



# LIQUID COOLING SOLUTIONS

## Heat Density Unlocked

### Overcoming Extreme Temperatures with Delta's Liquid Cooling Solutions

#### Overview:

What's the purpose of a Liquid Cooling Solution or LCS? Quiet and efficient are two words that sum up this solution, which is gaining ground in the cooling world. Increasingly, LCS is sought after for its unparalleled performance. By transporting heat far away from the hotspot of the processing unit, the computing system becomes more flexible as opposed to being constrained by a narrow room for heat transfer. Compared to traditional air-cooling, LCS ably resolves higher and denser heat-loading, thanks to its excellent thermal properties from the coolant and the ample availability of space. As information and communications technology (ICT) rapidly evolves, industry leaders who focus on 5G, IoT, AI and other new products are eyeing LCS as a key part of the overall solution. When precision is paramount, employing a more powerful cooling solution is inevitable.

#### Challenge:

Compared to air-cooling, LCS offers many advantages such as virtually silent operation, flexibility and unparalleled efficiency for heat transfer. However, LCS comes at a slightly higher cost and generally requires a more complex process for installation. Additionally, in order for LCS to operate, the facility must provide the cooling water by way of a water tower or other plumbing supply. As an established leader in power and thermal management solutions, Delta has a track record for keeping these issues at bay, while maximizing the benefits of LCS.

#### Solutions:

To cool a data-processing center, an integrated LCS is built up by board-level components and system-level components. Board-level mainly comprises of a pump, heat exchanger, cold plate and manifold. At the system-level,

components such as a liquid cooler module and coolant distribution unit (CDU) are included. Delta offers our customers full service, which is not only limited to the board-level, but can be expanded to an integrated system.

In the thermal management market, Delta is well known for fluid-machinery design. By employing advanced computational fluid dynamics (CFD) technology, optimized pumps are successfully engineered and built for our LCS. Compared with other companies, Delta's pump outperforms on all fronts with better running performance under a fixed dimension. It is also more compact with close performance. Delta has successfully optimized the design for the cold plate and heat exchanger. For the system-level cooling component, Delta's coolant distribution unit (CDU) products can meet the most stringent power consumption and sizing requirements.

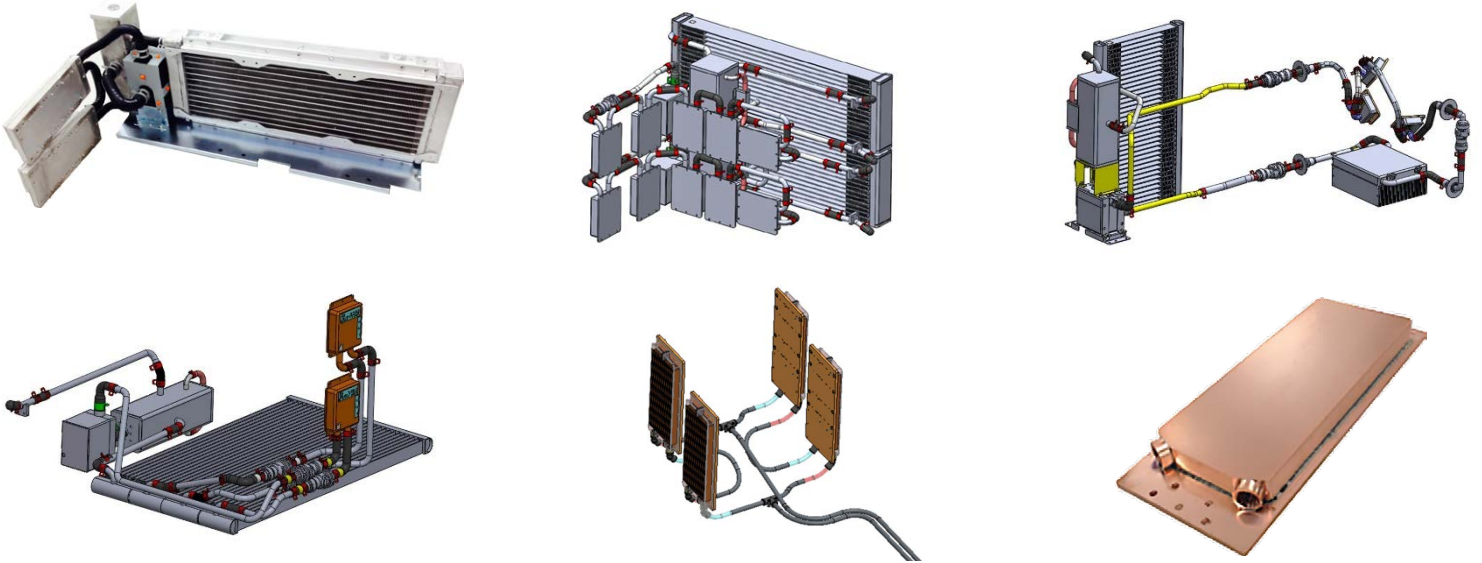
#### Conclusion:

In 2016, Delta launched our LCS line of products for the industrial and consumer industries. We have successfully provided thermal solutions on home battery charging for solar energy products, as well as high-end laser projectors with high-power-density needs. Based on these experiences, Delta developed LCS products for the ICT field beginning in 2018.

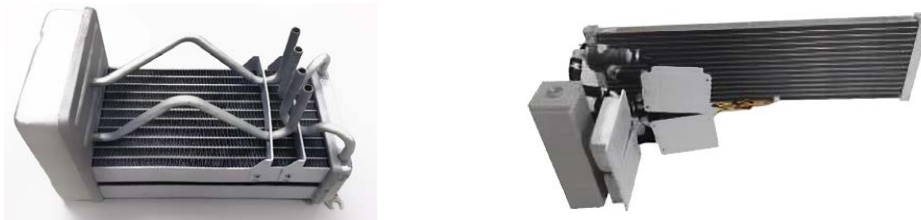
Delta is the perfect partner for producing the efficiency and results you demand in today's ever competitive world for interconnectivity. As technologies continue to mature, it is imperative to utilize the best LCS products on the market to maintain your reputation, reliability and long-term success. With its nearly half century history of innovation in engineering excellence, expect Delta to deliver on any customization or requirement.

## Sample Products:

Consumer product snapshots, laser projector

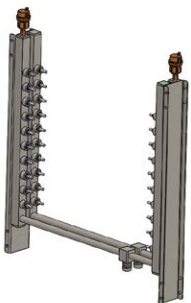


Industrial product snapshots, battery charging with solar energy



## Rack Level System

Manifold



Direct to Note (DTN) cooling

