

Technical Specification

Prefabricated 110 KW IT Module



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1. Introduction

1.1. Context

The purpose of the document is to introduce and present the technical specification of the 90 KW All In One Datacenter Module offered by Schneider Electric.

This solution consists of a constructive solution of equivalent quality to a proper room dedicated to IT.

The environment has been designed to provide the following qualities:

- Usability for IT and technical operations
- Security: Mechanical, Electrical, Cooling
- High quality, robust structure
- Reduced time to acquire and deploy

1.2. Main benefits

Prefabricated Datacenter Modules are the latest trend in the datacenter industry intended to decrease the time to acquire and deploy new datacenter capacity, improve the predictability and reliability of a new datacenter build and reduce upfront and ongoing capital expenditures.

All equipment in the proposed module are pre-installed and tested in our factories, reducing on-site construction risks and reducing time allocated for site works and commissioning.

Schneider Electric is a market leader in the data center business worldwide with complete integrated solutions including prefabricated modules, electrical distribution, cooling and IT space. Our installed base gives us a thorough knowledge of data center market evolution, future needs and a understanding of business challenges.

1.3. Scope of Work

This proposal covers a complete prefabricated module

This document mainly covers the following topics:

- Enclosure structure and design
- UPS
- Electrical distribution
- Cooling
- IT Infrastructure (Racks, rack and row level power distribution)
- Fire suppression and detection
- Monitoring

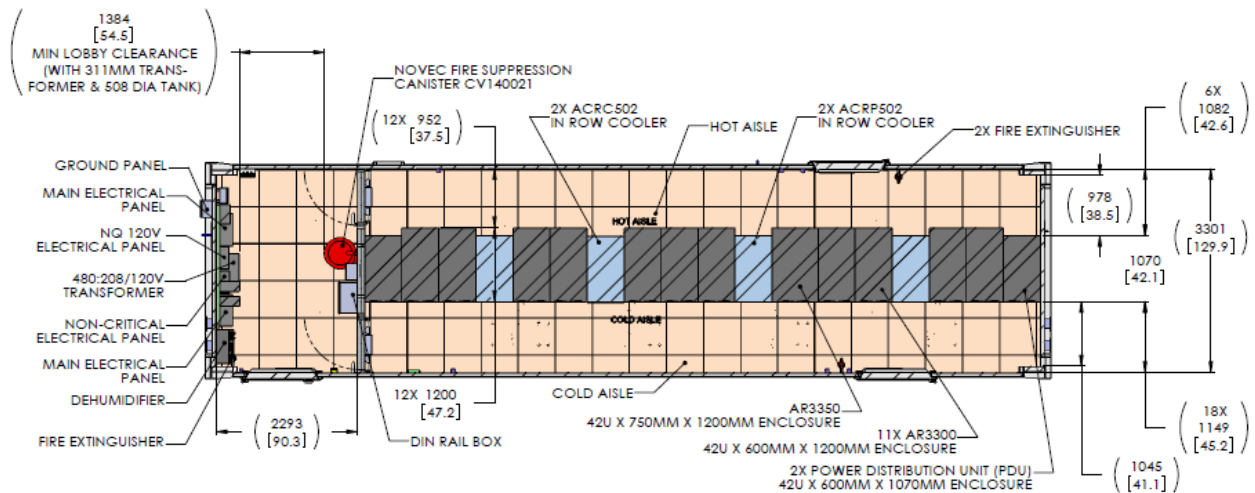
2. Prefabricated Datacenter Module

2.1. Introduction

The following proposal is for an All-In-One prefabricated IT Module that is a separate prefabricated structure. This module provides the complete functionality for a 90 KW Datacenter environment providing power, cooling, and access for an IT environment

2.2. Concept and Dimensions for Prefabricated Module

2.2.1. Prefabricated Solution for 12 Racks



Solution for 12 racks includes:

- 1 x Basic Module: 45' (12.2m) x 11.5' (3.5m) x 11.8' (3.6m) (LxWxH)
- (2) Modular Power Distribution, distributing power from UPS protected input feed to each IT rack with branch circuit monitoring. Input Voltage 480 VAC, Output Voltage 415 VAC
- Electrical configuration
 - General power, lights and HVAC on non-critical power (separate feed).
 - 2N Distribution to IT racks on UPS power.
- Cooling – (2) InRow RC (with humidity control) + (3) InRow RC, N+1 configuration
 - Cooling capacities are nominally rated for 14 degree C differential between hot and cold aisles, performance may vary based on load conditions.
 - Cooling Capacity is calculated based on 15 degree C water temperature and 35% glycol
- Racks – NetShelter SX Enclosures

- (11) NetShelter SX, 600x1200x2000 (WxDxH),
 - (1) NetShelter SX 750x1200x2000 (WxDxH)
- Metered Rack Power Distribution – (22) 3 Phase 20A Metered Rack PDU
- Netbotz 570 environmental monitoring system monitoring the following
 - Internal temperature
 - Internal humidity
 - Leak detection
 - External Door Status
 - Security camera monitoring
- Struxureware DC Expert Basic for overall Datacenter Monitoring
- Automatic fire extinguishing system
- Cable glands for power, refrigerant piping, and fibre entrance into the module
- The entire assembly will be classified and labeled via Underwriters Laboratory (UL) utilizing the QXRA program – “prefabricated industrial commercial buildings and units”
- Structural calculations to be performed on all units per the site conditions. A professional engineer stamp can be provided with additional fee

2.3. Structural design

Structural framework will be made of steel with a fully welded design to support the installed equipment.

2.3.1. Enclosure Frame Design

The enclosure is designed to be weather proof, insulated and to be suitably robust to provide durability during its intended lifetime.

The enclosure will be constructed with interlocking sheet metal wall and roof panels attached to a structural welded steelwork base frame. All steelworks will be built up by means of automatic or semi-automatic welding. All exterior welding, including that on base structure, will be continuous to give watertight properties. All the welds, will have full penetration without undercutting or porosity.

2.3.2. Floor

The floor shall be ¼” minimum steel plate. The floor panels are to be securely attached to the base frame members and to be stitch welded to adjacent floor panels. If the floor panels need to be removable, they will be screwed to the base frame members with countersunk screws that are flush to underflush with the floor top surface.

The underside of the container is insulated. The sheet metal base pans and side walls of the weldment are insulated with closed cell polyurethane spray foam insulation to provide minimum R-11 thermal insulation.

2.3.3. Wall and Roof Assemblies

The walls and roof are constructed as prefabricated and pre-coated interlocking sheet metal panels. Typical sheet metal thickness is 2.0mm. The wall panels are attached to the base steelwork frame and to each other in a watertight manner using self drilling sealing type screws or sealing type rivets. Fiberglass insulation will be installed between the panels and interior wall. Thermal insulation of the walls will be to R-13.

The standard construction of the enclosure walls will not have a fire rating. The enclosure walls will be designed to allow an optional, alternate construction of walls with 1 hour fire rating and listed per UL 263. Class B or better rated materials (flame spread 26-75, smoke developed 0-450) per UL 723 shall be used.

2.3.4. Roof Assemblies

Roof panels are attached to the wall structure and to each other in a watertight manner using self drilling sealing type screws or sealing type rivets. Roof panels will have 2 degrees minimum pitch to allow water runoff. There shall be no instance where water may pool on the roof.

2.3.5. Doors

Steel doors with polystyrene core are provided. Dimensions of the doors are 3' wide x 7' High. Door construction meets requirements of ANSI A250.8-2003 (SOI 100).

The doors should be positioned per the detail drawing specification. Door and door frame to accommodate optional electronic entry system. The door core will include insulation to provide minimum R-6 thermal insulation.

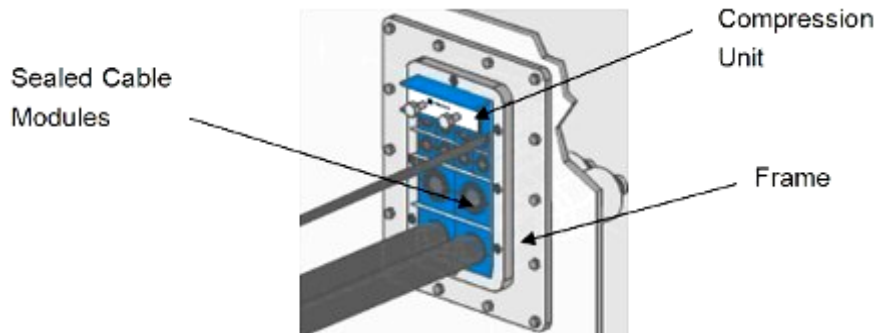
Optional constructions with 1 hour fire rated walls will require that the door assembly be ¾ hour minimum fire rated. It shall be tested to NFPA- 252 as verified and listed per UL10C (for NAM).

All Doors supplied with

- external locking mechanism
- frame and threshold
- gasket
- door closer hardware
- Aluminum panic bar

2.3.6. Cable Glands

Roxtec cable glands will be installed at all cabling and piping interface points that enter or exit the module. Cable glands provide thermal, fire, and water protection for the module. The cable gland is easily configurable to adapt to the number and dimensions of cables and pipes that enter the module as it provides isolation and protection fitting its compression unit.



2.3.7. Air Renovation System

Each datacenter module is equipped with an air renovation system which will refresh the air inside the module with outside air at a rate to comply with local regulations. An overpressure damper is installed in the module to allow for removal of air inside the module.

2.4. Technical Specifications

The module is designed to provide a controlled environment suitable for equipment and personnel. The units will be capable for delivery and installation on site without deformity or failure with a max deflection no greater than $\frac{1}{4}$ ".

2.4.1. Shock-load

Building module units can withstand normal transportation conditions before installation on the site, without deformations or damage.

2.4.2. Wind load

- The module can withstand wind speeds up to 130 mph. as defined by BS6399 1997 Part 2 'Loading for Buildings – Code of Practice for Wind Loads

2.4.3. Roof load

The module can withstand roof loads up to 50psf

2.4.4. Floor load

The module can withstand floor loads up to 250psf across the entire floor structure. Specific bracing for heavy components such as battery cabinets are provided.

2.4.5. External temperature range

The enclosure is rated to operated in -25°C to 45°C (-13°F to 113°F) environments. External cooling equipment needs review for suitability in high or low ambient conditions.

2.4.6. Internal environmental conditions

The internal conditions will maintain ASHRAE 90.1 recommended temperature and humidity ranges.

2.4.7. Operating Altitude

The performance of equipment such as Cooling, switchgear, and UPS are affected by the operating altitude. The details are contained in the specification section of each integrated equipment will clarify the limits and derating requirements t higher altitudes.

2.4.8. Fire resistance

1 hour fire resistant construction for enclosure walls, roof, and doors is provided as an option

2.4.9. Painting

Paint will be Schneider White, color RAL 9002

Surface Preparation

1) All steelwork surfaces prior to forming or after will be de-greased and shot blasted to Swedish Standard SA 2.5 to obtain the surface roughness at 25 to 35 microns which can result in the removal of all the rust, dirt, mill scale and all other foreign materials.

2) All fasteners such as bolts/nuts, washers, self-tapping screws, which are not mentioned in this Spec. will be electro zinc plated to 13 Microns minimum, unless specified otherwise.

3) Sealant is applied to the perimeter of the floor, all overlapped joints, all holes for bolts and nuts and all places where water may leak to prevent water entry.

Steelwork Frame Coating

1) Prior to Assembly

All the structural steel surfaces will be coated with primer paint immediately after shot-blasting.

2) After Assembly

All the weld joints will be shot-blasted to remove all the welding fluxes, spatters, burnt primer coatings caused by welding heat, and other foreign materials, and followed with the primer paint operation immediately.

External paint color and logos can be modified for customer specific requirements.

2.5. Mounting Pad support

The module must be placed on a foundation with continuous support for the perimeter walls. The foundation must be level and engineered to support the final total load of the installed and operational module.

2.6. Lifting elements

Module is equipped with appropriate lifting points located on the base of the frame.

3. Electrical System

Following is the description of the electrical system provided inside the module.

3.1. Components

- **Main Input Breaker Enclosure** (2) Breaker Enclosures including 400A Breaker feeding the Modular Distribution Power Distribution Units from a UPS protected source
- **30 KVA 480/208 V Transformer:** A wall mounted transformer to create 208.120 Volt supply for house loads such as lighting, fire suppression, and convenience outlets
- **Non Critical power panel:** A small 208V panel fed by the 30 KVA transformer to feed house loads.
- **Modular Power Distribution:** (2) Modular power distribution unit part # PDPM175G6H providing power distribution from the critical inputs to each rack. The Modular Power Distribution unit accepts 480V and transforms input power to 415V before feeding power to the rack
- **Rack PDU:** (24) Metered rack PDU APC Single-phase 415V 20A 3 Phase power, part # AP8881.
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- **Main Power Cabling:**

- (2) Input power feed from UPS protected power source (A +B 2N Configuration)
- (2) power lines between main panel and each Modular Power Distribution Unit
- Power connection to the racks provided by integrated modules included in the modular power distribution unit.
- (1) Input power feed from non-UPS protected source
- Power lines to all internal support equipment from non-critical feed

- **Lighting:**

- (4) 4' 64W Light Fixtures are installed above each aisle in the rack space.
- (2) 2' 64W Light Fixtures installed in the lobby area
- The above light fixtures are controlled by a single lighting control. Additional controls can be added or upgraded as an option.

- **Emergency lighting:**

- (3) Royal Pacific Limited Exit Sign/Emergency lighting block mounted above each door

- **Additional Power Metering**

- Additional power meters can be added to the input panels as an option.:

3.2. Grounding

The module includes an integrated grounding system. The customer will supply a ground from the external system to a grounding bar on the outside of the module. All internal components will be grounded to this bar via the internal electrical system. The module is designed to connect to a TN-S type grounding system.

4. Fire Suppression System

The fire protection system is designed to prevent, detect and extinguish possible fires inside the rooms. This will be an automatic system innocuous for people, goods and friendly environment. It will include the following equipments:

- Fire Control Panel
- Smoke Detection System
- Fire extinguishing system based on Novec1230.

4.1. Fire Control Panel

The fire panel controls the fire detection and extinguishing system. The panel can monitor two distinct areas, can trigger at least 2 levels of alarms, and incorporate a delay to evacuate the room before activating the extinguishing system. The system can also be activated by a manual switch attached to the panel.

This solution will implement an ANSUL AutoPulse 542R fire panel with following features:

- Suitable for multiple types of Suppression: Clean Agent, Carbon Dioxide, Pre-Action Sprinkler/Deluge, and Watermist Systems
- Microprocessor based with hardware and software integration designed to guarantee reliability
- Cross zone, sequential manual release, abort, water flow and supervisory detection types
- Three Class B, Style Y notification appliance circuits rated for 2.0 amps @ 24VDC
- Dedicated release circuits compatible with agent release or solenoid actuation
- Five Class B, Style B initiating circuits
- Optional Class A modules for notification appliances/releasing circuits and initiating circuits
- Alpha-numeric LED display for status and troubleshooting
- Programmable pre-discharge and discharge timers
- Resettable and continuous auxiliary output power
- Small surface or flush mount enclosure with removable door
- Approved for releasing device service and sprinkler supervisory
- Built-in Gentex and System Sensor synch protocol
- Steel enclosure 19" x 16.65" x 5.25"
- Enclosure equipped with .50" wide lip for flush mounting
- **(Additional control panels and features available upon request)**



4.2. Smoke Detector

Smoke Detection is achieved by photoelectric smoke detectors mounted to the roof of the enclosure and spaced evenly among the enclosure. All sensors will be wired to create a single detection circuit wired back to the fire panel.



4.3. Extinguishing system

The automatic fire extinguishing system will be able to extinguish the fire quickly using clean extinguishing agents that don't damage the equipment to be protected. The gas release will be ordered by the fire panel at the second alarm level and once the timeframe expires. A description of the system is provided below

DESCRIPTION

Ansul Clean Agent Containers are used in fire extinguishing systems to store the Clean Agent until a fire develops and the agent must be released. The Clean Agent is retained in the container by a solenoid and an Electric Actuator Assembly. An electric signal initiates the actuator and the Clean Agent is released. The actuator is can be controlled both electrically and manually.

Ansul Clean Agent Containers have passed extensive testing by Factory Mutual and Underwriters Laboratory. Clean Agent containers can be filled in 1 pound (0.5 kg) increments to their maximum capacity.

SPECIFICATION

- Fill Range: 116 to 280 lbs/ft³ (630 to 1121 kg/m³)
- Fill Increments: 1.0 lbs (0.5 kg)
- Valve requirements in accordance with DOT regulations
- Container Construction: Carbon Steel Alloys
- Paint Options: Red (default)
- Container Ratings: DOT 4BW450
- Actuation Methods: Electric/Manual/Pneumatic (capable but used for multiple containers)



APPROVALS

- UL/cUL Listed
- FM Approved

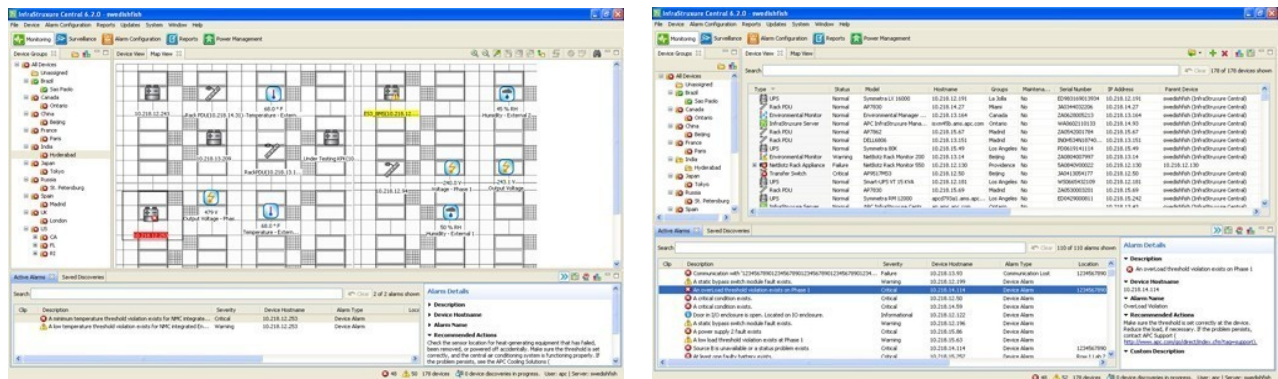
Gas, pipe, pipe fittings, bottle fittings, chrome steel diffusers, stainless diaphragms, manual pulls, system abort button, and protected local labels will be included.

5. Monitoring System

The Data Center Module will be provided with an integrated monitoring system that will monitor the status of the module and report the overall health and any alarms associated with the equipment inside the module.

5.1. Struxureware DC Expert

The module includes one Struxureware DC expert appliance, and the associated cabling and switches to communicate with all equipment in the module. StruxureWare Data Center Expert provides an efficient way for organizations to monitor their company-wide multi-vendor physical infrastructure: power, cooling, security, and environment. Real-time monitoring, user-defined reports and graphs, and instant fault notification and escalation enable quick assessment and resolution of critical infrastructure events that can adversely affect IT system availability. This centralized repository of critical information can be accessed by multiple users from anywhere on the network, creating a consolidated view of the physical data center infrastructure. This open and flexible architecture expands with changing business needs through additional device licenses, add-on surveillance, capacity management and change management modules, and through integration with enterprise and building management systems.



5.2. Environmental Monitoring

Each Module includes a Netbotz 570 rack mounted appliance that will monitor the environment and provide security monitoring for the module. The Netbotz 570 is a scalable system which will allow additional sensors and devices to be added to the system to scale to the final needs of the user.



The Netbotz 570 system will monitor the following information inside the module:

- 1 temperature point mounted on the front of each rack
- 1 humidity level in the cold aisle
- The status of all the external doors
- Security cameras at each external door location
- The dry contact alarm status on the fire panel.

6. Internal Module Components and Design

6.1. Racks

Netshelter SX

APC NetShelter rack enclosure maximizes flexibility with a progressive, non-proprietary feature-set as well as an extensive line of scalable accessory products to address current needs and adapt to future technology trends. APC NetShelter® rack systems provide a progressive feature-set available in a vendor-neutral rack environment while allowing the user the flexibility to quickly adapt to emerging trends. Available in a variety of heights and widths, NetShelter racks and enclosures support can adapt of any type of applications.



6.1.1. Cable Management

The solution includes all overhead cable management accessories (power and data cable). This greatly simplifies the cable management in the IT room in creating a self-contained cabling, eliminating the need to use space under a raised floor and permitting better organization in non-raised floor environments.



6.1.2. Rack Power Distribution

APC Metered Rack Power Distribution Units (PDUs) provide active metering to enable energy optimization and circuit protection. User-defined alarm thresholds mitigate risk with real-time local and remote alerts to warn of potential circuit overloads. Metered Rack PDUs provide power utilization data to allow Data Center Managers to make informed decisions on load balancing and right sizing IT environments to lower total cost of ownership. Metered Rack PDUs include real power monitoring, a temperature/humidity sensor port, locking IEC receptacles, and ultra low profile circuit breakers. Users can access and configure Metered Rack PDUs through secure Web, SNMP, or Telnet Interfaces which are complimented by Struxureware Centralized Management platforms.



6.2. Room Power Distribution

Modular Power Distribution mitigates the need to predict the future requirements and configurations of your data center. This visionary power distribution system is agile enough to match the needs of your data center today and enable rapid expansion or reconfiguration in the future. Power distribution management is simplified by output metering, branch current/circuit monitoring and auto-detection by the StruxureWare suite of management options. When demand rises and expansion becomes necessary, simply plug in new [Power Distribution Modules](#). The factory-assembled modules, which include circuit breaker, power cord, and power connection, can be installed in mere minutes. There are multiple power ratings and power cord lengths for low to high power, guaranteeing compatibility and quick, easy, and convenient installation.



6.3. Cooling

The InRow Chilled Water product design closely couples the cooling with the IT heat load. This design prevents hot air recirculation, while improving cooling predictability and allowing for a pay as you grow environment. Available with and without humidity control, these products are designed to meet the diverse requirements for medium to large data centers. Data center operators looking to improve efficiency or deploy high density servers will benefit from the modular design of the InRow Chilled Water products. The intelligent controls of the InRow Chilled Water products actively adjust fan speed and chilled water flow to match the IT heat load to maximize efficiency and address the dynamic demands of today's IT environments.



7. Exclusions

The following list gives the limit of our scope of supply. All works listed hereafter are excluded from this proposal.

General:

- Any item not specifically listed in the proposal
- Freight to the final site
- Unloading of the module into its final position
- Project management services

Civil works:

- Any outdoor and indoor civil works (e.g. trenches, preparation of foundations, concrete slabs, fireproof walls, doors, holes, stairs...)
- Any opening or drilling in the building existing walls and roof
- Any scaffolding, builders work or allied tradesman work
- Any ceiling or overhead plenum
- Installation of condensers on external slab
- Attachment of piping between condensers and module
- Any steps or ramps required for doorways
- Design and approval of any civil works with local authority

Data cabling:

- Any IT cabling and fiber optics installation

Electrical cabling:

- Any electrical installation work outside the prefabricated building solution.
- Any digging, trenches and soil preparation for fuel tank and piping network installation
- The supply and installation of the incoming LV electrical supply from the Gensets
- The supply and installation of the incoming LV electrical supply from the normal source

Electrical equipment:

- Emergency gensets including fuel tanks

Others

- Specific compliance to any unique local building codes unless expressly noted
- Compliance to Title 24 Part 6 California Energy Code unless expressly noted in section 2
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