CO\textsubscript{2} transcritical FTE System
Full Transcritical Efficiency
F-Gas restrictions and bans directly impact on market **prices and availability**

- Gas producers are discontinuing the production of R404A
- Not only the R404A but also R407A/C/F, R134a, R410A are increasing in price
- The price for installers and service providers is even higher
- The HFO refrigerants are stable
The Kigali Amendment

- Decision XXVIII/1, October 2016
- Comes into force 1 Jan 2019
- Global phase-down of HFCs on CO2e basis from agreed baseline
- 70-80 GtCO2e avoided by 2050
- > 0.4°C warming avoided by 2100
- Can be strengthened over time
- Energy efficiency gains could significantly increase climate impact
- Guidelines for finance to developing (A5) countries to be negotiated by end of 2018
Why CO2 for DX remote systems

- Environment friendly refrigerant
- ODP = 0
- GWP = 1
- Excellent heat transfer capability
- Colorless and odorless up to 3%
- Not flammable
- Stable substance that does not decompose
- High cooling capacity compared to traditional refrigerants.
- Smaller pipe diameters
- Low and stable price
CO$_2$ transcritical FTE System

New highly innovative CO$_2$ transcritical solution that combines low costs, energy saving and reliability in any country, with any external temperature
**What is the superheat?** The amount of heat added to the refrigerant after its complete evaporation. The superheat is necessary to have only vapor at the evaporator outlet, but it also introduces a significant energy waste and higher compression work.

**Superheat and Evaporating Temperature** The maximum evaporating temperature is limited by the approach between the air inlet temperature and the refrigerant temperature at evaporator outlet. Superheat causes lower evaporation temperature and hence higher energy consumption.

**ZERO superheat: overfeeding of evaporators** Superheat is completely eliminated, liquid refrigerant is mostly used at the evaporator, liquid and vapor are present at the MT evaporator outlet.

**Advantages of evaporators overfeeding** Higher evaporation temperature (up to 6K), liquid refrigerant ensures excellent heat transfer.
CO₂ TRANSCRITICAL FTE SYSTEM

IT Patent Application Pending 10201600004985
CO₂ TRANSCRITICAL FTE SYSTEM

Energy saving independent of the external temperature

MT compressor discharge temperature decreased

No oil return issues

OVERFEEDING OF EVAPORATORS

SH

Evaporating temperature increased 3.5% yearly and better heat transfer rate

LT loads supplied with cooler liquid

IT Patent Application Pending 10201600049985
FTE Advantages

1. **Evaporating temperature increased 365day/year**
   
   The efficiency of the CO$_2$ FTE SYSTEM is given by the MT cabinets operating with flooded (overfeeding) evaporators without superheat
   
   Evaporation temperature is increased up to 6K (2.5-3% energy saving per K)

2. **Energy saving is independent of the external temperature**
   
   Unlike ejector technology, the FTE system works in energy saving mode with flooded evaporators all year long

3. **Optimal performance at EVERY temperature**
   
   The absence of superheat decreases the discharge temperature of the compressors considerably, making it the ideal system for every climate.

4. **LT loads supplied with cooler liquid**
   
   Liquid to the LT freezers is subcooled after MT cabinets

5. **No oil return issues**
   
   Perfect lubrication is ensured as the oil circuit is uninterrupted
FTE combines simplicity with outstanding performance:

» **Energy Saving : 10%**
  
  on an annual basis, independent of the latitude and the climate

» **Installation and maintenance cost savings: UP TO 20%**
  
  as it requires no ejector or parallel compression and is intrinsically very reliable

Simply available everywhere...NOW!
SIMPLE

because it does not need ejectors or sophisticated components, it is as simple as a standard basic CO2 booster system.

Mechanically the FTE system operates with the same components as the basic CO\textsubscript{2} transcritical system, plus the FTE multilevel liquid receiver.
as it works perfectly in hot climates but offers the advantage of a dramatic reduction in consumption all year in any location.

One solution for all markets, sustainable and efficient everywhere, and does not require any special expertise.

**Evaporating temperature increased**

-8.5°C  -4.5°C

**Energy saving independent of the external temperature**

-9.7%  -10.1%  -10.3%  -10.6%  -11.2%

### Key features

- Australia
- Rome
- Milan
- Paris
- Helsinki

Conditions:
- MT cooling capacity installed: 80 kW
- LT cooling capacity installed: 20 kW
RELIABLE

as it is a modular solution based on standard components produced on a large scale: the MT and LT systems use standard CO₂ cabinets and freezers, the power pack is a standard basic CO₂ booster system, whereas the heart of the system is the FTE module, an intelligent standard multi-level liquid receiver.
finally a CO₂ booster system solution more safe and robust than ever, because the FTE system reduces the compressor discharge temperature and allows perfect oil circulation providing better lubrication.

MT compressor discharge temperature decreased

Certificate

This is to certify that

Epta

has developed a highly innovative, energy-efficient CO₂ solution with reliable BITZER compressors, which maintains an uninterrupted cold chain in all climate conditions. The transcritical Epta FTE (Full Transcritical Efficiency) system introduces a simple method to introduce flooded evaporators in commercial applications. This leads to a significant reduction of the difference between evaporation and display cabinet temperatures in the optimized mode and thus lower energy consumption.

Especially in combination with ECO LINE+ refrigerating compressors, BITZER sees the new FTE technology as a major step in the right direction towards the environmentally friendly use of refrigerants in commercial refrigeration, combined with energy efficiency in high ambient temperature regions. The FTE solution is reliable and resistant under all operating conditions, no matter whether it is used in warm or cold areas.

We would like to thank Epta, the expert in commercial refrigeration, for its innovation as well as for being a great collaborative partner and hope to carry on working together to create a successful future.

Erik Bucher
Director Sales Refrigeration
Sindelfingen, 15 February 2017
FTE is a new business model:
• INDUSTRIALIZE
• RELIABLE
• EFFICIENCY

The future of natural refrigeration depends on systems that combine cost, energy saving and reliability in a simple design.

With CO₂ FTE SYSTEM the cost, performance and reliability gaps can finally be seen to be bridged.

FTE gives a significant contribution to break down the barriers to a natural future in refrigeration.
Compact intelligence
High Efficiency System Technology
• Refrigeration systems are usually subject to huge variations of thermal loading conditions, mostly dependent on climate, HVAC store management, as well as the use of the cabinets, openings, food loading, light dimming, etc.

• Frequency controlled variable speed motors applied to waterloop systems offer practical way to achieve maximum performance all the year /all the day adapting themselves to the different field condition

STORE LAYOUT
Simple, economical and practical
✓ Single loop for MT/LT
✓ No subcooling chiller
✓ No technical room nor installation work
✓ No perceptible noise
✓ No equipment outdoor
✓ Warm climate version and new extended limits
✓ Freezing protected up to -25°C (glycol)
Waterloop system
A FULLY COMPREHENSIVE PRODUCT RANGE FOR THE NEEDS OF ANY STORE FORMAT

ENERGY EFFICIENCY
- All units always at their best working condition
- Wide modulation range and energy efficiency at part load
- Optimum food temperature control
- Full control of units: preventive diagnostic and maintenance

FLEXIBILITY
- Easy layout change and showcases repositioning,
- Wider sales area, less space needed for machine room
- High investment recovery in store relocation
- Low installation and maintenance cost

ENVIRONMENT RESPECT
- Charge reduction 80%
- Leaks reduction 96%
- TEWI reduction of more than 50% due to 96% direct effect reduction (in case of HFC)

A 25% energy saving

- High efficiency BLDC compressors
- Individual evap. temperature
- Fully controlled performances

A 80% refrigerant charge reduction

- No long copper pipes
- No comp rack and receivers
- 1-2kg refrigerant charge for cabinets
- Leakage free as factory connected charged, sealed and tested
Natural refrigeration systems for Retail

To ensure the best shopping experience for the consumer and profitability for the client, while promoting sustainable development. A vision built on the solid foundation of the 4 E’s: Experience, Efficiency, Excellence and Evolution.

Experience

More than 100 years of history in the sector, with big investment in R&D. Creating CO₂ plant and heat recovery systems around the world

Efficiency

Epta subscribes to Eurovent, a voluntary European certification programme

Excellence: Certifications

- ISO 26001 (Corporate Social Responsibility)
- HACCP (Food Safety Programme)
- PED (Pressure Equipment Directive)
- PAS 99:2012 (Integrated System)
- ISO 9001:2008 (Quality System)
- ISO 14001:2004 (Environment System)
- OHSAS 18001:2007 (Safety System)
- ISO 9705 (Fire Protection – Coldrooms)
- ETA MARK
  (European Technical Approval – Coldrooms)
- WEEE (Waste Electrical and Electronic Equipment)

Evolution The Tev UP way

Innovative solutions like RevUP technology applied to a complete range of products, which revolutionizes the purchasing experience and ensures:

- high energy efficiency
- attractive merchandising
- maximum product visibility
- total quality
Retrofitting for the best performances

The advantage is not only making the installed equipment compliant with ecocompatible technology, but also improving the performance levels in terms of energy efficiency

✓ **Technological analysis**
✓ Management of the old HFC refrigerant
✓ TEV adjustment/replacement
✓ EEV software setting/updating (or new controller)
✓ Energy mechanical and software update
✓ Refill/restart of the plant
✓ After few hours the system is regenerated

**Benefits of HFO refrigerants**

- Non-ozone depleting and low GWP
- Improved energy efficiency vs. R-404A
- Quick, easy and cost-effective R404A retrofit
- Safe and non-flammable (ASHRAE A1)
- Supported by component manufacturers
- Extensively field tested
- Miscible with POE lubricants
- Can be topped off after leak

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<th>Temperature (°C)</th>
<th>R404A</th>
<th>PERFORMAX LT- R407F</th>
<th>XP40 - R449A</th>
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<th>Temperature (°C)</th>
<th>ESEMPI DI VALORI DI GLIDE</th>
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F-GAS POLICIES IN EUROPE ARE WORKING WELL

• The CO2 emissions are falling in EU
• Energy consumption is key target (ECODESIGN)
• The prices and availability of HFCs is critical
• Natural refrigeration products and systems are available
• The implementation of the F-Gas and the Kigali amendment applied at national level are essential to effectively fight global warming