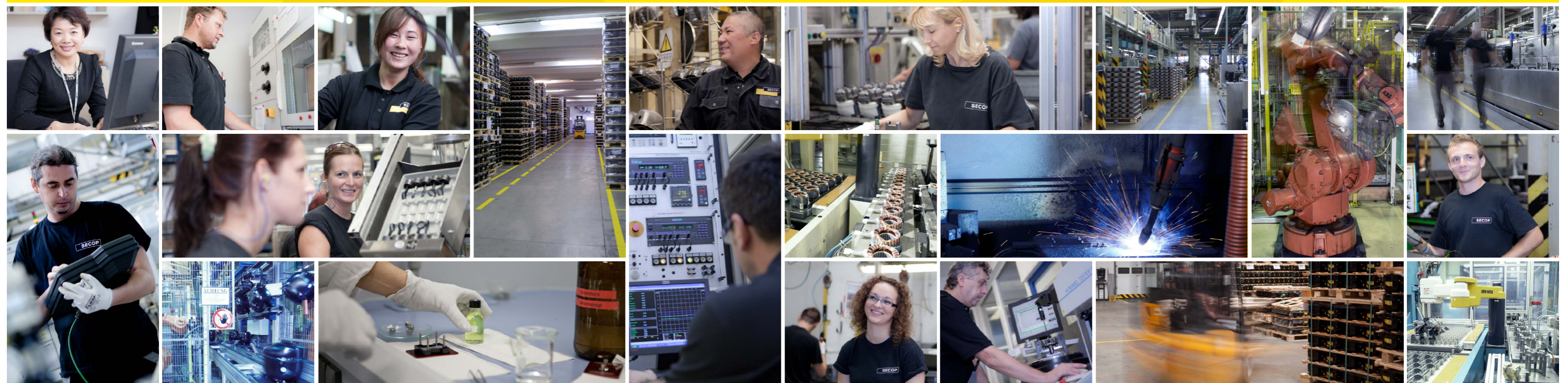
- Testing for customer's appliances
- Advanced trouble shooting
- System optimization support
- Support conversions to HC refrigerants
- System knowledge to support the introduction of variable-speed solutions

## Research and Development

- Rooted knowledge in mechanics, electrical motors, electronic controls, and thermodynamics development
- 12 international partners for advanced development
- 33 laboratories located in Austria, Germany, Slovakia, China, US, and Turkey
- 160 R&D engineers and technicians
- 440 patents globally

## Advanced Electronics and Controls

- Unparalleled competency in motor design and variable-speed control
- Advanced motor and inverter electronics development
- Simulation tools and innovative design systems





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