Liquid Cold Plates
for Disc Semiconductors

Hockey Puck Cooler KWK

The series KWK is specifically designed for cooling a stack of power semiconductor discs like IGBT’s or GTO’s. Inlet and outlet fittings can be added to the liquid cooling plate. This highly effective cooling plate with its superior thermal performance is made from high quality copper and is plated with minimum 8 µm nickel.

Dimensions in mm

<table>
<thead>
<tr>
<th>Type</th>
<th>KWK 57 - 84</th>
<th>KWK 85 - 98</th>
<th>KWK 100 - 100</th>
<th>KWK 125 - 125</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>84</td>
<td>98</td>
<td>100</td>
<td>125</td>
</tr>
<tr>
<td>B</td>
<td>57</td>
<td>85</td>
<td>100</td>
<td>125</td>
</tr>
<tr>
<td>C</td>
<td>23</td>
<td>23</td>
<td>23</td>
<td>23</td>
</tr>
<tr>
<td>D</td>
<td>28.5</td>
<td>42.5</td>
<td>77</td>
<td>102</td>
</tr>
</tbody>
</table>

Clamp force (max KN) 50 100 100 102

Flow Rate (l/min) 6 l/min nominal (4 to 15 l/min)

Pressure drop (bar at 6 l/min) 0.38 0.21 0.18 0.28

Test pressure (bar/min) 7/20

Rth at 6 l/min 13.9 7.7 6.1 5.9

Temperature range -40°C to +125°C
**Explanation $R_\text{th}$ Curve**
The shown $R_\text{th}$ values represent the average middle temperatures by measuring 4 points in a circle diameter of 30 mm from the center position of the plate under the power modules, of both sides. The power dissipation is 500 Watt per module per side. The water inlet temperature is 40°C.

**Explanation Pressure Drop Curve**
The shown curves represent the different cooling plates with a water inlet temperature of 40°C.

Pressure drop and $R_\text{th}$ curves can be modified by changing the design of water flow path.
Design engineers are always looking for better methods to cool their power semiconductors. DAU has therefore developed a new state of the art hockey puck cooling system – the series KWK.

This cooling system made from copper and plated with nickel (max 8 μm) is especially designed for stacking IGCT and GTO disc semiconductors with diameters from 50 to 125 mm.

This type KWK is especially designed for IGCT discs with different diameters. The enormous advantage of the series KWK is that the configuration of the water connectors can be easily adapted according to the stacking requirements of the customer. It is possible to adapt the configuration of the water connectors and also the electrical connectors – inline configurations (inlet on one side and outlet on the opposite side) as well as inlet and outlet connectors on one side.
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Different fitting sizes for the fluid Inlet/Outlet are available. The size of the fittings depend on the outside dimensions of the cooling plate and can therefore be up to ½ inch.

Several materials (from brass to stainless steel) are available. All KWK Hockey Puck Coolers can be used with either deionized water or water-glycol mixtures.

DALI Hockey Puck Coolers series KWK can be designed for nearly all requested thermal resistance and pressure drops by modifying the internal water flow pattern. The Hockey Puck Coolers can also be supplied with integrated bus bars for electrical connection of the semiconductors. As with the fittings it is also possible to configure the connector according to custom requirements.