

FluidCool-X

Precision coolant distribution for
high-performance thermal management



Shaping the Future of AI-Driven Data Centre



The ascent of the AI era is transforming the data centre landscape, fuelling exponential demand growth whilst establishing groundbreaking new benchmarks for performance, efficiency, and reliability.

With three decades of engineering heritage, AIRSYS PowerOne—our comprehensive AI thermal management solution (encompassing chillers, fan walls, CDUs, and spray liquid-cooled Data Racks) delivers sustainable, high-performance cooling designed to adapt alongside your evolving requirements, both now and in the years to come.

As your trusted partner, AIRSYS remains dedicated to collaborating with you on this journey, jointly pioneering innovations to create more intelligent, environmentally conscious, and resilient data centres for the AI-driven future.

**Rack-to-Plant
Thermal
Orchestration**

**Low-GWP
Refrigerants**

**Autonomous Load
Balancing**

**Built for
Liquid Future**

**Future-Proof
Modularity**

**AI-Density
Optimized**



FluidCool-X

As AI workloads surge, data centres are facing unprecedented power densities and thermal loads. Liquid cooling—and specifically, Coolant Distribution Units (CDUs)—has become essential to maintaining performance and uptime in these high-intensity environments. Reliability, precision, and energy efficiency are no longer optional—they are the baseline for supporting next-generation compute infrastructure.

FluidCool-X was built for this new era. With 3-tier redundancy and advanced VFD pump controls, it delivers 99.999% uptime and ultra-efficient cooling with pPUEs as low as 1.05. Available in 500kW, 1000kW, and 2000kW models, its modular design supports fast deployment for everything from edge AI pods to large-scale training clusters.



500kW



1000kW



2000kW

Specifications at a Glance

Reliability

Triple-Layer Uptime Protection

- **Component Redundancy:** Dual pumps, sensors, and valves enable instant failover to maintain operation.
- **Power Redundancy:** Optional ATS switches to backup power without interruption.
- **Smart Control Redundancy:** Auto-switch between supply and return temperature control for stable performance.



High Efficiency

Engineered for Peak Performance

- **VFD Pumps:** Dynamically adjust flow to cut energy use by 30%.
- **4K Ultra-Tight Approach Temp:** Maximizes heat exchange with industry-leading ΔT .
- **BPHE & W4 Water Reuse:** High-efficiency plate heat exchangers + closed-loop water recycling slash OPEX.

Serviceability

Maintenance without Downtime

- **Hot-Swappable Components:** Pumps and filters can be replaced in minutes without system shutdown.
- **Front-Access Design:** 90% parts serviceable from the front.
- **Quick-Deploy Piping:** Sanitary connections allow fast, tool-assisted plumbing changes.



Modularity

Grow as You Compute

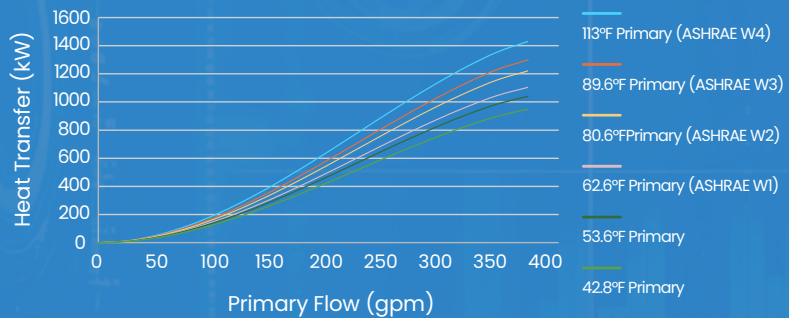
- **Rack-Sized Footprint:** Fits standard racks without retrofitting.
- **Plug-and-Play Expansion:** Scale in Hours, Not Days.
- **Centralized Control:** Seamlessly manage multi-units networks via a single interface.

Critical Components

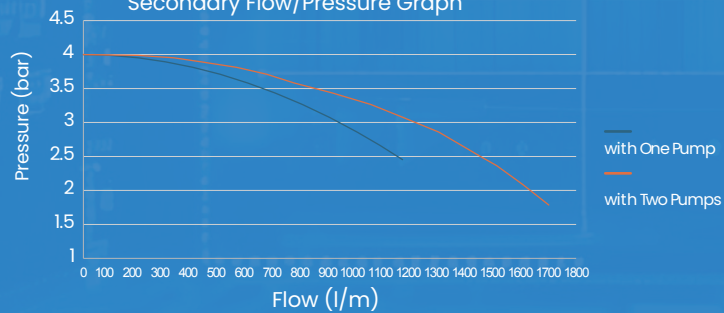
Industry-Leading Pump

- **Higher Flow**
Enables superior low ΔT operation for enhanced reliability
- **Stronger Head Pressure (40m)**
Confidently handles complex multi-rack deployments
- **Space-Optimized Design**
Compact footprint with a service-friendly layout for easier maintenance

Primary Flow/Heat Transfer Graph at 7.2°F ATD



Secondary Flow/Pressure Graph



Comprehensive Sensor Suite

- **Coolant Quality Monitoring**
Standard pH and conductivity sensors for real-time coolant condition tracking
- **High-Precision Monitoring**
Primary and secondary loops equipped with precision temperature/pressure sensors (redundant sensors on critical points ensure continuous operation)
- **Multi-protections**
Condensation Protection/Leak Detection/Clogging Prevention

Dedicated VFD

- **Standalone VFD**
More flexible than pump-integrated VFDs, easier maintenance
- **Advanced Control Capability**
Supports complex cooling logic requirements
- **Built-in EMI Filter**
Reduces interference risks in sensitive environments

Premium Expansion Tank

- **Pressure Surge Control**
Controls sudden pressure spikes during pump operation to protect piping and system components.
- **Pressure Stabilization**
Maintains steady system pressure for reliable performance and longer equipment life.



Ultra-Efficient Brazed Plate Exchanger

- **Engineered Reliability**
Copper-brazed stainless steel construction for maximum corrosion resistance
- **10%+ Design Margin**
ensures uninterrupted cooling performance during sudden workload spikes or system degradation
- **Compact High-Efficiency**
Smaller footprint vs. conventional designs

Precision Two-Way Valve

- **Dynamic Flow Optimization**
Auto-adjusts primary side flow based on real-time secondary heat load
- **Fail-Safe Self-Resetting**
Returns to setting position after a power failure to ensure continuous cooling during emergencies
- **Smart Hydraulic Balancing**
Prevents flow "hogging" in multi units deployments

Other Components

- Conductivity Sensor
- pH Sensor
- Controller
- Touch Screen
- Flow Meter
- Isolator Switch
- Stainless Steel Filter Housing
- Stainless Steel Automatic Air Vent
- Stainless Steel Filter
- Stainless Steel Piping

Options

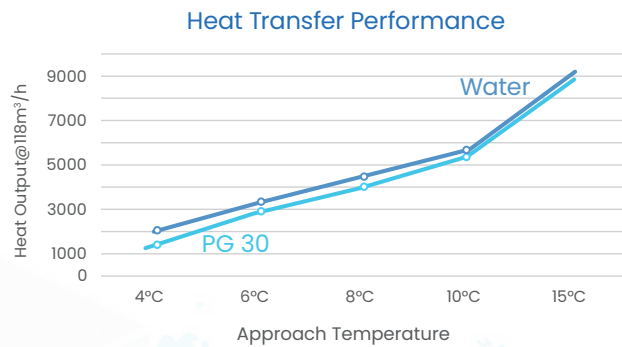
- Turbidity Sensor
- Flow Switch
- Make-up Water Pump Assembly
- Flexible Connector
- Butterfly Valve at Interface

Highlights

Efficient 4°C Approach—Engineered for High Thermal Performance

Approach temperature refers to the temperature difference between the facility water supply and the coolant supply to the IT equipment. A lower approach temperature means more efficient heat transfer, enabling the CDU to deliver cooler liquid to the racks even when facility water temperatures are higher.

FluidCool-X achieves an industry-leading 4°C approach temperature, enabled by its advanced heat exchanger design and control algorithms. This ultra-low differential maximizes cooling efficiency, supports higher facility water temperatures, and reduces energy use—making it ideal for high-density AI and HPC workloads where thermal precision is critical.



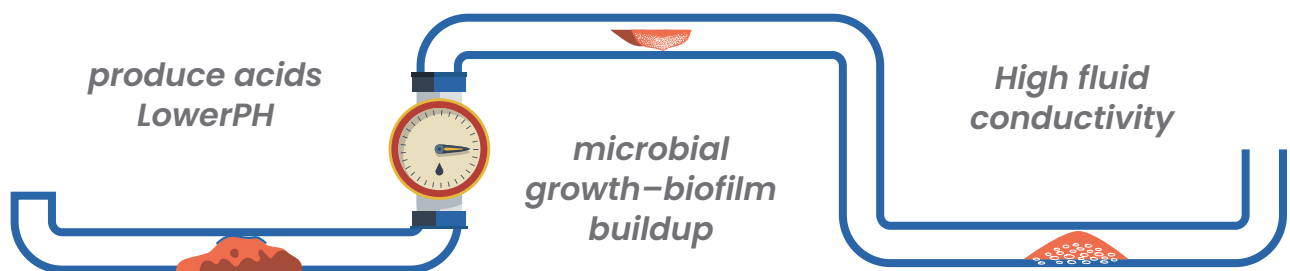
Leak Protection for Mission—Critical Reliability

Leak detection is a critical safeguard in liquid-cooled environments. FluidCool-X features a fully integrated leak protection system with a rope-style sensor deployed across the base—the lowest point in the unit, ensuring rapid detection of even minimal fluid presence.

Upon detection, the system automatically triggers a leak alarm, halts pump operation, and closes the motorized two-way ball valve to isolate the circuit—minimizing risk to adjacent equipment and preventing water damage. This multi-layered response helps protect high-value IT infrastructure and maintains operational integrity in high-density deployments.

Corrosion Protection—Designed to Resist Glycol-Induced Degradation

In CDU systems, propylene glycol is widely used but can degrade over time—especially under high temperatures and produce acids that lower pH and accelerate corrosion. It also supports microbial growth, leading to biofilm buildup that weakens metal protection. When different metals coexist, such as stainless steel and carbon steel, galvanic corrosion becomes a serious risk. High fluid conductivity makes the system even more vulnerable.



Engineered Protection in FluidCool-X

Recognizing these risks, the FluidCool-X is engineered with a comprehensive corrosion prevention strategy:

- 316 stainless steel is used throughout the fluid-handling piping to mitigate risks of acid-induced corrosion and biofilm formation.
- Insulating gaskets are deployed at all interfaces involving dissimilar metals to mitigate galvanic coupling.
- The system is equipped with integrated pH and conductivity sensors, enabling real-time visibility into fluid condition and early warning of additive depletion or glycol degradation.
- Data-driven analysis allows for predictive maintenance, enabling operators to schedule chemical adjustments and servicing before issues escalate—minimizing unplanned downtime and reducing total cost of ownership.

While end-users remain responsible for routine fluid maintenance—including corrosion inhibitor and biocide management—the FluidCool-X is designed to actively protect itself from within, ensuring long-term reliability in mission-critical cooling deployments.



Specification	FCX.05V2	FCX.10V2	FCX.20V3
Nominal Cooling Capacity (kW)	500	1,000	2,000
Max Cooling Capacity (kW)	800	1,300	2,500
Approach Temperature(°C)	4	4	4
Pump Quantity	2	2	3
Power Supply (V/Ph/Hz)		380/3/50	
Power @ Nominal Cooling Capacity (kW)	6	10.5	21
Power @ Max Cooling Capacity (kW)	9	14.5	26
FLA (A)	34.8	50.8	75.8
MCA (A)	50.0	80.0	100.0
MOP (A)	42.5	62.5	93.8
Flow Rate @ Nominal Cooling Capacity (m³/h)	32	65	130
Flow Rate @ Max Cooling Capacity (m³/h)	52	48	149
Noise Level dB(A) ⁽¹⁾	66	70	75
Secondary			
Secondary Coolant Type	Water/Propylene Glycol		
Secondary Head (m) ⁽²⁾	40	40	40
Secondary Coolant Temperature Range (°C)	15-50	15-50	15-50
Secondary Connection	2 1/2" Flange top or bottom	4" Flange top or bottom	4" Flange top or bottom
Secondary Filtration	Standard 50µm, Optional 25µm filters		
Primary			
Primary Coolant Type	Water/Propylene Glycol		
Primary Pressure Drop(kPa)	60	80	120
Primary Coolant Temperature Range (°C)	7-46	7-46	7-46
Primary Connection	2 1/2" Flange top or bottom	4" Flange top or bottom	4" Flange top or bottom
Primary Filtration	Optional Mesh 60 Y-strainer for external filtration		
Dimension and Weight			
Length (mm)	600	900	1,200
Width (mm)	1,200	1,200	1,200
Height (mm)	2,100	2,100	2,100
Shipment Weight (kg)	840	1,210	1,700
Operating Weight (kg)	925	1,320	2,000
Configuration			
Control Configuration	Multiple Unit Controller design		
Color	Black, Optional White		
Dual Power Feeds (ATS)	Optional		

Note:

(1) Noise level at 1m

(2) Converted based on water density

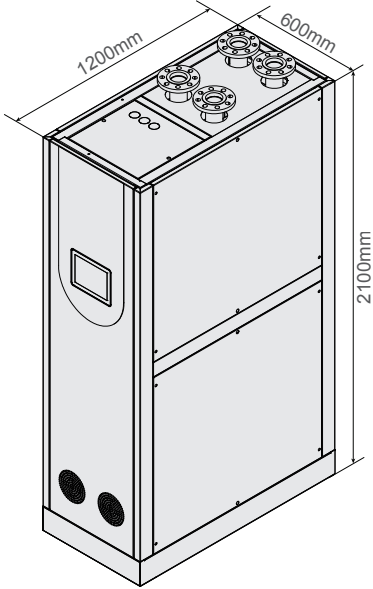
Nomenclature

01	02	03	04	05	06	07	08	09	10	11	12
FCX.	20	V	3	B	05	M	C	S	B	X	X

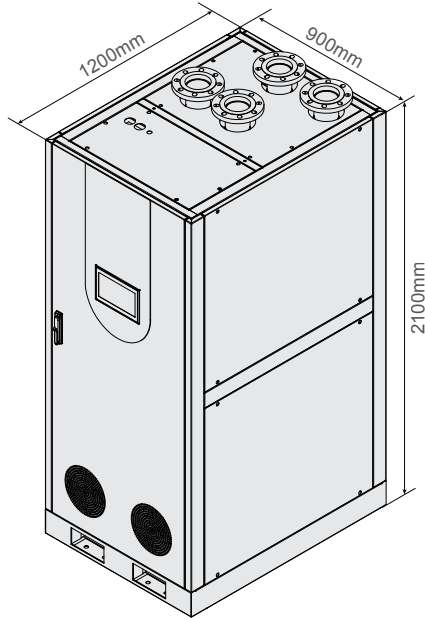
01	FCX.	FluidCool-X
02	20	Capacity 05: 500kW 10: 1000kW 20: 2000kW
03	V	Pump type and Speed Control V: Fixed Frequency Pump+Frequency Converter M: Fixed Frequency Pump+Frequency Converter with EMI Filter
04	3	Pump Qty. 2: 2 Pumps 3: 3 Pumps
05	B	Mechanical Connection Code B: Primary/Secondary Bottom Pipe Connection T: Primary/Secondary Top Pipe Connection
06	05	Cabinet Size 03: 500kW 04: 1000kW 05: 2000kW
07	M	Design Control Configuration M: Design for Multiple Unit Controller
08	C	Power Source C: 460/3/60 D: 380/3/50
09	S	ATS Options S: Single Power Supply without Automatic Transfer Switch (ATS) A: Power Termination Enclosure with Automatic Transfer Switch (ATS) 400 V or 480 V Nominal
10	B	Color Options B: Black W: White
11	X	Standard Filtration Options Code X: Factory fitted (50µm) H: Factory fitted (25µm)
12	X	Special Controls Options X: None 2: Turbidity Sensor (0-100 NTU)

Dimensions

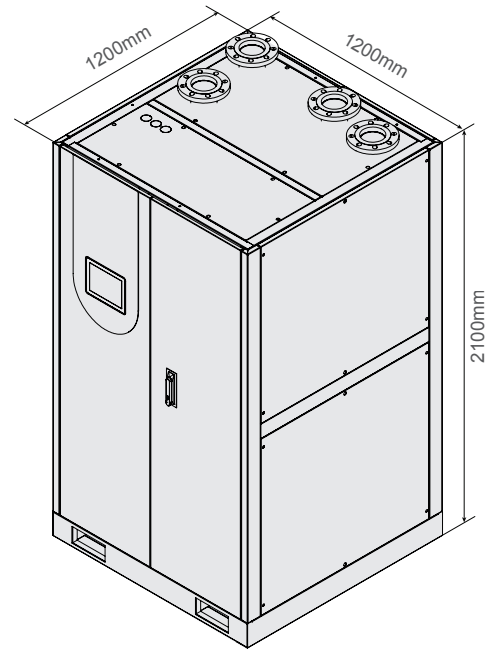
Top Piping Connection



FCX.05V2

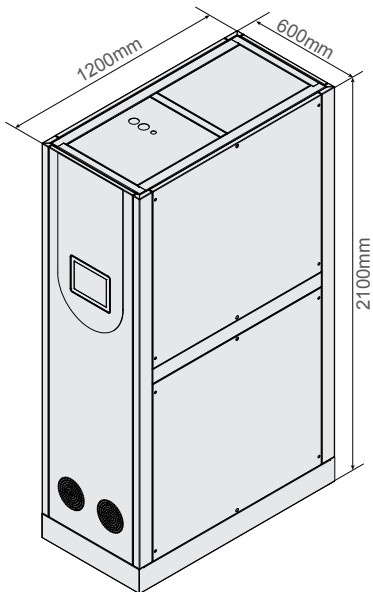


FCX.10V2

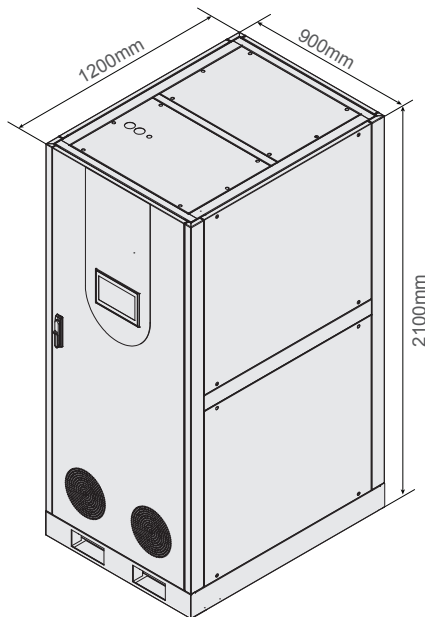


FCX.20V3

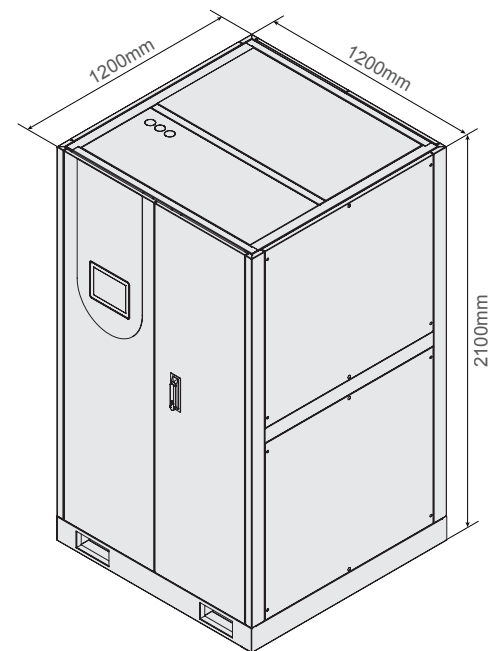
Bottom Piping Connection



FCX.05V2



FCX.10V2



FCX.20V3



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