



Technical Information | Technical Note

COMBIVERT F6

Stainless steel liquid-cooled heat sink

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1 Preface

The Technic Notes contain additional information about the units and accessories. They are helping constructors and developers to use KEB products in their applications. However, they are considered for information only without responsibility. The selection with regard to their suitability for the intended use can only be made by the user. If you have any questions, please contact KEB Automation KG or your area representative.

The use of our devices in the target products is beyond of our control and therefore exclusively the responsibility of the machine manufacturer, system integrator or customer.

This document is not legally part of the certified device documentation. The functions described in the current KEB documentation must always be given priority. The enclosed documents correspond to conditions valid at printing. Misprint, mistakes and technical changes reserved.

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2 Introduction

The F6 stainless steel fluid heat sinks offer a high-quality solution without compromising on functionality or performance. The design, choice of materials, supplier specifications, incoming goods inspection and accelerated durability tests were specifically designed to ensure long-term stability, reproducible thermal bonding and corrosion resistance. The evaluated results show that, when used as intended, there is no evidence of any quality issues for the customer arising from the position of the stainless steel tubes on the top of the heat sink.

Further information on cooling water management can be found in the following technical information sheet:



Technical Information – Liquid cooling of drive inverters:

<https://www.keb-automation.com/000Z>

Document: ti_dr_an-liquid-cooling-00004_en



3 Qualification and quality criteria

- The stainless steel tube solution combines the good machinability of the aluminium base body with the high corrosion resistance of the stainless steel tube through which the medium flows.
- Surface quality is not left to chance during the manufacturing process, but is ensured through defined cross-sectional dimensions, contact surface flatness and incoming goods inspection.
- The supplier specifications cover stainless steel tubing, epoxy resin, aluminium base bodies, pressure and leak-tightness requirements, as well as relevant dimensions and tolerances. This ensures the quality of the critical interface between the tube, the base body, the encapsulant and the contact surface.
- HAL (Highly Accelerated Life) tests and supplementary investigations were deliberately used to identify thermomechanical cyclic stresses and potential ageing mechanisms at an early stage. A comparative evaluation using new power amplifier modules and new thermal paste confirmed that, for the selected configuration, no significant deterioration in the heat sink's performance was apparent.

4 Overview of risk mitigation measures

Levels of protection	Implementation at F6	Customer benefits
Choice of materials	Stainless steel tube 1.4404 in accordance with EN 10216-5	High resistance to media and a robust, clean inner and outer pipe surface.
	EN AW-6063-T5 aluminium base plate	Good thermal conductivity and machinability, low weight.
	A thermally conductive, cold-curing two-component epoxy resin with defined material properties.	A stable, consistent transition between the pipe, the grouting zone and the machined surface.
Geometry qualification	Cross-sectional dimensions and test range defined for all relevant F6 housing sizes; Dimensions are subject to mechanical machining.	Contract manufacturing is focused on the geometries relevant to heat transfer.
Goods Receipt / Quality	Specification and verification of flatness, particularly in the thermally relevant contact surfaces.	Reduces installation risks and ensures the thermal connection of the power modules.
Pressure and leak-tightness requirements	The test pressure, leakage rate and test duration are specified in the specification.	Protection against the risks of leaks and pressure build-up in the cooling circuit.
HAL / Robustness testing	Accelerated thermal cycling with realistic component layout, controlled cooling and comparative evaluation using new thermal paste and new modules.	Evidence that potential weaknesses have been identified, distinguished from module effects and controlled through design or quality assurance.

Tab. 1: Overview of risk mitigation measures

The design featuring stainless steel tubes on the top of the heat sink is technically sound. Our HAL and detailed investigations have shown that the relevant interfaces are understood and are being managed through specifications and incoming goods inspections. This does not result in any additional quality risks or technical disadvantages for the customer compared with the intended application.



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