

ALL-ELECTRIC ROOFTOP AIR CONDITIONING UNIT FOR ELECTRO- AND HYBRID BUSES

# REVO<sup>®</sup>-E GLOBAL



## STRONG LIGHTWEIGHT ELECTRIFIES THE WORLD

The REVO<sup>®</sup>-E Global is supplementing our range of all-electric rooftop air conditioning units and is specifically oriented to the demands of the global markets. A special emphasis was placed on lightweight construction, performance and simple installation. In addition to heat pump technology, customers also have the option of PTC heating.

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## HIGHLIGHTS



### Low life-cycle costs

- Low consumption of energy due to low unit weight
- Short dimensions allow space for battery system on the roof
- Long duration due to brushless EC blowers
- Nearly maintenance-free



### Environmentally friendly

- Safety against leakage due to the hermetically sealed refrigerant circuit
- Noise emissions optimized



### Comfort

- Cooling capacity from 23 to 33 kW
- Heating with PTC heater or heat pump possible as an option
- Tropical version: deployment up to 55°C outside temperature



### Range of driving

- Maximization of the range due to the low unit weight
- Optimized power consumption
- Variable regulation of the PTC heater



### Others

- Integrated compressor, no installation of refrigerant lines necessary
- Designed for R 134a & R 407C



Optionally with PTC heating, available in 20 kW versions.

## PTC HEATER

The new high-voltage PTC heaters complement our heating systems. They are intended for use whenever there is simply an additional need for heating. In operation the PTC heaters can be infinitely adjusted by means of an electronic control unit developed by Valeo.

## TECHNICAL DATA

REVO®-E Global REVO®-E Global T	Version 1 Cooling	Version 1 Tropo Cooling (application up to 55 °C)	Version 2 Cooling + PTC heater	Version 3 Cooling + heat pump	Version 4 Cooling + heat pump + PTC heater
Cooling capacity (kW) Refrigerant R 134a Refrigerant R 407c	25 33	- 33	25 33	23 30	23 30
Heating pump capacity (kW) Refrigerant R 134a Refrigerant R 407c	- -	- -	- -	13 19	13 19
Current consumption (A) (26V DC)	nominal 70 <sup>1)</sup>	nominal 70 <sup>1)</sup>	nominal 70 <sup>1)</sup>	nominal 70 <sup>1)</sup>	nominal 70 <sup>1)</sup>
Current consumption (A) (600V DC) Refrigerant R 134a Refrigerant R 407c	Cooling max.12 <sup>2)</sup> /regulated 7 <sup>3)</sup> Cooling max.18/regulated 11	- Cooling max.18/regulated 11	Cooling max.12 <sup>2)</sup> /regulated 7 <sup>3)</sup> Cooling max.18/regulated 11	Cooling max.12/Heat pump max.10 <sup>4)</sup> Cooling max.15/Heat pump max.14	Cooling max.12/Heat pump max.10 <sup>4)</sup> Cooling max.15/Heat pump max.14
PTC heater (optional) (kW)	-	-	0 - 20	-	0 - 20
Fresh air	optional	-	optional	optional	optional
Weight (kg)	230	238	250	250	270
Dimensions L x W x H (mm)	3,100 x 1,900 x 295	3,550 x 1,900 x 295	3,100 x 1,900 x 295	3,100 x 1,900 x 295	3,100 x 1,900 x 295

1) Nominal (condenser 80%) (evaporator 70%)

3) regulated (temperature passenger compartment at set-point 27 °C and ambient 35 °C)

2) Cooling maximum (compressor speed 90 Hz)

4) Heat pump maximum (compressor speed 90 Hz)

ELECTRIC HEATER

# THERMO AC/DC



THIS HEATER HAS THE WATTAGE





## ► MORE VOLTS – NO FUMES

For optimum thermal management in hybrid, electric, hydrogen and trolleybuses Valeo offers the Thermo AC/DC all-electric heater. The independently operated heater with direct (600 VDC) or alternating current (400 VAC) is our answer to the drives of the future:

It is 100% emission-free, i.e. no unpleasant odours from exhaust fumes and no noise. With a heat output of 7, 13 or 20 kW and efficiency factor of 98% the heater is suitable even for outside temperatures up to -40 degrees Celsius. Reliable operation is ensured by a proven and tested temperature sensor in the device.

## ► HEATING WITH ELECTRICITY MEANS BREATHING FREELY

Those who equip their vehicle fleet with electric heating, or supplement existing heating systems, will make many friends not only on the road, but also before starting the journey. It ensures a good climate with local residents,

passengers as well as the employees at the depot. They will especially appreciate it, when there is a further significant improvement in the air quality at their workplaces.



## ► CLEAN BUSES – CLEAN HEATING

In addition to the driver's seat, passenger compartment and combustion engine, all electrified components can be precisely temperature controlled without emissions. Excess energy recovered when the batteries

are full is effectively utilised by returning it to the water cooling circuit via the electric heater. A further clean aspect: where no fuel is burnt there can be no dirt, and where no dirt accumulates the maintenance and cleaning

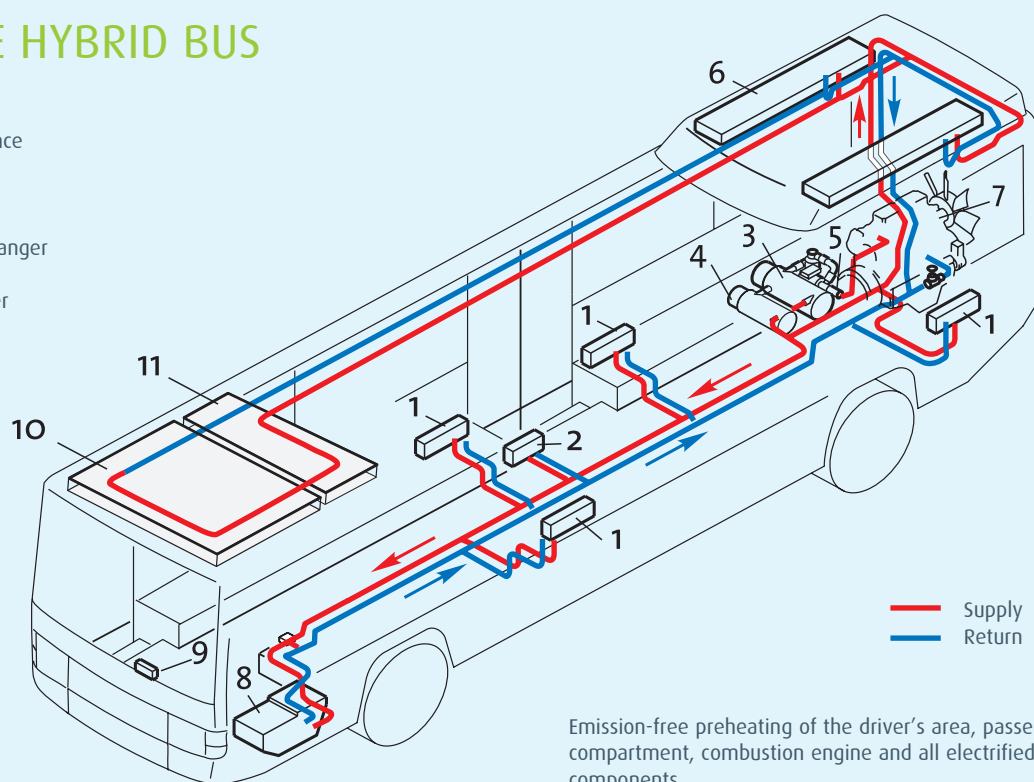
costs are virtually zero. Moreover, the absence of mechanical components such as a combustion air motor or fuel pump in the Thermo AC/DC means a further significant reduction in life cycle costs.





## ► USE IN THE HYBRID BUS

- 1 Wall heater with fan
- 2 Heat exchanger at entrance
- 3 Diesel heater
- 4 Thermo AC/DC
- 5 Circulation pump
- 6 Roof-mounted heat exchanger
- 7 Vehicle engine
- 8 Driver's under-seat heater
- 9 Control unit
- 10 Battery
- 11 Power electronics



Emission-free preheating of the driver's area, passenger compartment, combustion engine and all electrified components.

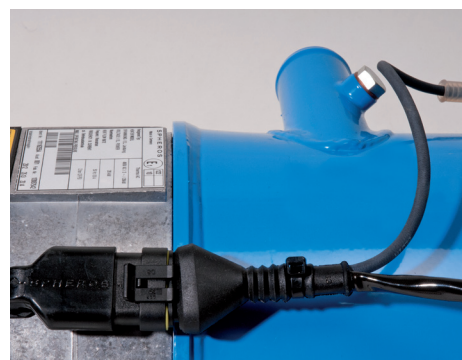
## ► DIESEL COMBINED WITH VOLT

### Electricity as an ideal supplement

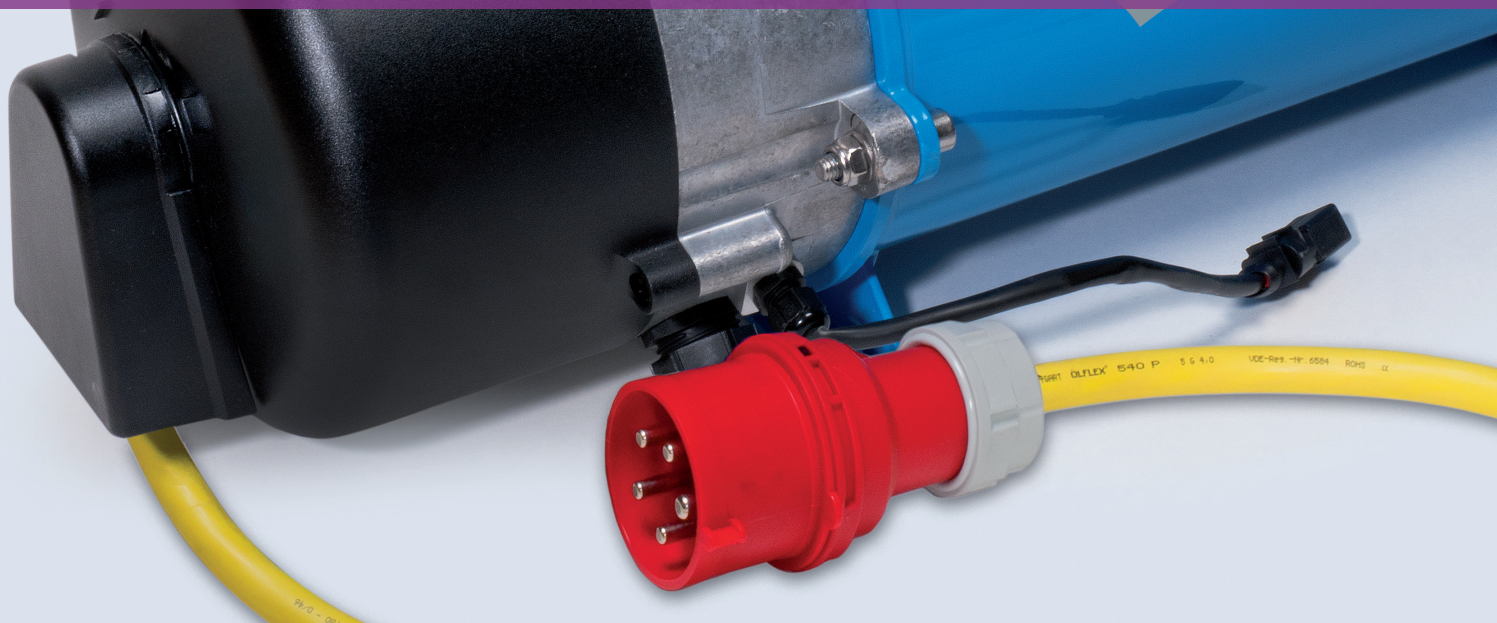
The Thermo AC/DC can also be used in conjunction with a diesel heater in diesel buses as depot heating; for electric preheating of the

bus water system at the depot, in enclosed spaces ("ramp heating") or for heating at termini.

The power is supplied externally from a socket (off-board). This saves expensive fuel costs.



# THERMO AC/DC – 100% EMISSION-FREE HEATING



## HIGHLIGHTS



### Low life-cycle costs

- Minimum maintenance
- High level of efficiency: efficiency factor of > 98%



### Environmentally friendly

- 100% emission-free heating
- Almost noiseless
- No annoying exhaust fumes
- Emission-free preheating
- Booster heating in zero-emission zones



### Comfort

- High reliability by proven temperature sensors
- Use in enclosed spaces and at the depot
- Use in trolleybuses as a full heating system

## TECHNICAL DATA

	Thermo AC 200	Thermo AC 070 <sup>1)</sup>	Thermo AC 130 <sup>1)</sup>	Thermo DC 200 <sup>1)</sup>
Heat output (kW)	20	7	13	20 <sup>2)</sup>
Supply voltage (V)	400 VAC / 3~	400 VAC / 3~	400 VAC / 3~	600 - 750 VDC
Current consumption (A)	approx. 30	approx. 10	approx. 20	600V = 26 A / 750V = 32 A
Volume flow (l/h)	> 1500	> 1500	> 1500	> 1500
Operating pressure (bar)	max. 2.0	max. 2.0	max. 2.0	max. 2.0
Weight (kg)	15	12.5	14	16
Dimensions L x W x H (mm)	578 x 247 x 225	578 x 247 x 225	578 x 247 x 225	578 x 247 x 225

<sup>1)</sup> On request <sup>2)</sup> Nominal heat flow dependent on voltage applied



CIRCULATION PUMPS

# AQUAVENT 5000/6000

5000 / 5000S / 6000C / 6000SC



## THE HIGH-PERFORMANCE CIRCULATION PUMP SOLUTION

High efficiency, compact construction and reliability are the core requirements for modern circulation pumps.

The Valeo Aquavent range combines proven cutting-edge technology in a compact format and in modern lightweight construction. Last but not least, the optimized mounting possibilities are extremely application-friendly.

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## HIGHLIGHTS



### Low life-cycle costs

#### Aquavent 5000 / 5000S

- Extended working lifetime through improved motor efficiency
- No maintenance

#### Aquavent 5000S

- Magnetic coupling (seal-free; basic Aquavent 5000 with mechanical seal)
- Watertight throughout entire lifetime
- Improved resistance to dry running and foreign bodies
- No steam leakage

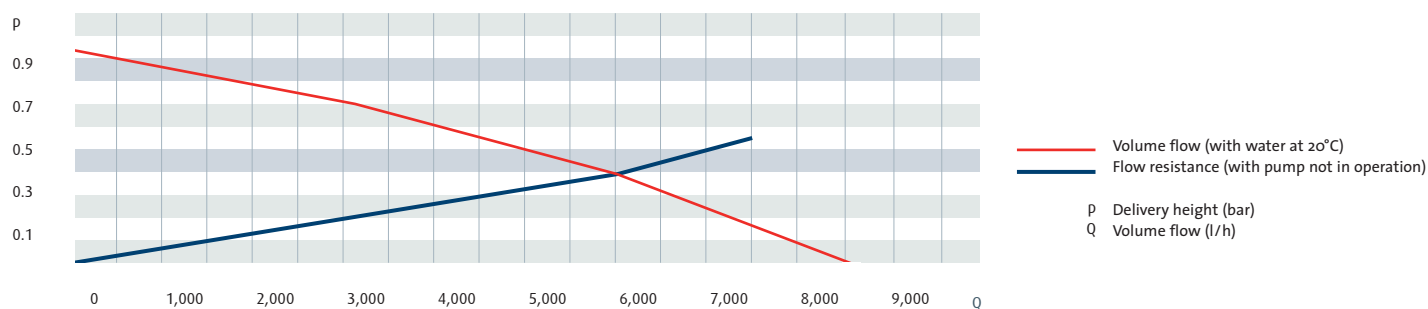
#### Aquavent 6000C / 6000SC

- Brushless EC motor with higher durability
- 14% lighter construction than the predecessor pump results in less fuel/energy consumption of vehicle
- Self-protection:
  - Reduced loading thanks to smooth start-up control
  - Overload protection by integrated blocking and dry running protection
- No maintenance

#### Aquavent 6000SC

- Magnetic coupling (seal-free; basic Aquavent 6000C with mechanical seal)
- Watertight throughout entire lifetime
- Long lifetime (comparable with motor)
- No steam leakage

Static head and pressure loss characteristics



## TECHNICAL DATA

Circulation pump	Volume flow (l/h)	Nominal voltage (V)	Working voltage range (V)	Nominal power requirement (W)	Dimensions (L x W x H)	Weight kg
Aquavent 5000	5,000 (against 0,2 bar)	24	20-28	104	229 x 100 x 105	2.1
Aquavent 5000S	5,000 (against 0,2 bar)	24	20-28	104	249 x 100 x 105	2.2
Aquavent 6000C (U4855)	6,000 (against 0,4 bar)	24	20-28	210	225 x 110 x 115	2.4
Aquavent 6000SC (U4856)	6,000 (against 0,4 bar)	24	20-28	210	229 x 110 x 115	2.5