Rittal – The System.

Faster – better – everywhere.

Direct Liquid Cooling

Modular Solutions

ENCLOSURES | POWER DISTRIBUTION | CLIMATE CONTROL | IT INFRASTRUCTURE | SOFTWARE & SERVICES

Direct Liquid Cooling

Empowering AI

The growing demand for computing power drives the need for a new level of cooling.

Artificial intelligence (AI) is growing rapidly: the market value will increase from **67 billion US dollars** (2023) to over **1.3 trillion US dollars** by 2032*.

Applications such as high-performance computing (HPC) and large language models (LLMs) generate extreme heat loads and push air cooling systems to their limits.

* Source: Bloomberg

The solution: Direct Liquid Cooling (DLC)

- **Efficient cooling** heat dissipation directly at the processors
- **Higher power density** optimised for AI and HPC applications
- **Energy savings** reduced consumption and lower operating costs
- **Sustainability** Minimisation of CO_2 emissions

Direct Liquid Cooling

Portfolio based on a platform strategy

Modular: **H**igh flexibility

Scalability: Pay as you grow

Hot swappable: Easy servicibility

Redundancy: High availability

Physical IT infrastructure from a single source

The complete system

Power

- Busbar
- PDU

Monitoring

- Control module (for system control)

Rack

- 19“ server rack
- Open rack V3
- Accessories

Cooling

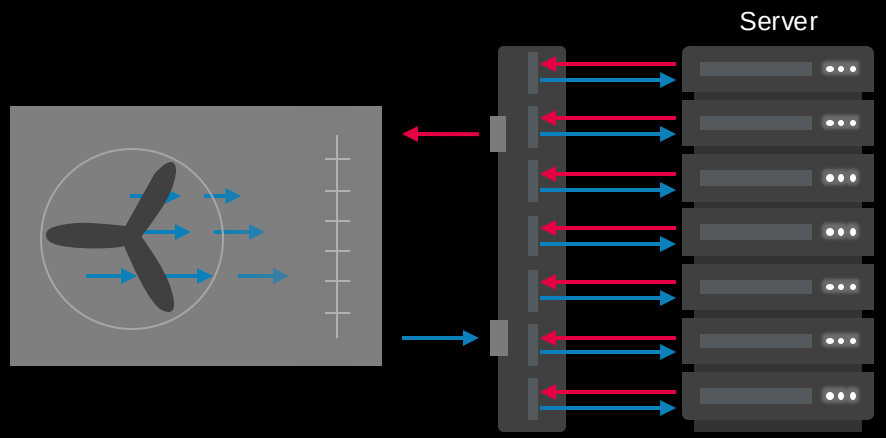
- CDU / CCU
- Manifold
- Rear Door Heat Exchanger

Direct Liquid Cooling – single phase

Liquid to Air | Liquid to Liquid

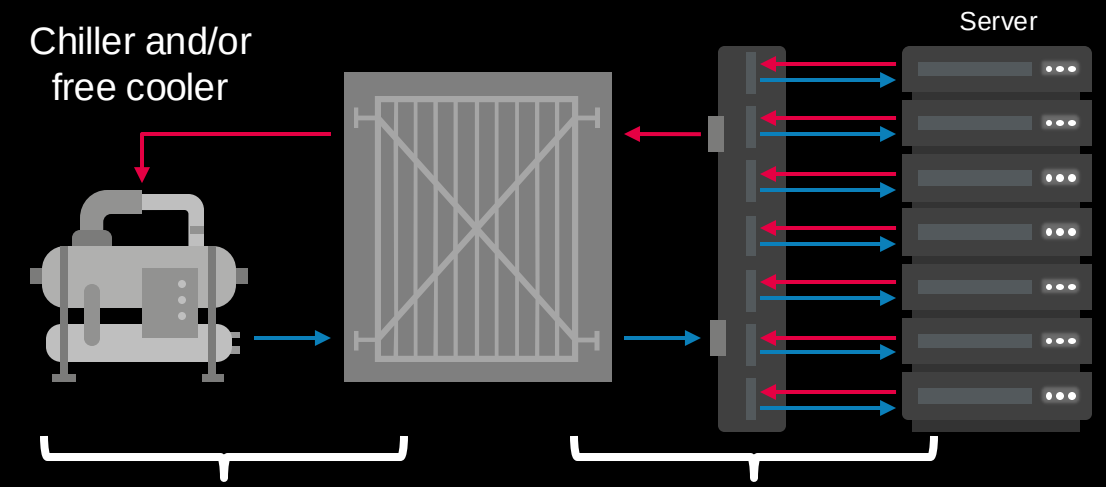
DLC for data centres WITHOUT water at row level

primary circuit is AIR



DLC for data centres WITH water at row level

primary circuit is WATER



Direct Liquid Cooling

Target portfolio

Liquid-to-Air

Rear Door Heat Exchanger

70 kW
for 21“ OpenRackV3

Side Cooler

100 kW
for 21“ OpenRackV3 or 19“ Rack

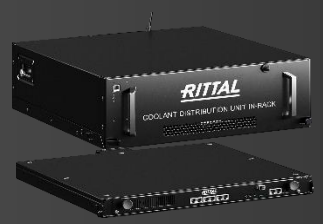
Liquid-to-Liquid

CDU In-Rack 21“

up to 150 kW for an OpenRackV3 incl. control module

CDU In-Rack 19“

up to 150 kW for a 19“ Rack incl. control module



CDU In-Row

scalable up to 1 MW for multiple racks

Liquid-to-Air
Solutions

Rear Door HEX

Liquid-to-Air | Main features

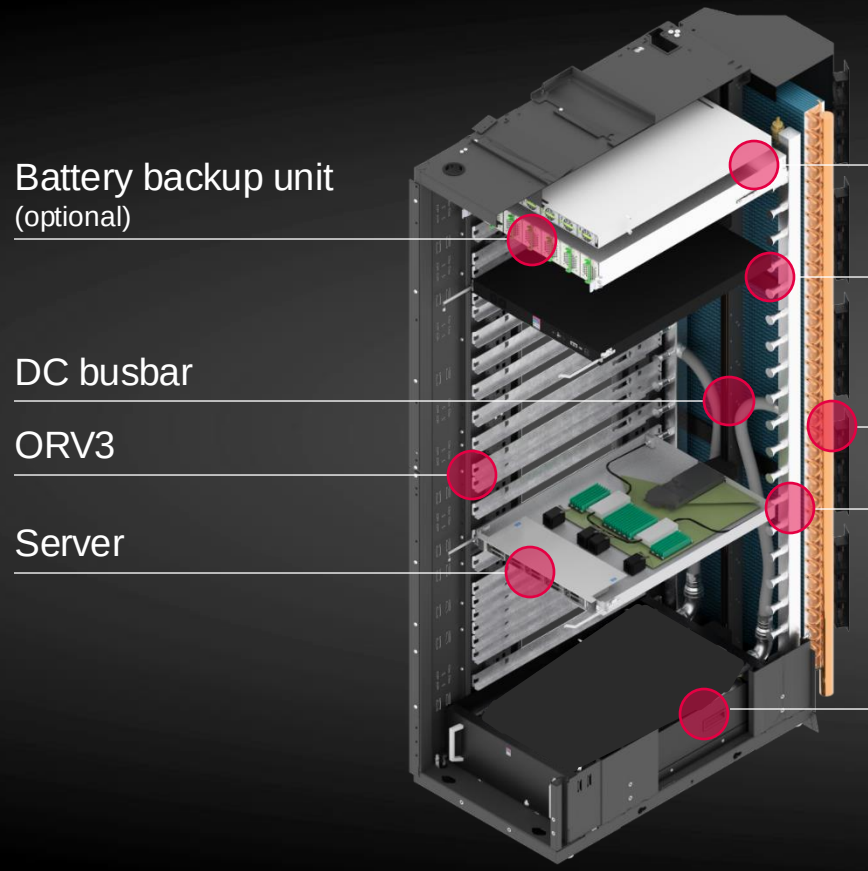
- Installation frame for routing the hoses
- Liquid-to-Air Heat Exchanger
- Fans and pump units powered via DC busbar
- Pumps and fans N+1 redundant
- Control module hot swappable

Rear Door HEX

Liquid-to-Air

Perfect for the use of liquid cooled servers without any facility water requirements.

Facts and data	
Performance	70 kW@15K ATD @ 13,000 m³/h (7,652 CFM)
Dimensions (w x h x d) in mm	600 x 2289 x 1400
Flow rate of CCU	105 lpm @1.5 bar
	27,7 GPM @ 21.8 PSI
Max. air flow rate	14,000 m³/h / 8,240 CFM
Redundancy pumps	N+1
Rated operation voltage	45-57 VDC
Max. system pressure (p max)	5 bar (72,5 PSI)
Coolant secondary loop	PG25
Required approvals	CE, CB report, UL listed, FCC



Side Cooler

Liquid-to-Air | Main features

Fact and data:

Performance:	100 kW@15K ATD @ 16,000 m³/h (9,417 CFM)
Flow rate CCU:	150 lpm @1.5 bar 39,6 GPM @ 21.8 PSI

- Build in ORV3
- Liquid-to-Air Heat Exchanger
- Fans and pump units powered via DC busbar
- Pumps and fans N+1 redundant
- Control module hot swappable build in the rear door

Liquid-to-Liquid
Solutions

CDU In-Rack

Liquid-to-Liquid | Main features

- Pumps N+1 redundant
- Mountable in 19“ rack / 21“ ORV3
- Height 4U / 4OU, depth 855 mm
- Water supply (FWS): ASHRAE W3/W4
- Manifold connection via flexible hose (tri-clamp/ optional: dripless)

CDU In-Rack

Liquid-to-Liquid

Perfect for the use of liquid cooled servers with available facility water.

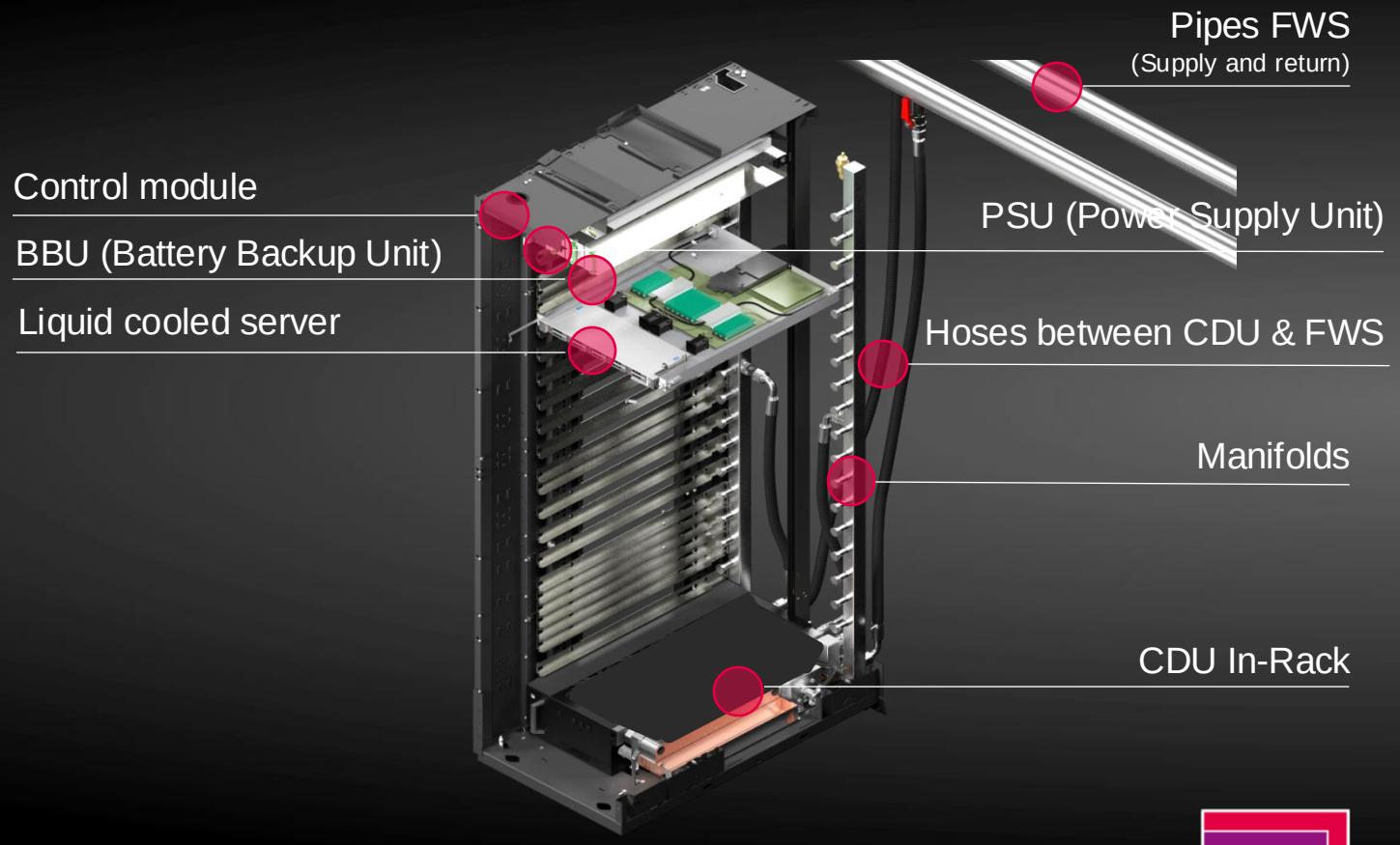
Facts and data	
Performance	150 kW@ 8K ATD @ 225 lpm (59.4 GPM)
Dimensions (w x h x d) in mm	535 (21”) x 185 (4OU) x 855
Flow rate pumps	225 lpm @1.5 bar
	59.4 GPM @ 21,8 PSI
Redundancy pumps	N+1
Rated operation voltage	45-57 VDC (via busbar ORV3)
Max. system pressure (p max)	5 bar / 72.5 PSI
Coolant secondary loop	PG25
Connection to controller	via CAN-Bus
Required approvals	CE, CB report, UL listed, FCC

CDU In-Rack | DLC “Ready”-Rack

Liquid-to-Liquid

Complete solution from a single source in an ORV3 incl. DC busbar, PSU, manifolds and CDU In-Rack

Facts and data	
Performance	150 kW@ 8K ATD @ 225 lpm (59.4 GPM)
Dimensions (w x h x d) in mm	535 (21”) x 185 (4OU) x 855
Flow rate pumps	225 lpm @1.5 bar
	59.4 GPM @ 21,8 PSI
Redundancy pumps	N+1
Rated operation voltage	45-57 VDC (via busbar ORV3)
Max. system pressure (p max)	5 bar / 72.5 PSI
Coolant secondary loop	PG25
Connection to controller	via CAN-Bus
Required approvals	CE, CB report, UL listed, FCC



CDU In-Row

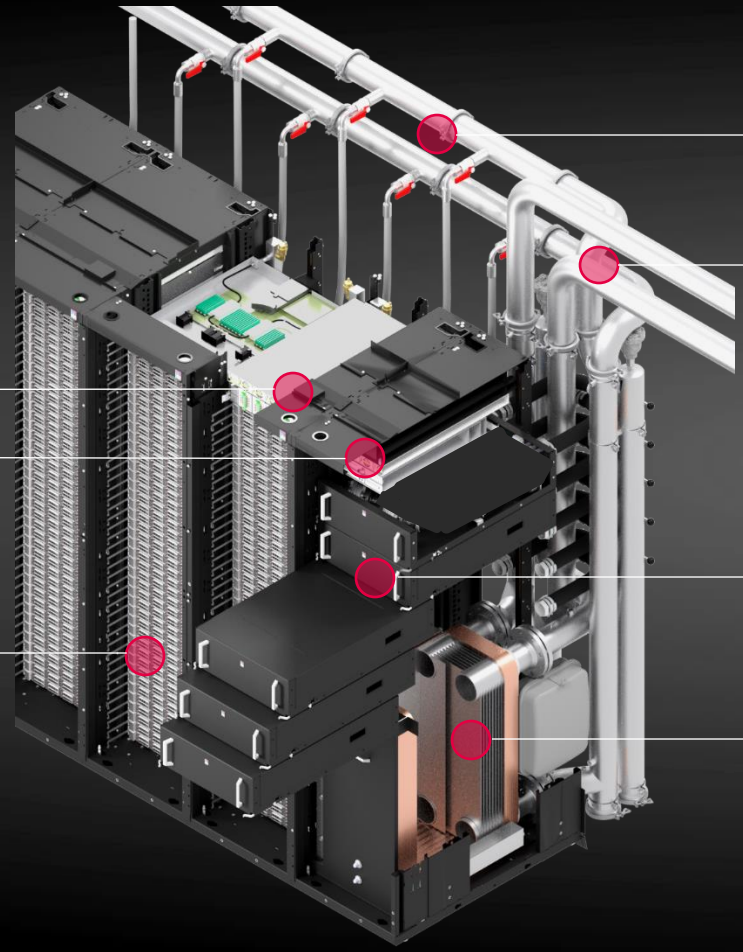
Liquid-to-Liquid | Main features

- Pump units (CCUs) N+1 redundant
- Build in ORV3
- Pump units, control module, sensors and filters hot swappable
- High efficient HEX and pumps
- Scalability (pay-as-you-grow)

CDU In-Row
Liquid-to-Liquid

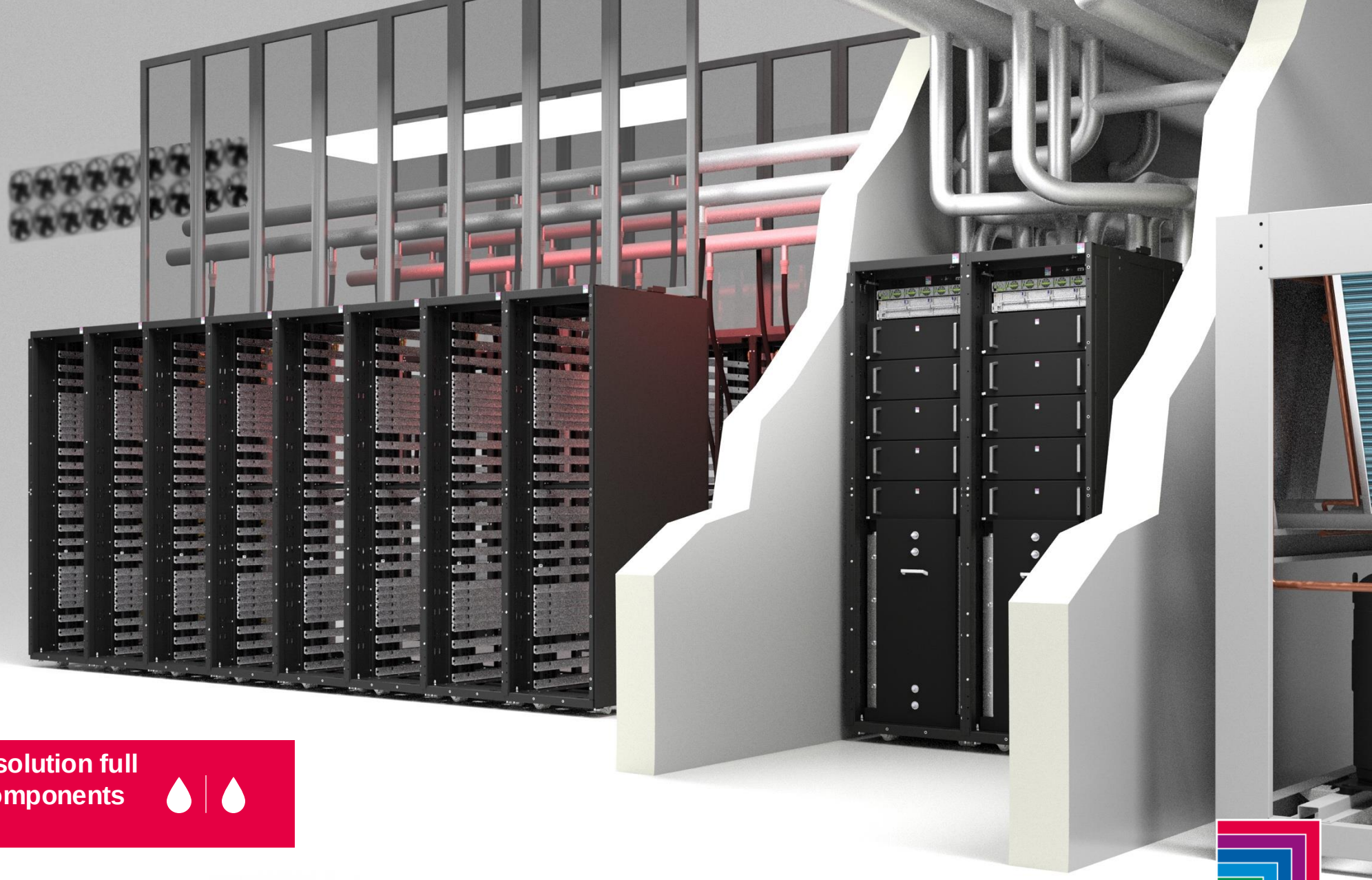
Perfect for the use of liquid cooled servers with available facility water.

Facts and data	
Performance	1 MW@ 4K ATD @ 1500 lpm (396 GPM)
Dimensions (w x h x d) in mm	600 x 2350 x 1400
Flow rate pumps	375 lpm @ 2.3 bar
	99.1 GPM @ 33.36 PSI
Redundancy pump units	N+1
Rated operation voltage	45-57 VDC
Max. system pressure (p max)	5 bar / 72.5 PSI
Housing	Build in an ORV3
Coolant secondary loop	PG25
Filter	50 µm, 2N redundant
Required approvals	CE, CB report, UL listed, FCC



CDU In-Row

Liquid-to-Liquid



CDU In-Row | Liquid-to-Liquid solution full scalable with hot swappable components such as pump units and more

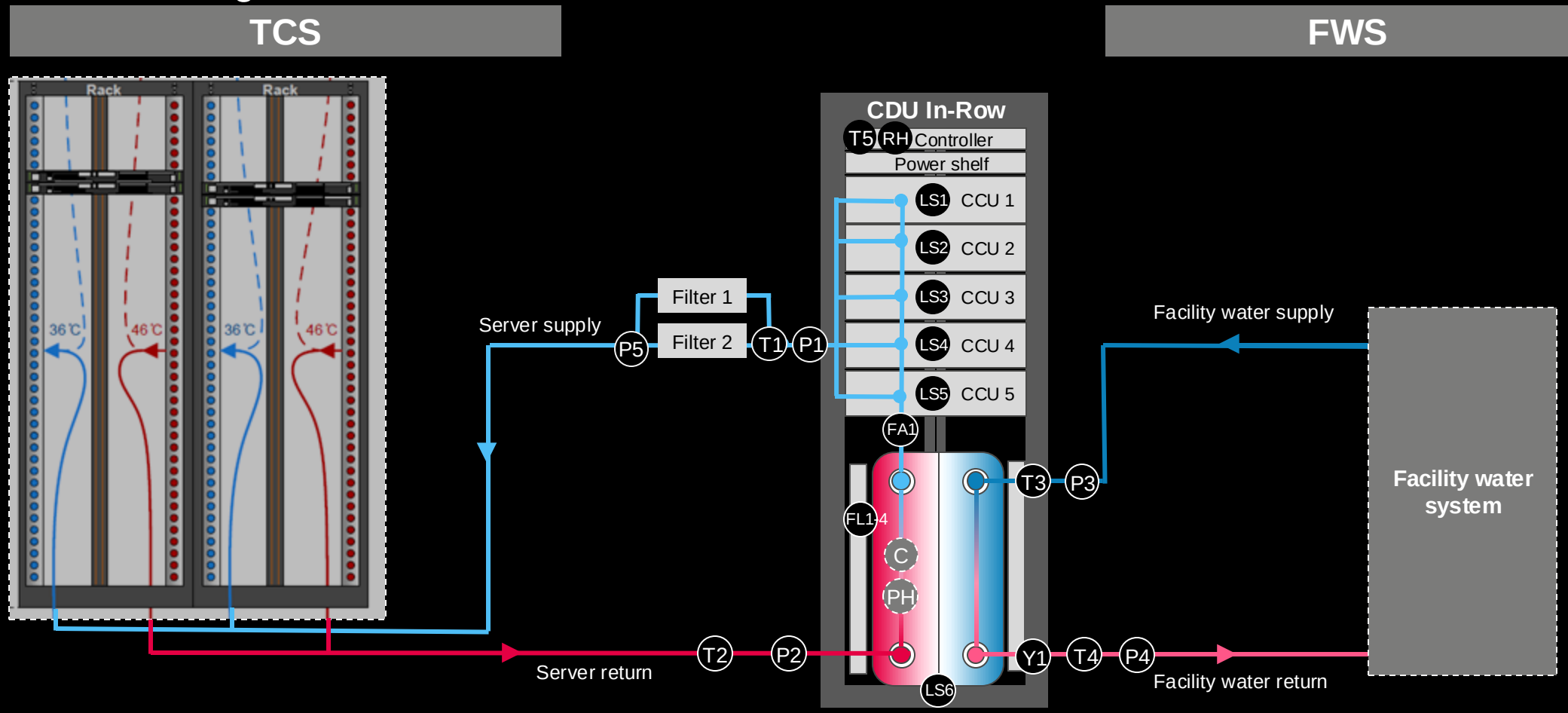
Control Module

Control module is designed as a separate module so that it can be replaced during operation. The control module monitors and controls the entire system.

Facts and data	
Power supply	via DC busbar
Dimensions (w x h x d) in mm	21” / 1OU
Main protocols control board	SNMP, OPC, UA, Modbus TCP
DC converter	2N redundant
Air side sensors	Temperature, humidity, pressure
Required approvals	CE, CB report, UL listed, FCC
Serviceability	Hot swapable (incl. fail safe mode)

CDU In-Row

Schematic diagram of the sensors, filters and valve

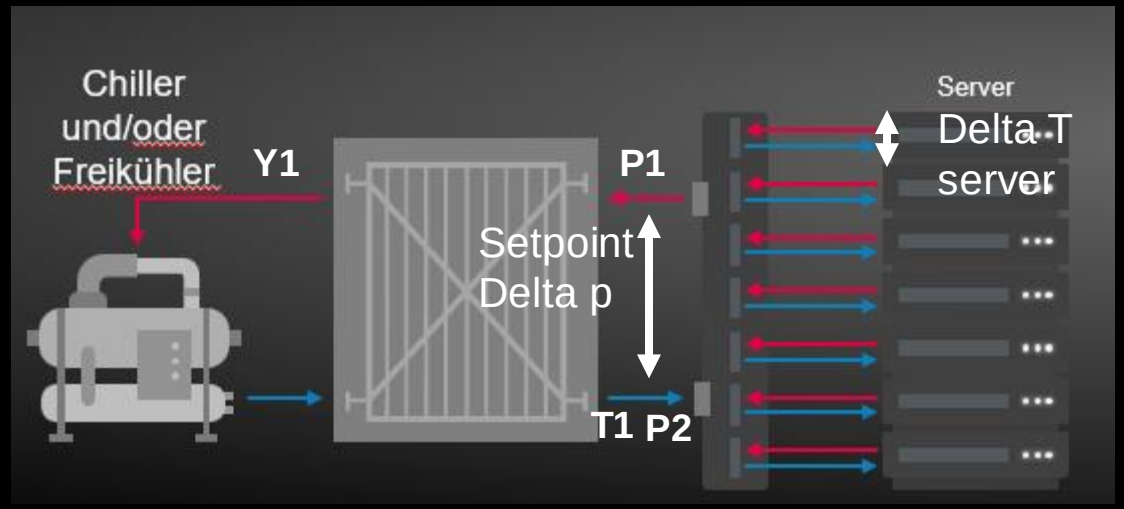


T1-T4: Temperature sensors coolant
T5/RH: Temperature/humidity sensor air
P1-P5: Pressure sensors

LS1-LS6: Leakage sensors
FA1: Volume flow meter
Y1: 2-way control valve

CDU In-Row
Control

Setpoint Delta P
Delta P between P1 and P2
The pumps control to this setpoint



Setpoint coolant supply temperature secondary loop (T1)
→ Is controlled by the 2-way control valve (Y1)

Delta T Server
The delta T between the supply and return of the coolant in the secondary circuit (server in, server out) depends on the volume flow of the coolant.
1.5 lpm / kW cooling capacity → delta T 10 K

Direct Liquid Cooling

Hydraulic connections

Secondary side

can be connected from above or below

Primary side

can be connected from above or below

Connections designed as tri-clamb connection

Size: 4 inch