Air-to-Liquid Cooling Upgrade Kit - Official Technical Overview & Hardware Datasheet

EXECUTIVE SUMMARY

The Air-to-Liquid Cooling Upgrade Kit is a factory-engineered, field-installable solution that converts select air-cooled telecom chassis into direct-to-chip liquid-cooled platforms. Designed for carrier-grade and high-density compute environments, the kit enables a transition to liquid cooling without wholesale chassis replacement—preserving existing investments while unlocking higher rack power density, reduced fan power, and lower total cost of ownership. The kit comprises a cold plate assembly, coolant manifold, quick-disconnect couplings, leak-detection sensors, and a control module with firmware integration. This datasheet defines the component checklist, sizing methodology, compatibility matrix, and operational specifications required for deployment planning.



ARCHITECTURE & CHASSIS DESIGN

The upgrade kit follows a modular, non-intrusive architecture. The cold plate assembly mounts directly to the processor and ASIC heat spreaders, replacing the original air heatsinks. A rear-mounted coolant manifold distributes supply and return lines to each cold plate via low-pressure-drop quick-disconnect couplings. The control module interfaces with the chassis management bus to report coolant flow, inlet/outlet temperatures, and leak status. Chassis structural integrity is maintained; no backplane modifications are required. The kit is compatible with standard 19-inch EIA racks and supports both horizontal and vertical manifold orientations.

HARDWARE FEATURES

- Direct-to-chip cold plates with copper base and nickel plating for corrosion resistance.
- Stainless-steel manifold with 3/8-inch and 1/2-inch ID options.
- Blind-mate quick-disconnect couplings rated for 10,000 mating cycles.
- Integrated leak-detection sensor with discrete alarm output.
- Coolant temperature and flow sensors with +/-2% accuracy.
- Control module with RS-485 and Ethernet management interfaces.
- Factory-charged coolant loop with propylene glycol mixture (optional).
- Tool-less installation for cold plate retention.

COMPLIANCE & STANDARDS

The kit is designed to meet the following standards: IEC 62368-1 (safety), IEC 60529 (IP rating for manifold assembly), Telcordia GR-63-CORE (NEBS), and RoHS/REACH directives. Liquid cooling loop components comply with ASHRAE W3 water quality guidelines. The control module is CE and FCC certified.

TECHNICAL SPECIFICATIONS

The following table summarizes the key technical parameters of the Air-to-Liquid Cooling Upgrade Kit. Sizing guidance is provided in the ordering options section.

Parameter	Specification
Form Factor	Field-installable kit for 1RU/2RU/4RU chassis
Cooling Capacity per Cold Plate	Up to 500 W (standard), 800 W (high-performance option)
Coolant Supply Temperature Range	15°C to 45°C (facility water)
Coolant Flow Rate	1.5 L/min to 4.0 L/min per cold plate
Manifold Pressure Rating	6 bar maximum
Quick-Disconnect Couplings	3/8-inch or 1/2-inch ID, blind-mate, 10,000 cycles
Leak Detection	Integrated sensor, discrete alarm, +/-1 mm detection
Control Interface	RS-485, Ethernet (SNMP), dry contacts
Power Supply	12 VDC from chassis management bus, 5 W typical
Operating Temperature	0°C to 50°C (chassis ambient)
Compliance	IEC 62368-1, GR-63-CORE, RoHS, CE, FCC

ORDERING OPTIONS

The kit is available in three configurations: KIT-LC-S (single cold plate, 1RU chassis), KIT-LC-M (dual cold plate, 2RU chassis), and KIT-LC-H (quad cold plate, 4RU chassis). Sizing is determined by the number of processors/ASICs to be cooled, chassis rack units, and facility coolant supply temperature. Each kit includes a component checklist: cold plate(s), manifold, QD couplings (supply and return), leak sensor, control module, mounting hardware, and installation guide. Optional accessories include a coolant distribution unit (CDU) interface cable and spare QD coupling set.

