

RAAL[®]
complete cooling solutions

You Want To Go Electric?

Let Us Manage Your Batteries Thermal Output

BATTERY CHILLER FOR ELECTRIC DRIVE BUSES



FEATURES

- All Seasons (Summer and Winter)
- State of Art controller
- Voltage configurations
- 24V DC • 100V DC
- 48V DC • 300V DC
- 700V*DC
- R134a refrigerant
- Variable speed
- Compressors
- Water pumps
- Fans

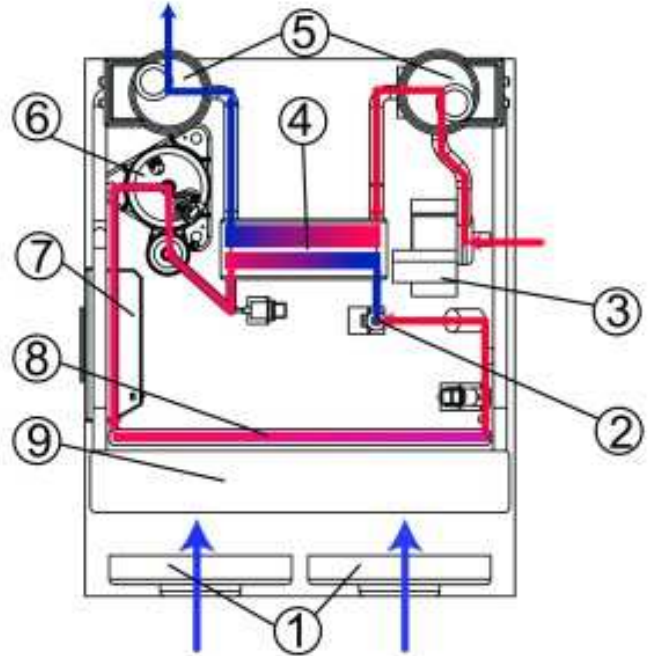
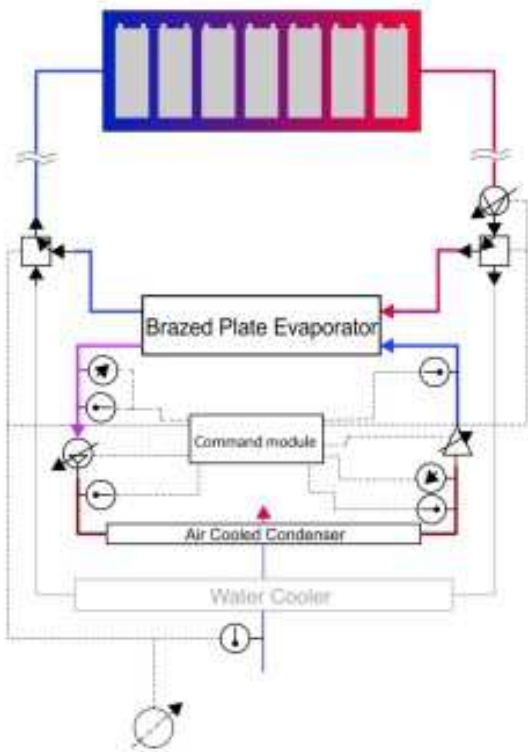


BATTERY AVERAGE THERMAL OUTPUT ~ 12W/Battery¹⁾

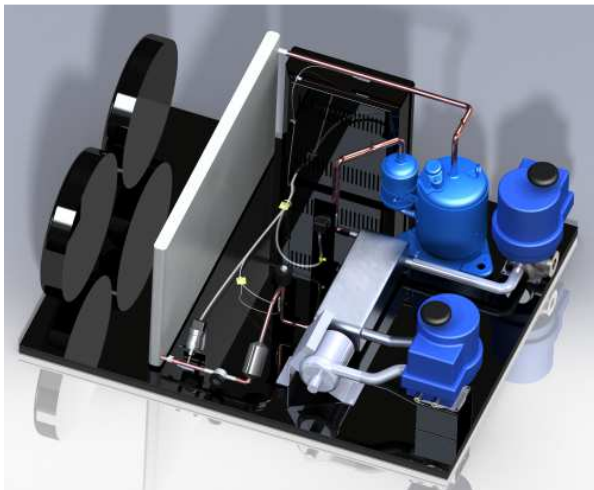
Voltage [V]	Heat Capacity [W]	Battery No.	Electrical Power [kW]	Battery Voltage [V]	Time [h]	Discharge rate
24	1950	160	72	512	1/2	2C
48	3830	316	141	505.6	1/2	2C
300	7224	596	267	953.6	1/2	2C

(1 M. C. Niculita, "Thermal Analysis of a LiFePO4 Battery Pack Master Thesis Project," Mads Clausen Institute, Sønderborg, 2012)

Hot Weather $T_{amb} \geq 15^\circ C$

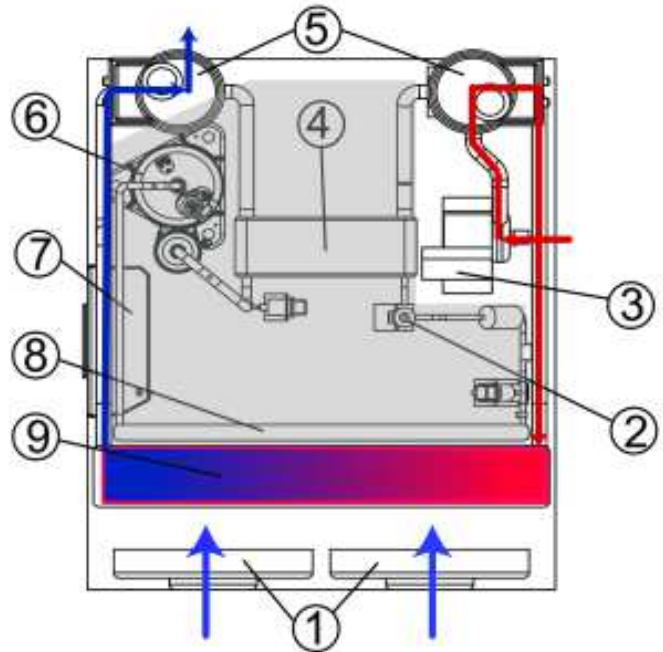
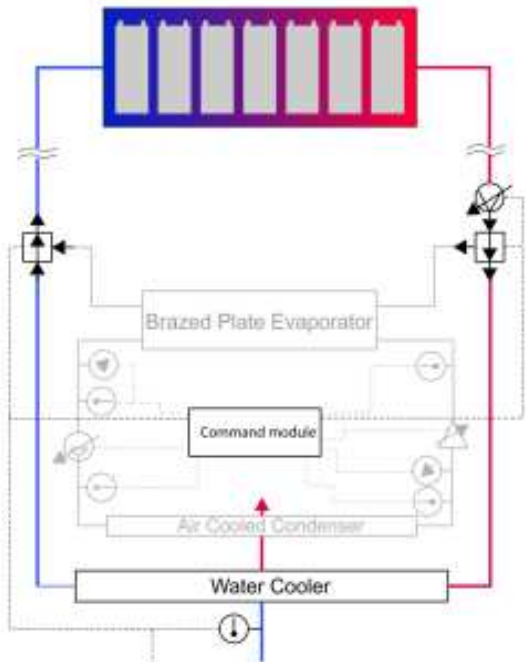


- | | | | |
|--------------------|-------|---------------------------|-------------------------------|
| 1 Air Fans | ON | 6 Compressor | ON |
| 2 Expansion device | ON | 7 Electronic command case | Command Refrigerating circuit |
| 3 Water Pump | ON | 8 Condenser | ON |
| 4 Evaporator | ON | 9 Water cooler | OFF |
| 5 Three way valve | Pos 2 | | |



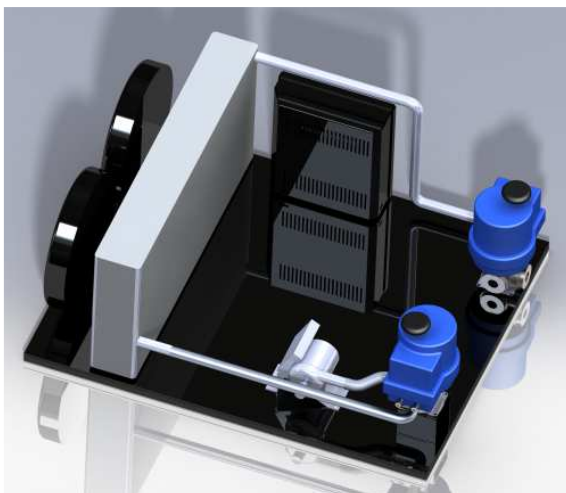
- Water Pump
- Compressor
- Expansion Device
- Temperature sensor
- Pressure sensor
- External Sensors/Signal
- Battery
- 3 way Valve

Cold Weather $T_{amb} < 15^{\circ}C$



- 1 Air Fans — ON
- 2 Expansion device — OFF
- 3 Water Pump — ON
- 4 Evaporator — OFF
- 5 Three way valve — Pos 1

- 6 Compressor — OFF
- 7 Electronic command case — Command the Water Pump
- 8 Condenser — OFF
- 9 Water cooler — ON



- Water Pump
- Compressor
- Expansion Device
- Temperature sensor
- Pressure sensor
- External Sensors/Signal
- Battery
- 3 way Valve