CLAROS™ REFERENCE DESIGN

# 2.7MW Power Gateway, AI Factory, Liquid-Cooled, Modular Reference Design

INTRODUCTION

The Claros 2.7MW modular data center is engineered for maximum compute power in a turn-key deployment. To address the growing demand for Artificial Intelligence workloads and bridging gaps in current market and product solutions, Claros integrates advanced liquid cooling technology and an optimized power distribution architecture.

These features enable significantly higher server rack power densities while reducing energy consumption, which helps customers lower both capital and operational expenses. This unique combination positions the Claros solution as an efficient, cost-effective choice for future-ready AI infrastructure.

DESIGN OVERVIEW

- IT Power Capacity: 2MW
- Redundancy: N+1 (Tier 2)
- Module Footprint: 900 sq ft
- Utility Voltage: 480Vac, 60Hz
- Operating Voltage: 800Vdc
- Total Racks: 17
- IT Rack Density: 132kw
- System Compliance
    - Safety: UL1741, IEEE 1547
    - EMC: FCC 47 CFR Part 15 (Class A)
    - Cyber Security: NIST IR7628, IEC 62443, UL 2900-1
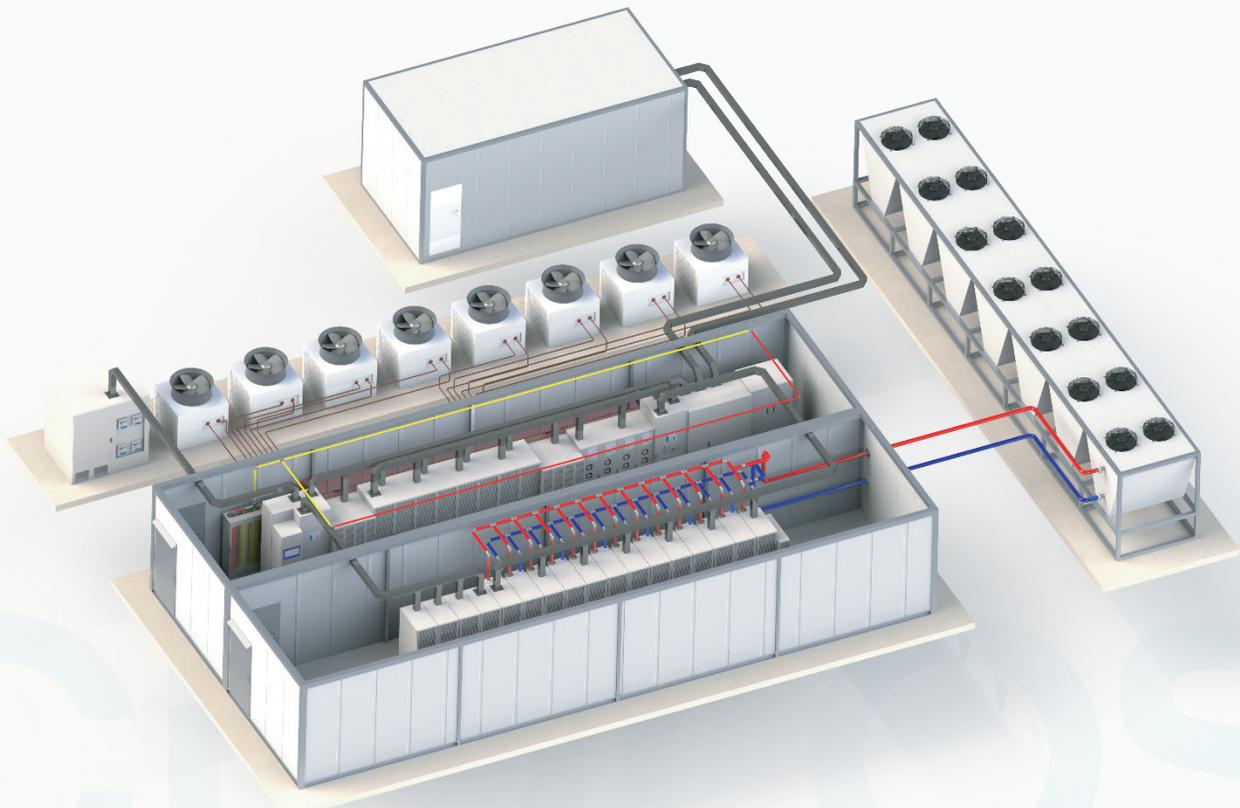
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Power Gateway

OVERVIEW

The Power Gateway module implements an 800Vdc power topology, delivering a total IT power capacity of 2MW and supporting up to 13 high-density IT racks, each with a rack density of 132kW.
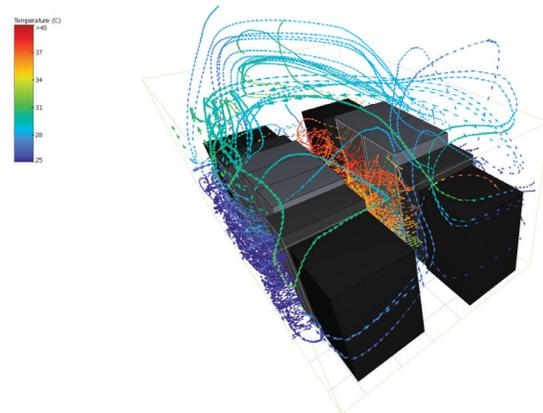
Engineered for reliability, the system achieves rapid failover response times typically under 5 milliseconds. Integrated in-row cooling and a high-performance Uninterrupted Power Supply (UPS) ensure stable thermal and power environments even during load fluctuations or utility disturbances.

Advanced onsite and remote monitoring platforms provide real-time visibility into key metrics such as power utilization efficiency (PUE), load distribution, and fault detection (including power and fire alarms, isolation monitoring). These capabilities enable data center operators to reduce unplanned downtime, optimize energy consumption, and schedule proactive maintenance based on actionable analytics.
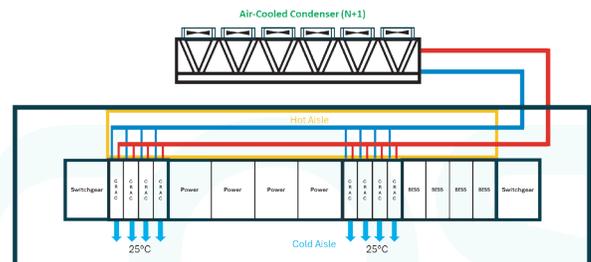
POWER DISTRIBUTION
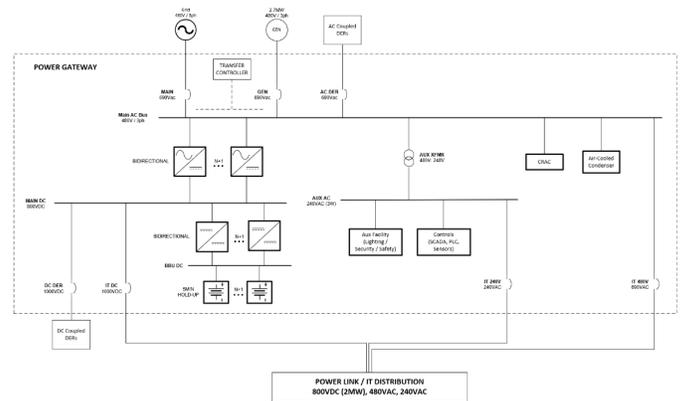
THERMAL MODELING

COOLING SYSTEM LAYOUT

POWER GATEWAY

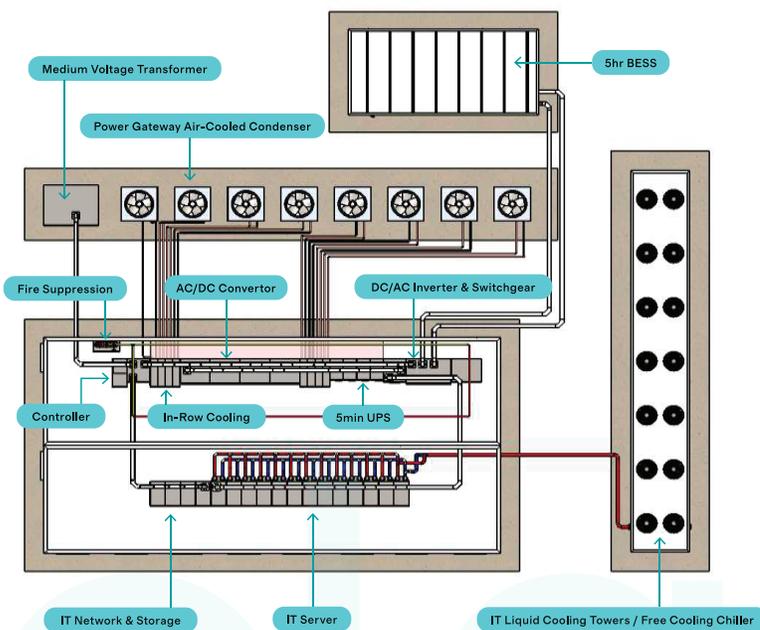| Attribute	Value	Unit
Input Voltage	480	Vac
Primary Power	2	MW
Primary Voltage	800	Vdc
Secondary Power	0.7	MW
Secondary Voltage	480/240/120	Vac
Operating Temp.	-5 to 45	C
Max Operating Altitude	10,000	ft
Cooling	In Row AI-Cooling	
UPS Power	2.7	MW
UPS Hold Up	5	min.
UPS Response	<5	ms
BESS Power	2.7	MW
BESS Hold Up	5	hrs

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AI Factory

OVERVIEW

The core of the design is a modular power string architecture that features a centralized 800Vdc busbar and distributed in-rack DC-DC conversion.

This approach minimizes transmission losses, enhances energy efficiency, and enables flexible scaling—clear advantages over traditional AC (alternating current) distribution methods. This power delivery architecture enables the highest power rack density.

The utility of the OCP (Open Compute Project) Orv3 standardized rack architecture offers exceptional flexibility for a broad range of CPU/GPU server solutions and is complemented by a liquid cooling infrastructure. The integration of liquid cooling further enhances rack density by efficiently dissipating heat generated by high-performance CPUs and GPUs, supporting optimal operation even at maximum power loads.

IT ROOM LAYOUT & COOLING SYSTEM

AI FACTORY

Attribute	Value	Unit
IT Load	2	MW
Supply Voltage	800	Vdc
Rack Density	132	kW
# of Compute Racks	13	
# of Network Racks	4	
Cooling	Liquid	
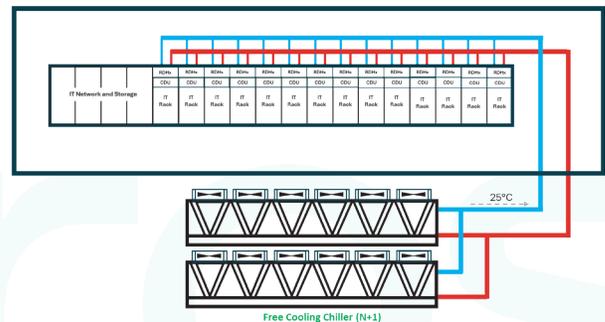
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Software Interface

OVERVIEW

The Power Gateway (PG) control system delivers a secure, resilient, and scalable automation platform designed for mission-critical data center environments. Built on industry standards (IEC 61850, IEC 62443, IEEE 2030.7), the architecture ensures interoperability, high availability, and streamlined integration with energy and IT infrastructure.

ARCHITECTURE & AUTOMATION

Enterprise Design: From device-level controllers to supervisory control and enterprise analytics, the PG system implements a modular, standards-based approach for flexibility and scalability.
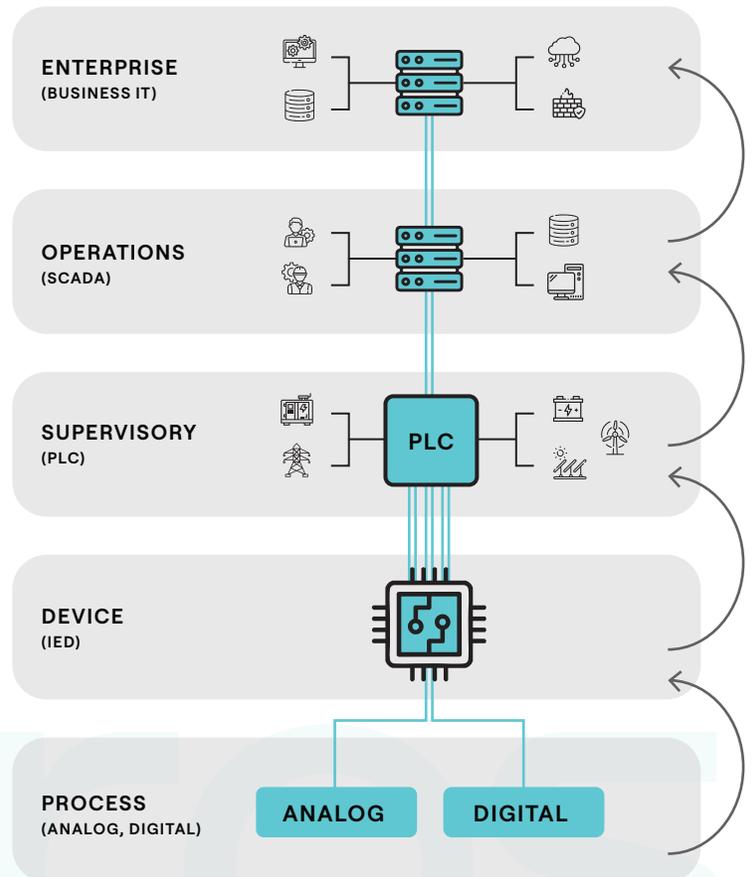
Integrated Control: Supervisory control logic coordinates utility, generator, battery storage, and distributed energy resources for automated, seamless transitions.

OPERABILITY & SECURITY

• Intuitive dashboards provide real-time visibility of system health, alarms, and KPIs.

• Open protocol support (i.e. Modbus,OPC) provide secure sub-system communication and control.

• Defense-in-depth philosophy through segmented networks, firewalls, and role-based access offers compliance with IEC-62443 cybersecurity standards.

• Process data historization, event logging, and analytics enable compliance tracking and performance optimization.

KEY BENEFITS

• **Resilient Operations:** Automated orchestration of power sources with deterministic transition sequences.

• **High Availability:** Design for 99.9999% uptime with fault tolerant redundancy.

• **Scalable & Flexible:** Modular architecture supports expansion and integration with DCIM and enterprise systems.

• **Operational Efficiency:** Centralized control, advanced analytics, and compliance-ready reporting reduce complexity and cost.

ENTERPRISE
(BUSINESS IT)

OPERATIONS
(SCADA)

SUPERVISORY
(PLC)

PLC

DEVICE
(IED)

PROCESS
(ANALOG, DIGITAL)

ANALOG   DIGITAL

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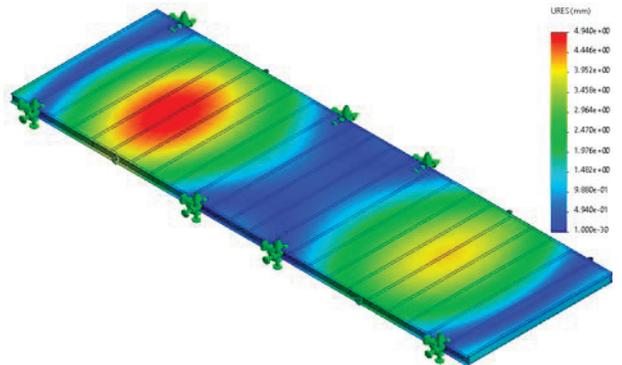
Deployment

CLAROS SOLUTION

Claros offers a comprehensive turnkey solution for building, delivering, installing, and commissioning your AI factory. We collaborate closely with your facility team and local authorities to guarantee a smooth deployment and to provide any necessary engineering documentation. Our product is designed for direct slab attachment and can be shipped directly to your location.

Its modular configuration enables transport in two separate units: the Power Gateway and the AI Factory. Each module weighs over 80,000 lbs., so we carefully address lifting methods, structural deflection, and center of gravity during installation.

PAD MOUNTING
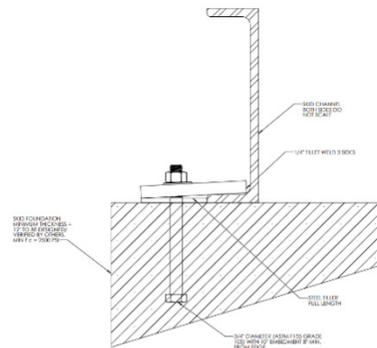
STRUCTURAL MODEL

SITE INSTALLATION