

BLUE H♥RT

# Multi source engines for flexible supply of heating and cooling

CONFIDENTIAL

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The **Blue Heart** Powered by Sound

# The Solution

*"Since 1913 no new technique was introduced for heating or cooling"*

*"Finally, after more then 100y a better technique arrived"*



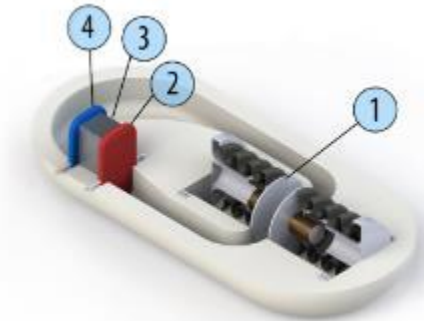
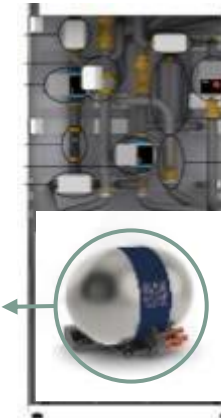
## BLUE HEART engine replaces the cold circuit. Focus on residential & chance for Industry



### ~~Compression HP~~

~~Compressor  
Evaporator  
Condenser  
Filter  
Expansion valve~~

↓  
**Thermocoustic HP**  
"BH Inside"



1 - Electric drive: Pressure wave inside 50 bar helium  
3 - Regenerator  
2 & 4 - Internal heat exchangers

- BlueHeart **replaces the refrigerant circuit** with a thermo-acoustic engine
- Uses **sound waves** to create a temperature difference
- Superior performance without harmful refrigerants

More info: <https://youtu.be/p1Tp2IznYso>



## The challenge

### The Situation:

- Different sources and output needs different Compressors and refrigerants.
- F-gases for compression technique are banned in the EU - Jan. '27! for HP's & Jan '29 for Airco.
- Compressors efficiency is optimized for special Power output, flows and DeltaTs.

### The solution:

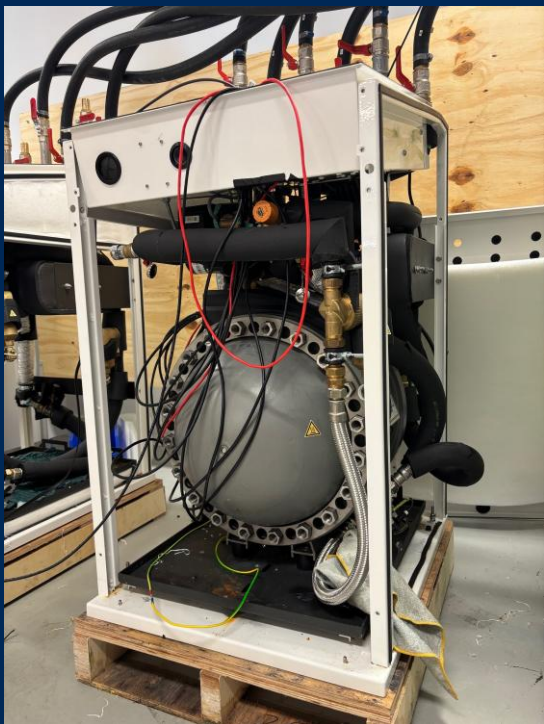
- With Blue Heart no refrigerants are needed.
- Efficiency stays (almost) equal for:
  - Different power output
  - Different flows
  - Different deltaT's
- No flammability risks
- Low noise.
- No **restrictions** on the max. and min. Temperature
- Very fast reaction time (seconds)



## The Solution

### Hence

- Ideal for multi source (Geo, LT district, Air, PVT, ... etc.)
- Ideal for multi supply
- Ideal for shifting fast between different modes, sources and supply
- Ideal for controlling temp.
- Ideal for less isolated / controlled surroundings
- Ideal where propane can't go (flammability)



# What are we offering

- Flexible and fast responding hardware to heat and cool
- Modulating system 1-8kW output
- Cascade till at least 10 units x 6-8kW output.

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# BLUE H♥RT

Technology for a better planet



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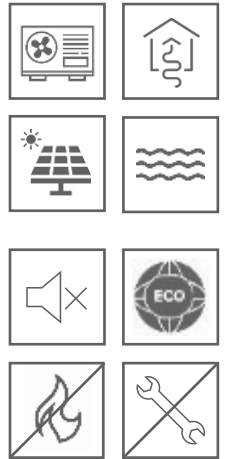
[hhalbesma@blueheartenergy.com](mailto:hhalbesma@blueheartenergy.com)

# Appendix

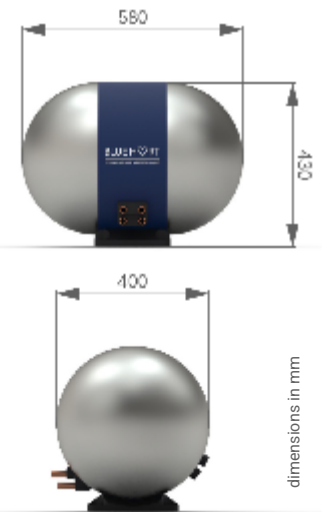
# Specification Summary



- ❑ **Wide operating envelope** enables wide source compatibility
- ❑ **Simplified controls** and **plug and play installation**
- ❑ **Quiet operation** gives indoor installation flexibility
- ❑ **Safe, non-flammable, non-toxic, zero-GWP** Helium working gas
- ❑ **Long lifetime** (exp. 20 years)
- ❑ **Maintenance free**

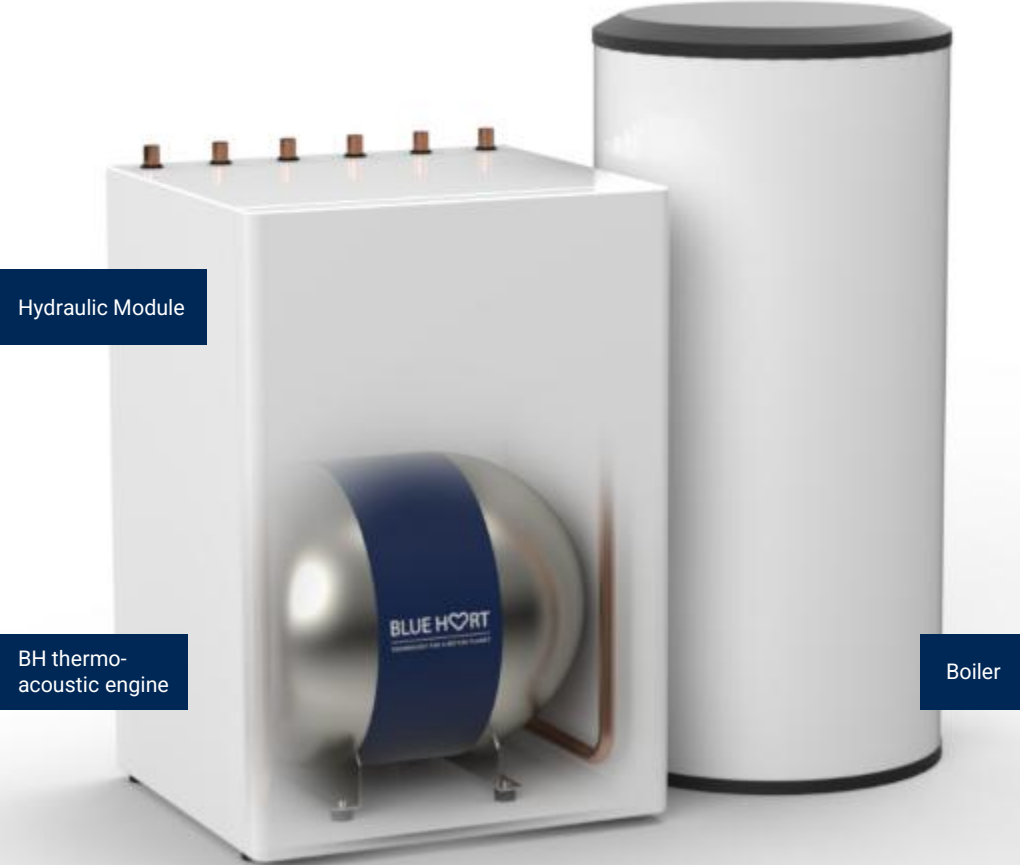


- ❑ **Place of installation:** Inside / Outside
- ❑ **Source compatibility:** Air / PVT / Ground / Water
- ❑ **Source brine(s):** Water / Detoxified Ethylene Glycol
- ❑ **Supported applications:** Space Heating / DHW / Cooling
- ❑ **Working gas:** Helium
- ❑ **Nominal pressure:** 60 bar
- ❑ **Weight:** 60 kg





# Heat Pump with BlueHeart Inside



## BlueHeart Unit Interfaces

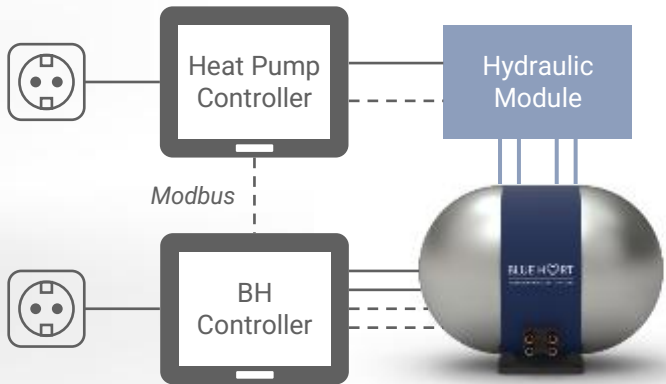


2x Supply connections (hot)  
2x Source connections (cold)



2x Power cables  
2x Data cables

## Controller Overview

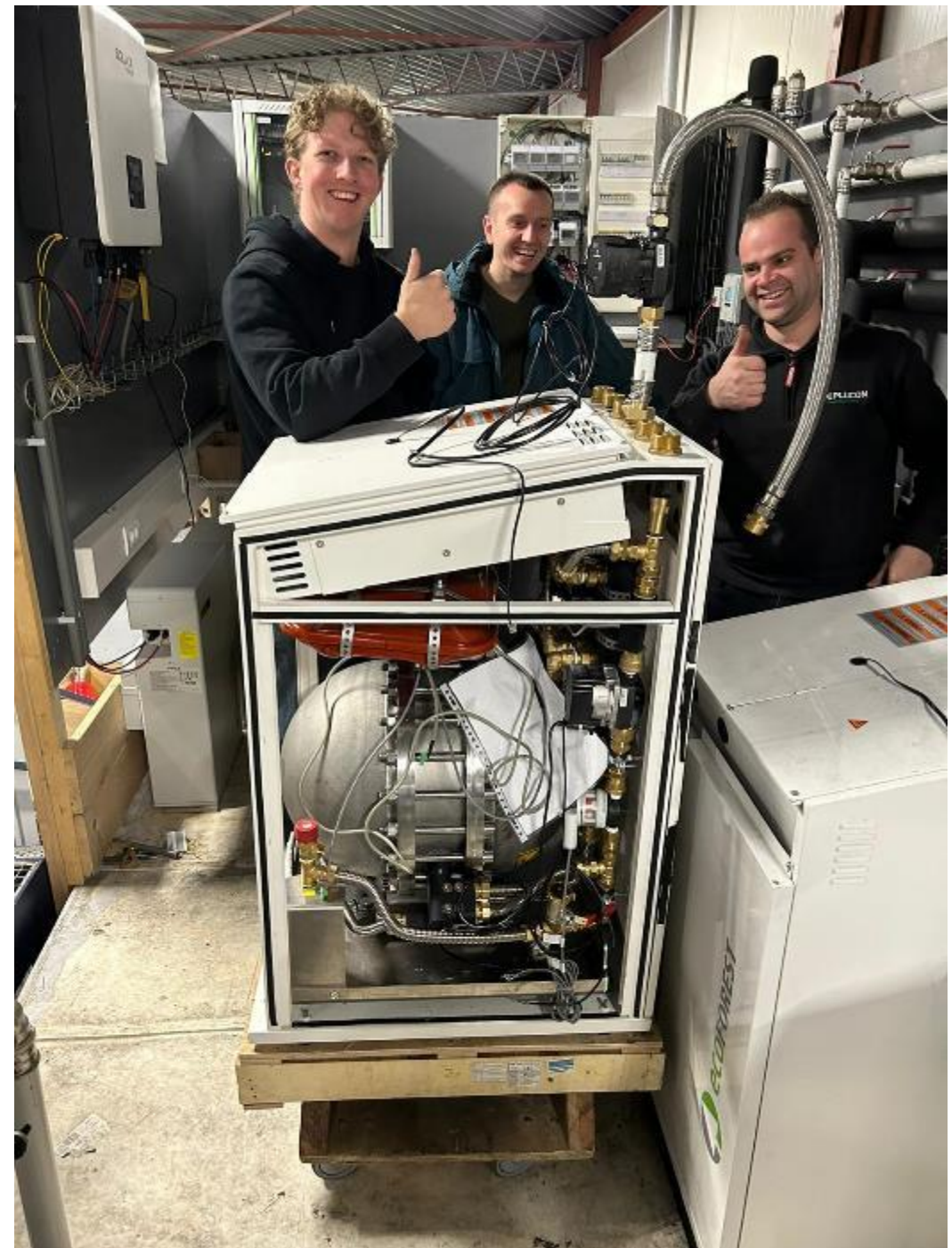


**HP Controller** sends power request to **BH Controller** as % of max power.

**BH Controller** sets power target in BH Unit (voltage modulated).

— Power  
- - - Data  
— Hydraulics

# Integrating at Customer



# BlueHeart can work with the widest range of temperatures

Now designed for below. With engineering and bit of R&D temperatures can go to 200C

## BlueHeart handles:

- Input temperatures from -25°C to +50°C
- Output temperatures from 0°C to +80°C

