



Virtus Energy Optimization

Maximize the efficiency of your refrigeration system and reduce your energy costs in the long term



**Engineering
is our Nature!**

We master Automation
to ensure efficient use
of Labor, Materials and Energy.

Energy Optimization of your Refrigeration System

Maximize the efficiency of your refrigeration system and reduce your energy costs in the long term! In times of rising energy costs and growing environmental awareness, it is more important than ever to operate your refrigeration system optimally.

With our customized energy optimization solutions, we help you significantly reduce the energy consumption of your refrigeration system while increasing its performance.

Let's take the first step towards a greener future together!



More efficiency. More sustainability. More benefits.

Learn more about innovative technologies, targeted maintenance, and customizations that help you benefit both economically and ecologically from an energy-efficient refrigeration system.

From analysis to optimization, we support you in reducing operating costs, increasing plant availability, and reliably meeting legal and environmental requirements.

Reduced energy costs

Save up to 15 % on your energy costs by using your refrigeration system more efficiently.

Increased service life

Regular maintenance and optimization will extend the service life of your system.

Environmental friendliness

Actively contribute to environmental protection by reducing the CO₂ emissions of your refrigeration system.

Investment protection

Protect your investment by using state-of-the-art technologies and targeted adjustments.



Consulting



Engineering



Hardware



Software
Solutions



Digital
Twin



Lifecycle
Management



Control Cabinet
Construction



Training



Worldwide
Service

Service packages

1. Remote energy optimization

- Back up the configuration of the entire system in its current state
- Remote evaluation of system parameters, temperature diagrams, cooling points and combined systems
- Creation of a catalog of measures based on the data available remotely

2. Vote on catalog of measures

- Discuss the catalog of measures with the refrigeration specialist so that it can be implemented on site
- Remote support from the refrigeration specialist – Programming of the specified parameters in accordance with the catalog of measures in consultation with the refrigeration specialist

3. On-site implementation

- Implement solutions developed from the catalog of measures in cooperation with the local refrigeration specialist
- Check whether the measures taken on site at the cooling points and the combined system are correct. Readjust any parameters that have been developed if necessary.



Optimization with measurable Savings Potential

Depending on the scope of the measures implemented, the use of modern automation solutions from Eckelmann enables energy savings of up to 15%. Through the continuous recording, evaluation, and optimization of all relevant operating data, the energy consumption of the refrigeration system is sustainably reduced – without compromising performance or operational reliability.



Intelligent Control for maximum Energy Efficiency

Key factor: Automation

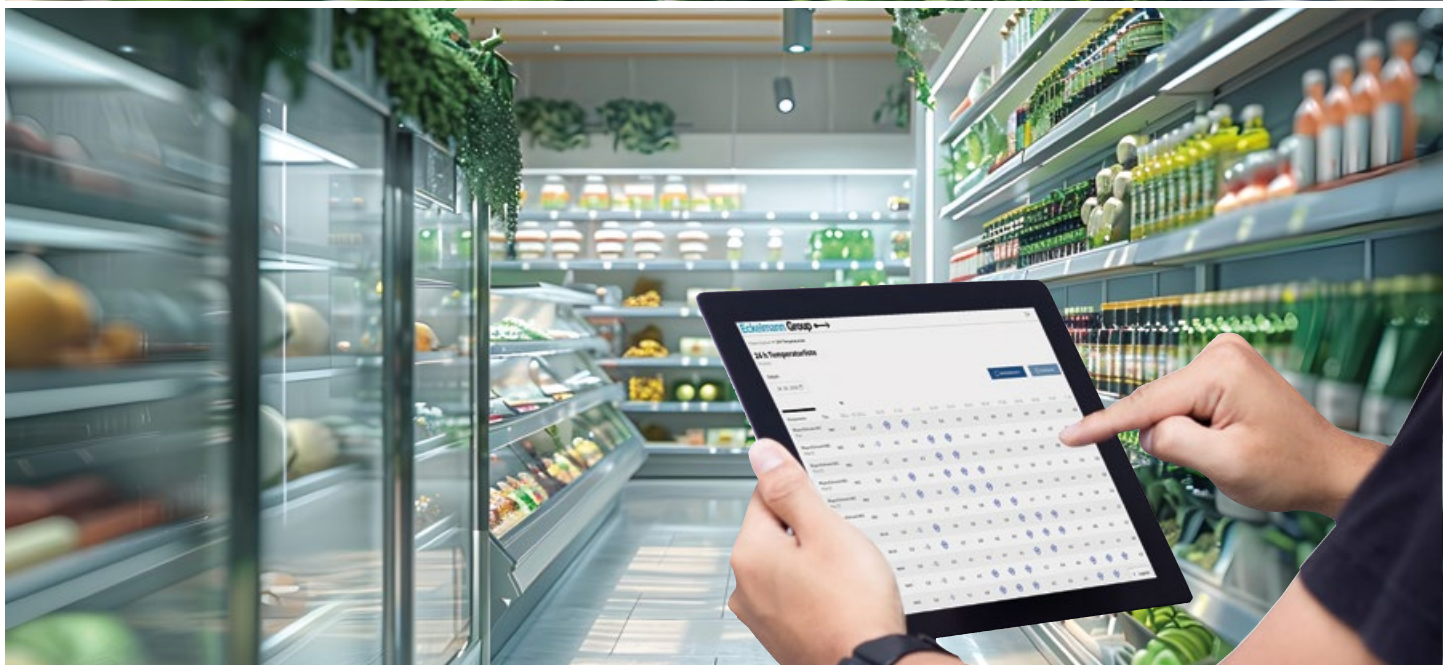
The Eckelmann Group provides individual advice to operators and refrigeration system manufacturers and calculates the expected life cycle costs for investments in energy-efficient control technology and the optimization of existing systems.

Automation technology has a significant impact on the energy efficiency of refrigeration systems. On the one hand, this is naturally because it takes over all measurement, control, and regulation tasks. Refrigeration systems are complex, highly non-linear systems with many internal feedback loops and disturbance variables (e.g., an open cold room door) as well as external influencing factors (e.g., outside temperature). Electronic control systems allow such systems to be modeled and intelligently controlled. On the other hand, an automation system provides a consistent information infrastructure that enables refrigeration technology to be effectively linked to higher-level energy and building management. Eckelmann's holistic automation concepts form the basis for the effective and transparent use of energy.

But it is also true that automation technology is only as good as the plant technology, and vice versa. Only when plant planning and automation design go hand in hand from the outset can solutions be created that make sensible use of what is technically possible today. Eckelmann therefore works closely with planning offices and refrigeration plant manufacturers in the project planning of new plants or the modernization of existing plants. Operators thus benefit from coherent solutions that are fully tailored to their individual requirements.

Operators would be well advised not to view improving the energy efficiency of existing plants as a one-off measure, but rather as an ongoing challenge. This is where Eckelmann comes in, offering operators and refrigeration engineers the right tools to continuously optimize plants and make them more efficient. Eckelmann has proven in numerous reference projects that this approach pays off: depending on the scope of the measures, automation with Eckelmann saves up to 15% energy.

Automation with Eckelmann									
Existing Systems					New Systems				
Monitoring & Energy Management			Optimize & modernize		Link & integrate				
Transparency through key figures	Identify potential savings	Identify maintenance requirements at an early stage	Reduce cooling demand	Increase the efficiency of refrigeration	Increase partial efficiency	Time and load management	Cross-trade Automation	Renewable energies	Building Management System



Eckelmann Strategies for increasing Energy Efficiency

Eckelmann combines energy with efficiency

Eckelmann offers one of the most technically advanced control, regulation, and remote monitoring systems for industrial and commercial refrigeration. Numerous well-known food chains rely on this automation system for energy efficiency, safety, and ease of use in food refrigeration. The control system, which specializes in refrigeration technology, also integrates numerous functions for building management systems.

This results in comprehensive automation solutions that save energy in the long term.

Process-related measures

Reduce the cooling requirements of refrigeration points

- Auto-adaptive control methods
- Steady and demand-driven evaporation
- Dynamic increase in evaporation temperature with E*COP+, also for existing systems with solenoid valves
- Better evaporator utilization through optimized refrigerant superheating
- Control based on the actual temperature in the cooling location via the wireless sensor system
- Automatic defrosting
- Fan management on the evaporator

Increase the efficiency of the refrigeration system

- E*COP+ Suction pressure optimization
- Lowering the condensation temperature
- Automatic monitoring of condenser contamination
- Dynamic adjustment of cooling capacity, speed control for compressors and condensers
- Automatic optimization of partial load efficiency
- Auto-adaptive determination of the optimal operating point
- Enthalpy-controlled frame and pane heating

Overall energy efficiency

Measure and analyze

- Active energy management: Monitoring temperatures and energy consumption with LDSWeb
- E*BenchMark functions for standardized system comparisons
- COP Live Monitoring
- Tools for analyzing and optimizing setpoints and hysteresis
- Expert system independently identifies key problem areas
- Identify potential savings
- Optimierungsmaßnahmen evaluieren

Integrate

- Coordination of all building services trades, e.g., refrigeration, heating, ventilation, air conditioning, or lighting
- E*Thermal Grid: Waste heat utilization via heat exchangers for heating or domestic water heating
- Heat pumps and geothermal energy
- Cross-trade time management
- Load shedding management for tariff optimization
- Smart Grid connection
- Prevent simultaneous cooling and heating



Your benefits at a glance:

- Energy savings
- Refrigeration capacity tailored to requirements
- Optimized partial load efficiency
- Nearly constant temperature
- Less icing
- Shorter defrosting phases
- Normal cooling compartment defrosting may no longer be necessary
- Higher humidity in the goods room
- Uniform refrigerant mass flow
- Refrigeration unit switch-on rate: 95 % to 100 % possible
- Compressor cycles reduced by up to 40 %



Switch on E*COP+ and Save Energy – Fast Return on Investment

Update existing systems and save energy

Eckelmann's E*COP+ algorithm is now also available as an update for existing systems with thermostatic expansion valves.

Tests in supermarket refrigeration systems have shown that the new firmware for automatic suction pressure optimization saves up to 15% energy, depending on the system structure.

The significantly lower operating costs and manageable update costs ensure a fast return on investment.

The E*COP+ function is already included in new systems with controllers from the UA 400 series.

Functionality

The auto-adaptive control method E*COP+ dynamically adjusts the suction pressure to the current cooling capacity requirement. The algorithm evaluates the operating data of all controllers and determines the optimum suction pressure for the respective refrigeration unit with the highest demand. Suction pressure p_0 and evaporation temperature t_0 are dynamically increased as far as possible.

The process takes advantage of the fact that raising p_0 or t_0 reduces the amount of compression work required. A 1 K increase in evaporation temperature saves approximately 3 % energy.

With fluctuating partial loads, E*COP+ always finds the ideal operating point, thereby improving the COP.

Proven to be more efficient

The graph shows the daily energy requirements of a test market based on the average outside temperature, before and after the update with E*COP+. At an outside temperature of 10°C, energy savings of 12% were demonstrated. This is due to the increased evaporation temperatures, which have caught the attention of refrigeration experts.

In normal refrigeration, for example, evaporation temperatures were regularly observed to rise by 5 K to very good values of -3°C. The table shows typical temperature differences for day and night operation for normal refrigeration units with demand-driven cooling:

Day:

Open refrigerated display cabinet

$$\Delta T = t_{\text{Supply air}} - t_0 \quad 4 - 6 \text{ K}$$

$$\Delta T = t_{\text{Return air}} - t_0 \quad 8 - 11$$

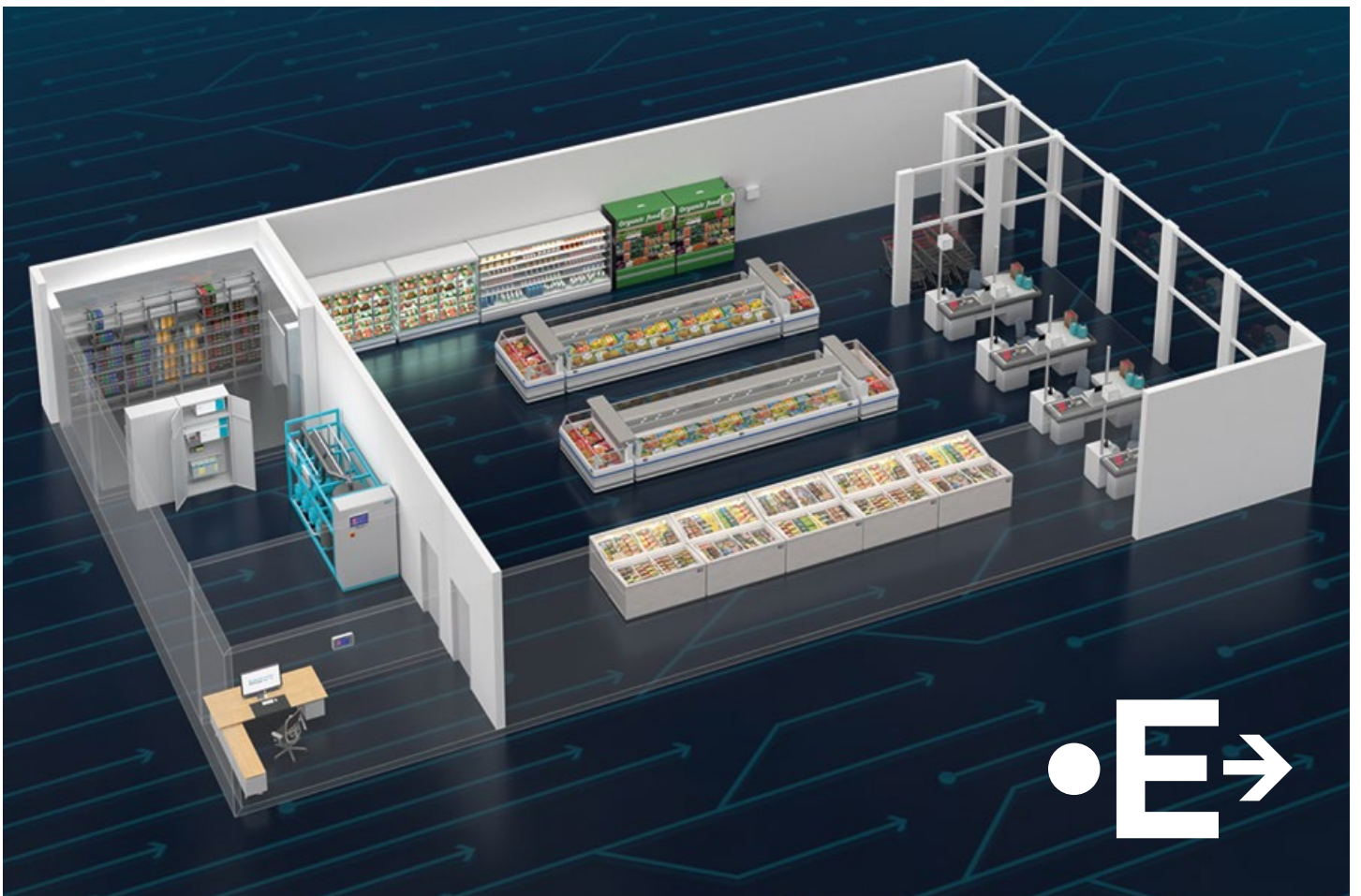
Night:

Closed refrigerated cabinet with night blind or cover

$$\Delta T = t_{\text{Supply air}} - t_0 \quad 1 - 3 \text{ K}$$

$$\Delta T = t_{\text{Return air}} - t_0 \quad 4 - 6 \text{ K}$$





In dialogue with customers and partners

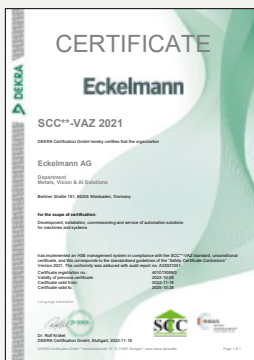
Eckelmann offers comprehensive, integrated solutions for refrigeration technology, building automation, and facility management – tailored to the requirements of modern, energy-efficient operations. Our E*LDS and Virtus LINE product series enable precise control, intuitive operation, intelligent networking, and continuous monitoring of refrigeration systems, cold rooms, refrigerated display cases, and building automation.

These systems optimize processes, minimize downtime, and sustainably reduce operating costs. At the same time, they offer maximum flexibility, future-proofing, and cutting-edge technology, making it easy to adapt to new requirements or regulatory specifications.

Eckelmann's solutions combine efficiency, transparency, and reliability – from commissioning and daily operation to maintenance and service. This is how we lay the foundation for energy-efficient, safe, and sustainable refrigeration and building technology.

Virtus Tectum Grid – Certifications

The Eckelmann Group is, of course, ISO 9001 certified.
In addition, we demonstrate our quality management and certifications with, for example:



Further information on the website



About us

Since 1977, innovation, flexibility, and customer focus have been among our strengths. We develop tailor-made solutions for industry, especially where standard solutions are not enough. In doing so, we combine years of in-depth industry experience with the latest knowledge of innovative digital technologies.

Our vision is to create a world without waste of energy, raw materials, and labor. We want to work with you today to pave the way for tomorrow.



Sites & partnerships – national & international
480 + employees



Contact us.

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