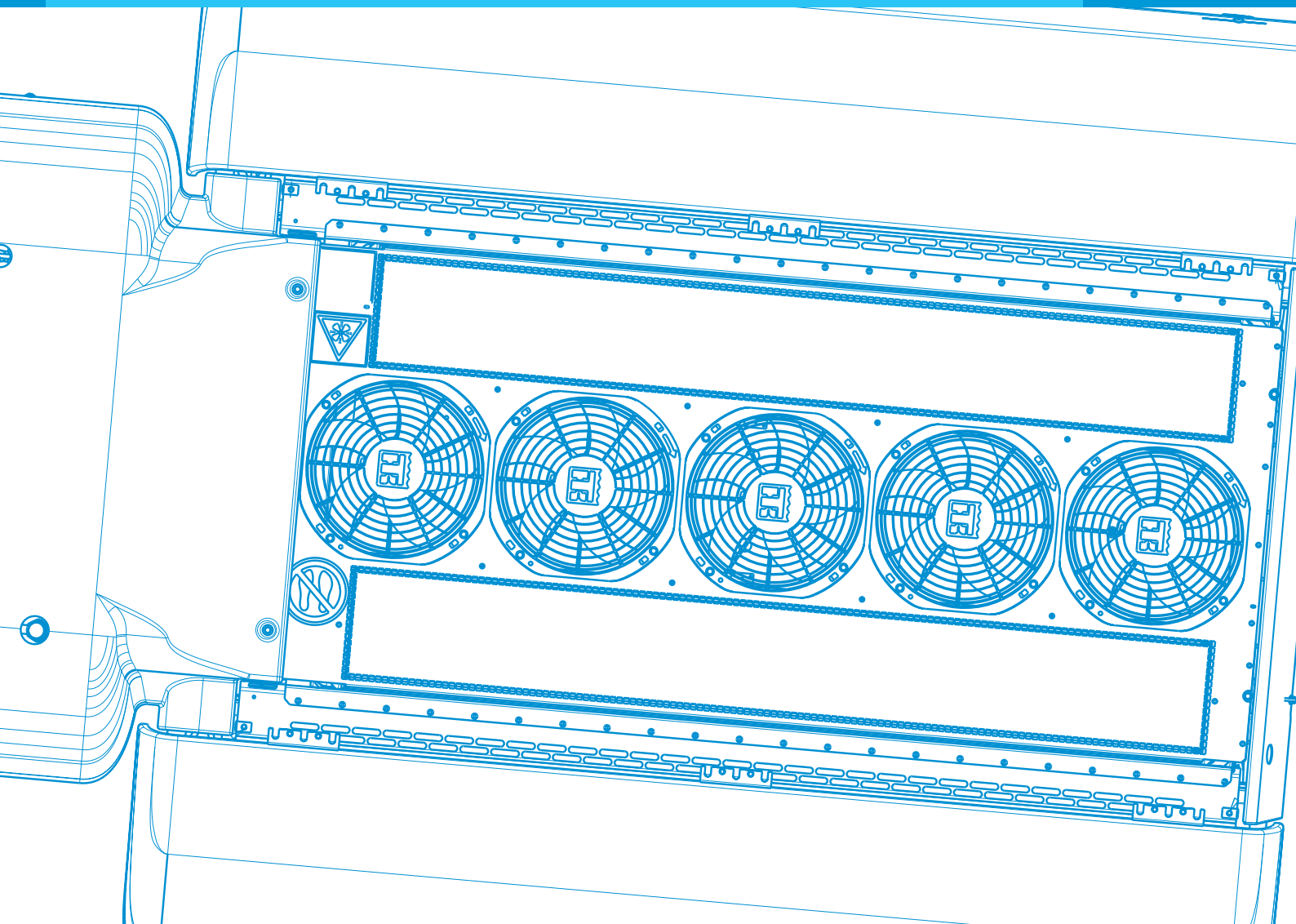
THERMO KING

ATHENIA™ MkII HEAT PUMP SERIES

AIR/AIR REVERSIBLE ELECTRIC HEAT PUMP HVAC UNITS FOR HYBRID & ELECTRIC BUSES



High Efficiency in Cooling and Heating

The Athenia™ MkII Electric Heat Pump product range offers the most efficient way of heating and cooling performances in hybrid and electric buses thanks to its reversible refrigeration circuit. It offers maximum passenger comfort not only during the summer months when cooling is required but as well during the winter months when heating is required.

In heating mode, the Athenia™ MkII Electric Heat Pump is able to transfer heat from outside air into the inside passenger area with a COP of up to 4. It means that for each 1kW of electricity consumed from batteries the heat pump generates up to 4kW of heating. In cooling mode the unit operates as Athenia™ MkII Electric HVAC unit.

The heat pump unit's battery cooling circuit works independently from the passenger compartment cooling and heating mode. It helps to effectively recycle the heating energy generated by batteries during bus operation and reduces energy consumption of the unit when heating mode is required for passengers.

For lowering total power consumption, the Athenia™ MkII Electric Heat Pump unit uses electric variable speed compressor with a heating and cooling capacity modulation range of up to 60%. Moreover, the HVAC heat pump unit operates independently from the engine RPMs.

For highest passenger comfort, the CANAIRE® control system can manage up to three temperature zones with precise temperature control for single, articulated and double-articulated buses. The unit can be equipped with a built-in CO_2 sensor that monitors air quality and efficiently provides fresh air intake into the bus.

The CANAIRE® control system features an ergonomically designed LCD driver panel which allows for the control of A/C roof unit in parallel with a front box unit placed in the driver´s area. Via service and diagnostic software tools the control system features can be changed in alignment with operating conditions and customer needs.

Environmental impact

The electrical heat pump technology increases unit power efficiency ratio and reduces CO_2 emissions impact.
To improve environmental compatibility, the Athenia™ MkII Electric unit is pre-filled with refrigerant and features a hermetic refrigerant circuit, minimising the risk of refrigerant leakage.
For additional safety, the unit runs on non-flammable refrigerants with an A1 classification.

Reliability

We carry out a range of rigorous functional and performance tests which regularly exceed the standard bus homologation requirements (ECE R10.05) to validate all our transport refrigeration equipment in a controlled environment.
Our Thermo King manufacturing plant is ISO 9001: 2008, ISO 14001: 2004 and BS OHSAS 18001: 2007 accredited to demonstrate our dedication to quality and reliability.

Ease-of-use and service

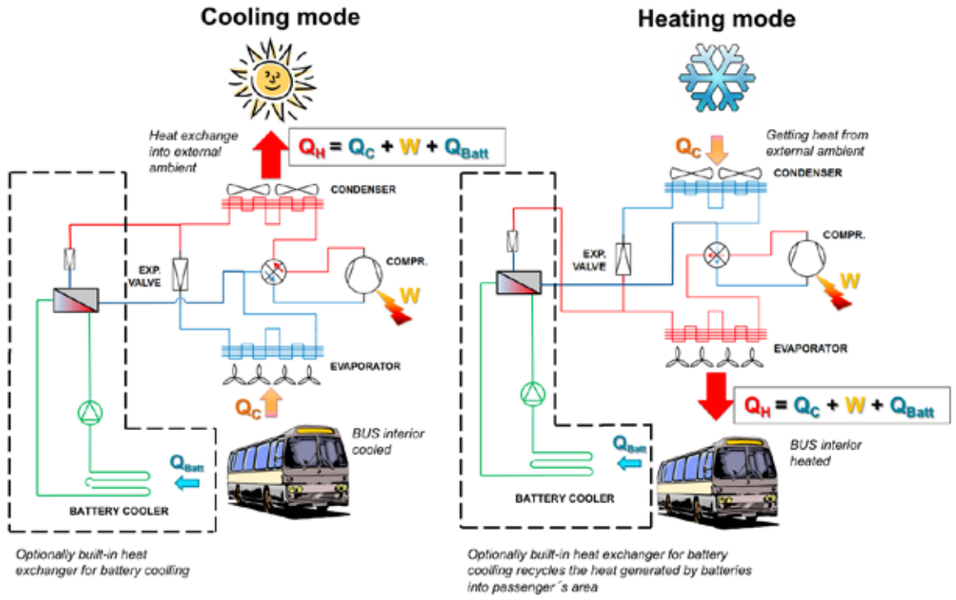
Athenia™ MkII Electric Heat Pump units are compatible with bus roofs with a radius ranging from 7,5m to flat.
To increase flexibility of use, the units are suitable for screw or glue installation. Moreover, all units are delivered prefilled band ready for immediate use.
To drive down further installation costs and facilitate installation, the electrical compressor has been integrated in the roof unit.
An optionally built-in heat exchanger for battery cooling helps to maintain ideal battery operating temperature for hybrid and electric buses and thus, extends battery life and guarantees maximum power capacity.

ATHENIA™ MkII SERIES SPECIFICATIONS

SPECIFICATIONS ATHENIA MkII ELECTRIC HEAT PUMP SERIES	E-700H	E-960H
Layout unit	Narrow (N)	Narrow (N)
Listed cooling capacity[1] [kW] / [kBtu/h] / [kcal/h]	**36** / 123 / 31000	**38** / 130 / 32700
Rated cooling capacity[2] [kW] / [kBtu/h] / [kcal/h]	**15,3** / 52/ 13100 @ 50Hz **19,5** / 66 / 16800 @ 75Hz	**16,0** / 55/ 13800 @ 50Hz **19,9** / 68 / 17100 @ 75Hz
Heating capacity - heat pump w/o battery cooler compressor@ 50 Hz, air inlet 20°C	**10,9** / 37 / 9400 @ ambient +7°C **7,1** / 24 / 6100 @ ambient -5°C	**13,3 / 45 / 11400 @ ambient +7°C** **7,4 / 25 / 6400 @ ambient -7°C**
Heating capacity - heat pump w/ battery cooler compressor@ 50 Hz, air inlet 20°C	**15,0** / 51 / 12900 @ ambient +7°C **10,5** / 36 / 9000 @ ambient -5°C	**16,4** / 56 / 14100 @ ambient +7°C **12,1** / 41 / 10400 @ ambient -7°C
Heating capacity - water coil[3] [kW] / [kBtu/h] / [kcal/h]	**19** / 65 / 16300	**19** / 65 / 16300
Evaporator air capacity[4] [m3/h]	4920	7380
Fresh air range [%]	0..100	0..100
Power supply of integrated compressor[5]	3PH 360V 45Hz - 460V 75Hz AC	3PH 360V 45Hz - 460V 75Hz AC
Dimensions roof unit (W x L xH) [mm]	1850x2925x305	1850x2925x305
Refrigerant type / average filling volume [kg]	R407C / 6,5	R407C / 6,5
Weight (cool+heat) [kg]	295	300
Control system (languages)	CANAIRE (EN/DE/CZ/IT/FR/SP)	CANAIRE (EN/DE/CZ/IT/FR/SP)
Compressor integrated	Variable speed compressor (45-75Hz)	Variable speed compressor (45-75Hz)
Driver unit evaporator extension availability	Yes (EDS-700H)	Yes (EDS-960H)

[1] - Simulated at conditions 40°C/40°C/95% @ 75Hz
[2] - Measured at conditions 35°C/27°C/19°C
[3] - Measured at conditions +20°C/+60°C/16,7 l/h
[4] - Free blow capacity for brushless blowers
[5] - Measured at conditions 35°C/27°C/19°C

Reversible heat pump operating modes



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