

AlN WATER COOLER

Technical Description

The flat solid water-cooler with lapped surfaces is made out of aluminium nitride ceramic (AlN). Cooling plugs, arranged in form of waffles inside the box, provide an excellent heat transfer from the ceramic to the cooling water. Polyethylene water connections are inserted with two seal rings. Also other connection systems, e.g. alumina tubes or tubes made out of other different plastics are known.

Measuring Method

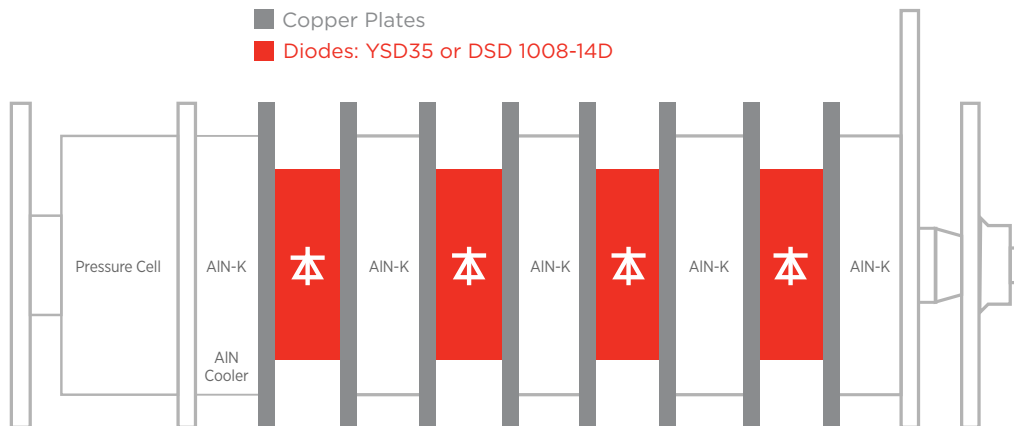
Data of coolant flow, pressure drop and thermal resistance refer to one cooling box. For measurements a test unit is built out of 5 similar cooling boxes. Measurements are made on the central cooler (see diagram below).

Application

For example the cooling box is used for semiconductor elements with contact surfaces from 47 to 78mm. The cooling water, partially with 44% parts Antifrogen N, doesn't come into direct contact with the semiconductor box (insulated, closed cooling system).

	YSD 35	DSD 1008-14
Load	39,240 N	19,620 N
Contact Area Diameter	78mm	47mm

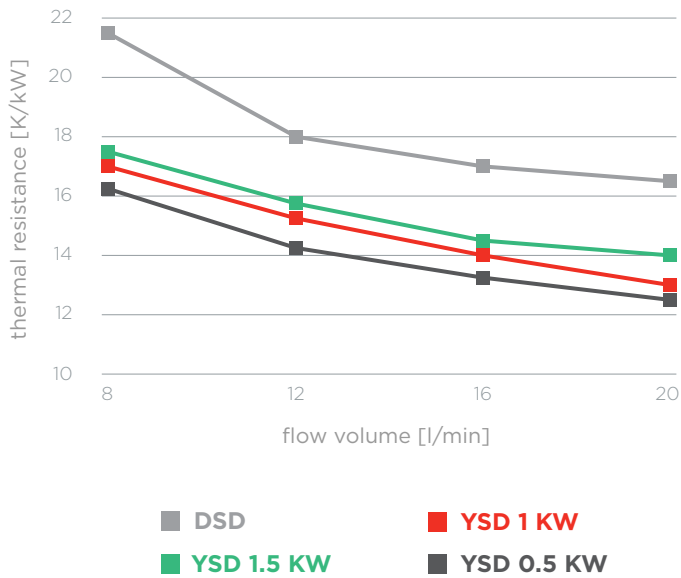
Mounting of rectifiers and diodes



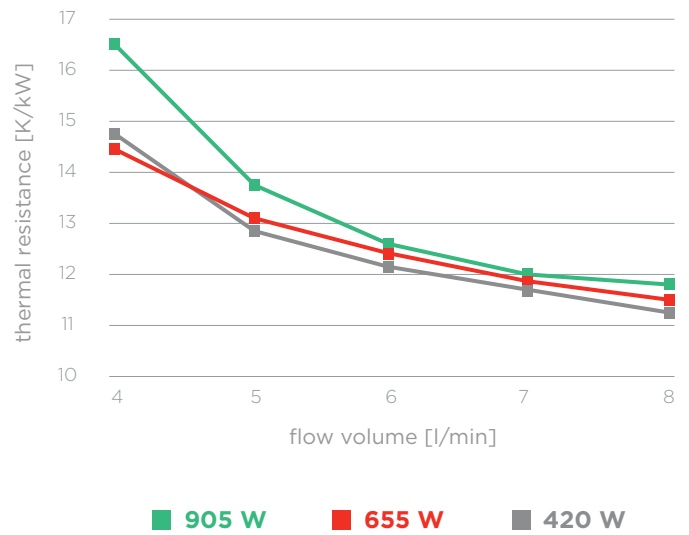
The resulting thermal resistance is an average value taken from the eight different temperatures of the contacting copper surfaces. Thermal resistance is calculated from the difference between the average temperature value and the inlet temperature of the cooling medium divided by the power loss of the transistor. Inlet temperature of the cooling medium is 60° C.

Safety note: Recently we have seen indications for electrochemical corrosion effects in AlN cooling boxes when exposed for a long term to high DC fields combined with significant levels of kationic impurities in the cooling water. Until we understand the origin of such corrosion effects, we highly recommend to check cooling boxes exposed to such or similar conditions after 3 years for potential corrosion damages. No corrosion was seen or reported from cooling boxes exposed to AC fields and tap water.

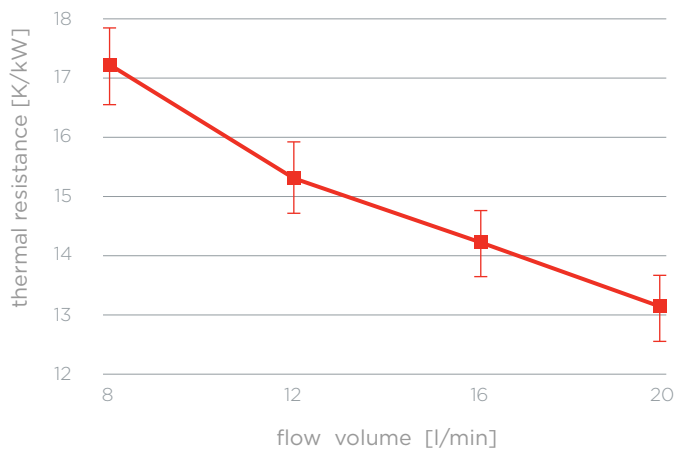
Thermal Resistance vs. Flow Volume
(different diodes)



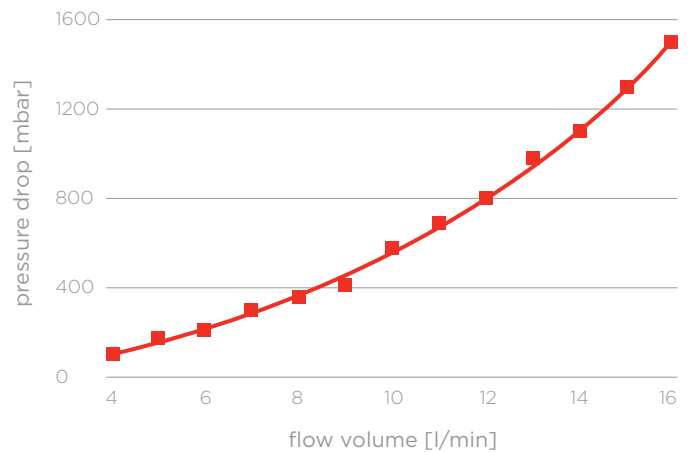
Thermal Resistance vs. Flow Volume
(different wattage)



Deviation of Measured Values



Pressure Drop vs. Flow Volume



4 different cooling boxes of different lots at a power loss of 1,5 kW using diodes YSD 35 with 78 mm diameter

Ceramic AlN Water Cooler

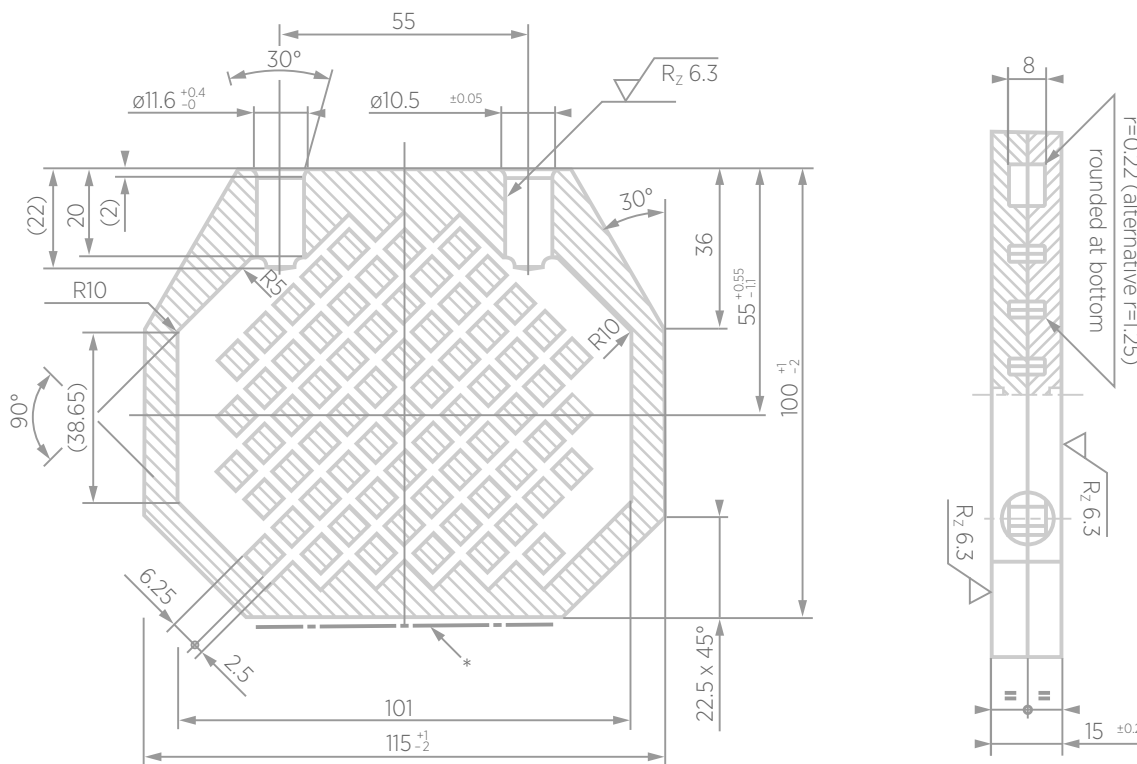
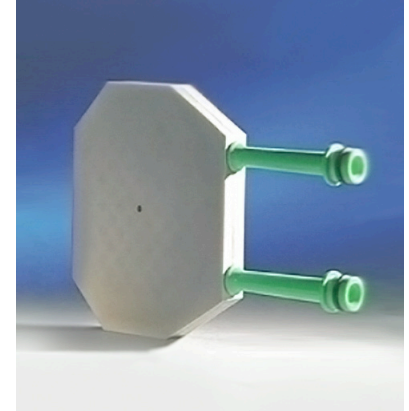
Basic Characteristics

Material	Diameter of Contact Surfaces	Cooling Medium
AlN 180	95mm	water with 44% Antifrogen N

Different versions, e.g. without center bore hole, different OD or position of the bore holes are available on request

Design of Cooling Box

Used more than 20 years in German, Spanish, and Swiss railway systems. Also used in rectifiers of wind turbines in Germany, Denmark, Scotland, and Australia since 2002. Different customer specified sizes and shapes available on request.



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The chart is intended to illustrate typical properties. Property values vary with method of manufacture, size, and shape of part. Data contained herein is not to be construed as absolute and does not constitute a representation or warranty for which CoorTek assumes legal responsibility. CoorTek and Amazing Solutions are registered trademarks of CoorTek, Inc. OpX is a trademark of CoorTek, Inc.

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