Compact chilled water unit for indoor installation with free cooling, adiabatic evaporative cooling and integrated compressor refrigeration system

Hybritemp 97 and 98
TOTAL COOLING CAPACITY: 33 kW – 455 kW

At a glance:
- Efficient cooling through the use of natural resources
- Very high performance with high EER and ESEER values at the same time
- Reliable cooling, even when outside temperatures are very high
- Compressor refrigeration system and free cooler optimally adapted to the respective application
- Compact design thanks to integrated recooling system, removing the need for cooling system components on the facade or on the roof
- Low air volumes required for heat dissipation
- Integrated control and regulation system, compatible with all conventional building management systems

Cooling systems using chilled water can be found in a wide range of areas: for discharging excess heat from rooms with high thermal loads, for cooling industrial manufacturing processes or for comfort air conditioning of buildings. The units of the Hybritemp 97 and 98 series are optimally adapted to these requirements. The "all-in-one" unit offers efficient cooling in a very compact way. It is generally not necessary for cooling system components to be installed at or on the exterior of the building – and this drastically reduces the overall investment costs. Hybritemp has been developed in two design variants: The COP-optimised 97 series is characterised by its very high efficiency; while the development of the 98 series focussed on achieving maximum performance with minimum space requirements. The combination of first-class components with precise control and regulation systems guarantees economical operation at all times.

Further performance parameters and options:
- High corrosion prevention through the use of zinc sacrificial anodes, EPD-coated parts and components made from plastic
- Use of electronic expansion valves
- Energy-saving EC fans
- Filtering the air in any operating mode
- Individually controllable performance parameters
- Complete unit, ready to connect, contains all structural elements for chilled water generation, including all control and regulation fittings
- Intensive quality inspection with factory test run

Options
- Conductivity-controlled elutriation control when using softened water
- Hot water extraction, to use waste heat for heating purposes
- Remote maintenance
- And many more
Free and evaporative cooling
At respective low outside air temperatures and humidity, the heat in the process water is dissipated to the outside air. In order to reduce the outside air temperature further and to increase the cooling capacity, evaporative cooling is activated. In an intermediate heat exchanger, the process water is cooled down to the required flow temperature. The cooling capacity is controlled continuously by varying the air volume flow rate.

Part-load operation with free and evaporative cooling: Compressor refrigeration system condenses in the exhaust air
When outside air temperature and humidity are rising, the amount of heat that can be dissipated by evaporative cooling will reduce. If the process water in the intermediate heat exchanger can no longer be cooled down to the required flow temperature, after-cooling takes place in the evaporator of the integrated compressor refrigeration system. The heat of condensation from the multistage compressor refrigeration system in part-load operation is passed onto the exhaust air.

Free and evaporative cooling in operation under load: Compressor refrigeration system condenses in the exhaust air and secondary circuit
When an increasing part of the total cooling performance is carried out by the compressor refrigeration system, the condensation heat can no longer be passed solely onto the exhaust air. A proportion of the water is directed from the secondary circuit downstream of the intermediate heat exchanger to the water-cooled condenser of the compressor refrigeration system in order to discharge the residual heat of condensation. The controller regulates the condensation pressure in order to operate the chilled water with an optimum EER.

Operation under full load: Cooling by the compressor refrigeration system
If the water temperature in the secondary circuit is higher than the process water temperature, the total cooling capacity required comes from the compressor refrigeration system. Due to the two-stage condensation heat output in the air conditioner (desuperheater) to the exhaust air and in the water condenser to the secondary circuit, only a very low air volume is required. Thanks to the upstream evaporative cooling system, low condensation pressures are achieved, which in return lead to a high EER in the compressor refrigeration system.
**Hybritemp Type 97 and Type 98**

**System dimensions and weights**

For service work, a clearance corresponding to dimension W is required on the operating side of the unit. If dimension W is smaller than one metre, please leave a clearance of one metre. For service work a clearance at the rear of at least 1.500 mm is required.

Please comply with the dimensions for body size, air duct connections and electrical switch cabinet.

All lengths are given in mm, weights in kg.

<table>
<thead>
<tr>
<th>Unit Type</th>
<th>L W1</th>
<th>H1</th>
<th>H2</th>
<th>L1</th>
<th>L2</th>
<th>L3</th>
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![Diagram of Hybritemp Type 97 and Type 98](image)

**Largest transport unit**

Caution! Where units are run in parallel, each unit has a controls cabinet. Mirror-image design possible.

<table>
<thead>
<tr>
<th>Unit Type</th>
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<th>H1</th>
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</table>

**Controls cabinet**

For service work, a clearance corresponding to dimension W is required on the operating side of the unit. If dimension W is smaller than one metre, please leave a clearance of one metre. For service work a clearance at the rear of at least 1.500 mm is required.

Please comply with the dimensions for body size, air duct connections and electrical switch cabinet.

All lengths are given in mm, weights in kg. Weight incl. controls cabinet:

1. Door fitting assembly increase unit width by 25 mm each operating side
2. Include 120 mm base frame
3. Further partitioning for smaller apertures possible (at extra cost).
## Technical specifications and services

<table>
<thead>
<tr>
<th>Unit Type</th>
<th>97 04 01</th>
<th>97 05 01</th>
<th>97 06 01</th>
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<th>97 13 01</th>
<th>97 16 01</th>
<th>97 19 01</th>
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</thead>
<tbody>
<tr>
<td><strong>Cooling capacity</strong>&lt;sup&gt;1, 2&lt;/sup&gt;</td>
<td>kW</td>
<td>33 - 48</td>
<td>45 - 64</td>
<td>56 - 81</td>
<td>74 - 106</td>
<td>118 - 168</td>
<td>148 - 217</td>
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<td><strong>Refrigeration capacity</strong>&lt;sup&gt;2&lt;/sup&gt;</td>
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<td>kPa</td>
<td>80</td>
<td>80</td>
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</tbody>
</table>

Technical data specified refer to nominal volume flow rate at 6°C flow temperature and outside air conditions 32°C, 40% r.h., unless otherwise specified.

1. dependent on flow/return temperature and water flow rate.
2. at flow = 6°C
3. with average filter contamination
4. at 250 Hz mid-band frequency
5. at OA = 32°C, 40% r.h.
6. 2 bar system pressure required at 25 l/min flow rate.
7. water quality of make-up water corresponds to VDI 3803 table B2 with a bacteria count < 100 CFU/ml, water hardness range "soft".

Please seek approval of technical data and specifications prior to start of the planning process.

---

Hybritemp Type 97

**efficiency-optimised**

Compact chilled water unit | Hybritemp 97 and 98
### Technical specifications and services

<table>
<thead>
<tr>
<th>Unit Type</th>
<th>98 04 01</th>
<th>98 0501</th>
<th>98 06 01</th>
<th>98 10 01</th>
<th>98 13 01</th>
<th>98 16 01</th>
<th>98 19 01</th>
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<tbody>
<tr>
<td>Cooling capacity ¹, ⁵</td>
<td>kW</td>
<td>65 - 93</td>
<td>79 - 112</td>
<td>102 - 145</td>
<td>133 - 189</td>
<td>196 - 278</td>
<td>244 - 350</td>
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<tr>
<td>Refrigeration capacity ²</td>
<td>ESEER</td>
<td>4.7</td>
<td>4.7</td>
<td>4.7</td>
<td>5.0</td>
<td>4.9</td>
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<tr>
<td>Nominal water volume flow rate for process water</td>
<td>m³/h</td>
<td>10.0</td>
<td>12.0</td>
<td>15.0</td>
<td>20.0</td>
<td>29.0</td>
<td>36.0</td>
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<tr>
<td>Air volume flow OA-EA</td>
<td>m³/h</td>
<td>4,400</td>
<td>5,300</td>
<td>6,300</td>
<td>9,500</td>
<td>13,000</td>
<td>16,000</td>
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<tr>
<td>Rated fan motor input for exhaust air ³</td>
<td>kW</td>
<td>2.0</td>
<td>2.3</td>
<td>3.5</td>
<td>4.8</td>
<td>6.6</td>
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<tr>
<td>Rated pump input</td>
<td>kW</td>
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<td>1.3</td>
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<td>Filling volume for refrigerant type R407C</td>
<td>kg</td>
<td>9</td>
<td>16</td>
<td>25</td>
<td>45</td>
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<td>Number of performance stages</td>
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<td>Number of cooling circuits</td>
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<tr>
<td>Max. current consumption</td>
<td>A</td>
<td>58.6</td>
<td>79.6</td>
<td>97.8</td>
<td>121.0</td>
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<td>213.6</td>
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<td>Operating voltage</td>
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<tr>
<td>Ext. pressure losses</td>
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<tr>
<td>Sound power level ⁴</td>
<td>dB(A)</td>
<td>66</td>
<td>64</td>
<td>71</td>
<td>68</td>
<td>73</td>
<td>76</td>
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<tr>
<td>Outside air vent</td>
<td>dB(A)</td>
<td>76</td>
<td>74</td>
<td>78</td>
<td>77</td>
<td>80</td>
<td>81</td>
</tr>
<tr>
<td>EA connection</td>
<td>dB(A)</td>
<td>58</td>
<td>56</td>
<td>60</td>
<td>59</td>
<td>62</td>
<td>63</td>
</tr>
<tr>
<td>Acoustic pressure at a distance of 1 m from the device ⁴</td>
<td>dB(A)</td>
<td>58</td>
<td>56</td>
<td>60</td>
<td>59</td>
<td>62</td>
<td>63</td>
</tr>
</tbody>
</table>

#### 6°C process water flow

| Total cooling capacity ¹      | kW       | 65.0    | 78.8     | 102.4     | 132.9     | 195.8     | 244.4     | 318.5     |
| Energy Efficiency Ratio      | EER      | 3.5     | 3.6       | 3.4       | 3.8       | 3.6       | 3.8       | 3.6       |
| Rated compressor input       | kW       | 18.6    | 21.9      | 29.7      | 35.0      | 53.9      | 64.4      | 88.9      |

#### Alternative process water temperatures

##### 12°C process water flow

| Total cooling capacity ¹      | kW       | 76.8    | 93.0     | 120.4     | 156.9     | 231.0     | 289.3     | 376.5     |
| Energy Efficiency Ratio      | EER      | 3.9     | 4.0       | 3.8       | 4.2       | 4.0       | 4.2       | 4.0       |
| Rated compressor input       | kW       | 19.5    | 23.1      | 31.6      | 37.1      | 57.1      | 68.3      | 94.3      |

##### 18°C process water flow

| Total cooling capacity ¹      | kW       | 92.7    | 111.9    | 144.7     | 189.3     | 278.4     | 350.4     | 455.4     |
| Energy Efficiency Ratio      | EER      | 4.5     | 4.5       | 4.3       | 4.8       | 4.5       | 4.8       | 4.5       |
| Rated compressor input       | kW       | 20.6    | 24.7      | 34.0      | 39.8      | 61.4      | 73.5      | 101.6     |

#### Connections

| Clean water connection ⁶, ⁷   | DN       | 15      | 15        | 15        | 15        | 15        | 20        | 20        |
| Slurry drain                 | DN       | 50      | 50        | 80        | 80        | 80        | 80        | 80        |
| Water drain                  | DN       | 25      | 25        | 25        | 32        | 32        | 40        | 40        |
| Floor drains                 | DN       | 40      | 40        | 40        | 40        | 40        | 40        | 40        |
| Process water flange         | DN       | 50      | 50        | 50        | 65        | 80        | 80        | 100       |
| Pressure loss process water  | kPa      | 80      | 80        | 80        | 80        | 80        | 80        | 80        |

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