



MODULAR DATA CENTER INFRASTRUCTURE

Containerized Modular Data Center

TECHNICAL SPECIFICATION SHEET

93 kW Factory-Integrated Modular Platform

High-Density Server Row | Edge Rack | High-Density RDHx Rack

1. Solution Overview

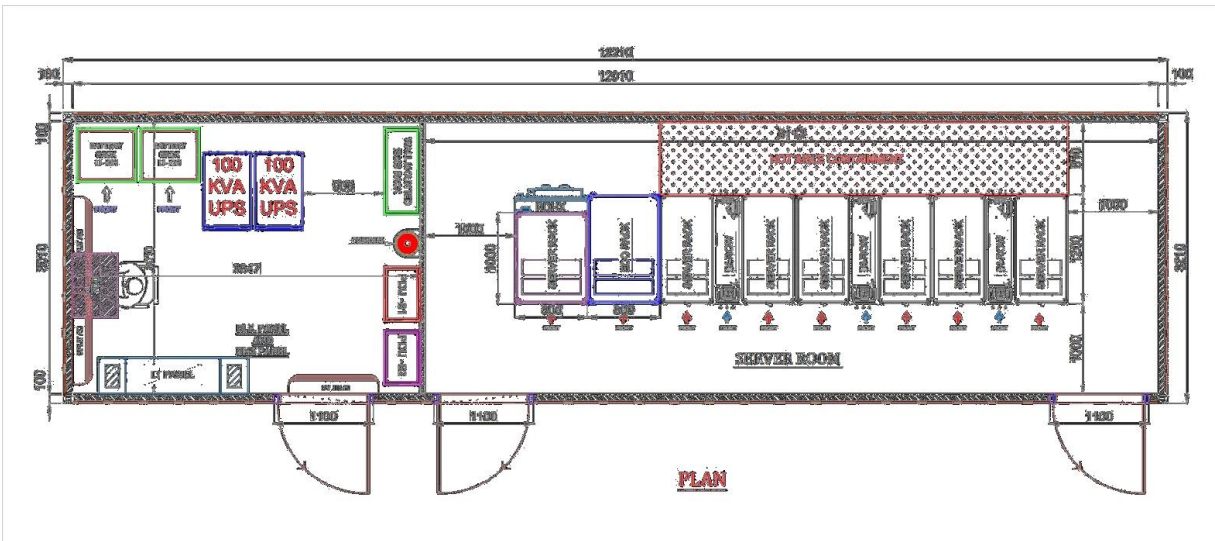
This containerized modular data center is a factory-integrated platform engineered to deliver high-density compute capacity in a compact, rapidly deployable enclosure. The platform consolidates power, cooling, rack, monitoring, fire and security systems into a single pre-tested container, reducing on-site construction dependency and deployment time.

The configuration supports three differentiated compute environments within one container: a high-density server row, a self-contained edge rack zone, and a high-density Rear Door Heat Exchanger (RDHx) rack.

Parameter	Specification
Container Type	Non-ISO 40 ft modular data center container
Total IT Load	93 kW
Rack Count	8 racks total: 6 High-Density Server Row + 1 Edge Rack + 1 high-density RDHx rack
Cooling Basis	DX in-row precision cooling, DX RDHx cooling, electrical room split ACs
Power Basis	2 x 100 kVA centralized online UPS for IT load, 3 kVA integrated UPS for Edge Rack
Zoning	Dedicated electrical room and server room within one container envelope

2. Solution Architecture

The container is organized into two primary zones: an electrical infrastructure zone and a server room zone, providing operational separation between power support systems and IT equipment while maintaining a compact, serviceable footprint.



Container layout and system zoning — electrical room and server room within a single 40 ft envelope

Architecture Component	Configuration
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Container	Non-ISO 40 ft modular container with integrated electrical and server zones
High-Density Server Row	6-rack high-density row with hot aisle containment
In-Row Cooling	3 nos. DX in-row precision cooling units
Edge Rack	Self-contained rack with integrated UPS, cooling, PDU and monitoring
High-Density Rack	Rack with DX-based RDHx cooling for high thermal loads
Fire System	Clean agent fire suppression and fire detection system
Monitoring	BMS/EMS integration with environmental, power, safety and security monitoring

Design intent:

- Support three deployment models inside one container: high-density server row, self-contained edge rack, and RDHx high-density rack.
- Minimize on-site dependency through factory integration, pre-wiring, pre-testing and controlled assembly.
- Improve cooling effectiveness through local heat capture, hot aisle containment and direct in-row/RDHx heat removal.

3. Container and Physical Infrastructure

Container Element	Specification
Structure	Double-walled steel sandwich panel construction with fully welded/bolted structural framework
External Surface	2 mm CRCA steel with high corrosion resistance and exterior surface treatment
Internal Surface	1.5 mm CRCA steel lining
Insulation	50 mm PUF insulation infill for thermal performance
Floor	Steel plate floor with anti-static finish and thermal barrier
Load Capacity	Base structure designed for 1,250 kg/sq. m load bearing capacity
Doors	2-hour fire-rated doors at entry points
Roof	Sloped roof surface on both sides to avoid water accumulation
Ingress Protection	IP55 shelter rating with IP65 cable entry glands
External Dimensions (L x W x H)	12,210 mm x 3,210 mm x 3,200 mm
Internal Dimensions (L x W x H)	12,010 mm x 3,010 mm x 3,000 mm

Environmental Design Criteria

Parameter	Design Criteria
Outdoor Ambient	5 deg C to 55 deg C, up to 90% RH
Server Inlet Condition	22 deg C +/- 1 deg C
Server Room RH	50% +/- 15%
Altitude	Up to 1,000 m
Shelter Protection	IP55 shelter rating, IP65 cable entries
Fire Rating	2-hour fire-rated doors and enclosure approach

4. Power and Electrical Architecture

The electrical system provides reliable power intake, UPS-backed IT distribution, raw power support for cooling and lighting, non-IT UPS support for monitoring and safety systems, and organized power distribution throughout the container.

Electrical Parameter	Specification
High-Density Server Row IT Load	60 kW through centralized IT UPS
High-Density Rack IT Load	30 kW through centralized IT UPS
Edge Rack IT Load	3 kW through integrated 3 kVA online UPS

Centralized UPS Selection	100 kVA x 2 nos. online UPS configured for high availability
Non-IT UPS Selection	4 kVA UPS with VRLA battery for BMS, safety and emergency systems
Total Raw Power Requirement	139.00 kW
Total Power with Losses	141.78 kW
Main Current Basis	232.06 A
DG Capacity Basis	196.92 kVA
Transformer Capacity Basis	175.04 kVA

Distribution philosophy:

- Main utility supply terminates at the LT panel and distributes to UPS systems, raw power DBs and auxiliary systems.
- IT load is supported through centralized online UPS systems and distributed via PDUs to High-Density Server Row and high-density racks.
- Edge Rack is self-contained with its own localized UPS and distribution for the edge load.
- Lighting, split AC, cooling ODUs and miscellaneous loads are segregated for operational clarity and maintainability.
- Earthing, bonding, cable trays and cable management are included to maintain safety and installation discipline.

5. Cooling and Thermal Architecture

The cooling concept removes heat as close to the source as possible. The High-Density Server Row uses DX in-row precision cooling paired with hot aisle containment; the high-density rack uses RDHx cooling at the rack rear; Edge Rack has its own integrated cooling system.

Thermal Design Item	Specification
High-Density Server Row Heat Load	60 kW
High-Density Server Row Cooling Type	DX in-row precision cooling
In-Row Units	3 nos. x approximately 31 kW / 9 TR class units
High-Density Server Row Redundancy	N+1 cooling configuration
Containment	Hot aisle containment for airflow segregation
High-Density Rack Heat Load	30 kW
High-Density Cooling Type	DX-based Rear Door Heat Exchanger
Edge Rack Cooling	Integrated rack cooling for approximately 3 kW edge IT load
Electrical Room Cooling	DX split AC units for electrical/UPS room temperature control

6. Rack Systems and IT Support Infrastructure

6.1 High-Density Server Row Solution

The High-Density Server Row zone is the primary high-density row within the container, configured for six IT racks at 10 kW design load per rack, supported by hot aisle containment and DX in-row precision cooling.



High-Density Server Row arrangement with hot aisle containment and in-row cooling

High-Density Server Row Parameter	Configuration
Rack Quantity	6 nos.
Rack Size	600 mm x 1200 mm
Rack Height	42U / 45U as applicable
Design Load	10 kW per rack
Total High-Density Server Row IT Load	60 kW
Cooling	DX in-row cooling
Containment	Hot aisle containment
Cooling Redundancy	N+1

6.2 Edge Rack Solution

Edge Rack is a compact, self-contained rack platform suited to edge computing, network equipment, control systems, monitoring systems and remote IT applications, combining localized cooling and UPS within a single rack enclosure.

*Edge Rack self-contained rack solution*

Edge Rack Parameter	Configuration
Rack Quantity	1 no.
Rack Size	800 mm x 1200 mm
Rack Load	3 kW
Cooling Type	Integrated rack cooling
UPS	Online UPS, 3 kVA
Monitoring	Integrated environmental monitoring
Deployment Type	Self-contained edge rack

6.3 High-Density RDHx Rack

The RDHx rack targets high-density IT deployments where rack-level heat capture is preferred. Hot exhaust air passes through the rear door heat exchanger and is cooled before discharge into the room, reducing hot-spot risk and room heat accumulation.



High-density RDHx rack cooling concept

RDHx Parameter	Configuration
Rack Quantity	1 no.
Rack Size	800 mm x 1000 mm
Rack Load	30 kW
Cooling Technology	Rear Door Heat Exchanger
Cooling Medium	DX-based RDHx
Heat Removal Method	Rear-door air-to-refrigerant exchange
Suitable Applications	AI, GPU, HPC and blade-server environments

7. IBMS, Fire, Safety and Security

An integrated monitoring, safety and security layer provides operational visibility and alarm management across the containerized infrastructure, monitoring power, cooling, environmental, fire and security parameters from a central point.

Subsystem	Function
BMS / EMS	Centralized monitoring layer for power, cooling and environmental parameters
Fire Alarm System	Fire detection panel, smoke detection, hooters, strobes and manual call points
Gas-Based Suppression	Clean agent fire suppression system with cylinder and release controls
Water Leak Detection	Detection cable / sensors in critical areas
Rodent Repellent System	Protection support for cable and equipment spaces
Access Control	Controlled entry to container / technical areas
CCTV	Security surveillance for operational visibility
PA / Annunciation	Alarm and voice / notification support where applicable

8. Compliance and Standards Reference

Standard / Reference	Application
ANSI/TIA-942	Data center infrastructure design reference
BICSI-942 / BICSI data center practices	Data center design and installation guidance
ASHRAE TC 9.9	Data center environmental conditions and thermal design basis
NFPA	Fire detection and suppression safety references
IEC Standards	Electrical safety and equipment compliance references
ISO Standards	Container, fabrication and quality process references

9. Deployment Methodology

Major systems are factory-assembled, wired and tested prior to dispatch, with site activity focused on placement, final interfaces, outdoor units, validation and handover.

Stage	Activity
1. Engineering Freeze	Finalize technical drawings, scope and execution plan
2. Factory Fabrication	Container structure, partitioning, doors, flooring, cladding, insulation and painting

3. Equipment Integration	LT panel, UPS, PDUs, cabling, racks, containment, cooling units and monitoring components
4. Pre-FAT Checks	Visual inspection, continuity checks, insulation resistance, mechanical checks and functional readiness
5. Factory Acceptance Test	Joint checklist-based verification before dispatch
6. Shipping / Dispatch	Preparation for transport with protection of installed equipment
7. Site Installation	Placement, final connections, Edge Rack installation, RDHx installation and ODU installation
8. Testing & Commissioning	Power-up, cooling validation, alarms, IBMS checks, fire interfaces and operational handover