



Cold for supermarkets

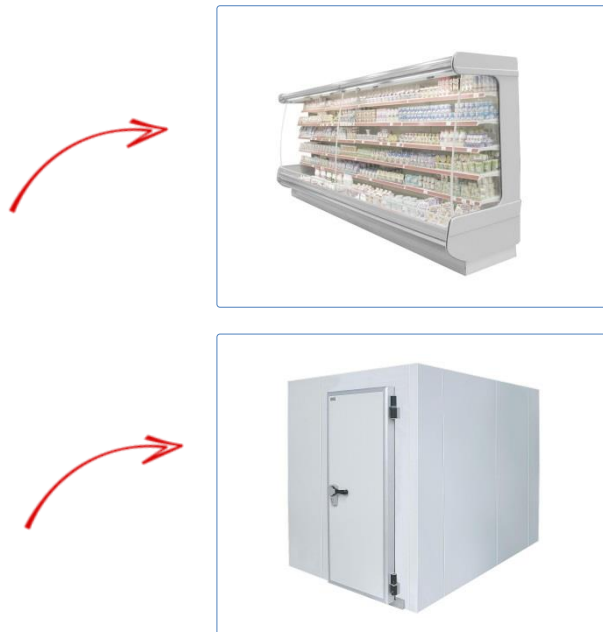
Working principle of refrigeration system

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Refrigeration is a process of removing heat from low temperature volume and transferring it to high temperature volume.

Heat can be moved by the refrigerant in centralized refrigeration systems or by water-loop-systems.

The influx of heat from the environment



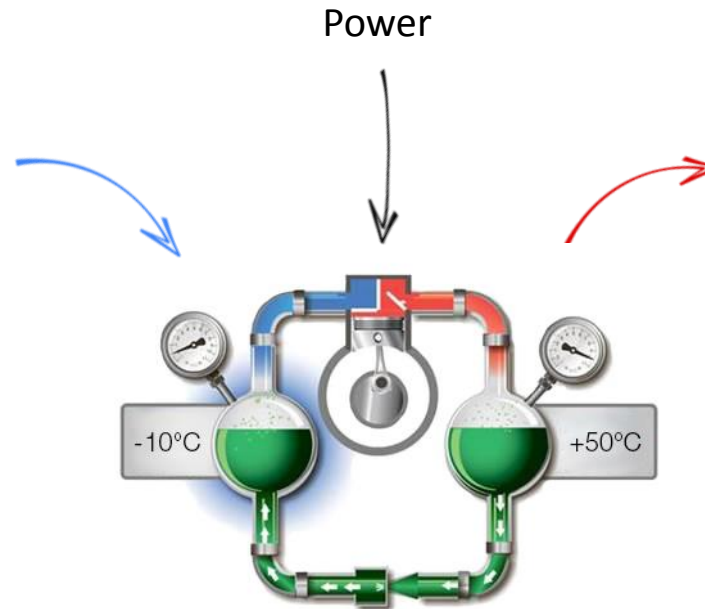
Heat rejection into the ambient



Working principle of refrigeration system

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Used cold



Waste heat



Required
refrigeration
capacity

+

Power
consumption

≈

Waste heat



Legislation and regulation for refrigeration systems:

1. Construction and Sanitary Norms
 - a. Restrictions on the placement of equipment on facades of buildings
 - b. Restrictions on the use of surrounding areas
 - c. Norms for noise level in residential areas
2. Ecological requirements. F-gas regulation EN 517/2014
 - a. Prohibition or significant restriction of the use of fluorine-containing gases
 - b. Higher taxes on refrigerants with a high GWP
 - c. Mandatory certification of service technicians
 - d. Regular independent checks for leaks
3. Energy Efficiency. ErP Directive 2015
 - a. Mandatory certification of products to determine the class of energy efficiency
 - b. Only products that correspond to the requirements of energy efficiency (MEI) should be admitted to the market



Shelf life of food

Loss of goods if temperature doesn't correspond to storage conditions



Energy consumption (energy efficiency)

Refrigeration systems consume up to 40% of the total power consumption



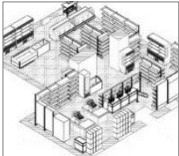
Design of the sales area

High noise of plug-in cabinets in sales area



Climate in the sales area

... and heat in sales area



Design of the sales area

The technical requirements of pipes installation limits sales technology



Facade design

... as well as the placement of external condenser or condensing unit



Noise in residential areas

Noise from outdoor equipment in traditional systems.



Phased construction and remodelling

Problems of phased commissioning of traditional systems

Service and maintenance:



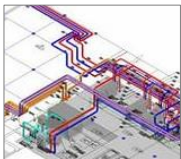
Searching for refrigerant leaks

According to European statistics, the percentage of annual refrigerant leaks is about 15 - 20% of the total refrigerant charge.



System balancing

Balancing and regulation of traditional systems and defrosting dramatically reduce energy efficiency.



Reliability and reservation

Refrigerant leakages or mistakes during installation and commissioning of the central system leads to failure all equipment in the supermarket.

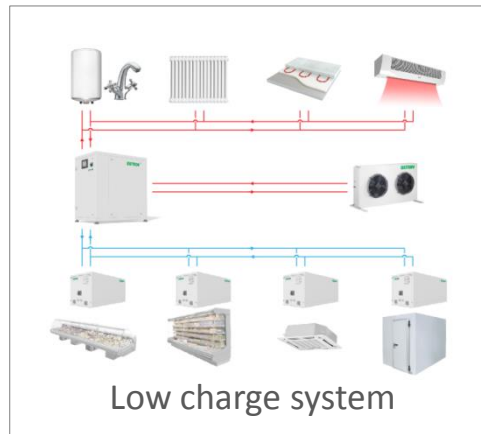
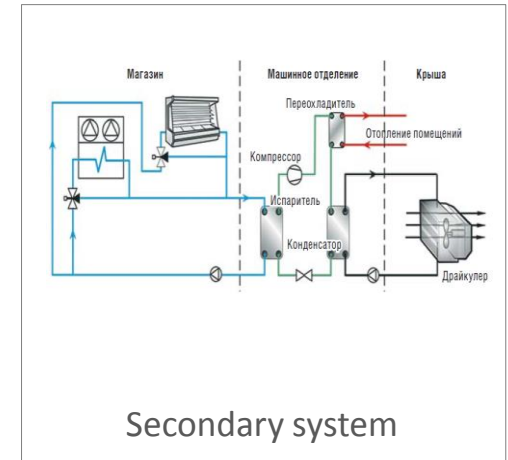
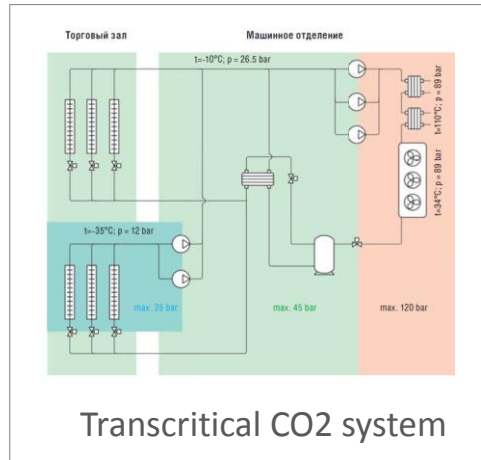
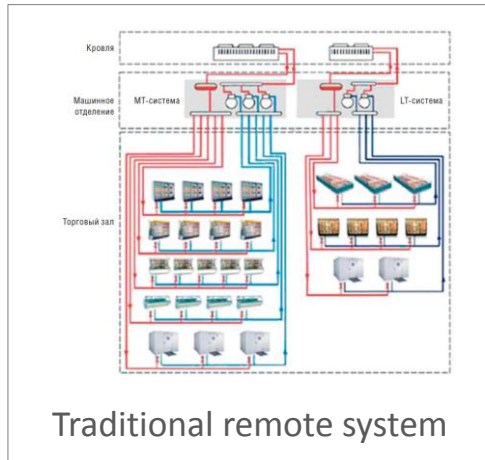


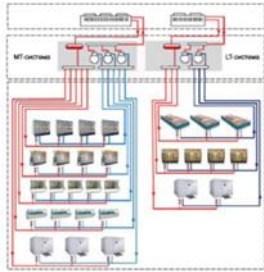
High operation cost

Special companies for engineering, installation and service.

Types of cooling systems

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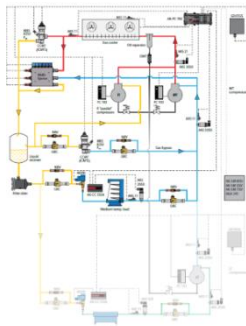
Traditional systems with HFC refrigerants

- High risks of replacement of equipment due to changes in legislation
- High refrigerant charge
- High power consumption
- High operating costs



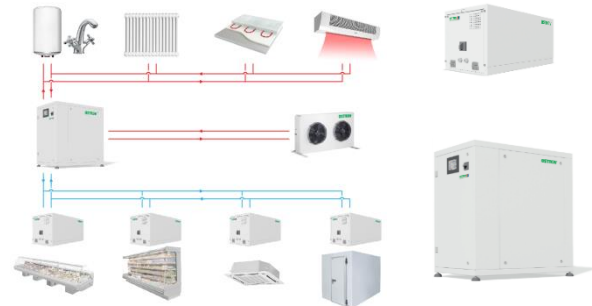
Transcritical CO2 system

- High pressures (up to 120 bar)
- Additional knowledge of engineers
- High cost of equipment
- Difficult and expensive service



Low charge systems

- + Compliance with F-gas regulation
- + 100% factory availability
- + Reliable and simple equipment
- + Full heat recovery

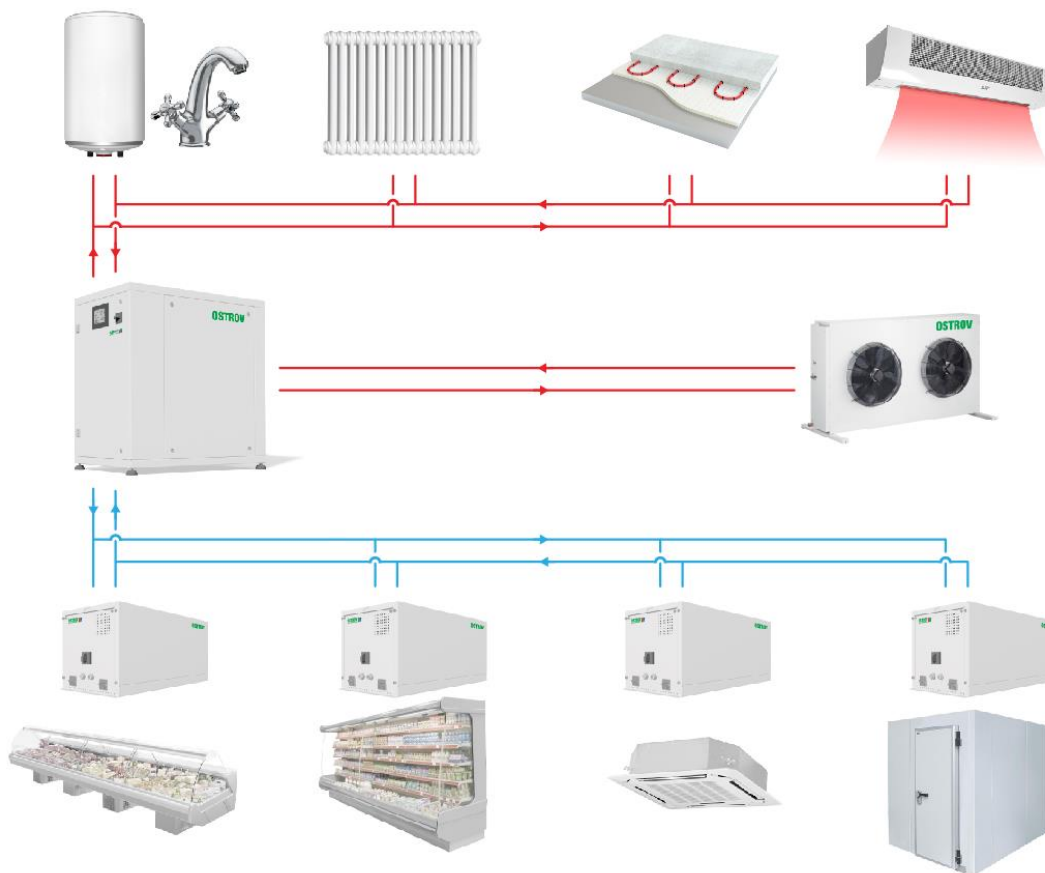




New generation of refrigeration systems

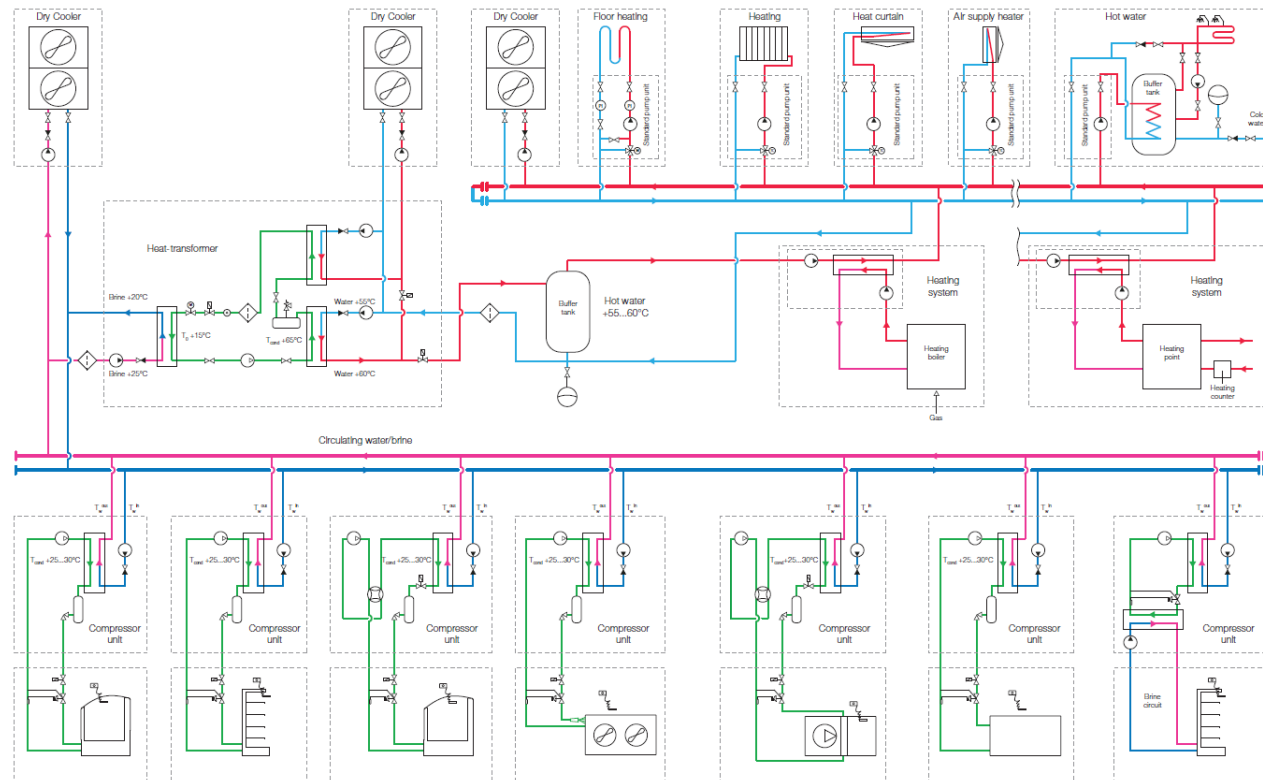
Low charge + Water loop

- ✓ *High energy efficiency*
- ✓ *F-GAS regulation capability*
- ✓ *Flexible design & Easy installation*



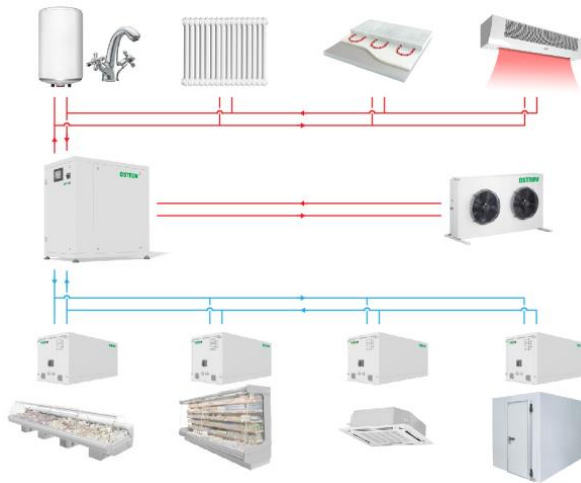
OGT system:

- Low refrigerant charge of condensing units with water cooled condenser
- Water loop circuit
- Heat transformer stabilizes temperature in the water loop circuit and transmit energy to high temperature level
- Hot water circuit
- Heat consumers



Operation :

1. Stable temperature in the water loop circuit (20-25°C)
2. Stable operation conditions of all plug-in units.
3. Full heat recovery at high temperature level
4. Dry cooler for summer time



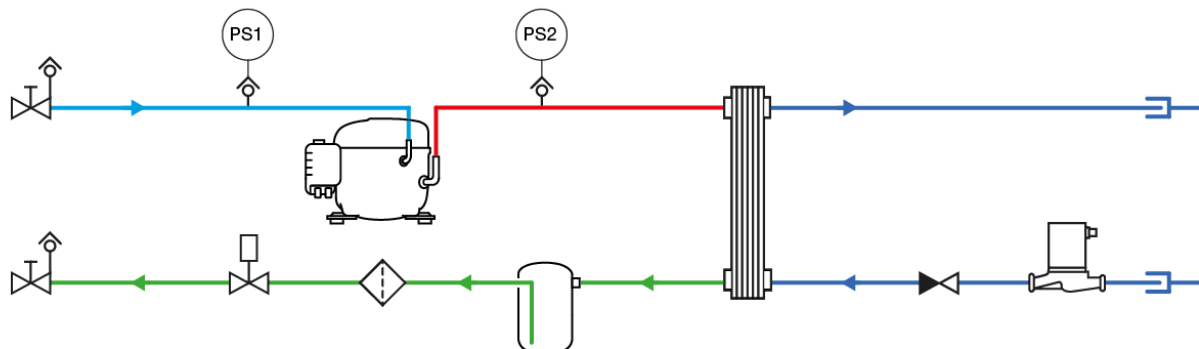
Main advantages:

- 100% factory assembly of equipment
- Installation on site using plastic pipes
- Stable operation conditions
- Option "No Frost" for commercial equipment
- 100% heat recovery
- Compliance with F-gas regulation
- Compliance with legislation on energy efficiency



Water cooled condensing units

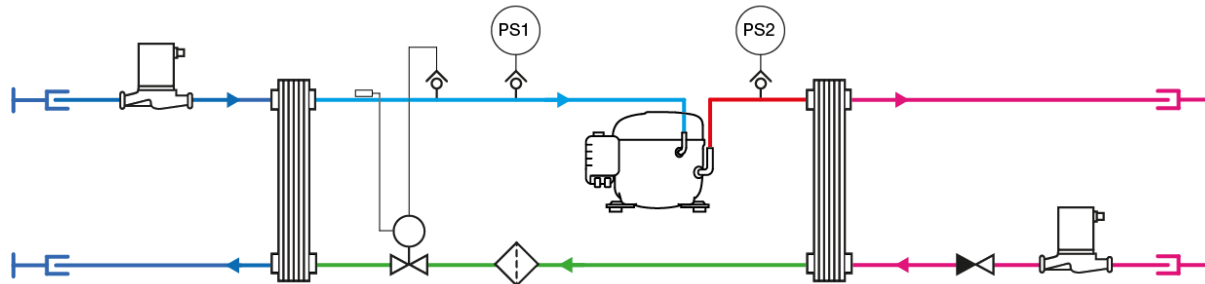
- 4 model ranges, 31 models
- Hermetic compressor
- R290 (Propane), R449A, R452A, R404A
- Cooling capacity from 0.2 to 6.2 kW
- Medium temperature $T_0 = -12...+2\text{ }^{\circ}\text{C}$
- Low temperature $T_0 = -35...-23\text{ }^{\circ}\text{C}$





Water cooled chillers

- 4 model ranges, 17 types
- Hermetic compressor
- R290 (Propane), R449A, R452A, R404A
- Cooling capacity from 1 to 9,3 kW
- Medium Temperature $T_{\text{brine}} = -8...+8\text{ }^{\circ}\text{C}$



OGT units in supermarkets



Installed units



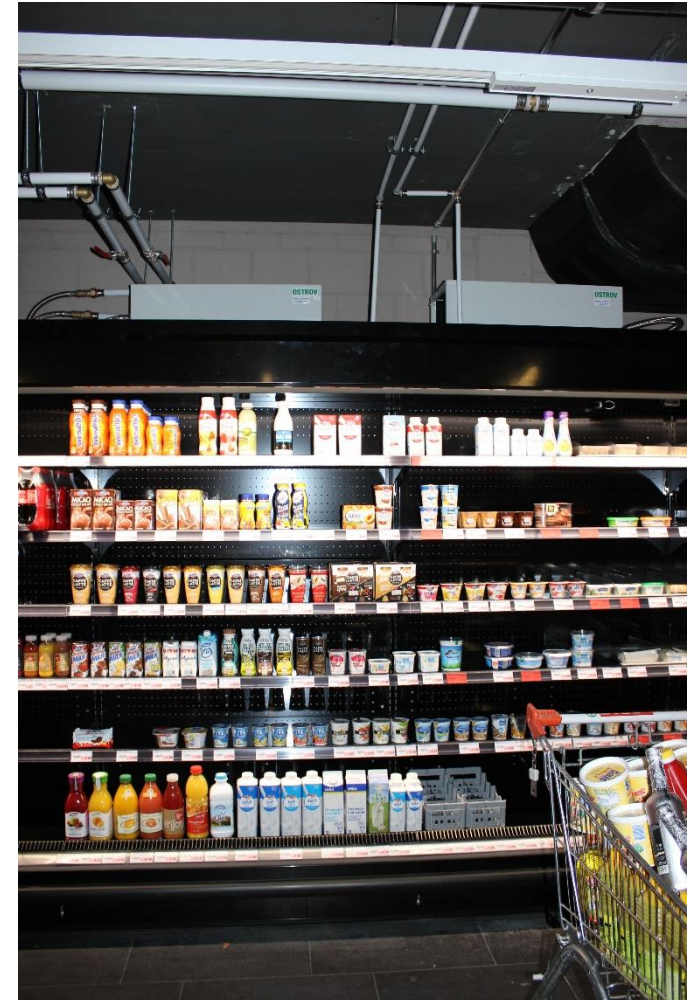
The units are covered with decorative panels

- Ergonomic design
- Simple installation
- Low noise level

OGT units in supermarkets



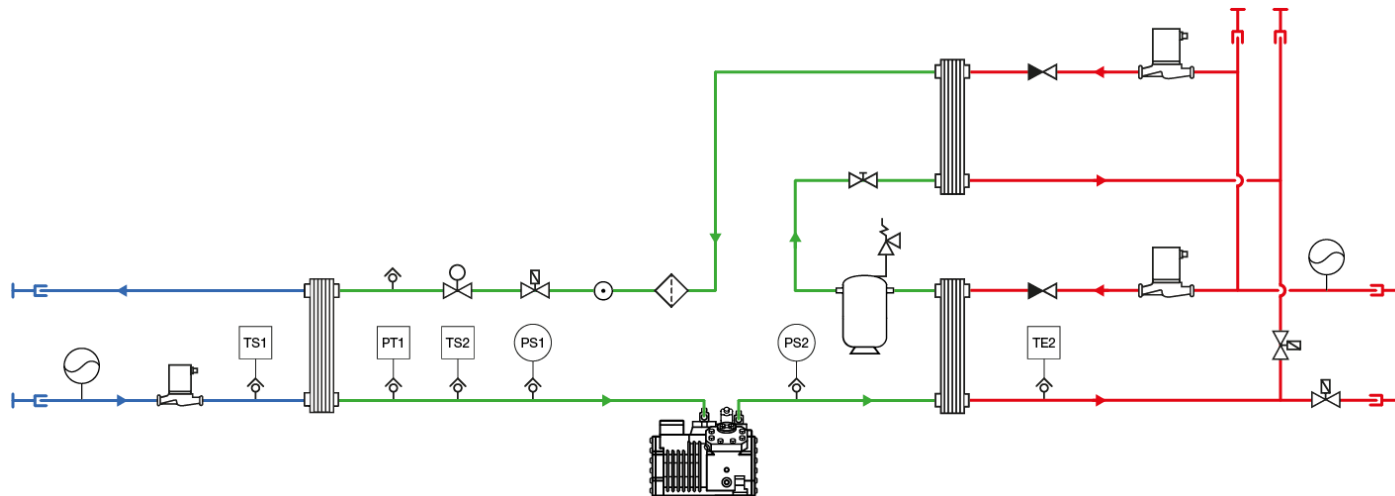
- Ergonomic design





Heat transformer

- 4 model ranges, 18 Models
- Semi-hermetic compressor with frequency inverter
- R134a, R513A, R450A, **R744(CO₂)**
- Cooling capacity from 12 to 151 kW
- Heating capacity from 12 to 172 kW
- Hot water temperature from 40 to 75 °C



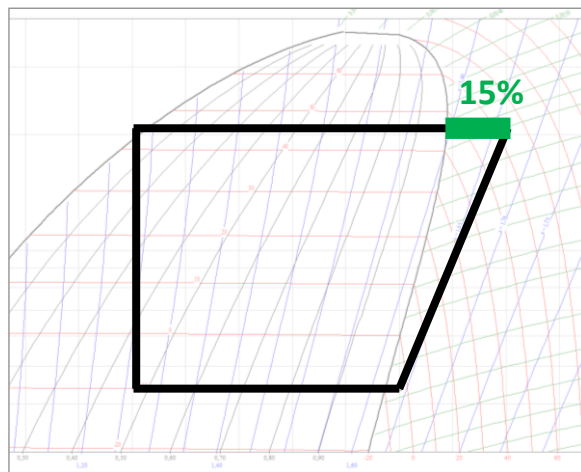
Condensing heat from
plug-in units

$T_{\text{water}} = +20... +25\text{ }^{\circ}\text{C}$

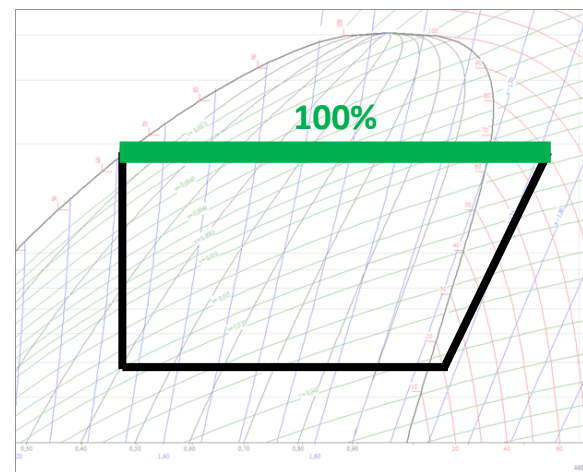


Condensing heat of heat
transformer

$T_{\text{water}} = +40... +75\text{ }^{\circ}\text{C}$



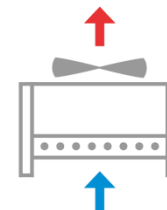
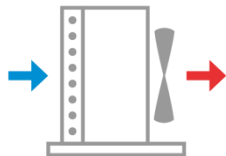
Heat recovery in a traditional system



Heat recovery in Ostrov Green Technology System

Dry cooler

- Low noise.
- EC fans
- Long distance between dry cooler and heat transformer



Applications



Shops



Petrol stations



Hotels



Restaurants



Offices

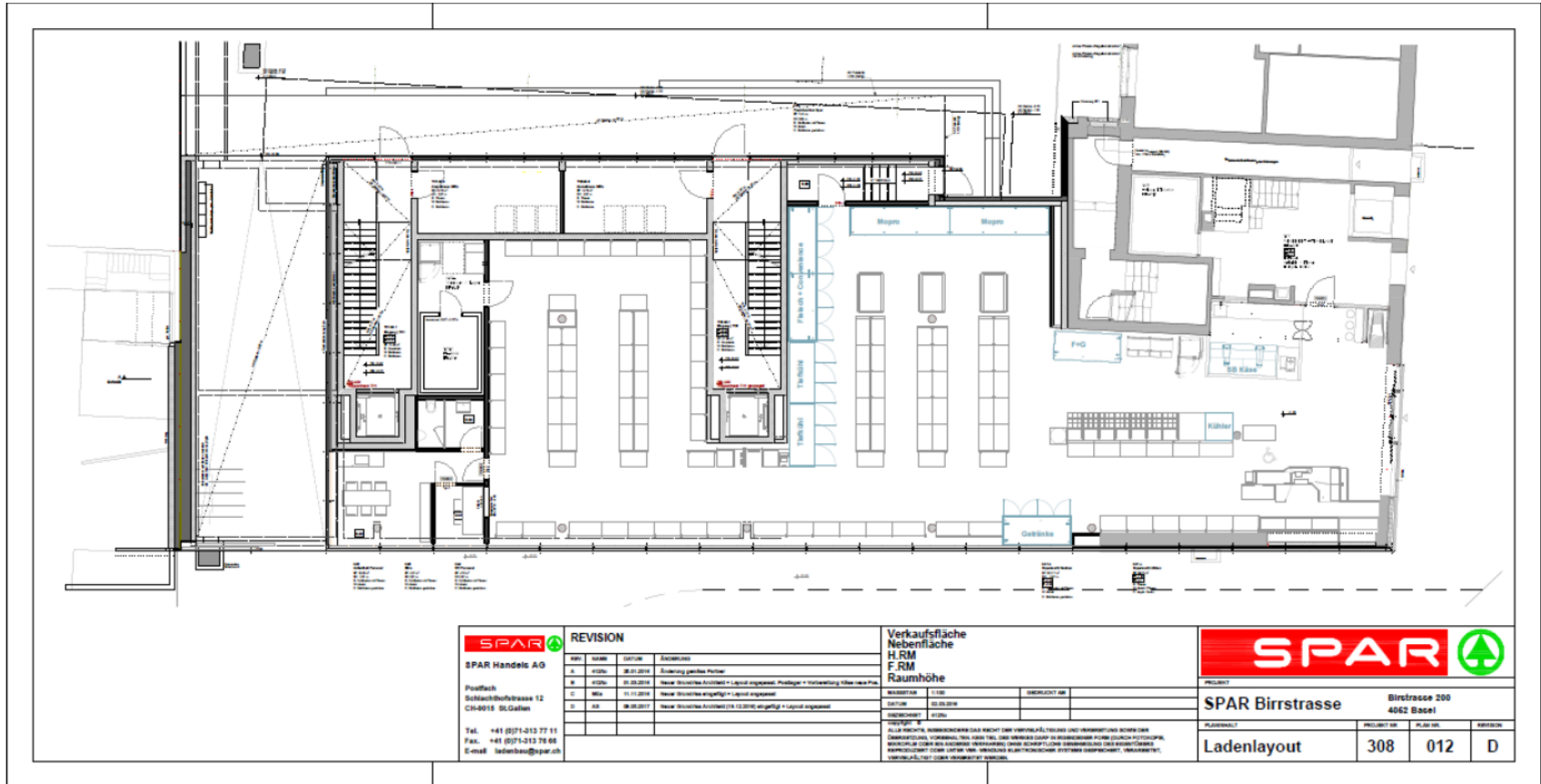


Warehouses and industrial
plants



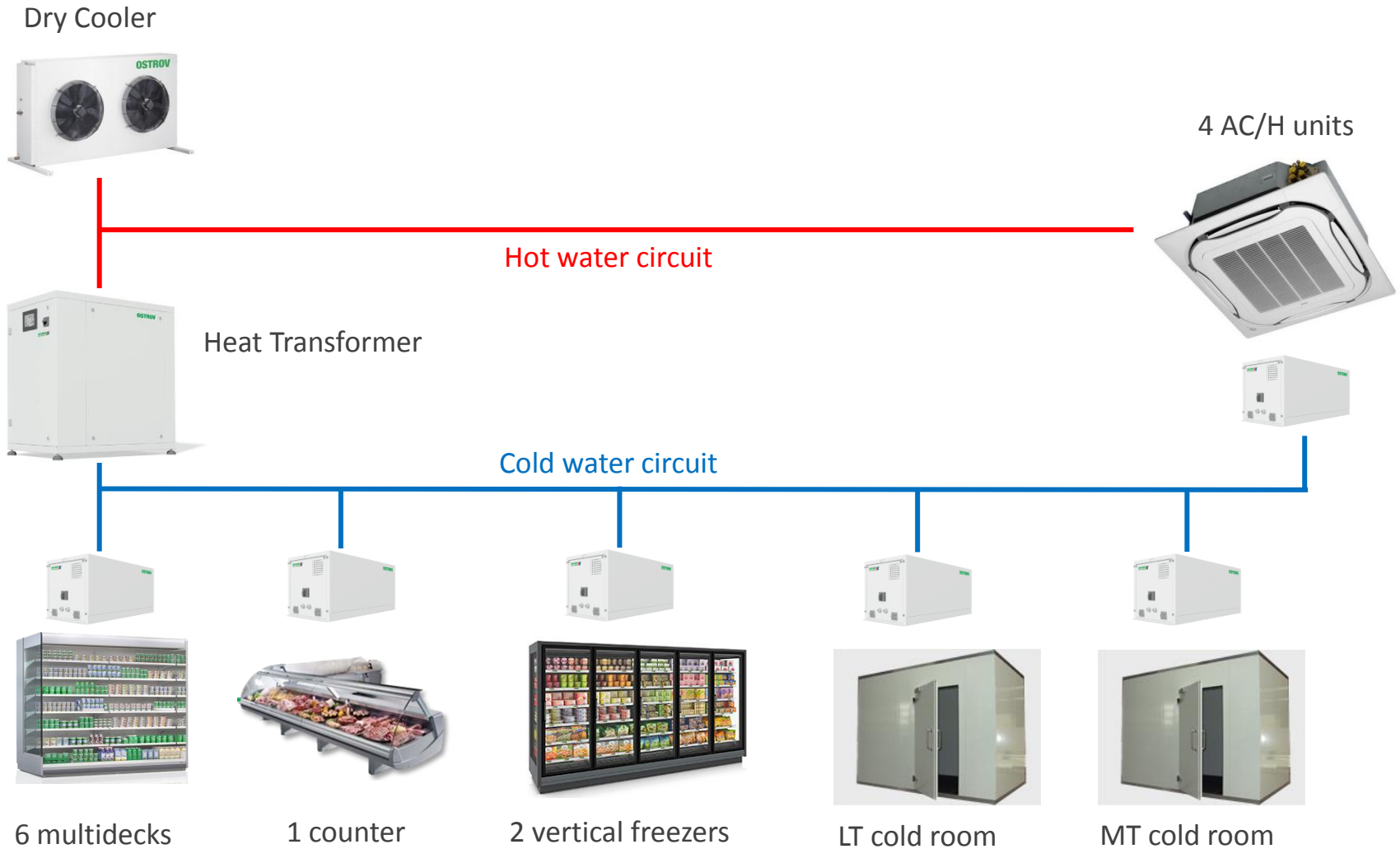
Customer - SPAR

Project information



- Region: Switzerland, Basel
- The total area is 550 m²
- Sales area 350 m²

Simplified scheme of the system







1. A reliable and simple system that operates in the same way as household refrigerator, which guarantees safety of products long-term and to a high quality.



2. Flexibility of sales technology: design of sales area, remodelling, cabinet relocation



3. High energy efficiency. Full heat recovery. Total Efficiency Coefficient $TEC \geq 7.5$



4. No noise in the sales area.



5. Three in one. Cooling, Air conditioning and Heating.



6. Clean facades without external condensing units.



7. No noise in residential areas from the operation of cooling and ventilation systems. Auxiliary dry cooler is located in a convenient place.



8. Possibility of phased construction and commissioning.



9. Simple and fast installation. No need in special high-knowledged companies. Easy servicing. No leakages.

10. Compliance with legislation



Storage of products

- ✓ Constant and stable temperature in commercial equipment
- ✓ Compliance with HACCP requirements for storage temperatures



Ecology

- ✓ Compliance with international and national environmental legislation
- ✓ Compliance with REGULATION (EU) No 517/2014 "on fluorinated greenhouse gases and repealing Regulation"



Energy Efficiency

- ✓ Total Efficiency Coefficient ≥ 7.5
- ✓ Compliance with the requirements of the European Directive ErP 2015 of the European Parliament and of the European Council with regard to ecodesign requirements and Energy related Products

Notes

OSTROV

refrigeration

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www.ostrov.com
infocz@ostrov.com

European Union

Ringhofferova 115/1, 15521
Prague 5, Czech Republic
Tel.: +420 234 252 223
Fax: +420 234 252 225

Russia & CIS

6, 2nd Bakuninsky Alleway, Mytishchi,
Moscow Region, 141011, Russia
tel.: +7 495 582 44 44
fax: +7 495 582 44 45