高性能风液混合假负载机柜
Rack-Level Hybrid Cooling Load Bank

FULLDE 高性能风液混合假负载机柜专为新一代液冷数据中心和 AI 计算平台打造，特别适配 NVIDIA GB200、OCP ORV3 等液冷机柜架构。该设备可在同一机柜内实现 风冷与液冷双重散热，真实再现高功率密度服务器的工作环境，是液冷系统交付、调试与优化的理想工具。

The FULLDE high-performance hybrid cooling load bank is designed for next-generation liquid-cooled data centers and AI computing platforms, specifically optimized for NVIDIA GB200, OCP ORV3, and other liquid-cooled rack architectures. It integrates both air and liquid cooling within a single cabinet, accurately replicating the thermal and power characteristics of high-density servers, making it an ideal solution for system delivery, commissioning, and optimization.



应用场景
Application Scenarios

1. NVIDIA GB200 液冷机柜热模拟：验证功率与冷却能力匹配。
NVIDIA GB200 Rack Thermal Simulation: Validating power and cooling capacity matching.
2. AI 训练集群 / 超算中心：大规模 GPU 节点的液冷散热能力测试。
AI Training Clusters / Supercomputing Centers: Testing large-scale GPU liquid cooling performance.
3. 数据中心建设交付：机柜级功率与散热冗余验证。
Data Center Commissioning: Verifying rack-level power and thermal redundancy.
4. 科研实验室 / 验证平台：新型液冷技术与混合散热方案验证。
Research & Testing Labs: Evaluating new-generation liquid cooling and hybrid cooling solutions.

NVL72风冷+液冷一体化假负载模拟机柜
NVL72 air-cooled + liquid-cooled integrated dummy load simulation cabinet

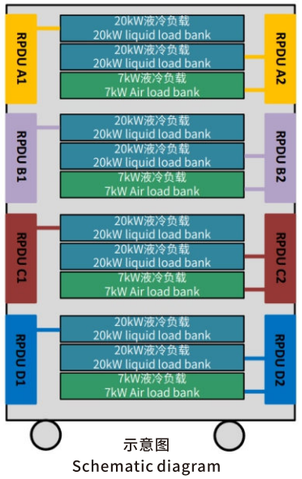

示意图
Schematic diagram

服务器机架 Server rack	机架高度 Rack Height	48U
	机架深度 Rack depth	1066 mm
	机架宽度 Rack width	600 mm
	机架PDU数量 Number of rack PDUs	8
	63安培CEE形式插头输入线缆带3米电缆和万向轮 63A CEE plug input cable with 3m cable and universal wheels	
液冷负载部分 Liquid load bank section	液冷负载数量Number of liquid load bank	8
	液冷负载容量Liquid load bank capacity	20kW
	断路器数量Number of circuit breakers	7
	断路器额定值Circuit breaker rating(kW)	1/1/1.5/1.5/2.5/2.5/10
	液体入口尺寸Liquid inlet size	DN50
	液体出口尺寸Liquid outlet size	DN50
风冷负载部分 Air-cooled load bank section	风冷负载数量Number of Air load bank	4
	风冷负载容量 Air load bank capacity	7kW
	断路器数量Number of circuit breakers	5
	断路器额定值Circuit breaker rating(kW)	1/1.5/2/2.5/5

例： 客户需要8* 132KW-NVL72风冷+液冷一体化假负载模拟机柜。每台NVL72 机柜的风冷与液冷占比为：风冷占比14%（132KW*14%=18.48KW），液冷占比86%（132KW*86%=113.52KW）

Example: A customer requires eight 132KW NVL72 air-cooled and liquid-cooled integrated dummy load simulation cabinets. The air-cooling and liquid-cooling ratios for each NVL72 cabinet are: 14% for air cooling (132KW*14%=18.48KW), and 86% for liquid cooling (132KW*86%=113.52KW).

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标准参数表
Standard parameter table

额定功率 Rated power	散热方式 Cooling	接口类型 Interface	适配标准 Compatibility
12 kW	风液混合 Hybrid	快接 + 航空插头 Quick-connect + Aviation Plug	GB200 / ORV3
20 kW	风液混合 Hybrid	快接 + 航空插头 Quick-connect + Aviation Plug	GB200 / ORV3
24 kW	风液混合 Hybrid	快接 + 航空插头 Quick-connect + Aviation Plug	GB200 / ORV3
48 kW	风液混合 + 并联扩展 Hybrid + Parallel Expansion	快接 + 航空插头 Quick-connect + Aviation Plug	AI 集群 / 超算 AI Clusters/Supercomputing

风液混合一体化设计
Air-liquid mixing integrated design

1. 风冷模块：内置高性能风机阵列，确保快速带走电阻模块产生的余热。
Air Cooling Module: Built-in high-performance fan array ensures efficient heat dissipation of resistor modules.
2. 液冷模块：采用冷板液冷技术，进出水口采用卫生级快接，快速接入机柜液冷循环系统。
Liquid Cooling Module: Cold-plate liquid cooling design with sanitary quick-connect fittings enables seamless integration into rack-level cooling loops.
3. 协同散热：根据功率密度自动匹配风冷与液冷比例，支持多场景测试。
Hybrid Operation: Automatically balances air and liquid cooling according to power density, supporting versatile test scenarios.

全面适配 GB200 热模拟
Fully compatible with GB200 thermal simulation

1. 支持 GB200 机柜功率密度与液冷接口标准，可直接部署在标准液冷机架中。
Fully compliant with GB200 rack power density and liquid cooling interface standards, enabling direct deployment in standard liquid-cooled racks.
2. 内置 流阻模拟单元，可调整液冷循环压降，真实还原服务器运行环境。
Built-in flow resistance simulation unit for adjustable pressure drop, replicating real-world server cooling environments.
3. 模块化设计，适配未来 GPU/CPU 更高功率需求，具备前瞻性。
Modular design future-proofed for higher power GPU/CPU generations.

高精度安全与控制
High-precision safety and control

1. 实时监控 温度、流量、电压、电流等关键参数。
Real-time monitoring of temperature, flow, voltage, and current.
2. 多级保护：短路保护、过温卸载、接地保护与一键急停。
Multi-level protection: short-circuit, over-temperature unloading, ground protection, and emergency stop.
3. 智能控制：支持远程监控与数据采集，兼容 DCIM/SCADA 平台。
Smart control: supports remote monitoring and data acquisition, compatible with DCIM/SCADA platforms.

灵活可扩展
Flexible and scalable

1. 精细化功率档位（最小 0.5kW 调节），覆盖从单机柜到整列机柜的负载模拟。
Fine-grained power steps (as low as 0.5kW), enabling load simulation from a single rack to full rack rows.
2. 插拔式模块扩展，支持 12kW、24kW、48kW 等功率等级组合。
Modular plug-and-play expansion with 12kW, 24kW, and 48kW configurations.
3. 可选 能量回收模块，实现绿色低碳的测试方案。
Optional energy recovery module for sustainable and eco-friendly testing.