COLD MACHINE
COOLING UNITS FOR MARINE AND PROJECT REFRIGERATION APPLICATIONS

INSPIRED BY COMFORT
<table>
<thead>
<tr>
<th><strong>WAECO ColdMachine Series 80</strong></th>
<th><strong>Product code</strong></th>
<th><strong>WAECO</strong></th>
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</thead>
<tbody>
<tr>
<td><strong>Compressor/Condenser CU84</strong></td>
<td>CU84</td>
<td><strong>Compressor/Condenser CU85</strong></td>
<td>CU85</td>
<td><strong>Compressor/Condenser CU86</strong></td>
<td>CU86</td>
<td><strong>Lamellar evaporator VD03</strong></td>
</tr>
<tr>
<td><strong>Size</strong></td>
<td>386 x 155 x 130 mm</td>
<td>220 x 155 x 220 mm</td>
<td>220 x 230 x 177 mm</td>
<td>380 x 230 x 83 mm</td>
<td>375 x 255 x 120 mm</td>
<td>375 x 350 x 25 mm</td>
</tr>
<tr>
<td><strong>Application</strong></td>
<td>Suitable evaporators: VD03, VD04, VD05, VD08, VD09, VD15 and VD16</td>
<td></td>
<td></td>
<td>Coolers &amp; refrigerators, especially suitable for larger cooling capacities and high ambient temperatures</td>
<td>Coolers &amp; refrigerators, for vertical and horizontal installation</td>
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<tr>
<td><strong>Cooling Capacities</strong></td>
<td>250 litres max. for normal refrigeration with direct evaporators. 70 litres max. for deep-freezing</td>
<td></td>
<td></td>
<td>170 litres max. with insulation of 35 mm PU</td>
<td>130 litres max. with insulation of 35 mm PU</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>200 litres max. with insulation of 50 mm PU</td>
<td>170 litres max. with insulation of 50 mm PU</td>
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<tr>
<td><strong>Voltage</strong></td>
<td>12/24 volts</td>
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<tr>
<td><strong>Power Input</strong></td>
<td>45 to 60 watts, depending on the evaporator type</td>
<td></td>
<td></td>
<td>50 watts</td>
<td>45 watts</td>
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</tr>
<tr>
<td><strong>System</strong></td>
<td>Fully hermetic Secop (formerly Danfoss) BD-35F compressor with control electronics and integrated low-voltage protection, low-voltage cut-off, electronic reverse pole protection, brushless DC fan, lamellar condenser, self sealing valve couplings</td>
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<td></td>
<td>Copper-aluminum lamellar evaporator with large surface through cooling lamellas, for vertical and horizontal installation, self-sealing valve couplings, flexible connection pipe approx. 2.5 m, electric supply cord approx. 3 m</td>
<td>Standard L-shape evaporator, self-sealing valve couplings, flexible connection pipe approx. 2 m, continuously variable thermostat (for external installation with blue knob and white plastic housing), electric supply cord approx. 3 m</td>
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<tr>
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<td></td>
<td>Standard plate evaporator, self-sealing valve couplings, flexible connection pipe approx. 2 m, continuously variable thermostat (for external installation with blue knob and white plastic housing), electric supply cord approx. 3 m</td>
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</tr>
<tr>
<td><strong>Weight</strong></td>
<td>Approx 6 kg</td>
<td></td>
<td></td>
<td>Approx 2 kg</td>
<td>Approx 1.5 kg</td>
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</tr>
<tr>
<td><strong>Quality features</strong></td>
<td>Suitable for floor mounting, corrosion-resistant stainless steel mounting plate</td>
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<tr>
<td><strong>Optional accessory</strong></td>
<td>WAECO W480.3 Product code W480.3 Air exhaust hood with grilles and 2 m hose</td>
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<tr>
<td><strong>Compressor</strong></td>
<td>BD-35F</td>
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<tr>
<td><strong>Warranty</strong></td>
<td>1 year warranty on everything</td>
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<tr>
<td><strong>Suitable for solar operation</strong></td>
<td>-</td>
<td></td>
<td></td>
<td>Power input x average running time</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Power consumption</strong></td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td><strong>Average running time</strong></td>
<td>-</td>
<td></td>
<td></td>
<td>45% with 35 mm PU insulation, 35% with 50 mm PU insulation, both at 5 °C interior temp, 32 °C ambient temp and medium cooling capacity</td>
<td>50% with 35 mm PU insulation, 40% with 50 mm PU insulation, both at 5 °C interior temp, 32 °C ambient temp and medium cooling capacities</td>
<td></td>
</tr>
</tbody>
</table>
### WAECO Plate evaporator VD18
- **Product code:** VD18
- **Dimensions:** 350 x 250 x 25 mm
- **50 mm PU insulation:** 150 litres max. with 100 litres max. with 35 mm PU insulation
- **Ambient temp and medium cooling:**
  - PU insulation, both at 5 °C interior temp, 50% with 35 mm PU insulation, 40% with 50 mm PU insulation, both at 5 °C interior temp and medium cooling capacities

### WAECO L-evaporator VD08
- **Product code:** VD08
- **Dimensions:** A - 450 x 270 x 10 mm, B - 340 x 270 x 25 mm
- **130 litres max. with 170 litres max. with 50 mm PU insulation**
- **Coolers & refrigerators, for vertical and horizontal installation**
  - Coolers & refrigerators, medium capacity. Also for deep-freezing up to 70 litres (100 mm insulation)
  - Coolers & refrigerators, especially suitable for medium cooling capacities, evaporator can also be used as a deep-freeze compartment

### WAECO O-evaporator VD09
- **Product code:** VD09
- **Dimensions:** 365 x 140 x 270 mm
- **220 litres max. with 200 litres max. with 50 mm PU insulation**

### WAECO Circulating air evaporator VD-15
- **Product code:** VD15
- **Dimensions:** 220 x 275 x 65 mm
- **250 litres max. with 200 litres max. for deep-freezing**

### Compressor and evaporator together in one compact unit
- **Suitable evaporators:** VD14N, VD16, VD21 and accumulator VD06
- **Compressor and evaporator for vertical installation, self-sealing valve couplings, flexible connection pipe approx. 2 m, continuously variable thermostat (for external installation with blue knob and white plastic housing), electric supply cord approx. 3 m**
- **Coolers & refrigerators, especially suitable for large cooling capacities and high ambient temperatures**
- **Approx 2 kg**
- **PAECO CS-NC-15**

<table>
<thead>
<tr>
<th>Standard plate evaporator, self-sealing valve couplings, flexible connection pipe approx. 2 m, continuously variable thermostat (for external installation with blue knob and white plastic housing), electric supply cord approx. 3 m</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Product code:</strong> CS-NC-15</td>
</tr>
<tr>
<td><strong>Dimensions:</strong> 386 x 155 x 130 mm</td>
</tr>
<tr>
<td><strong>Capacity:</strong> 400 litres max. for normal refrigeration with direct evaporators. 250 litres max. with energy accumulator 200 litres max. for deep-freezing</td>
</tr>
</tbody>
</table>

### WAECO ColdMachine Series 90
- **Product code:** CU94 |
| **Dimensions:** 220 x 155 x 220 mm |
| **Capacity:** 100 litres max with 35 mm PU insulation |

### WAECO Compressor/Condenser CU94
- **Product code:** CU94 |
| **Dimensions:** 220 x 155 x 220 mm |
| **Output:** 12/24 volts |

### WAECO Compressor/Condenser CU95
- **Product code:** CU95 |
| **Dimensions:** 220 x 155 x 220 mm |
| **Output:** 12/24 volts |

### WAECO W480.3
- **Product code:** W480.3 |
| **Dimensions:** 220 x 155 x 220 mm |
| **Capacity:** 200 litres max. for deep-freezing |

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| **Dimensions:** 220 x 155 x 220 mm |
| **Capacity:** 200 litres max. for deep-freezing |

### WAECO CS-NC-15
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| **Dimensions:** 386 x 155 x 130 mm |
| **Capacity:** 400 litres max. for normal refrigeration with direct evaporators. 250 litres max. with energy accumulator 200 litres max. for deep-freezing |

### WAECO ColdMachine Series 90
- **Product code:** CU94 |
| **Dimensions:** 220 x 155 x 220 mm |
| **Capacity:** 100 litres max with 35 mm PU insulation |

### WAECO Compressor/Condenser CU94
- **Product code:** CU94 |
| **Dimensions:** 220 x 155 x 220 mm |
| **Output:** 12/24 volts |

### WAECO Compressor/Condenser CU95
- **Product code:** CU95 |
| **Dimensions:** 220 x 155 x 220 mm |
| **Output:** 12/24 volts |

### WAECO W480.3
- **Product code:** W480.3 |
| **Dimensions:** 220 x 155 x 220 mm |
| **Capacity:** 200 litres max. for deep-freezing |

### WAECO W480.3
- **Product code:** W480.3 |
| **Dimensions:** 220 x 155 x 220 mm |
| **Capacity:** 200 litres max. for deep-freezing |

### WAECO CS-NC-15
- **Product code:** CS-NC-15 |
| **Dimensions:** 386 x 155 x 130 mm |
| **Capacity:** 400 litres max. for normal refrigeration with direct evaporators. 250 litres max. with energy accumulator 200 litres max. for deep-freezing |
### WAECO Compressor/Condenser CU96
- Product code: CU96
- Dimensions: 220 x 230 x 177 mm
- Suitable for floor mounting, corrosion-resistant stainless steel mounting plate, Danfoss AEO electronics
- Power: 60 to 100 watts
- Weight: Approx 6.5 kg

### WAECO Circulating air evaporator VD14N
- Product code: VD14N
- Dimensions: 310 x 255 x 170 mm
- Features: Special circulating air evaporator for deep-freezing
- Power: 80 watts
- Weight: Approx 7.5 kg

### WAECO Circulating air deep freeze evaporator VD16
- Product code: VD16
- Dimensions: 250 x 310 x 70 mm
- Features: Fully hermetic Secop (formerly Danfoss) BD-50F compressor with control electronics and integrated low-voltage protection, low-voltage cut-off, brushless DC fan, lamellar condenser, self-sealing valve couplings
- Power: 60 watts
- Weight: Approx 2 kg

### WAECO Plate evaporator VD21
- Product code: VD21
- Dimensions: 340 x 300 x 160 mm
- Features: Stainless steel energy accumulator with integrated high performance lamellar evaporator, self-sealing valve couplings, continuously variable by means of electronic TEC controller (See over page for operation)
- Power: 80 watts
- Weight: Approx 5 kg

### WAECO Energy Accumulator VD06
- Product code: VD06
- Dimensions: 1370 x 305 x 10 mm
- Features: Unit for water cooling
- Power: 80 watts
- Weight: Approx 4 kg

### WAECO CU97
- Dimensions: 310 x 255 x 170 mm
- Suitable evaporators: VD14N, VD16, VD21 and accumulator VD06
- Power: 60 to 100 watts
- Weight: Approx 7.5 kg

### WAECO VD14N
- Dimensions: 250 x 310 x 70 mm
- Features: Seawater-cooled condenser
- Power: 80 watts
- Weight: Approx 2 kg

### WAECO VD16
- Dimensions: 340 x 300 x 160 mm
- Features: Fully hermetic Secop (formerly Danfoss) BD-50F compressor with control electronics and integrated low-voltage protection, low-voltage cut-off, brushless DC fan, lamellar condenser, self-sealing valve couplings
- Power: 60 watts
- Weight: Approx 2 kg

### WAECO VD21
- Dimensions: 1370 x 305 x 10 mm
- Features: Standard plate evaporator with large surface, self-sealing valve coupling, continuously variable by means of electronic TEC controller (See over page for operation)
- Power: 80 watts
- Weight: Approx 4 kg

### WAECO VD06
- Dimensions: 1370 x 305 x 10 mm
- Features: Unit for water cooling
- Power: 80 watts
- Weight: Approx 4 kg

### WAECO CU96
- Dimensions: 220 x 230 x 177 mm
- Suitable for floor mounting, corrosion-resistant stainless steel mounting plate, Danfoss AEO electronics
- Power: 60 to 100 watts
- Weight: Approx 6.5 kg

### WAECO CU97
- Dimensions: 310 x 255 x 170 mm
- Suitable evaporators: VD14N, VD16, VD21 and accumulator VD06
- Power: 60 to 100 watts
- Weight: Approx 7.5 kg

### WAECO VD14N
- Dimensions: 250 x 310 x 70 mm
- Features: Seawater-cooled condenser
- Power: 80 watts
- Weight: Approx 2 kg

### WAECO VD16
- Dimensions: 340 x 300 x 160 mm
- Features: Fully hermetic Secop (formerly Danfoss) BD-50F compressor with control electronics and integrated low-voltage protection, low-voltage cut-off, brushless DC fan, lamellar condenser, self-sealing valve couplings
- Power: 60 watts
- Weight: Approx 2 kg

### WAECO VD21
- Dimensions: 1370 x 305 x 10 mm
- Features: Standard plate evaporator with large surface, self-sealing valve coupling, continuously variable by means of electronic TEC controller (See over page for operation)
- Power: 80 watts
- Weight: Approx 4 kg

### WAECO VD06
- Dimensions: 1370 x 305 x 10 mm
- Features: Unit for water cooling
- Power: 80 watts
- Weight: Approx 4 kg

### WAECO W480.3
- Product code: W480.3
- Air exhaust hood with grille and 2 m hose
- Power: 50% with 35 mm PU insulation, 35% with 50 mm PU insulation, both at 5 °C interior temperature, 32 °C ambient temperature and medium cooling capacities

### SECOP BD-50F
- Formerly Danfoss Compressors

### Battery Load
- At two charge/discharge cycles per day = 10 watts/hour

### Charging time
- Approx. 1.5 hours

### Discharging time
- 8 to 18 hours (without compressor operation)

### Pipe length
- 2.5 m

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**Power input x average running time**

- 50% with 35 mm PU insulation, 35% with 50 mm PU insulation, both at 5 °C interior temperature, 32 °C ambient temperature and medium cooling capacities
- 55% with 50 mm PU insulation, 40% with 100 mm PU insulation, 32 °C ambient temperature and medium cooling capacities
- 50% with 35 mm PU insulation, 40% with 50 mm PU insulation for deep freezing, both at 32 °C ambient temperature and medium cooling capacities
Any refrigeration system consists of an evaporator, a condenser and a compressor. For the system to work efficiently, the three components must be optimally coordinated. WAECO ColdMachine refrigerating systems only use power-regulated BD35F and BD50F Secop (formerly Danfoss) compressors. These, combined with the factors mentioned below, contribute significantly to the highly efficient design of WAECO ColdMachine:

- The compressor speed adapts precisely to the performance requirements of the other system components (evaporator and condenser).
- Both compressor types can be supplied with plate and lamellar evaporators in diverse shapes and sizes. This ensures that every shape of container can be equipped correctly. It also makes optimum use of the compressor performance.
- The dynamically ventilated or water-cooled condenser units always guarantee the necessary heat diffusion.

Air cooling offers many advantages. Except for the water cooled CU97 unit, all ColdMachine cooling units are air-cooled. They release the heat to the atmosphere through a dynamically ventilated condenser. WAECO ColdMachine uses only brush-less, wear-free fans. The water-cooled unit normally requires additional equipment and fitting, which, if not properly maintained, can be an additional source of technical risk. Even so, we do recommend water cooling in a few special cases, e.g. where the cooling unit has to be installed in the overheated engine room, or where the yacht will mostly be sailing in tropical waters.

Otherwise, air-cooling is the more elegant and an equally efficient solution, because the air temperature at the ship’s hull below the water line is barely higher than the water temperature.

In our opinion, what really counts is not “air or water”, but the optimum combination of compressor, evaporator and condenser as well as the appropriate installation location. WAECO ColdMachine offers a wide range of designs for all components, so that even the most awkwardly shaped spaces can be used. The best location is below the water line, as the air is already cooled by the water temperature. During installation, it is necessary to ensure that the unit has adequate air circulation. This can be achieved by simple slots or holes, or with the air exhaust hood, which is available for series 80 and 90. The connection between the evaporator and the compressor/condenser unit is especially easy on WAECO ColdMachine, as the refrigerant hoses feature self-sealing valve couplings with a very small diameter.

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THE REFRIGERATION CYCLE:

Cold is produced by the extraction of heat. In a refrigerator, the heat is "absorbed" when the refrigerant changes from the liquid state to the gaseous state in the evaporator. The compressor draws in the gaseous refrigerant, compresses it and passes it on to the condenser. Here, the absorbed heat is released to the atmosphere. The refrigerant reverts to the liquid state and flows back to the evaporator, where the whole cycle starts again.

Dometic Group is a customer-driven, world-leading provider of leisure products for the RV, automotive, truck and marine markets. We supply the industry and aftermarket with a complete range of air conditioners, refrigerators, awnings, cookers, sanitation systems, lighting, mobile power equipment, comfort and safety solutions, windows, doors and other equipment that make life more comfortable away from home.

Dometic Group supplies a wide range of workshop equipment for service and maintenance of built-in air conditioners. Dometic Group also provides specially designed refrigerators for hotel rooms, offices, wine storage and transport and storage of medical products. Our products are sold in almost 100 countries and are produced mainly in wholly-owned production facilities around the world.