



ATMO
sphere

Business Case for
Natural Refrigerants



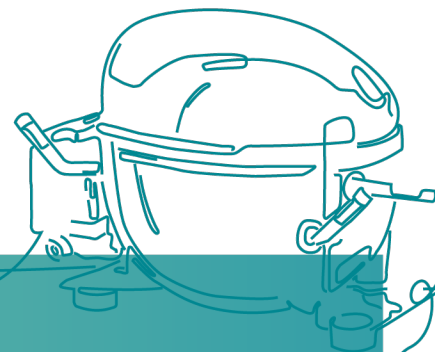
embraco



**Helmer &
EMBRACO FMX
COMPRESSOR**
FOR A BETTER
WORLD



Overview
Embraco



+ 11,000
employees

7 Plants/sales
offices in countries

Production capacity of
40 million
compressors per year

+ 1,500
patents worldwide

+ 500
professionals in
R&D in 4 continents

Overview

Helmer Scientific



**Privately
owned**

**+250
employees**

Medical Device Design and Manufacturing

Medical-grade cold storage for lab,
pharmacy, and Blood bank

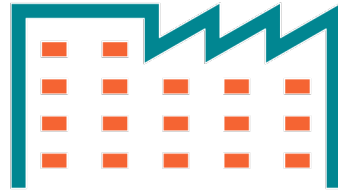
Specialized Blood Bank storage and
processing equipment



- FDA Regulated GMP Facility located in Noblesville, IN.

- >100,000 installed devices across over 130 countries

- ISO-13485 Certified



CHALLENGES FOR OEMS

Medical Refrigerator & Freezers



CHALLENGES FOR OEMS

Medical Refrigerator & Freezers



Temperature Stability

Maintain tight temperature control



Quality & Reliability

Safeguard critical clinical samples and products



Energy Efficiency

Address sustainability and regulatory needs



Noise

Installation near staff and patient care areas





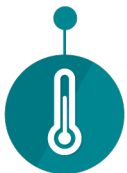
CHALLENGES FOR END USERS

Medical Refrigerators and Freezers



CHALLENGES FOR END USERS

Medical Refrigerator & Freezers



Temperature Stability

Maintain tight temperature control



Quality & Reliability

Safeguard clinical samples and products



Energy Efficiency/Sustainability

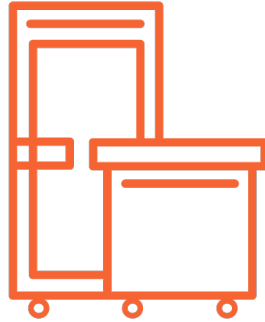
Lower total cost of ownership



Serviceability

Reduce cost and downtime





HELMERS'S CHALLENGES

Case study



HELMER'S CHALLENGES

Case Study

01

Drive Continuous Improvement of performance & quality

Customer delight & competitive differentiation

02

Address regulatory drivers

Transition from high GWP refrigerants & reduce energy consumption

03

Enhance value while managing costs

Remain cost effective with new technology

04

Meet evolving customer requirements

Includes decreasing noise level / sound power for installations near staff & patient care areas



Cabinet Type
5 cu.ft. Undercounter
Current Compressor
4cc Competitor
Refrigerant
R-134a

Helmer

LEADING INNOVATION

HOW WE WORK TOGETHER?

- Evolving global environmental regulations
- Need a reliable solution with a short time to market
- Embraco FMX platform was able to address all the needs in a record
- Aggressive targets on "noise" reduction
- By delivering the whole condensing unit, Embraco enabled Helmer to speed up its time to market

EMBRACO - HELMER



WHAT CHANGES DID WE MAKE TO REDUCE ENERGY CONSUMPTION?

01

CHANGE COMPRESSOR

02

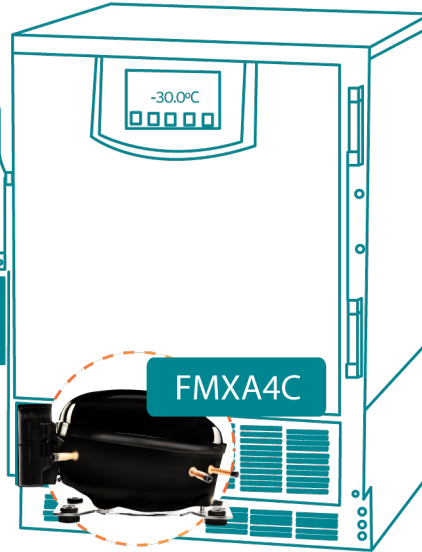
CHANGE FAN

03

CABINET CHANGES



	4cc Baseline		FMXA4C
Capacity down 15% <i>Btu/h</i>	306	↓	68 - 259
EER up 75% <i>Btu/Wh</i>	3.19	↑	5.60
Displacement up 6% <i>cc</i>	3.76	↑	3.97
Weight down 37% <i>lb</i>	16.7	↓	10.6



Quiet and Efficient EC Fan Motor

R134a




R600a











*At ASHRAE LBP



Helmer Case Study



Competitor R134a			FMXA4C R600a	
 Charge (g)	128		60	
 Energy consumption kWh/day	2.40		1.09	
 % of Energy Star Allowance 4.42 kWh/day	54%		25%	
 Sound Power dB(A)	59		45	
 Pull down time (Mins)	48		36	
 Temperature Uniformity (°C)	1.5		0.8	
 Temperature Stability (°C) (Door openings)	2.5		0.6	



Case Study Results

TEWI - It is defined as sum of the direct emissions and indirect emissions (energy use) of greenhouse gases.



Direct	BASELINE	CABINET WITH FMX
GWP - Global Warming Potential	1430	3
L - Annual leakage rate (kg/year)	0.003	0.003
N - Life of equipment	10	10
M -Charge (kg) (1-recycling factor)	0.128	0.060

Indirect	BASELINE	CABINET WITH FMX
a - Recycling Factor	0.95	0
E - Energy consumption (kWh/year)	876	298
β - Emission from energy generation (kg CO ₂ /kWh)	0.508	0.508

TEWI (T)	4.50	2.02
-----------------	-------------	-------------

55%
OF REDUCTION ON
THE ENVIRONMENTAL
IMPACT DUE TO
CO₂ EMISSIONS

$$\text{TEWI} = \text{GWP} \cdot \text{L} \cdot \text{N} + \text{GWP} \cdot \text{M} \cdot (1 - \alpha) + \text{N} \cdot \text{E} \cdot \beta$$



Case Study Results

If the market were to convert 1,000 cabinets for this technology, the savings in carbon emissions generated by the new equipment are equivalent to:



CO₂ emissions from



Annual energy consumption of 268 Homes (Saves \$33,445 per year)

Greenhouse gas emissions from



278,947
gallons of gasoline consumed



6,075,980
miles driven by an average passenger vehicle

Thank you

Questions

