PENTAIR

Hoffman™ Schroff™ McLean COOLING TECHNOLOGY

RACK & CABINET SOLUTIONS

EQUIPMENT PROTECTION SOLUTIONS | COMMUNICATIONS

SIX CORE CHALLENGES
FOR TODAY'S DATA CENTERS

The speed of technological change has created significant new challenges for the data center. Realizing goals of increased processing capacity, greater efficiency, a smaller physical footprint and reduced operational costs are met with both expected and unexpected consequences. Higher rack densities lead to increased cooling and energy requirements. Multi-vendor systems create complexity. Busy connection pathways are stressed to their limits. And new security threats emerge daily. But with a systemic approach that reaches beyond containment, Pentair Technical Products' Hoffman™ brand helps you meet your goals and these evolving challenges.

SCALABLE PHYSICAL INFRASTRUCTURE
Once an IT afterthought, today the cabinet has evolved into a foundation for infrastructure, facilitating cabling, security, thermal management and physical protection. Hoffman cabinets are designed to evolve with the rapidly changing requirements of network demand and equipment.

AIRFLOW MANAGEMENT
BEST PRACTICE The essential solution to airflow management is achieving isolation between chilled supply air and heated return air to eliminate hot spots, lower energy costs and achieve higher operating efficiencies. Hoffman's cabinet solutions utilize CFD modeling to ensure proper air flow.

ENERGY EFFICIENCY
As data center heat loads increase, energy costs escalate. Hoffman's passive cabinet designs can increase equipment densities by 50% or more through efficient HACA designs, chimney cabinets and HA and CA containment solutions.

HIGH-DENSITY THERMAL MANAGEMENT
BEST PRACTICE Today's high-density IT equipment creates thermal challenges that fall outside the designed capacities of traditional premise networks and data center room cooling. Effective management requires the ability to address thermal issues on a room, row and rack basis for optimal energy efficiency.

CABLE MANAGEMENT & PERFORMANCE
BEST PRACTICE The ability to effectively organize and manage increasingly-dense network connections begins with a cabinet with clearly defined pathways for network cables. Defined cable pathways and bends provide superior organization for MACs and assure optimal data transfer rates.

SECURITY & PROTECTION
A wide selection of access control provisions combines with Hoffman's heavy-gauge steel and welded construction to create cabinets that thwart destructive attacks and breach attempts while allowing convenient access for approved personnel.

ROBUST AND SCALABLE CABINET, COOLING AND PATHWAY SOLUTIONS, TRUSTED IN THE MOST DEMANDING DATA ENVIRONMENTS WORLDWIDE

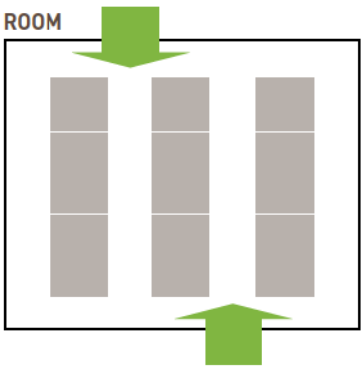
RETHINKING DATA CENTER COOLING
THREE CORE ARCHITECTURES

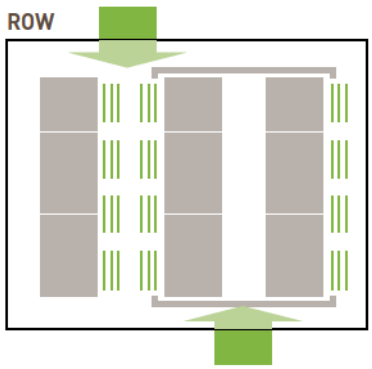
AS RACK DENSITIES INCREASE, so does waste heat in the data center. The demands of modern IT equipment has forced re-examination of the architectures designed to keep equipment cool and reduce energy use.

In traditional **ROOM-BASED COOLING,** where CRAC units will cool the entire room, the standard response to increased load is to reduce the supply air temperature set point and increase the speed of cooling equipment to provide additional CFM. However, air mixing as a cooling strategy is increasingly insufficient – unable to keep pace with small heat loads exceeding 1-2kW per rack, at a time when densities of >20kW are common.

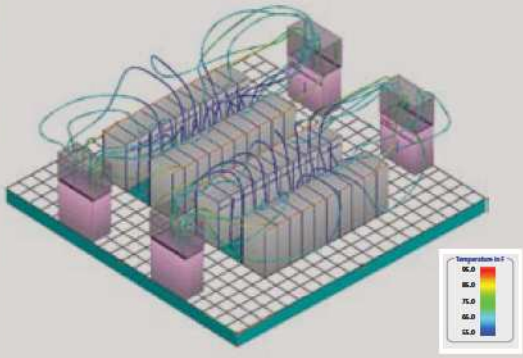
Using **ROW-BASED COOLING,** CRAC units are integrated within a row of IT equipment, rather than cooling the entire room. The airflow paths are shorter and more clearly defined, eliminating hot and cold air mixing for greater efficiency. New containment strategies can further enhance this approach.

RACK-BASED COOLING has the CRAC dedicated to a specific cabinet. The airflow paths are extremely short and are precisely defined. While this can provide cooling for the highest densities, it also is limited from sharing any cooling and can have poor efficiencies on lower IT loads.

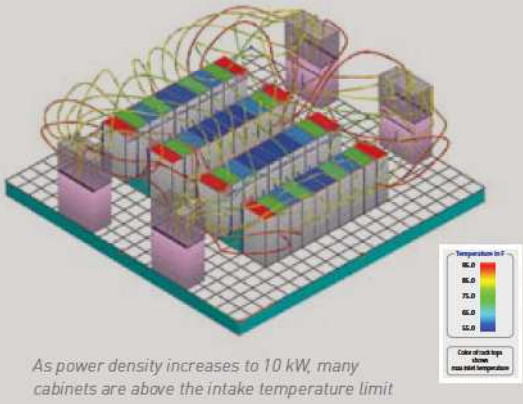




TRADITIONAL COMPUTER ROOM AIR CONDITIONING (CRAC) SYSTEMS CANNOT EASILY OR COST-EFFECTIVELY SOLVE COOLING PROBLEMS CAUSED BY INCREASED POWER DENSITY



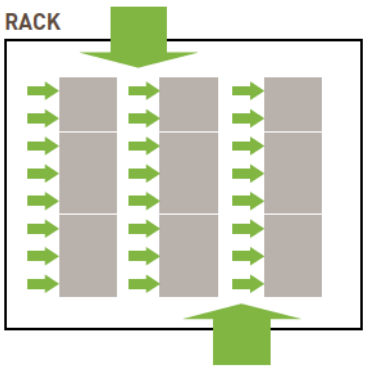
A 5 kW per cabinet hot-aisle/cold-aisle environment



As power density increases to 10 kW, many cabinets are above the intake temperature limit

Every data center is unique, with different equipment, rack densities, layout and other obstacles to efficiency. For this reason, many are adopting **HYBRID COOLING ARCHITECTURES** consisting of multiple cooling strategies applied to meet specific challenges. For instance, a room's low-density equipment (1-3kW/rack) can be served by a CRAC, while higher density servers and equipment can be isolated into rows which are cooled by CRAC contained to the aisle of cabinets. Likewise, ultra high-density racks (>30kW) can be isolated with cooling augmented by rack-based CRAC units.

Loads, distribution, airflow and efficiency are the key performance factors which determine the optimal design for data centers. Hoffman,™ Schroff™ and McLean™ are pioneers and partners who will help you adopt an effective strategy based on your unique requirements.

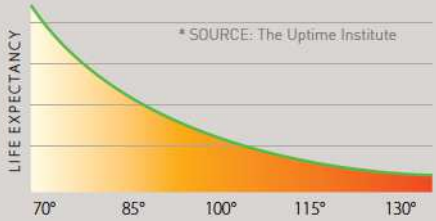


COOLING ARCHITECTURES

A row-based cooling architecture offers significant return in performance, lifecycle costs and adaptability, but a hybrid approach also incorporating room- and rack-based architectures directed to isolated challenges, may be the best solution

HOW MUCH DOES HEAT BUILD-UP AFFECT EQUIPMENT?

Heat build-up diminishes server performance and equipment lifespan. For every 18° F (10° C) that internal cabinet temperatures rise above normal room temperature, the life expectancy of the enclosed electronics drops 50%*.



THERMAL MANAGEMENT
IN SERVER CLASS APPLICATIONS

CONTINUUM OF COOLING – SERVERS AND NETWORK INFRASTRUCTURE

Hoffman™ includes a progression of server cabinets designed to balance the thermal load of your devices, ensuring optimum performance and service life. From standard passive cooling features that inherently dissipate heat, to active, ducted and air-conditioned solutions that maintain proper operational temperatures in high-density environments.

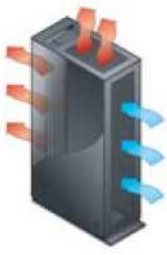
HIGH-DENSITY CONTAINMENT

The Hoffman™ VARISTAR™ cabinet platform and an LHX series air/water heat exchanger combine to deliver the ultimate containment solution for high-density equipment. Flexible and scalable, VARISTAR Cabinets can dissipate up to 40,000 W with noise levels of less than 55 dB(A).

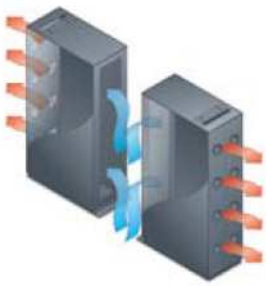
View
online now

THERMAL MANAGEMENT WHITE PAPER

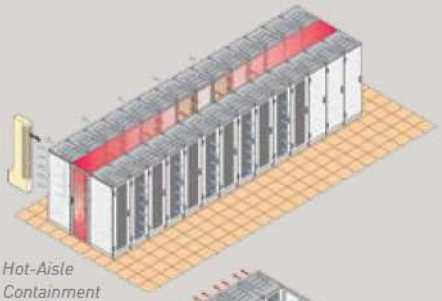
Learn more about effective thermal management strategies including cabinet design, data center layout and passive and active cooling strategies. E-mail ***datacenter@hoffmanonline.com*** *to request our Thermal Management White Paper.*



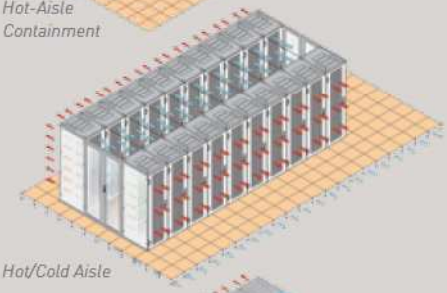
Passive Cooling



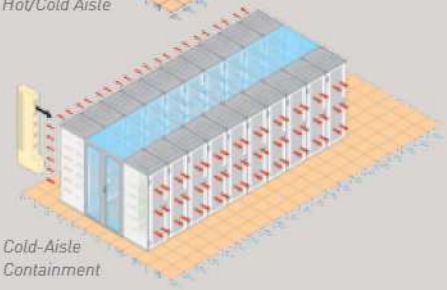
Active - Hot/Cold Aisle



Hot-Aisle Containment



Hot/Cold Aisle



Cold-Aisle Containment

THERMAL MANAGEMENT STRATEGIES

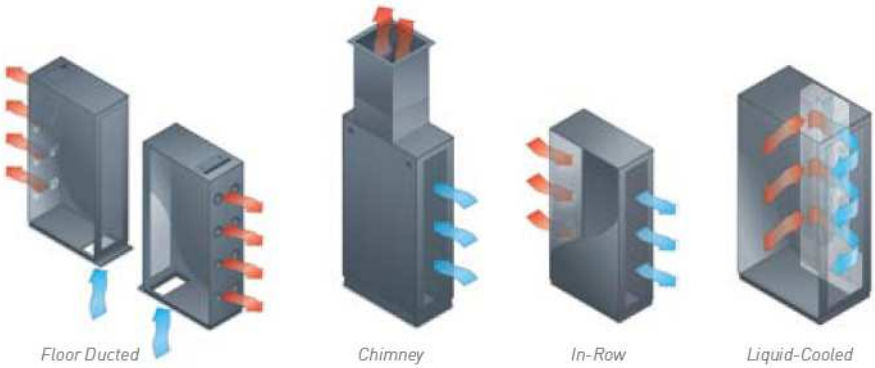
Thoughtful data center layout and cabinet design can significantly affect thermal management efficiencies. In Pentair Technical Products' thermal test lab, engineers have tested a full range of cabinet designs, cooling systems and data center configurations to incorporate the most efficient cooling strategies into our cabinets:

PASSIVE relies on cabinet openings (vents, louvers or perforated panels) and ducting to direct hot air away from IT equipment.

ACTIVE venting fans within the cabinet are used to exhaust hot air. This method may also incorporate chilled air fed into the cabinet.

CHIMNEY utilizes ducting to remove hot air back to the CRAC unit.

HOT-AISLE/COLD-AISLE CONTAINMENT layout uses the concept of containing to manage intake and exhaust air in order to avoid mixing hot/cold air.



Floor Ducted

Chimney

In-Row

Liquid-Cooled

THE HOFFMAN™ ADVANTAGE

PROTECTION TRUSTED BY OVER 90% OF THE FORTUNE 500

HOFFMAN™ NETWORKING CABINETS DO MORE THAN PROTECT YOUR IT EQUIPMENT— they protect your advantage through delivery of solutions tailored to meet your unique requirements. Our cabinets are best-of-breed, integrating complete power, cable and leading thermal management into versatile solutions that anticipate the inevitable changes and increased demands of your growing network. With 50 years of engineering enclosures and cabinet solutions for the world's most demanding environments, we know what it takes to protect the performance of your network. And unlike other companies for whom cabinets are a line extension – at Hoffman, cabinets are at our core.

HOFFMAN™ HAS PROVIDED ENCLOSURE SOLUTIONS FOR 9 OF 10 FORTUNE 500 COMPANIES

CABINETS FOR ANY IT APPLICATION

- Large line of standard solutions with a wide array of modifications and co-development solutions
- Server, communication and network switch cabinets designed for scalability and compatibility with present and future components
- Leader in thermal, cable and power management solutions
- Dedicated solutions for collocation, voice/data, hot/cold aisle, liquid-cooled, containment and NEMA-rated applications
- Complies with all server manufacturers: IBM, Dell, HP, ORACLE/Sun and NetApp

SERVER CABINETS

- Modular server cabinet platforms offering a wide variety of sizes, configurations and versatility
- Passive- and active-cooling configurations and options
- Industry leader in modifications and non-standard requirements
- Chimney and containment models for high density applications

COMMUNICATION CABINETS

- Communication/patch cabinets accommodate high-density cables, patch cords and equipment
- Feature two full-length vertical cable managers in the front of the cabinet providing an essential pathway

NETWORK CABINETS

- Designed specifically for network switches like CISCO's 6509, 6513, 7010 with unique right to left airflow ducting
- Robust cable management
- Hoffman is a Cisco Registered Developer

HIGH-DENSITY CABINETS

- VARISTAR™ LHX air/water heat exchangers deliver closed-system cooling dissipating up to 40 kW of heat per cabinet
- Lowest energy consumption and noise levels
- Vertical configuration of cooling unit provides up to 20% more server space
- Narrow footprint

PROLINE™ FLOTEK™
SERVER CABINET SERIES

THERMAL PERFORMANCE OPTIMIZED SERVER CABINETS

Designed deeper (up to 1200 mm) to house servers and manage power cables, PROLINE™ FLOTEK™ Cabinets rely on optimized passive airflow for thermal management. The cabinets may be placed in data rooms randomly, in hot/cold aisle configurations or in containment applications.

PROLINE™ Cabinets come standard with an adjustable, foam-lined gland plate cable entry to maintain a dust-tight seal

THREE FLOTEK MODELS

- **PC** (Passive Cooling)
- **HCA** (Hot/Cold Aisle) Server Cabinet
- **FD** (Floor Ducted) Server Cabinet

FEATURES

- Fully-perforated front and rear doors and on top allow maximum air movement around equipment; conforms to server manufacturer open space requirements (70% openings)
- Models without side panels gang together quickly for easy data center installation
- Three-point locking pushbutton swing handle provides security
- Rear doors are split for easy access and include 3-point, low-profile, locking swing handle
- Two sets of 19" rack angles support front and rear of equipment; infinitely adjustable from front to rear for positioning flexibility
- Large top gland plate allows easy routing of cable, pre-terminated cables and patch panels. Perforated tops on passive cabinets and solid tops on HCA cabinets.
- Welded frame construction
- Ability to personalize the cabinet for unique thermal, cable and power management solutions

COMMON MODELS (SEE NETWORKING CATALOG FOR COMPLETE LISTINGS)

Model	Size (mm)	Rack Units	Notes
PSCPC20610B	2000 x 600 x 1000	42	Passive Cooling
PSCPC20612B	2000 x 600 x 1200	42	Passive Cooling
PSCHCA20610B	2000 x 600 x 1000	42	Hot Aisle/Cold Aisle w/fans
PSCHCA20612B	2000 x 600 x 1200	42	Hot Aisle/Cold Aisle w/fans

FLOTEK™ MODELS

- **PC** (Passive Cooling)
- **HCA** (Hot/Cold Aisle) Server Cabinet
- **FD** (Floor Ducted) Server Cabinet

PC — *Rear View*

HCA — *Rear View*

FD — *Rear View*

PROLINE™ CHIMNEY
PASSIVE COOLING SOLUTION

EXTREMELY EFFICIENT COOLING FOR APPLICATIONS UP TO 20KW

Hoffman™ passive, direct-duct cooling chimney solutions are key to many green data center initiatives.

- Perforated front door ensures proper equipment intake airflow and a solid rear door prevents hot exhaust air from escaping out the back
- Filler panels should be utilized in front to eliminate bypass airflow around equipment
- Adjustable vertical exhaust duct is located on top to direct hot exhaust out of the cabinet back to the cooling system or CRAC unit
- Exhaust duct is typically connected to the ceiling plenum return; however, this is not necessary if the data center has high ceilings which can provide a sufficient return path

ADVANTAGES OF THE CHIMNEY METHOD

- Many outside studies suggest that the chimney method lowers cooling system costs by at least 25 to 40%
- Low initial capital costs; no ongoing maintenance expenses
- The number of CRAC/CRAH units in the data center could be reduced or the future cooling capacities could be increased
- Outside studies have successfully tested hot air extraction for heat loads up to 20kW

BENEFITS

- Cabinets do not have to be arranged in the typical HACA configuration; there is more freedom for flexible arrangements
- Floor tiles do not need to be dedicated to cabinets; by managing the exhaust airflow, hot spots are eliminated so the cabinet can pull air from anywhere in the data center
- Provides a better design for non-raised floor data centers
- Allows higher set-points on CRAC units and creates higher hot temperature returns, which improves efficiency of air conditioners

COMMON MODELS (SEE NETWORKING CATALOG FOR COMPLETE LISTINGS)

Model	Size (mm)	Rack Units	Notes
PSTD20610B	2000 x 600 x 1000	42	Passive-Chimney
PSTD20611B	2000 x 600 x 1100	42	Passive-Chimney
PSTD20612B	2000 x 600 x 1200	42	Passive-Chimney

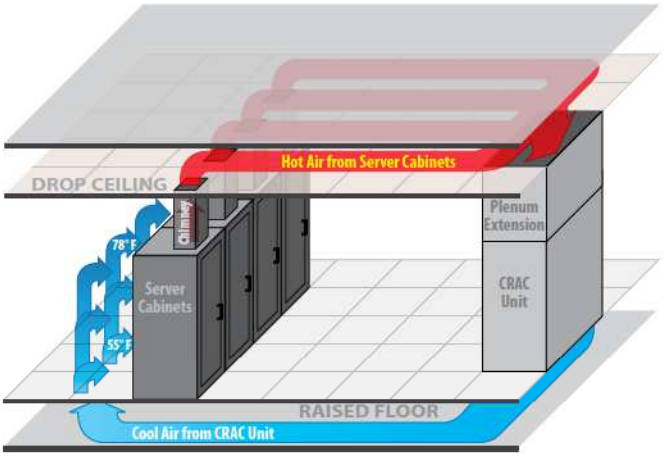
MANAGING EXHAUST AIRFLOW

Hoffman's PROLINE™ Chimney solution exhausts hot air from the cabinet directly into the ceiling plenum, eliminating the problem of hot air recirculation. This very simple, cost-effective approach provides enhanced cooling for your equipment.

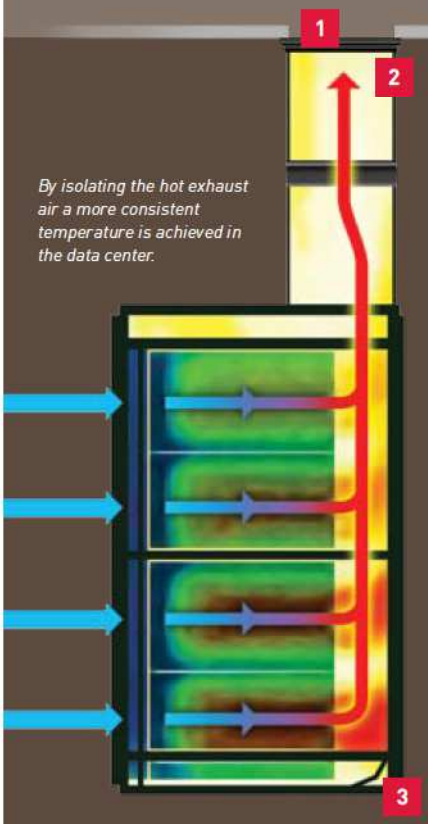
CHIMNEY CABINET DESIGNS

Unique features for the top of the telescoping chimney include S-connectors and edge gaskets to ensure proper connections and an air flow deflector to mitigate hot spots in the base of the cabinet.

1. *Edge bulb gasket*
2. *HVAC S-strips*
3. *Air flow deflector plate*



Passive cooling (chimney) cabinets do a very good job of containing the hot air and directing back to the CRAC unit.



By isolating the hot exhaust air a more consistent temperature is achieved in the data center.

AIR-CONDITIONED CABINETS

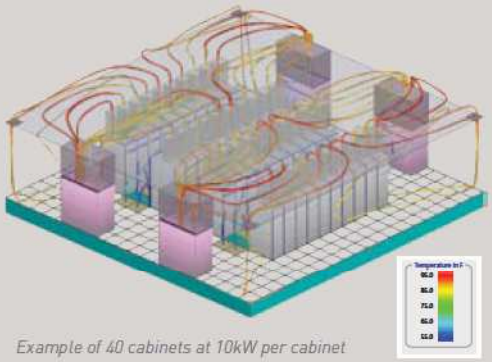
PROLINE™ NEMA-RATED AC CABINETS

PROLINE™ AC Cabinets offer integrated air conditioners, sized to meet your specific cooling requirements. Air-conditioned models provide closed-loop cooling for equipment that must be kept at or below ambient temperatures for optimal performance.

PROLINE™ TYPE 12 AIR CONDITIONER CABINET*

Model	Size (MM)	RUs	Notes
PDCP202078BAC	83.10 x 27.87 x 31.46 (2085 x 708 x 799)	42	Black Communication Cabinet / Active Cooling
PSC20610BAC	83.10 x 23.94 x 39.34 (2085 x 608 x 999)	42	Black Server Cabinet / Active Cooling
PDCP202078GAC	83.10 x 27.87 x 31.46 (2085 x 708 x 799)	42	Gray Communication Cabinet / Active Cooling
PSC20610GAC	83.10 x 23.94 x 39.34 (2085 x 608 x 999)	42	Gray Server Cabinet Active Cooling

*Order AC unit separately



Example of 40 cabinets at 10kW per cabinet utilizing a chimney solution.

VARISTAR™ LIQUID-COOLED HIGH-DENSITY SERVER CABINETS

Historically liquid-cooled cabinets were successful and safely used to cool mainframe computers; however as densities fell, air cooling became more popular. Today, as electronics become more powerful and are packaged more densely into ever-smaller devices, the demands for temperature control within high-density cabinets has risen exponentially. Hoffman™ VARISTAR™ cabinet platform provides the ultimate solution for demanding thermal performance and protection where air cooling methods are insufficient or impractical. The active air/water heat exchanger technology offered in the VARISTAR platform provides optimal levels of cooling efficiency with appreciable energy cost savings.

VARISTAR LIQUID-COOLED CABINETS

Heavy-duty cabinet with microprocessor-controlled LHX air/water heat exchanger offers more effective and more efficient cooling than is possible with air cooling methods.

- LHX unit dissipates up to 40 kW independent of environment; water-based cooling relieves "hot spots"
- 1200 mm depth accommodates all current server types and allows more space for cabling
- LHX unit is slotted into the left or right side of the cabinet leaving the 19" plane usable throughout its height (42U)
- Airflow elements and six fans installed across the entire height ensure a uniform level of heat removal from all components

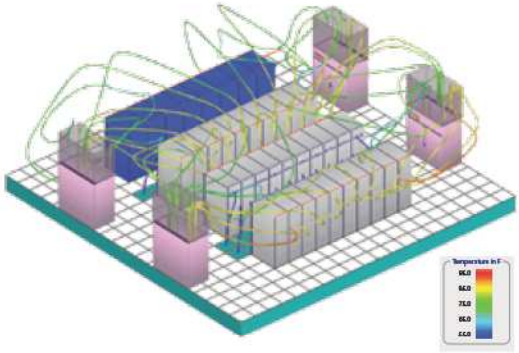
BENEFITS

- Cooling is integrated into an enclosed environment and allows users to monitor their cooling in a more targeted way for high-density loads
- Water can carry and remove about 350 times more heat than air can
- Great solution to add liquid-cooled cabinets to handle all the high-heat loads, thus enabling more capacity for your data center

COMMON MODELS (SEE NETWORKING CATALOG FOR COMPLETE LISTINGS)

Model	Size (mm)	Rack Units	Notes
DV218012LX2	2100 x 800 x 1200	42	Max Cooling 20kW
DV218012LX4	2100 x 800 x 1200	42	Max Cooling 40kW

Flexible and scalable, VARISTAR™ Cabinets can dissipate up to 40,000 W with noise levels of less than 55 dB(A)

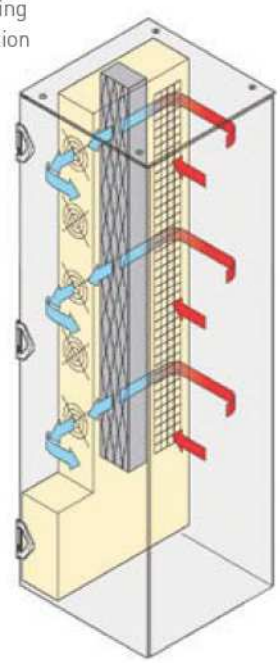


Schroff®
ELECTRONICS CABINET SOLUTIONS

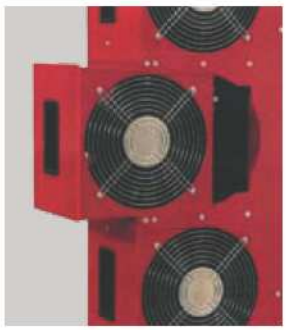
HOW THE COOLING SYSTEM WORKS

The cooling system consists of an air loop and a water loop. The fans of the cooling unit draw warm air from the rear section of the cabinet into an air/water heat exchanger. The air is cooled here and then blown into the front area of the cabinet.

Inside the air/water heat exchanger the heat energy of the warm air is transferred to the medium of water. The air/water heat exchanger is connected to an external reciprocal chiller unit (not supplied with the module), where the water is cooled again.



Functional principle of the air/water heat exchanger



Hot-swap fans during operation

Redundancy via side-by-side installation

NOVASTAR™

Schroff™ brand NOVASTAR™ cabinets provide practical solutions for electronic test and measurement, medical OEM and security-related applications. Cabinets can be supplied with or without glass door. This cabinet has a high tech aesthetic look.

VARISTAR™

Schroff VARISTAR™ Cabinet Platform consists of a modular and flexible basic design and versatile accessories, making it well-suited to numerous electronic enclosure applications, such as general electronics, medical and test and measurement. Cabinets meet the applications requirements of IP55, EMC or seismic deployments.

TECNORACK™

Schroff TECNORACK™ Cabinet Platform offers feature-rich cabinets for electronics and telecommunications equipment. Featuring rugged construction to suit demanding application requirements, cabinets deliver IP55 protection to DIN 40 050 and seismic earthquake protection up to NEBS Zone 4.

POWERLEAN™
IN-ROW COOLING UNITS

HIGH-COOLING CAPACITY, HIGH-EFFICIENCY IN-ROW COOLING FOR HIGH-DENSITY RACKS

Forty percent more efficient than alternative solutions in the marketplace, POWERLEAN™ In-Row Cooling Units can supplement hot aisle/cold aisle raised-floor and non-raised-floor cooling systems by delivering efficient cooling directly to high-density racks – exactly where the cool air is needed the most.

SCALABLE COOLING WHERE YOU NEED IT

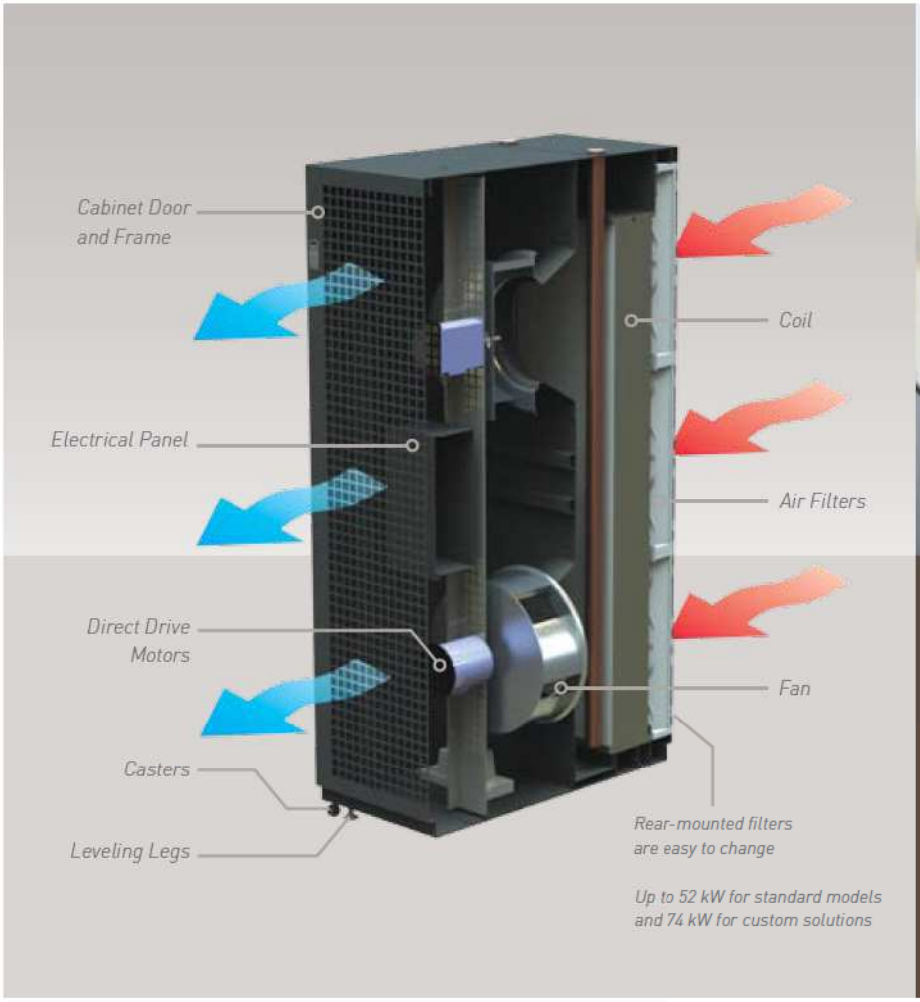
Supporting row-based cooling architectures, POWERLEAN In-Row Cooling Units are ideal for modular data centers and evolving requirements, since they support easy scalability. By eliminating hot spots, POWERLEAN units allow you to accommodate a greater overall server load and future-proof your data center.

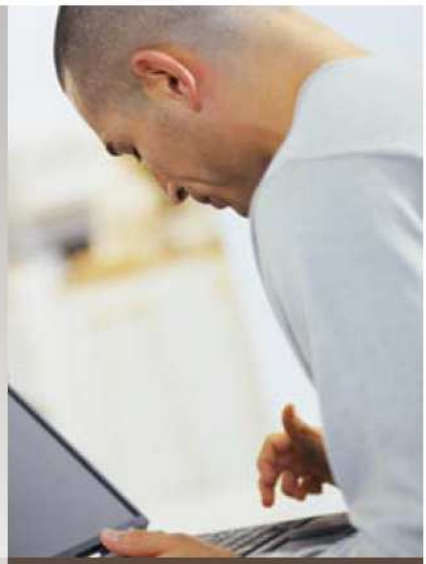
BENEFITS

- Lowest cost of ownership
  - Highly-efficient design utilizes chilled water to significantly reduce energy consumption
  - 82% energy savings (operating costs) compared to a competitor's model
  - Access from the front and back of the unit reduces service time
- Superior acoustic performance for quieter operation; 59.2 dBA
- Versatile speed fan; high-efficiency, direct-drive EC motor
- 460 V, 3-phase power supply; custom voltage operation available
- Ideal for room- and row-based cooling for small to large data centers
- Rack-sized unit for easy data center deployment
- Flexible sizes: 78" x 24" 31 kW and 78" x 36" 52 kW models available
- Custom solutions are available to meet unique application requirements; capacity up to 74 kW available

POWERLEAN™ IN-ROW COOLING UNITS

Model	Catalog Number	Description	Dimensions: W x D x H in. (mm)
21816	PL782442IR3	In-Row Cooling Unit 31 kW	24 x 42 x 78 (610 x 1067 x 1981)
21817	PL783642IR5	In-Row Cooling Unit 52 kW	24 x 42 x 78 (610 x 1067 x 1981)





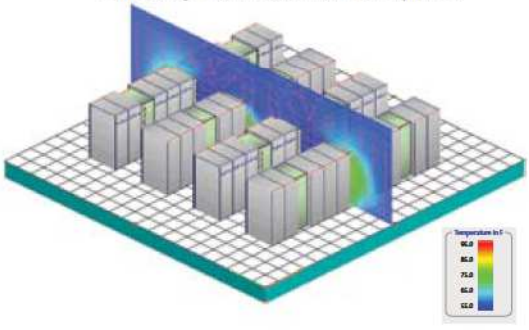
POWERLEAN™ CONTROLLER OPTIONS

There are three controller options with the POWERLEAN unit

1. No controller provided (standard). Allows for easy integration with customer building management system (BMS).
2. Custom controller available upon request. Protocols include SNMP, Modbus, BACnet, etc.
3. Customer provides control solution and we integrate it into the unit.

IN-ROW COOLING – NO RAISED FLOOR

In-Row Cooling Units distributed between the cabinets move cold air closer to heat sources to further overall data center efficiency. No raised floor is required.



POWERLEAN™ ENERGY SAVINGS COMPARISON

	POWERLEAN PL782442IR3	POWERLEAN PL783642IR5	Competitor "A"
Dimensions (W x D x H)	24" x 42" x 78"	36" x 42" x 78"	24" x 42" x 78"
Cooling options*	Chilled Water	Chilled Water	Chilled Water
Capacity, kW	31 kW	52 kW	43 kW
Capacity, tons	9 tons	15 tons	12 tons
Airflow	4,600 CFM	7,600 CFM	6,900 CFM
Power consumption	0.58 kW	0.97 kW	3.3 kW
Cost per kWH cooling per year	$16.39	$16.34	$67.23
Annual operating cost**	$508	$850	$2,891
Energy savings % over competitor "A"	82%	71%	–

*Capacity data based on 45° F entering water, 15° F water rise and 85° F entering air.
**Operating cost based on $0.10/kWH.

PROLINE™ CONTAINMENT SYSTEM
HOT AND COLD AISLES

EFFECTIVELY SEGREGATE HOT AND COLD AIRFLOW WITH THE PROLINE™ CONTAINMENT SYSTEM

Increase data center cooling efficiency, lower energy costs and accommodate raised equipment densities with the easy-to-install Hoffman™ PROLINE™ Containment System. Consisting of aisle doors, ceiling panels and chimney stacks, the PROLINE Containment System encloses the area between rows of cabinets to create contained areas of either cold (intake) or hot (exhaust) airflow. The containment system is designed to work with the company's popular line of PROLINE enclosures and can also be modified to work with other enclosure brands. It is available for use on raised or non-raised floors and fits small to large data centers.

CONTAINMENT SOLUTION ADVANTAGES

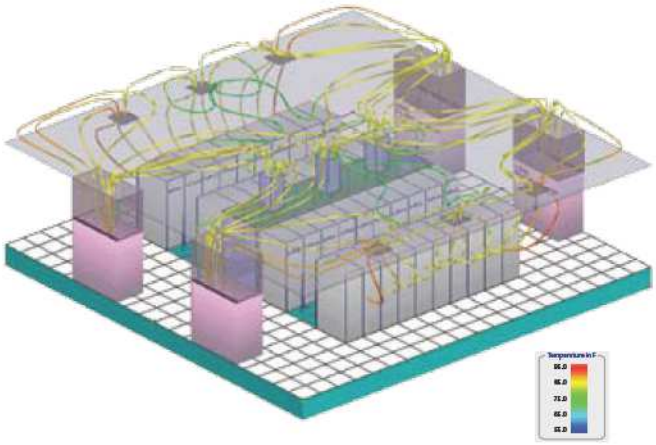
- Increases the cooling capacity and energy efficiency of the cooling unit
- Increased capacity, together with the separation of hot and cold air makes it possible to cool higher heat loads per rack

In many data centers it is possible to raise the air temperature and still remain within the ASHRAE recommendations of 64.4° F (18° C) to 80.6° F (27° C). Raising the temperature reduces the overall energy required for cooling.

FEATURES AND BENEFITS

- Aisle doors slide to the right for quick aisle way access. Brushes are installed on the bottom of the door for an airtight closure
- Fits 36" (OSHA minimum aisle width) and 48" (two floor tile) aisle ways
- Tool-less ceiling panels are easy to install and remove for cleaning and provide above-the-cabinet access to cables, equipment and systems
- Transparent door and ceiling panels provide maximum light to aisle way
- 0.22" polycarbonate window ceiling panels are easy-to-modify and accommodate local fire suppression codes
- Chimney ceiling panels direct hot exhaust air to drop ceiling, duct work or other means back to the computer room cooling devices
- Chimney heights are available in short and tall sizes to fit a wide range of applications

Aisle door slides on heavy duty top-mounted track and trolley. No floor mounted alignment channels needed



HOT-AISLE CONTAINMENT – DIRECT DUCT

Chimney cabinets with direct ducting to the CRAC unit provides efficient hot-aisle containment.

APPLICATION NOTES

- Fire code – it is important to contact local fire codes to discuss aisle containment
- Plastic curtains vs. metal containment structure
  - Do not effectively separate and seal hot and cold air
  - Utilize fusible links that require ongoing maintenance
  - Fusible links have temperature thresholds that require the fire to become engulfed before separating

PROLINE™ CONTAINMENT SYSTEM

Model	Catalog Number	Description	Fits Cabinet Width	Fits Aisle Width
19872	PCAD2	Aisle door fits 36" or 48" width	–	–
19867	PCP69	Ceiling panel, window	24 in	36 in
19868	PCP79		28 in	
19871	PCP89		32 in	
20768	PCP612	Ceiling panel, window	24 in	48 in
20771	PCP712		28 in	
20772	PCP812		32 in	
20788	PCPC69	Ceiling panel, chimney	24 in	36 in
20792	PCPC79		28 in	
20794	PCPC89		32 in	
20791	PCPC612	Ceiling panel, chimney	24 in	48 in
20793	PCPC712		28 in	
20795	PCPC812		32 in	
20786	PCM1	Chimney stack short	–	–
20787	PCM2	Chimney stack tall	–	–

HOT-AISLE CONTAINMENT

Hot-aisle containment isolates the hot aisle and captures the hot exhaust and directs it to a room-level or row-level CRAC unit.

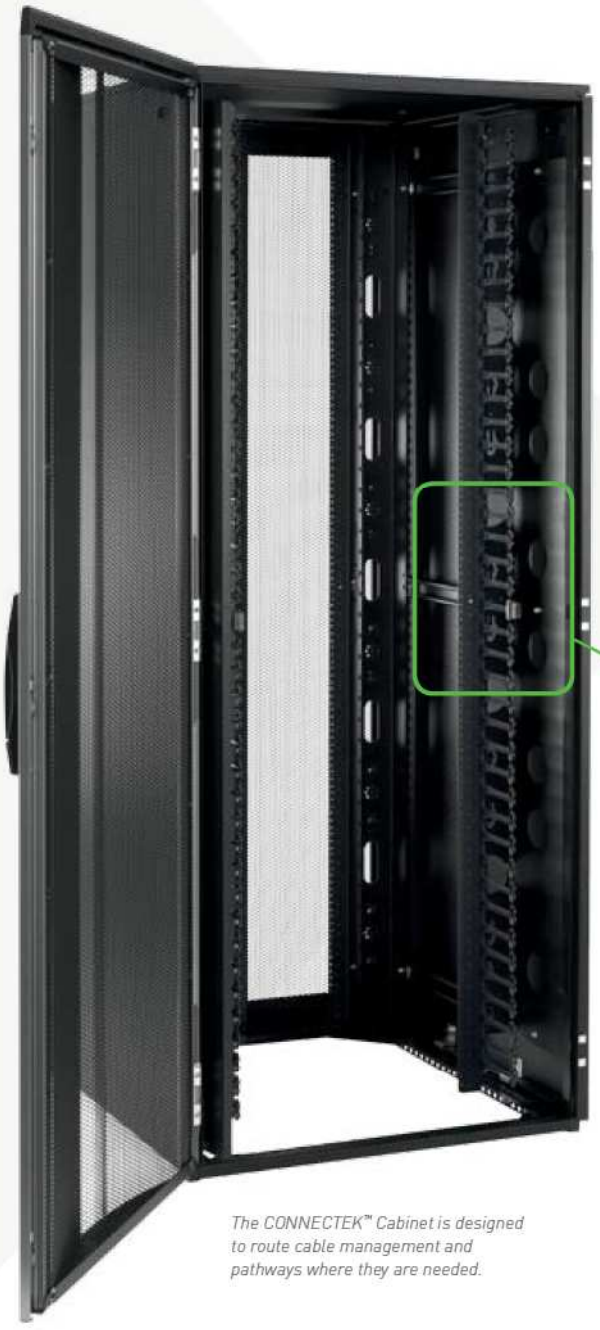
- Can be deployed in an existing data center
- Provides better rise-through in case of cooling failure
- Hot air directional ducted to the CRAC unit is more efficient
- Temperature outside the containment structure is more enjoyable

COLD-AISLE CONTAINMENT

Cold-aisle containment isolates the cold air, preventing it from mixing with the hot air.

- Can be deployed in existing data center
- Noise outside the containment will be less
- Temperatures outside the containment will increase

PROLINE™ CONNECTEK™
COMMUNICATIONS (PATCH) CABINETS



The CONNECTEK™ Cabinet is designed to route cable management and pathways where they are needed.

PROLINE™ Communications Cabinets are available in standard configurations to meet the essential protection needs for rack-mounted voice/data, switch and patch equipment. PROLINE cabinets feature a contemporary design with practical innovative features including CABLETEK™ Vertical Cable Managers, a top gland plate and perforated panels for maximum airflow. Hundreds of accessory and modification choices are available.

PROLINE™ CONNECTEK™ COMMUNICATIONS CABINET

CONNECTEK™ Cabinets are available in 700 mm and 800 mm widths to accommodate high-density cables, patch cords and networking equipment.

- Fully-perforated top, front door and rear doors for maximum ventilation per server manufacturer open space requirements
- Two front cable managers with covers (see cable fill table below)
- Three-point locking swing handle on front door; rear doors are split for easy access via the 3-point, low-profile, locking handle
- Large gland plate in top allows easy routing of cable, pre-terminated cables and patch panels
- Two sets of rear cable managers are also provided

Front Vertical Cable Manager

COMMON MODELS (See Networking Catalog for complete listings)

Model	Size (mm)	Rack Units	Notes
PNC2089B	2000 x 800 x 900	42	Communication Cabinet
PNC20810B	2000 x 800 x 1000	42	Communication Cabinet
PNC20811B	2000 x 800 x 1100	42	Communication Cabinet
PNC20812B	2000 x 800 x 1200	42	Communication Cabinet

PROLINE™ CONNECTEK™ – Front Vertical Cable Manager Cable Fill Rates (per manager)

Cabinet Width	Cross-Sectional Area	Cable Fill Rate for Front Cable Manager – Each Side at 60% Fill 5E (0.22" Dia.)	6 (0.25" Dia.)	6A (0.30" Dia.)
700 MM	17.24"	272	210	146
800 MM	34.48"	544	421	293

CABLETEK™
VERTICAL CABLE MANAGEMENT SYSTEM

CABLETEK™
VERTICAL CABLE MANAGEMENT SYSTEM

Defining cable pathways is more than aesthetics — a properly configured cabling environment eliminates potential kinks, twists and sharp bends to ensure maximum signal quality and transmission speed. It's safer and it supports faster, easier system MACs (moves, adds, changes) facilitated by easier cable tracing. CABLETEK™ from Hoffman provides a host of features that help you route and organize cabling for maximum flexibility, performance and protection.

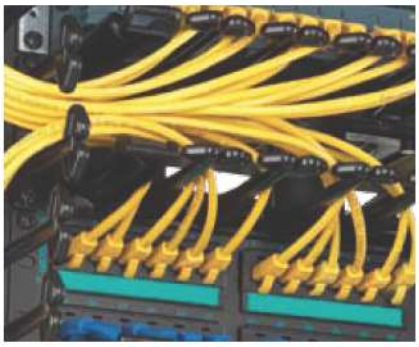
CONFIGURE YOUR
CABLE MANAGEMENT SOLUTION

- Fingers are patented arrowhead design for simple wiring
- Vertical cable managers with optional covers and doors secure large cable bundles and guide individual cables
- Horizontal cable managers with troughs; optional covers
- CABLETEK horizontal and vertical managers with high-capacity fingers offer tool-less mounting and optimal bend radius for CAT 5e, 6, 6A
- Front-to-back cable managers
- Spools, fingers, tie-down points, D-rings, cable ties and transition brackets to meet specific requirements
- Gland plate top with cable entry facilitates quick installation of large cable bundles
- Multiple cable supports to ensure transitions to vertical pathways
- Fingers align with rack spaces to ensure proper bend radius

Extra deep, high-capacity allows transitions from horizontal cable managers to vertical without obstructions.

EXCLUSIVE
HIGH FILL
PATENTED DESIGN

Patent-pending design allows for easy one hand cable insertion.



No sharp edges to damage cables.

PROLINE™
NETWORK SWITCH CABINET

NETWORK SWITCH THERMAL MANAGEMENT

A major challenge in data centers is preventing network switches with right to left airflow from providing hot air directly into other network equipment. Re-consuming hot air will greatly impact equipment temperatures. It is very important to utilize cabinet solutions that address this unique thermal issue. Hoffman™ PROLINE™ Network Switch Cabinet is engineered to eliminate recirculation of hot air and direct the hot air through the cabinet.

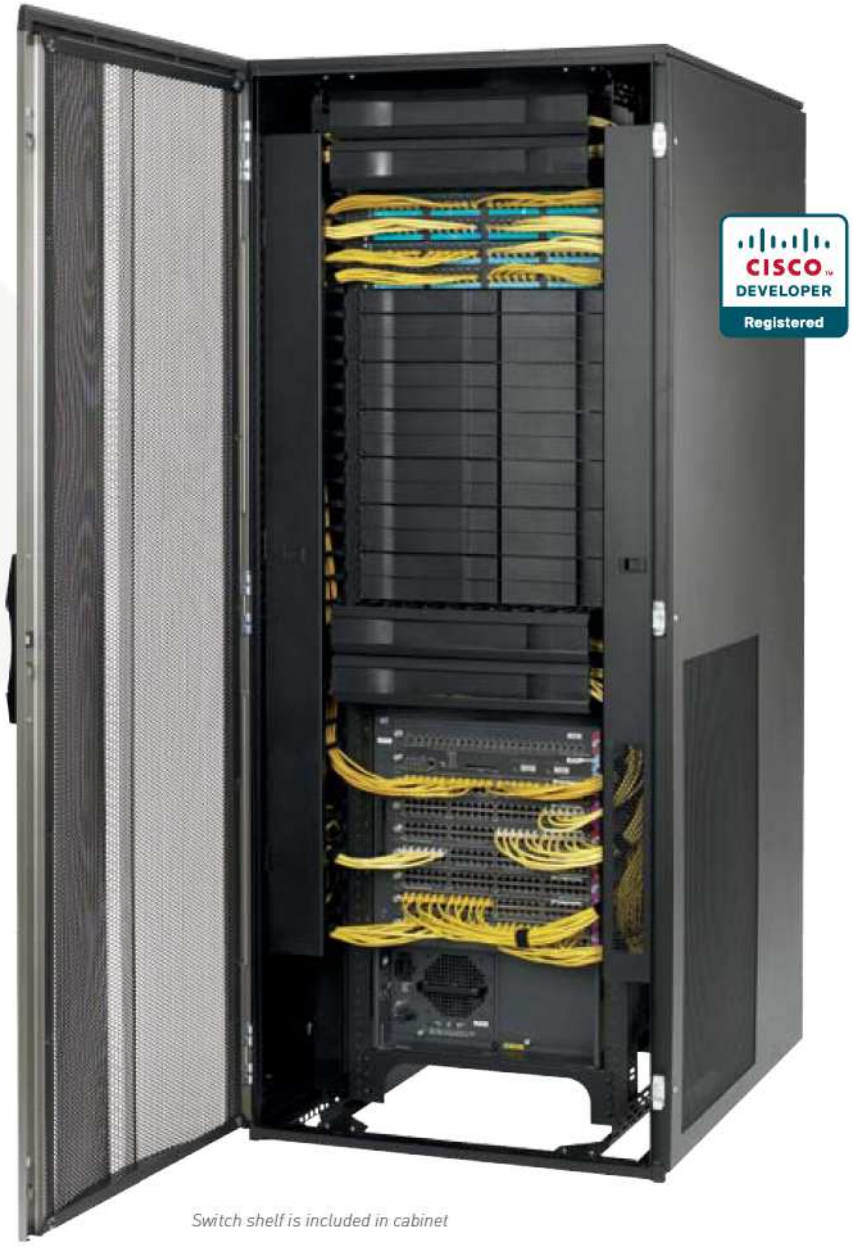
FEATURES AND BENEFITS

THERMAL MANAGEMENT

- Fully-passive solution that provides a higher volume of cold air pathways to switch intakes than any other switch cabinet in the market
- Specifically designed to support and meet the needs of CISCO 6500, 9500 and 7000 Series switches. Accessory kits allow you to modify the airflow to support the Nexus 7010 Series products. Hoffman exceeds CISCO airflow space requirements.
- Designed utilizing CFD Modeling software to monitor airflow within the cabinet

CABLE MANAGEMENT

- Advanced cable management for both the front and rear sides of the network switch. Rear-side cable management designed for handling cable bundles
- Dual-side cable managers provide the best solution to highlight your network investment by providing multiple pathways for routing and slacking cables



Switch shelf is included in cabinet

PROLINE™ NETWORK SWITCH
FRONT VERTICAL CABLE MANAGER CABLE FILL RATES (per manager)

Cabinet Width	Cross-Sectional Area	Cable Fill Rate for Front Cable Manager –Each Side at 60% Fill		
		5E (0.22" Dia.)	6 (0.25" Dia.)	6A (0.30" Dia.)
800 MM	34.48"	544	421	293

Passive solution with the most cold air pathways of any switch cabinet in the market

HOFFMAN IS A CISCO REGISTERED DEVELOPER

Hoffman and Cisco have created a pre-configured cabinet that optimizes the unique airflow requirements and cable management requirements of Cisco's core network switches. The Hoffman Net Platform conserves energy by establishing front/back efficient airflow routes.

Cisco Catalyst 6513-E Switch

PROLINE™ Network Switch Cabinet

Cisco Nexus 7010 Switch

CONNECTEK™ Communications Cabinet

Cisco Nexus 7000 18-Slot Switch

New PROLINE™ Network Switch Cabinet

CISCO CATALYST 6509 / 6513

Model	Size (mm)	RUs	Notes
PNS20810	2000 x 800 x 1000	42	Passive Hot Aisle/Cold Aisle Right to Left Cooling
PNS20811	2000 x 800 x 1100	42	Passive Hot Aisle/Cold Aisle Right to Left Cooling
PNS20812	2000 x 800 x 1200	42	Passive Hot Aisle/Cold Aisle Right to Left Cooling

CISCO NEXUS 7010

Model	Size (mm)	RUs	Notes
PNC20810	2000 x 800 x 1000	42	Passive Hot Aisle/Cold Aisle Front to Rear Cooling
PNC20811	2000 x 800 x 1100	42	Passive Hot Aisle/Cold Aisle Front to Rear Cooling
PNC20812	2000 x 800 x 1200	42	Passive Hot Aisle/Cold Aisle Front to Rear Cooling

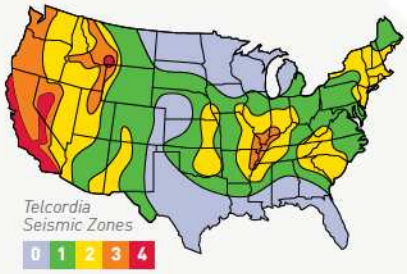
CISCO NEXUS 7018

Model	Size (mm)	RUs	Notes
PNC201012B	2000 x 800 x 1000	42	Passive Hot Aisle/Cold Aisle Right to Left Cooling

HOFFMAN™ ENC SERIES
SEISMIC CABINETS AND RACKS

HOFFMAN™ ENC SERIES SEISMIC CABINETS

NEBS™-Telcordia GR-63-CORE Zone 4-rated Seismic Cabinets from Hoffman™ provide an extra measure of protection for vital LAN and WAN network equipment, servers and phone/voice mail equipment during seismic activity. In addition, ENC Series Seismic Cabinets are also used in central offices, power plants, railroads, airports and other installations where rack-mounted electrical and electronic equipment is subject to vibration and other motion that can over-stress equipment framework, components and connections. The cabinet's passive cooling design can be augmented with optional fans.



The Hoffman ENC Series of Seismic Cabinets is a true NEBS-Telcordia GR-63-CORE Zone 4-rated cabinet. Some manufacturers apply seismic bracing and achieve an IBC (International Building Codes) rating. This rating is less stringent and better served for non-essential facilities. For end-users that require their electronics to continue to function through an earthquake, Hoffman recommends a GR-63 compliant enclosure.

NEBS™ is a trademark of Telcordia

Hoffman provides the tallest 45-rack unit cabinet and the strongest 1100 lb. dynamic load, 2500 lb. static load with a safety factor of 4

FEATURES

- ENC 21895 can be configured for 19- or 23-inch rack angles
- Doors and side panels are inset and flush with frame
- Top has two cable entry ports with caps and grommets plus two fan-ready cut outs
- Highest-rated load rating in the industry

2 POST AND 4 POST SEISMIC RACKS

OSHPD Approved

FEATURES

- Integral front waterfall is included on both the 2 and 4 post racks
- Rear rack angle is adjustable on the 4 post
- Highest load ratings in industry
  - 2 post: 500 lb./2500 lb.
  - 4 post: 1000 lb./2500 lb.

ENC SERIES STANDARD PRODUCT SEISMIC CABINETS

Model	A x B x C (in.)	A x B x C (mm)	Description	Rack Units	Rack Angle Hole Types
ENC21785	84.05 x 27.55 x 31.50	2135 x 700 x 800	19" cabinet	45	Tapped
ENC21785	84.05 x 31.50 x 35.44	2135 x 800 x 900	19" or 23" cabinet	45	Tapped
ENC21785	84.05 x 27.55 x 39.37	2135 x 700 x 1000	19" cabinet	45	Square
ENC21785	84.05 x 27.55 x 47.25	2135 x 700 x 1200	19" cabinet	45	Square

STANDARD PRODUCT SEISMIC RACK

Model	A x B x C (in.)	Rack Units
ESDR19FM45U	86.02 x 26.75 x 18.00	45
E4SDR19FM45U	86.02 x 26.75 x 39.87	45

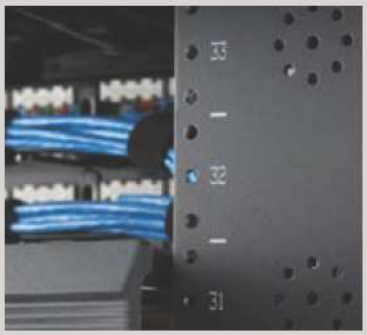
MAXRACK
HIGH-DENSITY RACKS

MAXRACK – HIGH-DENSITY RACKS

Standard 19" racks work well in many environments; however, when your cable management demands increase to support many of today's high-density applications, the MAXRACK provides the proper infrastructure for your network. Designed for higher-density cabling applications such as data centers and SANs.

Designed to maximize airflow of network switches that require both thermal management and cable management

Optional baffles provide management of intake and exhaust air for aisle vented equipment



High-visibility full RU markings

Built-in waterfall and top-mounted brackets for ladder rack and basket tray

Bonding and grounding ready

STANDARD PRODUCT MAXRACK HIGH-DENSITY RACKS

Model	Depth	Description	Rack Units
M846B45	6 in.	84 in. high, open frame, black	45
M8410B45	10 in.	84 in. high, open frame, black	45
M8416B45	16 in.	84 in. high, open frame, black	45
M8432B45	32 in.	84 in. high, open frame, black	45

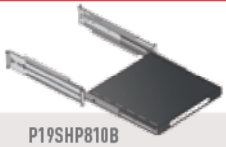
Note: MAXRACK high-density racks accommodate both CABLETEK™ vertical and horizontal managers as well as Ortronics vertical managers.

A HOFFMAN™ SOLUTION FOR NEARLY EVERY NETWORKING CHALLENGE

PROLINE™ SERVER CABINETS

Model	PROLINE™ FLOTEK™ PC	PROLINE™ FLOTEK™ HCA	PROLINE™ FLOTEK™ FD	PROLINE™ AC
		 Back	 Back	
Size Range (inches)	72.28 x 23.62 x 35.43 to 72.28 x 23.62 x 47.24	72.28 x 23.62 x 35.43 to 72.28 x 23.62 x 47.24	82.30 x 23.62 x 35.43 to 82.30 x 23.62 x 47.24	84.74 x 27.87 x 31.31 to 86.74 x 23.94 x 41.18
Rack Units (RU)	42	42	42	42
Loading (Static)	1,500 lbs.	1,500 lbs.	1,500 lbs.	1,500 lbs.
Watts Dissipated	–	–	–	500 to 1200 watts
Unique Features	Provides maximum cooling without added fans for hot aisle/cold aisle and other data center configurations.	Ideal for hot aisle/cold aisle data center configuration in high-density applications. Rear split doors access separately powered fan banks for redundancy with easy equipment access.	Integrates raised floor cool air pathway to the network equipment. Raised floor cutout required.	Fully-sealed cabinet with provisions for AC unit (order separately). Mobile base with casters and levelers allows for best positioning.
BODY FEATURES:				
Front & Back Door	Perforated front, split perforated rear with key locking handle	Perforated front, split fan rear with key locking handle	Window front, split fan rear with key locking handle	Fully-gasketed front window door and rear solid door
Base	Open with internal bolt brackets	Open with internal bolt brackets	Open base with floor duct, casters and levelers	Mobile base with casters, levelers and gland plate
Top	Perforated with sliding gland plate for cable entry	Removable solid with sliding gland plate for cable entry	Removable solid with sliding gland plate for cable entry	Fully-gasketed solid top
Rack Angles	2 sets Square hole Front and back RU markings	2 sets Square hole Front and back RU markings	2 sets Square hole Front and back RU markings	Server cabinets feature 2 sets of EIA spaced square holes. Communication cabinets have EIA spaced tapped holes. Front and back RU markings
Sides	No sides or removable sides with 2 snap latches, quarter-turn key latch ready	No sides or removable sides with 2 snap latches, quarter-turn key latch ready	No sides or removable sides with 2 snap latches, quarter-turn key latch ready	Fully-gasketed solid sides (2) attached with fasteners
Applications	Data center Passive cooling	Data center Hot aisle/cold aisle	Data center Floor ducted	Factory floor, remote networking locations Dusty, dirty environments
Ratings	RoHS compliant ISO 9001 EIA (rack spacing)	RoHS compliant ISO 9001 EIA (rack spacing)	RoHS compliant ISO 9001 EIA (rack spacing)	UL Type 12 RoHS compliant ISO 9001 EIA (rack spacing)

Accessories

Tool-Less Shelf	Snap-In Blanking Panel	Sliding Shelf	Rack Shelf
			
D19FVT69B 600-900 mm depth	**D19BPT1RU** 1 RU snap-in panel	**P19SHP810B** L: 24.6 D: 41.3	**P19VSH810B** Vertical, Black W: 17.3 L: 27.6 D: 38.6
D19FVT912B 900-1200 mm depth	**D19BPT2RU** 2 RU snap-in panel		**P19SH810B** Solid, Black W: 17.3 L: 27.6 D: 38.6

NET SERIES CABINETS	COMMUNICATIONS	SWITCH CABINET	HIGH-DENSITY SERVER CABINETS	
NET SERIES	**PROLINE™ CONNECTEK™**	**PROLINE™ SW Switch**	**PROLINE™ Chimney**	**VARISTAR™**
				
49.00 x 23.52 x 34.00 to 84.00 x 31.50 x 49.75	78.28 x 27.56 x 35.43 to 78.28 x 31.50 x 47.24	78.28 x 27.56 x 35.43 to 78.28 x 31.50 x 47.24	72.28 x 23.62 x 35.43 to 72.28 x 23.62 x 47.24	82.68 x 31.5 x 47.24
21 to 43	42	42	42	42
1,000 lbs.	1,500 lbs.	1,500 lbs.	1,500 lbs.	1,500 lbs.
–	–	up to 6000 watts	15-20 kw	up to 40kw
19-in. or 23-in. rack spacing on 27.55 in. and 31.50 in. widths.	Cabinet is designed for network communications. Includes front vertical cable managers with covers and rear vertical tie-down cable managers.	Cabinet is designed to house network core switches that have right to left airflows. Cabinet provides duct work to provide proper air streams to network core switches. CISCO version available.	Provides chimney-to-duct hot air exhaust from the cabinet into the ceiling plenum.	Integral water-to-air heat exchanger. Fully-gasketed and sealed from all outside air.
Reversible, window or perforated front, split perforated or louvered rear, all with key locks	Perforated front, split perforated rear with key locking handle	Perforated front, split perforated rear with key locking handle	Perforated front, split perforated rear with key locking handle	Fully-gasketed front window door and rear solid door
Open	Open with internal bolt brackets	Open with internal bolt brackets	Open with internal bolt brackets	Plinth base with levelers
Fan-ready (two 6 in. fans) top with cable cap and grommet	Removable perforated with sliding gland plate for cable entry	Removable perforated with sliding gland plate for cable entry	Top with integral adjustable duct work (chimney) and gland plate	Fully-gasketed solid top
2 sets Communications have tapped 10-32 Server has square hole Front and back RU markings	2 sets Tapped hole 10-32 Front and back RU markings	1 set of rack angles tapped per EIA spacing. Top rear 4RU rack angles tapped per EIA spacing. Front and back RU markings	2 sets Square hole Front and back RU markings	2 sets Square hole
Removable with quarter-turn latch	No sides or removable sides with 2 snap latches, quarter-turn key latch ready	No sides or removable sides with 2 snap latches, quarter-turn key latch ready	No sides or removable sides with 2 snap latches, quarter-turn key latch ready	Fully-gasketed solid sides (2) attached by fasteners
General datacom computer room	Data center Network equipment Communications	Data center Network switch cabinet	Data center	High-density data centers and remotely located network applications
RoHS compliant ISO 9001 EIA (rack spacing)	RoHS compliant ISO 9001 EIA (rack spacing)	Type 1 CISCO Registered Developer* RoHS compliant ISO 9001 EIA (rack spacing)	Type 1 RoHS compliant ISO 9001 EIA (rack spacing)	IP 55, NEMA 12 RoHS compliant ISO 9001 EIA (rack spacing)

*Meets CISCO third party enclosure requirements

Cage Nuts	Screw Kit	Floor Brushes	PDU - Horizontal/Vertical
 *10-32, silver*	 *10-32 x 5/8", silver*		
P1032CN 20 qty	**AS1032** 20 qty	DFB410F	*Complete list of PDUs can be found in the Hoffman Networking Catalog*
P1032CN250 250 qty	**AS1032250** 250 qty	DFB57F DFB66S DFBA1024F	

NET SERIES
COMMUNICATION AND SERVER CABINETS

A VERSATILE, GENERAL PURPOSE CABINET PLATFORM

Hoffman™ NET SERIES Cabinets are an economical solution for contractors, small computer rooms, schools or smaller networks that require a general-purpose cabinet to house servers and communications equipment. Multiple sizes, adjustable rack angles and accessories deliver broad application suitability.

FEATURES

- Two sets of adjustable L-shaped rack angles for convenient equipment mounting
- Rack angles on communications cabinets have tapped 10-32 holes and rack angles on server cabinets have square holes per EIA standards
- All doors are field-removable and reversible with left or right hinging for installation flexibility
- Communication cabinets feature fully-perforated or window-front and louvered-rear doors for equipment ventilation
- Server cabinets have fully-perforated front and split rear-perforated doors for easy access to servers
- Fan-ready top with an integral finger guard accommodates up to two optional 6" fans, available separately

COMMON MODELS (SEE NETWORKING CATALOG FOR COMPLETE LISTINGS)

Model	Size (MM)	Rack Units	Notes
NC1268	49.00 x 23.62 x 33.99 (1245 x 600 x 863)	23	Communication Cabinet Passive Cooling
NS12610	49.00 x 23.62 x 41.86 (1245 x 600 x 1063)	23	Server Cabinet Passive Cooling
NC2178	84.00 x 27.56 x 33.99 (2134 x 700 x 863)	43	Communication Cabinet Passive Cooling
NCW2178	84.00 x 27.56 x 33.99 (2134 x 700 x 863)	43	Communication Cabinet Passive Cooling Window Door
NS2169	84.00 x 23.62 x 37.93 (2134x600x963)	43	Server Cabinet Passive Cooling

SPECIALTY NETWORKING CABINETS

PROLINE™-CL COLLOCATION CABINETS

PROLINE™-CL Collocation Cabinets are designed for secure data centers that store computer equipment for multiple customers. Standard components allow cabinets to be configured with up to four separate, secure compartments that can be reconfigured on-site as needs change.

NETWORKING PC CABINET, TYPE 1

Used for remote network access from a factory floor or warehouse, the Networking PC Cabinet is built to house PCs, keyboards and printers for data entry as well as LAN and WAN equipment. Key-lock doors provide security and physical protection for equipment.

SOHO CABINET

SOHO (Small Office and Home Office) Cabinets are designed to house servers, networking equipment and phone and voice mail equipment under a desktop. Casters allow the cabinet to be easily moved for access.

ABOUT PENTAIR TECHNICAL PRODUCTS

Pentair Technical Products, a Pentair global business unit, is the leading provider of worldwide product and service solutions for enclosing, protecting and cooling electrical and electronic systems. Its industry-leading brands—Hoffman™, Schroff™ and McLean™ Cooling Technology—provide a broad variety of standard, modified and engineered solutions to the commercial, communications, energy, general electronics, industrial, infrastructure, medical and security and defense markets.

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