Supermarket of the future is now a reality: integrated, connected and 25% more efficient A real case study.

CONNECTING EXPERTS.
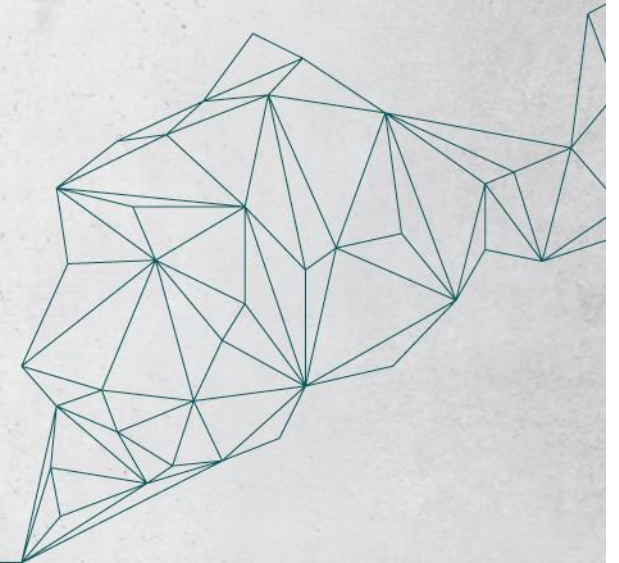
Supermarket of the future is now a reality

Integrated, connected and 25% more efficient.
A real case study.

– **Mauro De Barba**

  Marketing Manager Refrigeration Systems
  and Digitization

– **Topics**:

  – Natural Refrigerants: CO_2 Transcritical

  – Refrigeration, Heating and Cooling

  – Machine Integration

  – System integration

  – Design, installation and maintenance

– **Contributors**

  – MIGROS Ticino

  – Biaggini Frigoriferi

  – Eliwell Controls

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Supermarket of the future is now a reality
Case study information

– **Supermarket chain requirements:**

– **Natural refrigerant supermarket**

– **Energy Efficiency**

– **Reliability and maintenance support**

" We want to be recognised as a driving force for the adoption of natural refrigerants. "

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Supermarket of the future is now a reality

Case study information

– Type: **Supermarket**

– Brand: **MIGROS**

– Location: **Riazzino-CH**

– Dimension: **1700 m²**

– Cooling Capacity: **60 kW positive + 15 kW negative**

– Heat Pump Capacity: **55 kW**

– Chiller Capacity: **70 kW**

– Design / Installation / Maintenance: **Biaggini Frigoriferi**

– Refrigerant: **CO$_2$**

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Supermarket of the future is now a reality

Sub-systems addressed by the solution

- **Refrigeration**
  - Compressor Rack
  - Cabinets
  - Cold Rooms
  - Refrigerant Leak Detection

- **HVAC**
  - Space cooling for Shop floor, offices, locker rooms

- **Heating**
  - Hot sanitary water
  - Space cooling for Shop floor, offices, locker rooms

- **Supervision**
  - Monitoring
  - Maintenance

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Supermarket of the future is now a reality
Sub-systems addressed by the solution. Current situation

- **Refrigeration**
  - Various options:
    - HFC
    - CO_2 cascade
    - CO_2 transcritical

- **HVAC**
  - Chiller
  - Chiller / Heat Pump

- **Heating**
  - Gas Burner / Boiler
  - Chiller / Heat Pump

- **Supervision**
  - Refrigeration monitoring
  - 3 maintenance service companies

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Supermarket of the future is now a reality
Compact solution based on CO_2 Transcritical Compressor Rack

- Refrigerant: CO_2

- Refrigeration Cooling Capacity:
  60 kW NT + 15 kW LT

- Heat Pump Capacity: 55 kW

- Chiller Capacity: 70 kW

- Single source for design,
  installation and maintenance

Supermarket of the future is now a reality
Compact solution based on CO2 Transcritical Compressor Rack

Key elements of the solution:

– **Auxiliary Compressors** with by-pass:
  – **heat pump** in winter
    Low Pressure 24bar with -5°C ext. temperature
  – **water chiller** in summer
    Low Pressure 38bar with 36°C ext. temperature

– **CO_2 to water exchanger** for HVAC:
  – Bypass after **Heat Recovery** in winter
  – Bypass after **Gas Cooler and EEV expansion modulation** in summer

– **Mechanical Subcooler** with dedicated heat exchanger and EEV modulating subcooling

Supermarket of the future is now a reality
Standard control components

– **EWCM 9000 PRO-HF**
Programmable controller with CO_2 baseline

– **RTX 600 DOMINO ZERO**
Expansion and flow control whit valve driver

RTX 600 /V DOMINO ZERO
KDEPlus user interface

EWCM 9000 PRO-HF
CO2 Compressor Rack

RTX 600 /VS DOMINO ZERO
HVAC Heat Exchanger
& Subcooling

RTX 600 /V DOMINO ZERO
KDX user interface

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Supermarket of the future is now a reality
Normal Temperature Compressors Performance Analysis in Summer

	Traditional system	Integrated system	
		Chiller and "free" subcooling Ext. Temperature 36°C	Mechanical subcooling with EEV Ext. Temperature 38°C
NT Suction Temperature	-4°C	-4°C	
Cold Water	12°C	12°C	
HP valve CO_2 Temperature	36°C	26°C	
COP	**1,73**	**2,22 (+28%)**	
Cooling Capacity		**(+26%)**	
Energy		**(-1,5%)**	

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Supermarket of the future is now a reality
Auxiliary Compressors Performance Analysis in Summer

	Traditional system	Integrated system	
		Chiller and "free" subcooling Ext. Temperature 36°C	Mechanical subcooling with EEV Ext. Temperature 38°C
NT Suction Temperature	5°C	5°C	
Cold Water	12°C	12°C	
HP valve CO_2 Temperature	36°C	26°C	
COP	**2,52**	**3,29 (+31%)**	
Cooling Capacity		**(+28%)**	
Energy		**(-2%)**	

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Remote Maintenance and BMS integration

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Supermarket of the future is now a reality
Quick setup and system tuning

– **Self-detection of the controller network**

– **Access to all relevant controller parameters**

– **Fast data acquisition database
  for system tuning**
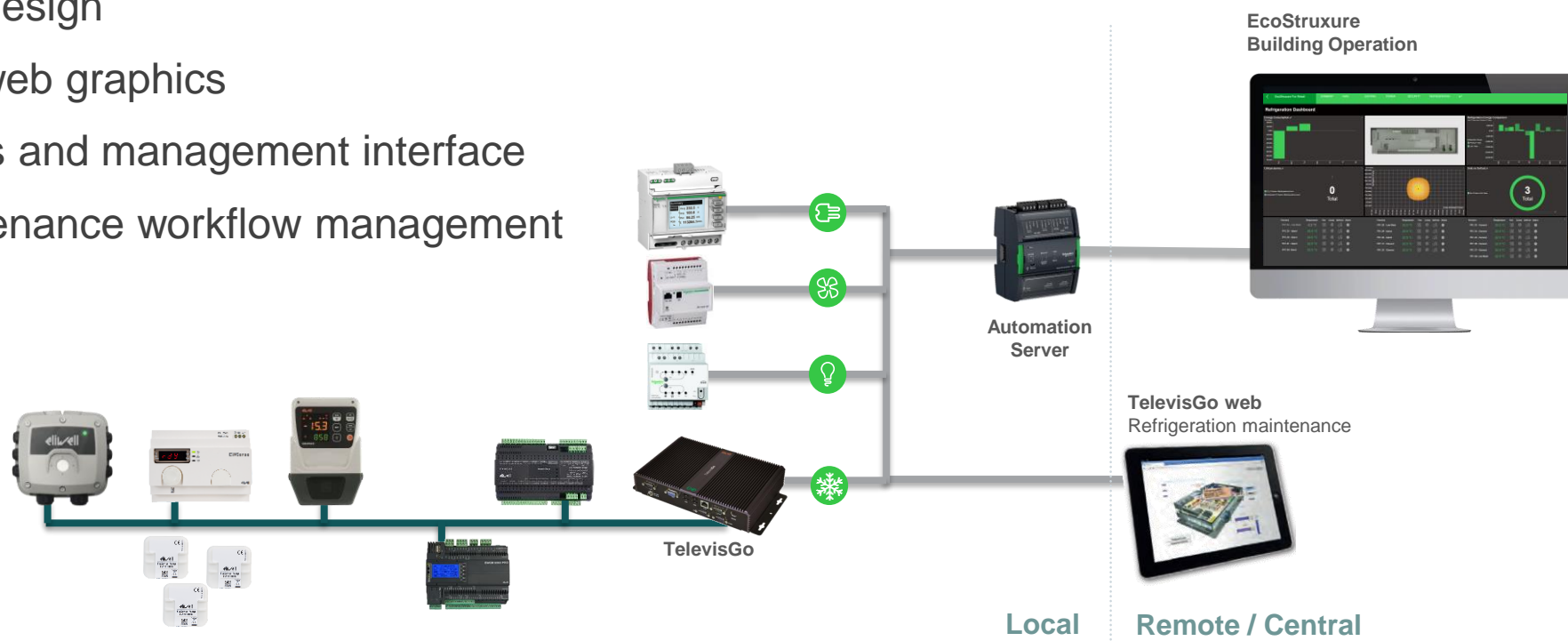
– **All functionalities accessible via web locally and
  from remote**

Supermarket of the future is now a reality
Connectivity and BMS integration enables improved maintenance service

Easy integration in
Schneider Electric EcoStruxure Building Operation

– Smart-widget graphical design

– Scalable and animated web graphics

– Centralized data analysis and management interface

– Central alarm and maintenance workflow management

EcoStruxure Building Operation

Automation Server

TelevisGo

TelevisGo web
Refrigeration maintenance

Local   **Remote / Central**

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CONNECTING REFRIGERATION EXPERTS.

Supermarket of the future is now a reality

- 1 machine instead of 2 or 3

- Reduced space needed

- High reliability with standard Refrigeration Equipment

- Higher reliability for HVAC system

- Higher total efficiency

- Single maintenance contract

- Lower total initial investment

→ **Lower Total Cost of Ownership**

Thank you for your attention.

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