EUROPEAN HEAT PUMP SUMMIT

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SYMPOSIUM + EXPO
NUREMBERG, 20–21.10.2015

Industrial | Commercial | Residential
Heating & Cooling | Components & Equipment

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NÜRNBERG MESSE

Industrial screw compressor heat pumps

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Kenneth Hoffmann, M.ScE
GEA

Introduction

Introduction

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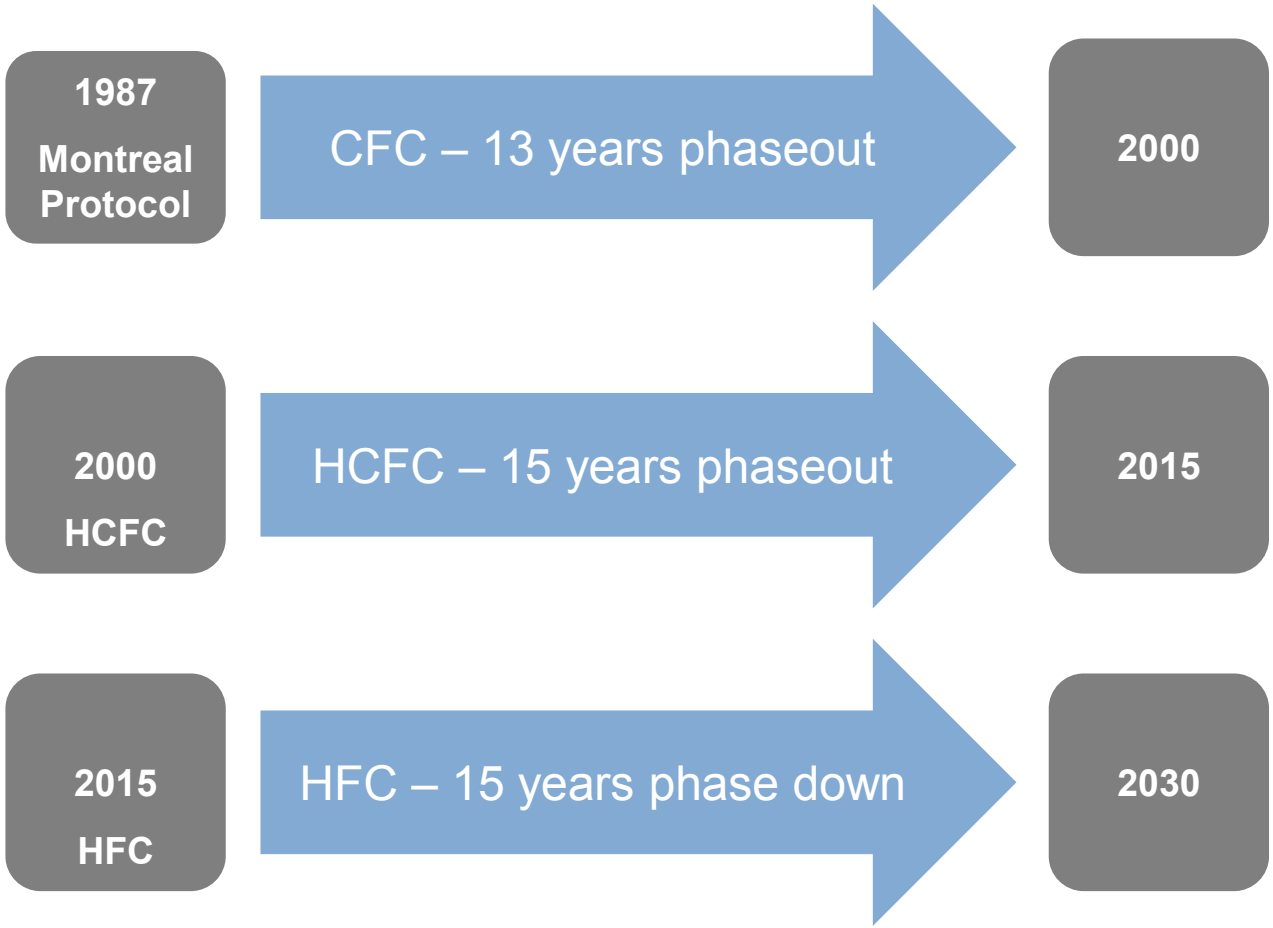
- 2009 First industrial high temperature heat pump installed by GEA
- Since then 200 heat pumps installed across Europe
- Growing sales each year
  - Increasing interest from Africa, Asia and North America
- Focus on ammonia as refrigerant
- Minimum carbon footprint

Ammonia as refrigerant



Safe, reliable and low cost ammonia

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1. Low charge ammonia chillers (0.1 – 0.2 kg/kW) 1000 kW heat pump has 125 kg ammonia

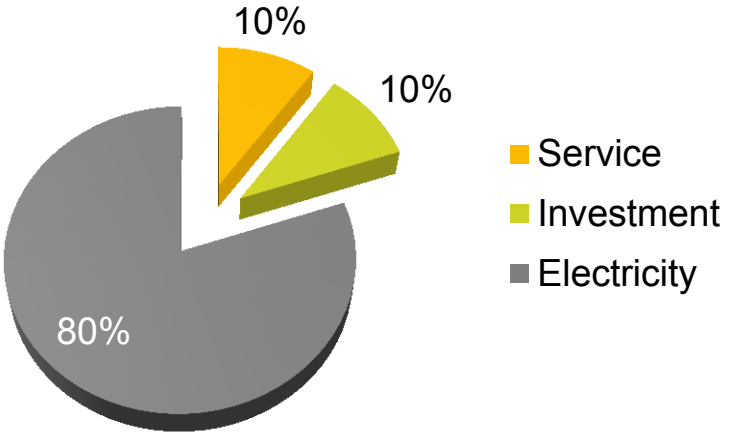
2. Plug and play installation on site – only water an power connections

3. Only ammonia in the plant room

4. Low service requirement

5. High performance heat pumps give lowest cost.

6. Longevity secures investment. Minimum 20 years service life



Heat pumps

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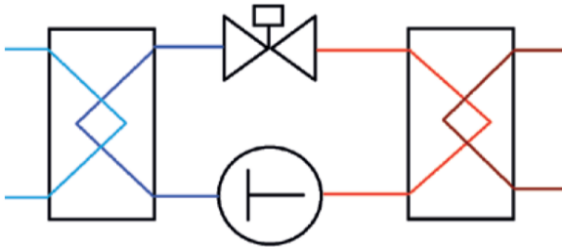
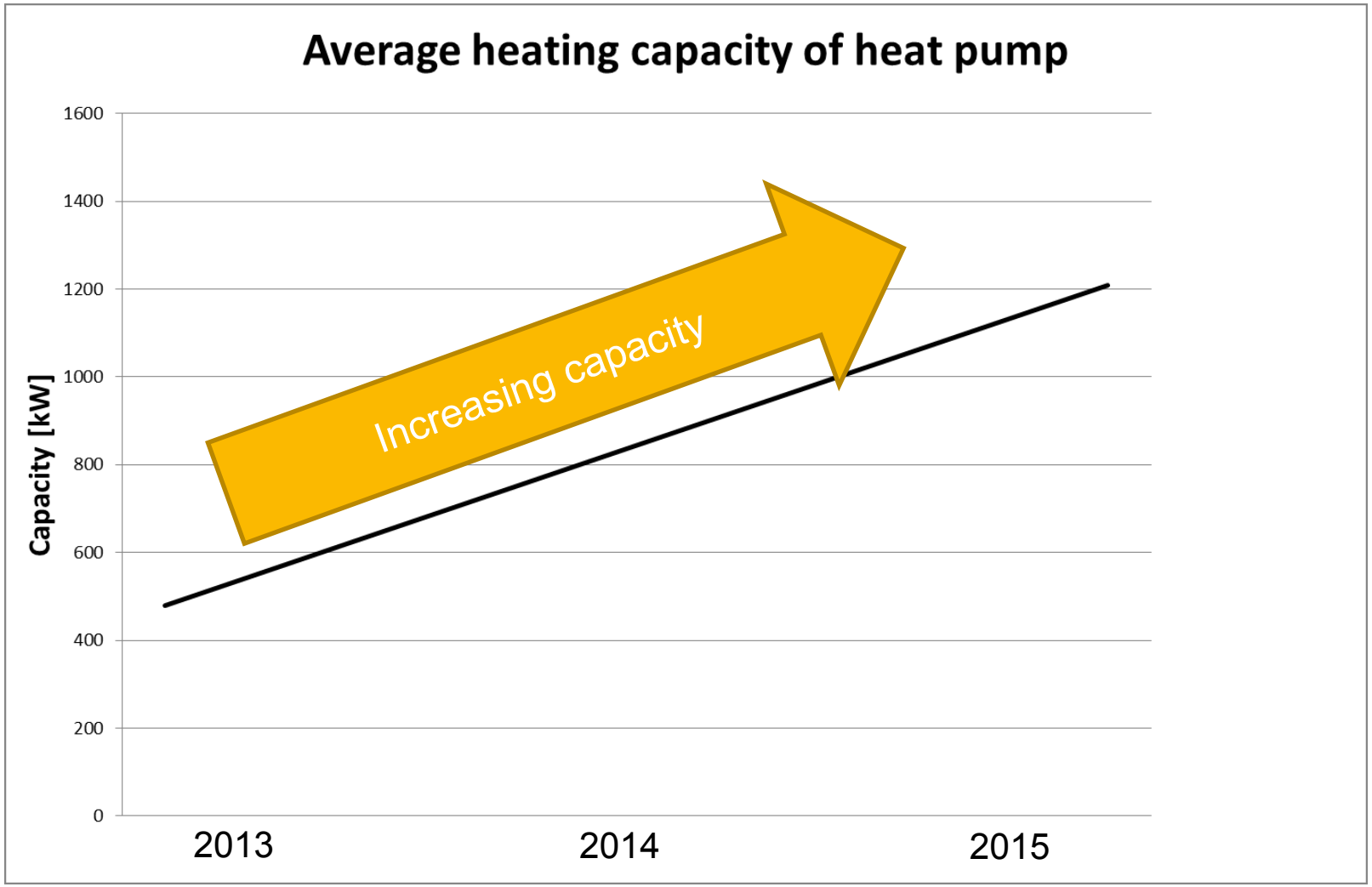
with piston compressors (2012)

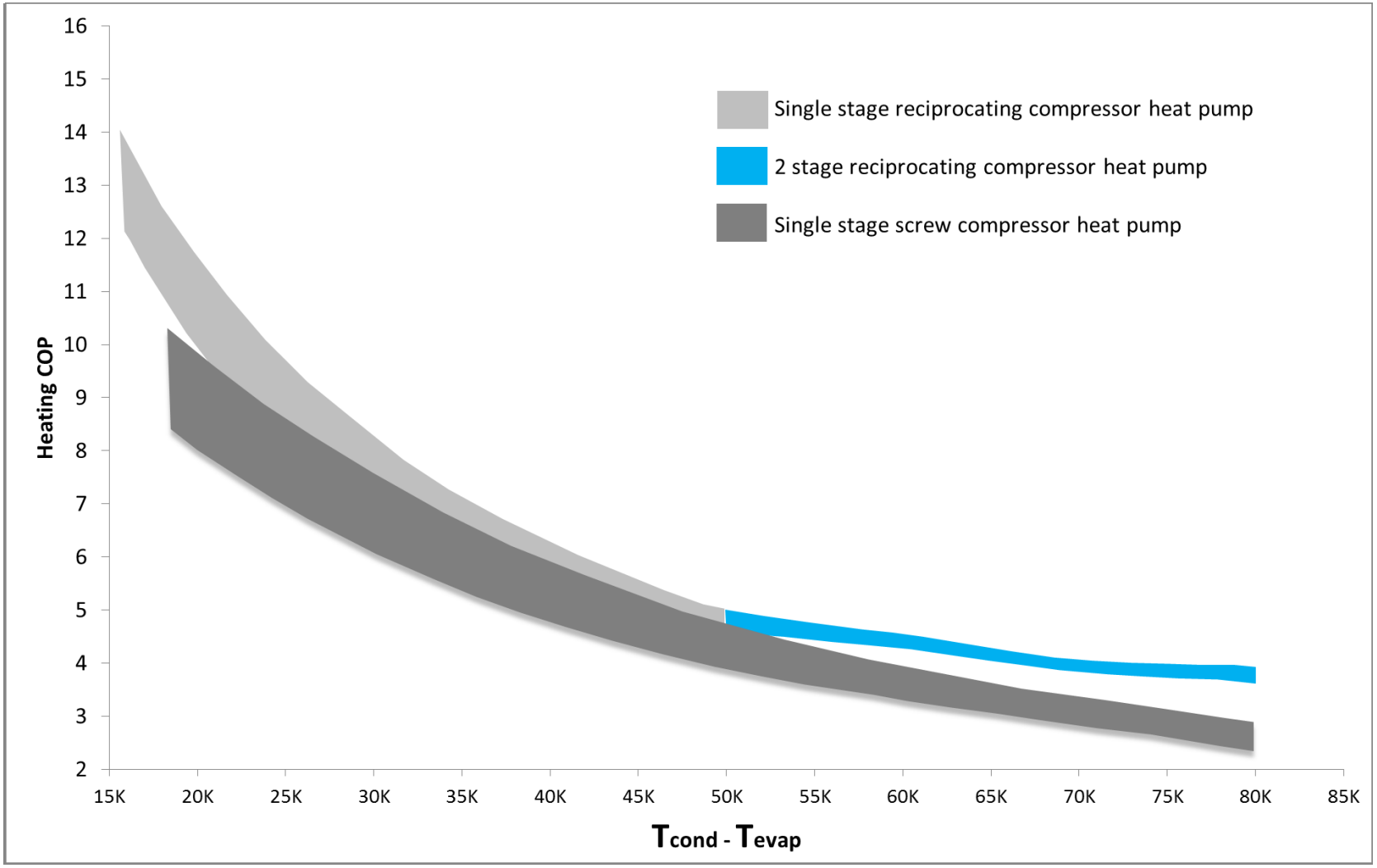


- 200 – 1,500 kW heating duty
- 20+ years service life
- Low maintenance
- High reliability
- VSD
- Single/ duplex compressor arrangement
- 28, 40 or 50 bar design
- 9 models
- 35°C to 82°C hot water

Heat pump market development



Screw vs Piston heat pumps



Heat pump range

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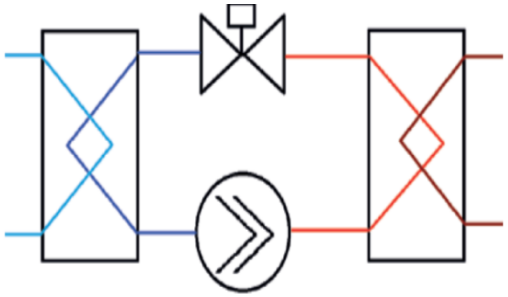
With screw compressors



20+ years service life

300 – 15,000 kW heating duty

35°C to 82°C hot water (on request up to 90°C)

22 models

Low mainte-nance

High reliability

VSD

28, 40, 52 or 63 bar design

New GEA M screw compressor

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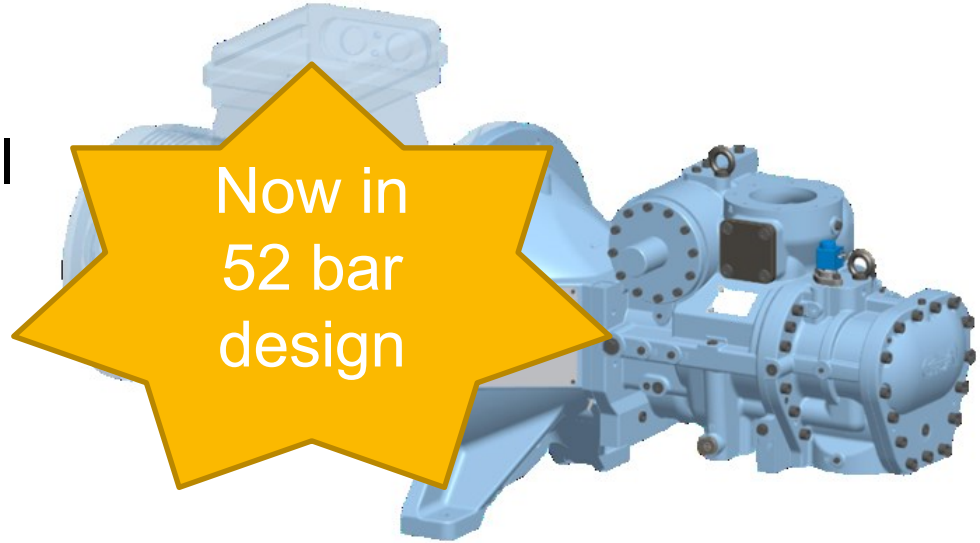
- Greatly improved efficiency in part load and full load
- Increased standard warranty to 2 years
- The non-return valves are not spring loaded, they are gas operated (extreme low pressure loss)
- Wider speed range enables 1000 - 4500 rpm screw packages
- Larger variable Vi range enables higher efficiency
- No oil pump under normal conditions.
- 5 – 7% efficiency improvement



Large heat pump range

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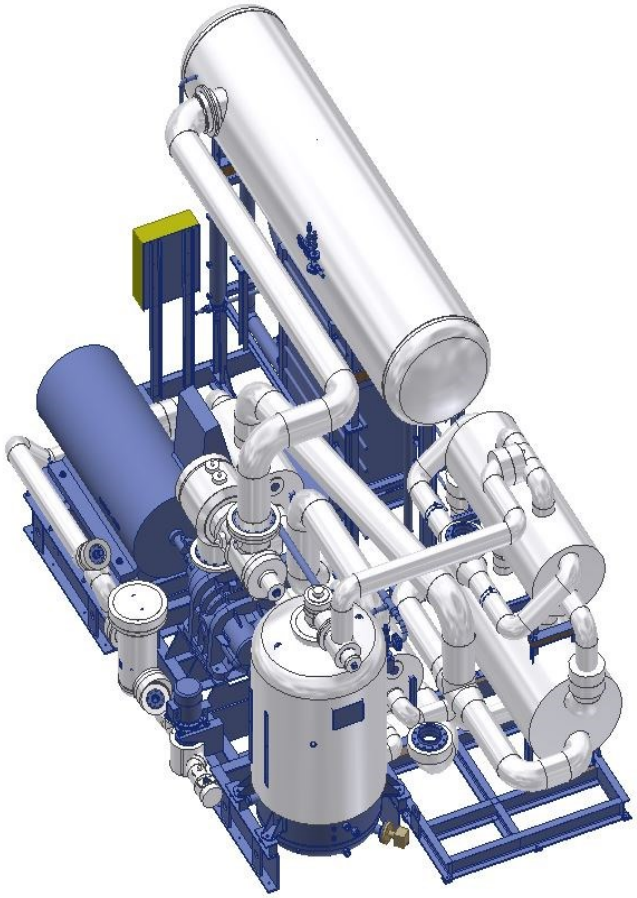

Bespoke
2,200kW – 15,000kW

Standard
800 kW – 2,200 kW

Large heat pump range

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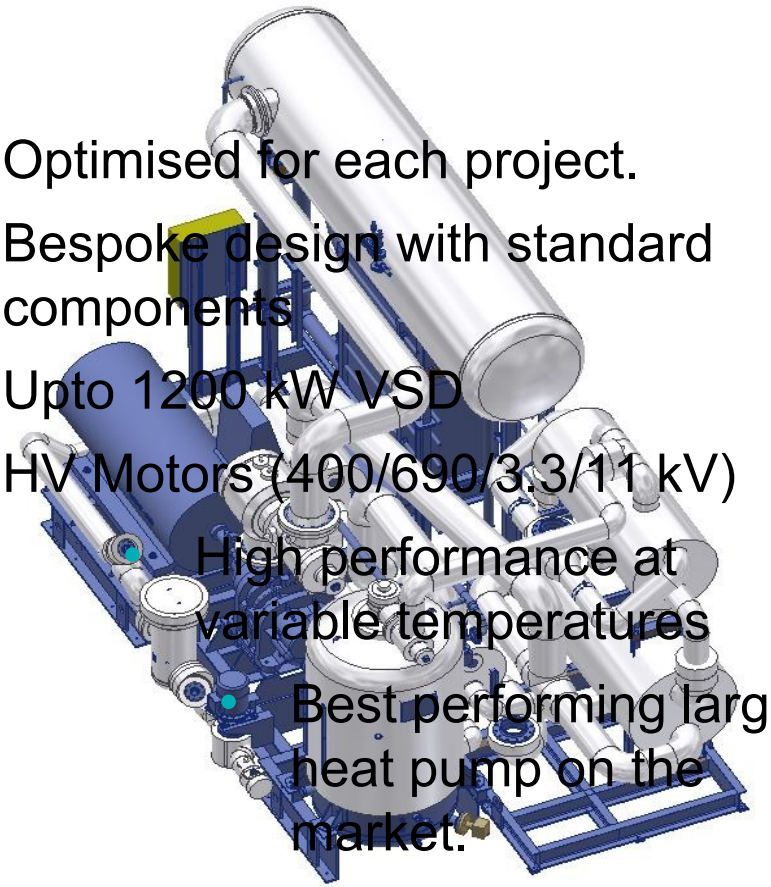
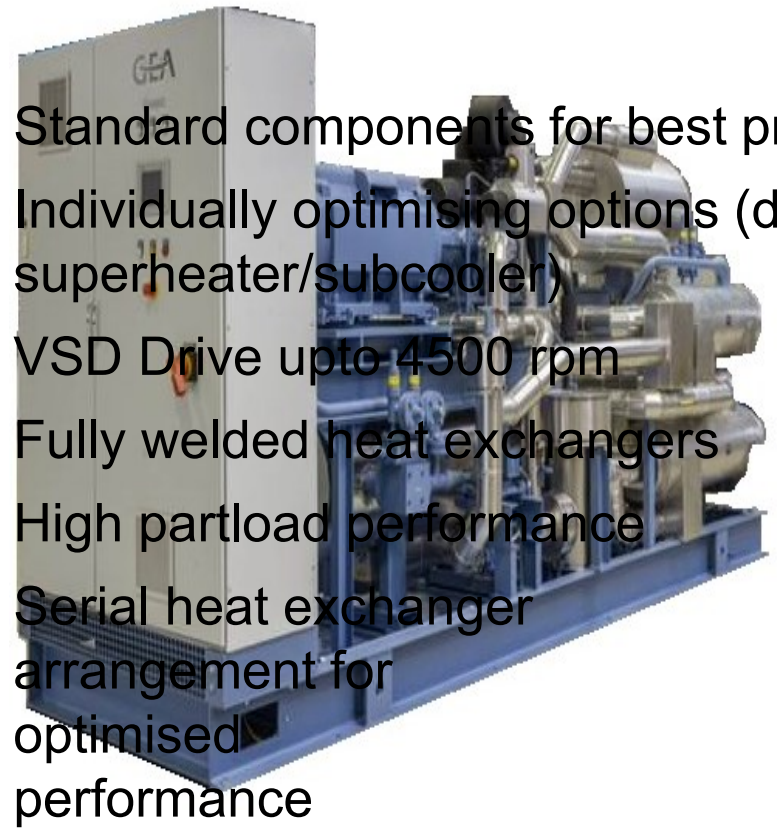


- Optimised for each project.
- Bespoke design with standard components
- Upto 1200 kW VSD
- HV Motors (400/690/3.3/11 kV)
  - High performance at variable temperatures
  - Best performing large heat pump on the market.

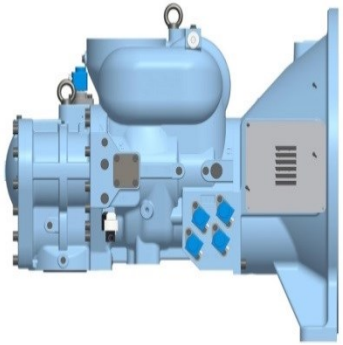
Bespoke
2,200kW – 15,000kW



- Standard components for best price
- Individually optimising options (de-superheater/subcooler)
- VSD Drive upto 4500 rpm
- Fully welded heat exchangers
- High partload performance
- Serial heat exchanger arrangement for optimised performance

Standard
800 kW – 2,200 kW

Standard screw based heat pump



H - 500 m3/h – 800 kW

L - 600 m3/h – 1200 kW ✓

M - 800 m3/h – 1500 kW

N – 1,000 m3/h – 1800 kW

Standard screw based heat pump

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Starter panel ✓

Standard screw based heat pump

Omni controller

Standard screw based heat pump

Electric motor

9 sizes

155 kW – 520 kW ✓

Upto 4500 rpm

Standard screw based heat pump

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Fully welded

Condensers, evaporators

10 sizes ✓

(Option de-superheater and subcooler)

Standard screw based heat pump

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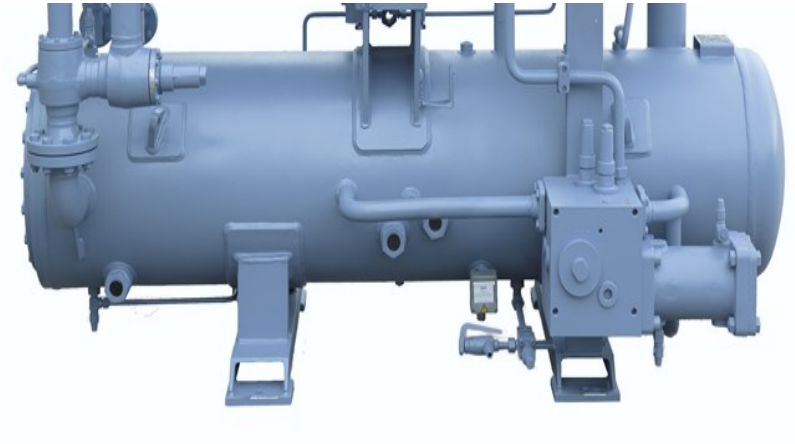

Oilseparator, Oilcooler, pipework ✓

Standard screw based heat pumps

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GEA RedASTRUM Concept

Coolant +40°C/+35°C

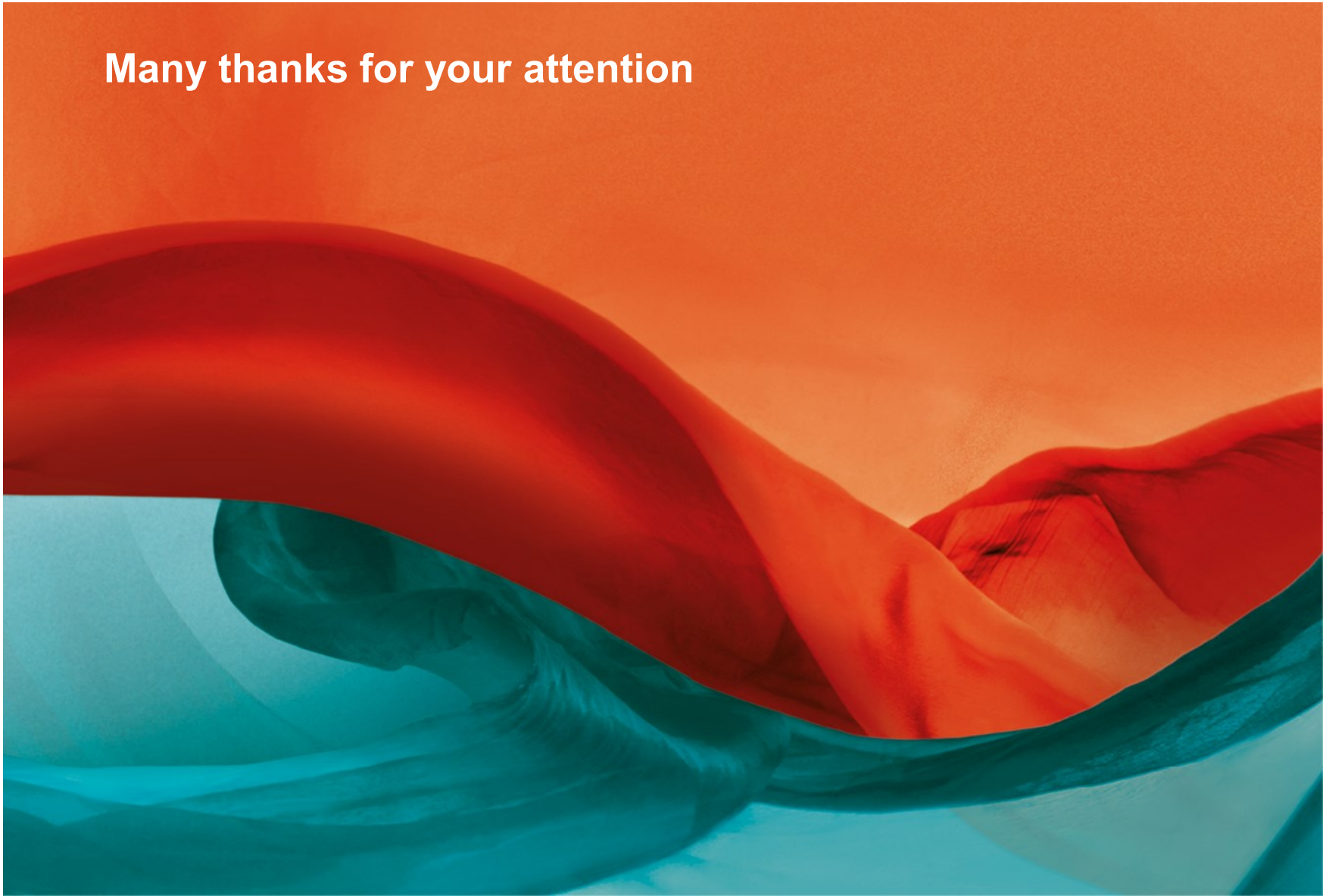
Type	Compressor Model R717	Cooling capacity [kW] at +40/+35°C 3600rpm	Cooling capacity [kW] at +40/+35°C 4500rpm	Heating capacity [kW] 3600rpm	Heating capacity [kW] 4500rpm	Heating water [2] [°C] inlet / outlet temp.	Electric power [kW] 3600rpm	Electric power [kW] 4500rpm	COP_{Heat} at compressor shaft [1] 3600rpm	COP_{Heat} at compressor shaft [1] 4500rpm
1200	HR-G21T-52	1045		1255		+50/+70	215		5.84	
	HR-G21T-52	960		1170		+60/+70	215		5.44	
	HR-G28T-52	955		1240		+70/+80	285		4.35	
	HR-G28T-52	870		1155		+60/+80	285		4.05	
1500	HR-G21T-52		1305		1570	+50/+70		265		5.92
	HR-G21T-52		1200		1465	+60/+70		265		5.53
	HR-G28T-52		1185		1540	+60/+80		360		4.28
	HR-G28T-52		1075		1430	+70/+80		360		3.97
2000	MR-H17T-52		1710		2060	+50/+70		355		5.80
	MR-H17T-52		1570		1920	+60/+70		355		5.41
	MR-H24T-52		1550		2010	+60/+80		465		4.32
	MR-H24T-52		1410		1875	+70/+80		465		4.03
2200	MR-L20T-52		1970		2360	+50/+70		390		6.05
	MR-L20T-52		1815		2200	+60/+70		390		5.65
	MR-L27T-52		1795		2310	+60/+80		520 [3]		4.44
	MR-L27T-52		1635		2155	+70/+80		520 [3]		4.14

Reference

- Installation: Sweden
- Heat pump:

- VSD Drive 50 – 100% duty
- With subcooler
- Hot water temperature: 40 → 78°C
- Chilled water temperature: 20 → 10°C
- Heating duty 560 kW
- Cooling duty 380 kW
- $COP_{Heating}$ 3,11
- L x B x H: 5000 x 1200 x 2100 mm
- NH3 charge: 110 kg

Many thanks for your attention



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