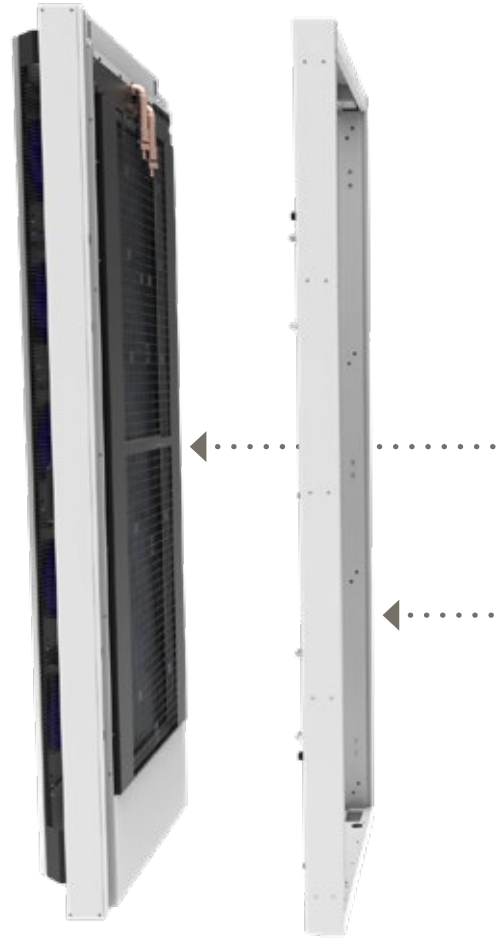


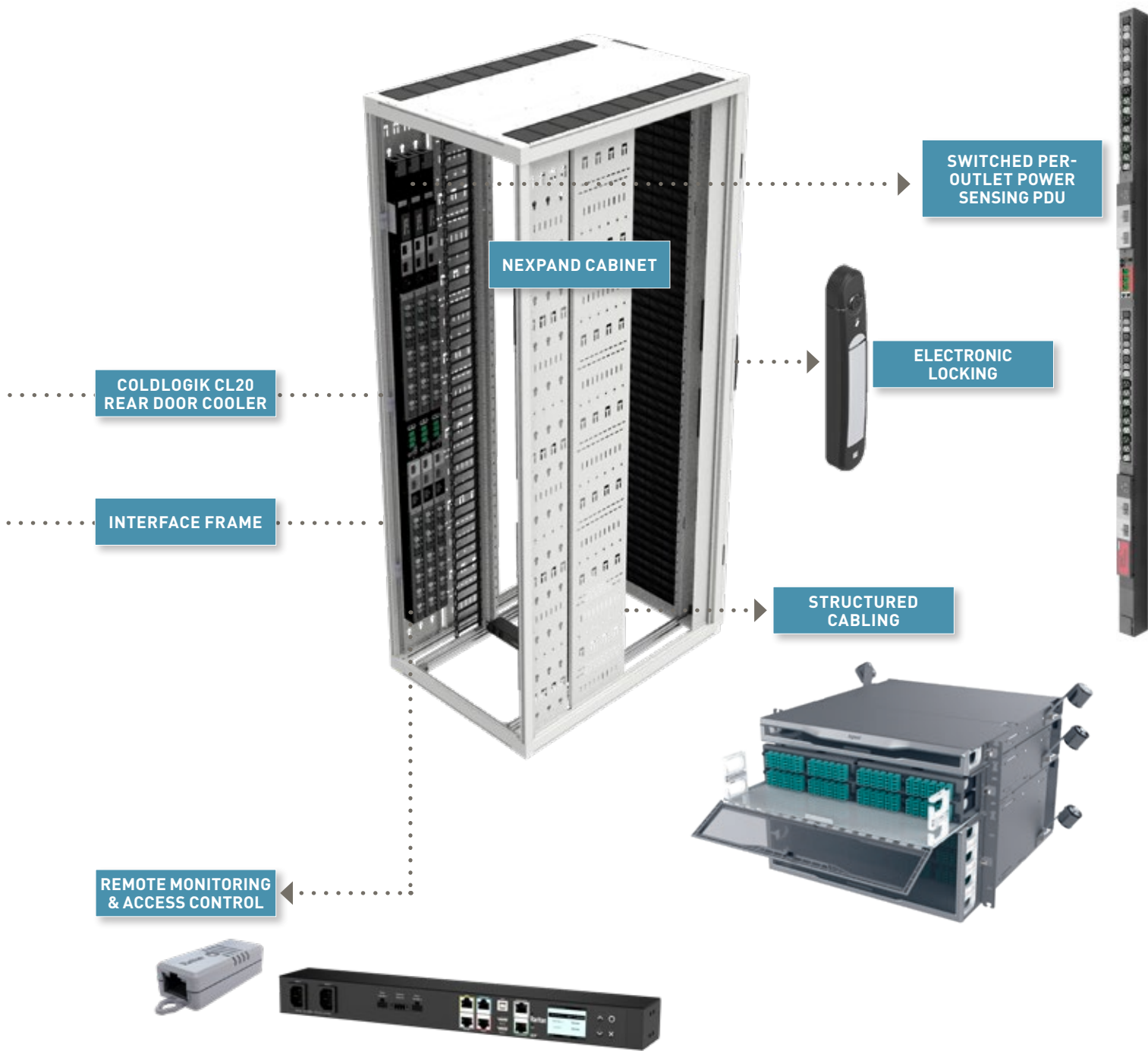
ENABLING HIGH PERFORMANCE COMPUTING APPLICATIONS

BENEFIT FROM OUR PREMIUM BRANDS TO ACHIEVE
THE BEST SOLUTION TO HOST YOUR HPC APPLICATIONS

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WITH LEGRAND YOU BENEFIT FROM A VAST PORTFOLIO OF PREMIUM BRANDS TO ACHIEVE THE BEST SOLUTION TO HOST YOUR HPC APPLICATIONS.

EXPLORE HOW OUR ADVANCED SOLUTIONS DELIVER CUTTING-EDGE TECHNOLOGY TO POWER, MONITOR, AND MANAGE YOUR CRITICAL INFRASTRUCTURE.

TOP CONSIDERATIONS

WHEN SELECTING SOLUTIONS TO SUPPORT HPC APPLICATIONS

The data center industry has traditionally worked with heat densities ranging from 1kW to 5kW per rack. But in recent years this trend has significantly changed. At Legrand we want to make sure that our customers have the right solutions in place to adapt to this change.

Racks are considered to have a significant heat density when they surpass the 10kW of heat load; this is what we call HPC solutions. Depending on the application, this heat load per cabinet can reach up to 90kW!

HPC requires more precise cooling solutions than those that traditional CRAC units deliver. When exceeding the 10kW threshold, precise cooling becomes more energy efficient and cost effective for your data center.

Implementing HPC installations in your data center can present challenges, such as increased power density heat. Demanding high density applications result in increased heat loads, leading to power imbalances, which can lead to costly downtime if not managed correctly. Selecting the best-in-class PDUs to power the servers is crucial to ensuring uptime.



A final challenge to address, is the ability to monitor and manage your critical HPC infrastructure remotely. To protect sensitive data, a combination of sensors and electronic door access and control solutions will provide the security you need to stay alerted 24/7 of service-impacting conditions, from any given location.

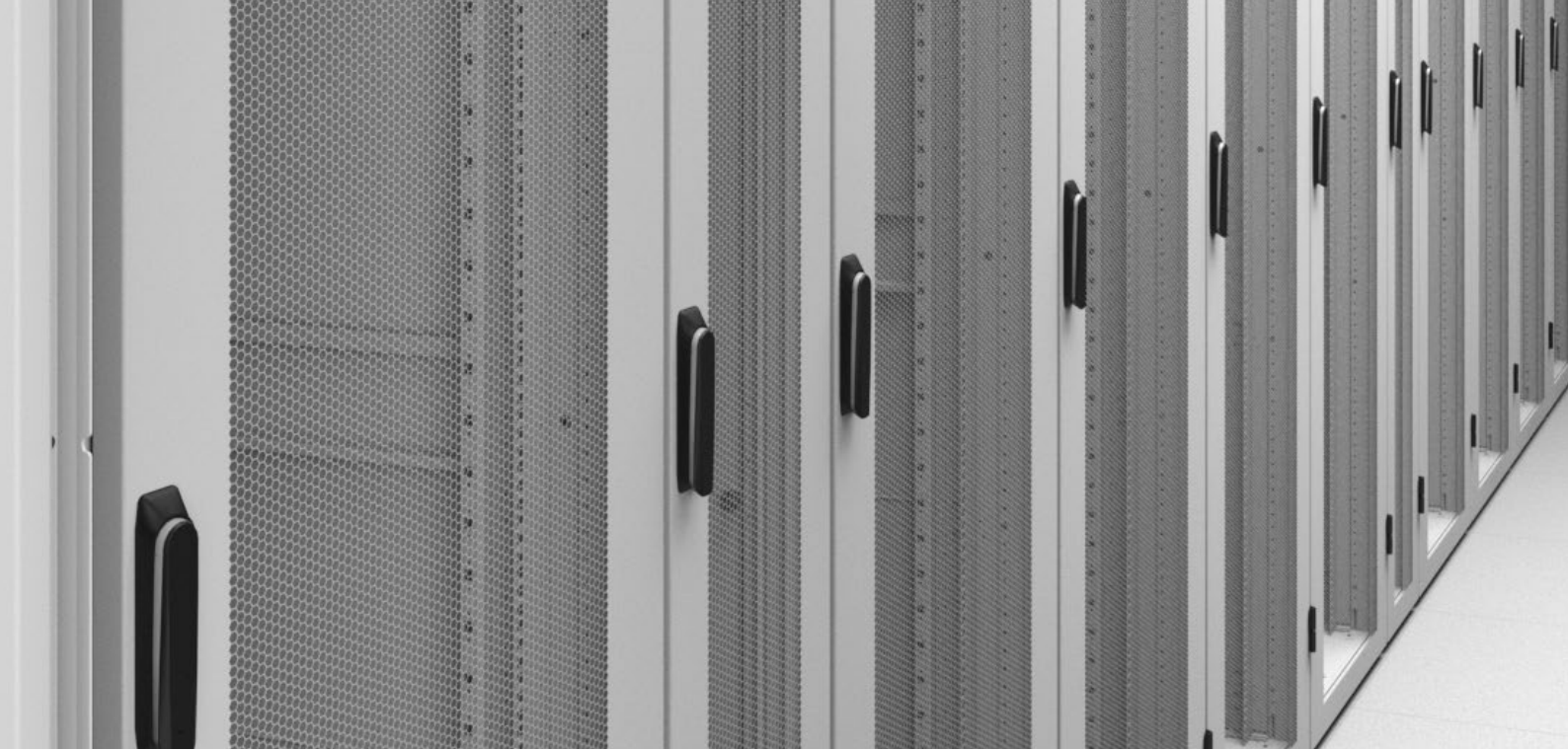
HPC is at the heart of many major technological innovations and advancements in the modern age. Applications in research and problem-solving, crypto mining, cloud gaming, climate modelling and AI algorithms are all demanding a next-level performance of your IT equipment, and the solution powering it must be up to the challenge.

Legrand is working closely with customers who use our solutions to host IT equipment to continuously run simulations of prototypes of their new products before they launch them. As a result, this generates high heat densities within their cabinets. To enable our customers to run these simulations or work on other challenging tasks that generate high heat densities, we have put together a solution that ensures the best performance possible, even for the most demanding applications.

With HPC multiple devices can result in dense cabling at the back of the rack, reducing airflow. Having a cabling solution that not only provides the best transmission possible but also maximises airflow is one of the biggest challenges to overcome when thinking about an efficient HPC application. Therefore, specific structured cabling products that were designed taking these aspects into account must be selected for optimal performance.

With Legrand you benefit from a vast portfolio of premium brands to provide the best solution to host your HPC applications! Please get in touch with us to learn more about our range of solutions to optimise energy efficiency in the data center.





NEXPAND Cabinet by Minkels¹



When it comes to HPC, the cabinet that will host your equipment should have the flexibility to meet both your current requirements and evolving future needs. The Nexpand cabinet offers just that, a future proof solution with the ultimate in flexibility and scalability.

Minkels' Nexpand solution features the best-in-class airflow management package in an 800mm wide, 1200mm deep, and 47U height frame to ensure no airflow recirculation or leakages to help your IT equipment perform at its peak all the time!

¹ The Nexpand cabinet selected is B1104-081247-159494. Specifically designed for HPC purposes. With a static load capacity of 1500kg and powder coated in white (RAL 9003).




Cable management solutions have also been developed to meet the challenges of the most demanding applications, with cable trays capable of mounting three PDUs per side at the rear of the cabinet, that's six PDUs in total! With HPC increasing the cable density in the back of the rack, Nexpan also offers mounting for two more cable trays specifically to guide cabling and cable fingers to enable the best cabling management possible.

Minkels' magnetic door switches for both the front door and the rear cooling unit are incorporated into the solution and can detect if a door is open or closed.

Even though your HPC solution incorporates electronic locking, this does not ensure that you have the right overview of the status of your door when checking from a remote location using your DCIM system.

It is possible to place the handle in a closed position while the door is still open. If this is the case, your DCIM system will show the door as closed through the status of the handle though the real situation is different!

With the addition of these magnetic door switches, in the previous situation the DCIM will show an open status for the door switch, while the handle is showing closed. Letting you know exactly what the status of the cabinet is, and only when both the door magnetic switch and the electronic lock show a closed status you will be certain that the door is properly closed.

The combination of electronic locking and Minkels' magnetic door switches will provide you with full visibility over the real door status of your HPC solution.





Switched Per-Outlet Power Sensing PDU by Server Technology²

HPC is all about power and controlling its distribution among the equipment. You could have the best servers possible running your applications, but if the products powering them are flawed, your whole solution collapses. The correlation between your HPC servers and the PDUs powering them is 1 to 1, meaning that no matter how premium your servers are, if the PDUs selected are the weak point of the solution, the servers are just as weak as the PDUs or vice versa.

With this in mind, Legrand has chosen the best-of-breed PDUs to make sure that, independently of the equipment used, your equipment won't be capped by the performance of our PDUs.

² The Server Technology PDU selected for Legrand's HPC solution is (6x) C2WG36TE-4PAE2M66: A three-phase Switched POPS PDU, with an input voltage of 400V and power capacity of 22kW, rated at 32A and featuring 24 C13 outlets and 12 Cx outlets. Giving a total of 36 outlets per PDU and a total outlet count of 216 outlets available!

Server Technology

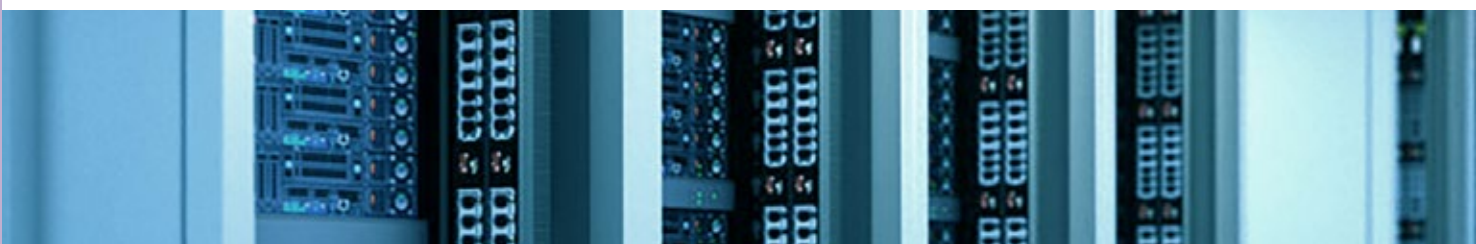


Legrand is proud to bring to the market the global leaders in intelligent rack power distribution (PDUs); Server Technology is undoubtedly one of them, delivering best-in-class rack PDUs known for quality, reliability, and innovation.

One of the key challenges when it comes to HPC is to make sure that load balancing across the equipment is maintained; Server Technology's Smart and Switched PDUs are ideal for this, allowing for power to be phased on a per-outlet basis. This simplifies load balancing and allows for shorter cords, improving airflow and efficiency.

But it is not only the simplified load balancing that makes Server Technology PDUs a perfect fit for powering your HPC applications; there are plenty of other reasons:

- High Density Outlet Technology (HDOT) - Offers the most outlets in a 42U tall intelligent rack PDU. Our HDOT Cx Outlet combines a C13 and C19 into one flexible outlet that can accommodate a C14 or a C20 plug
- Network monitoring and linking of multiple PDUs
- Hot swappable controller - 100% field replaceable with no risk of downtime!
- Per Outlet Power Sensing - Total control per outlet to monitor power, reboot servers or power off unused receptacles
- And much more!





Remote monitoring & Access control by Raritan



³The Smart Rack Controller selected for Legrand's HPC solution is SRC-0102: 1U Smart rack controller with, 2 x C14 power inputs, 1 x RJ-45 sensor port, 1 x RJ-45 Feature port, 2 x USB-A ports, 1 x USB-B port, 2 x RJ-45 (10/100/1000 Mbps) Ethernet ports, 1 x RJ-45 expansion port, with built in 1 x DX2-DH2C2 (Door Handle Interface) and multi-color LCD display.

⁴ DIRAK & SouthCo smartlock solutions also available.

⁵The American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) recommends measuring the cool air entering IT equipment near the bottom, in the middle, and near the top of each IT rack.

It is said that knowledge is power; in the data center industry, this statement could not be more accurate. Not understanding what is happening with your equipment can lead to costly downtime in a split second. Thinking about this need in the HPC world makes this even more critical. That is why Legrand includes a market leading brand like Raritan in its HPC solution offering.

As a global leader in intelligent PDUs (along with Server Technology), Raritan provides premium solutions to monitor every aspect of your HPC infrastructure 24/7, powered by its proprietary platform Xerus, a combination of hardware and software technologies embedded in all Raritan power solutions. From its inception, it was developed with the customer in mind; that is why Xerus is a developer-friendly platform that easily integrates into any BMS or DCIM software and delivers security, advanced alerting, and complete visibility into your power chain.



Raritan.



Legrand’s HPC solution integrates the following Raritan devices and features:

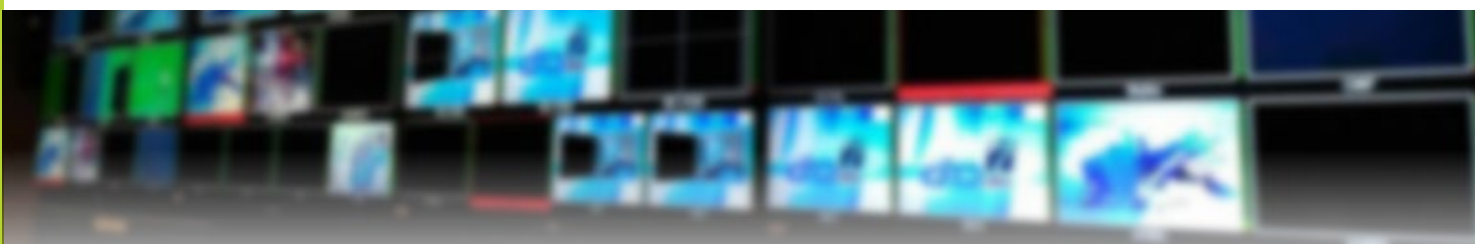
SMART RACK CONTROLLER³ (Powered by Xerus™ Technology Platform) & EMKA⁴ electronic locking. Raritan’s SRC is an intelligent sensor management solution that serves as your central connection point for environmental monitoring, physical access and other monitoring and security sensors. The electronic locking solution enables you to provide access to specific key users from a remote location, understand who is

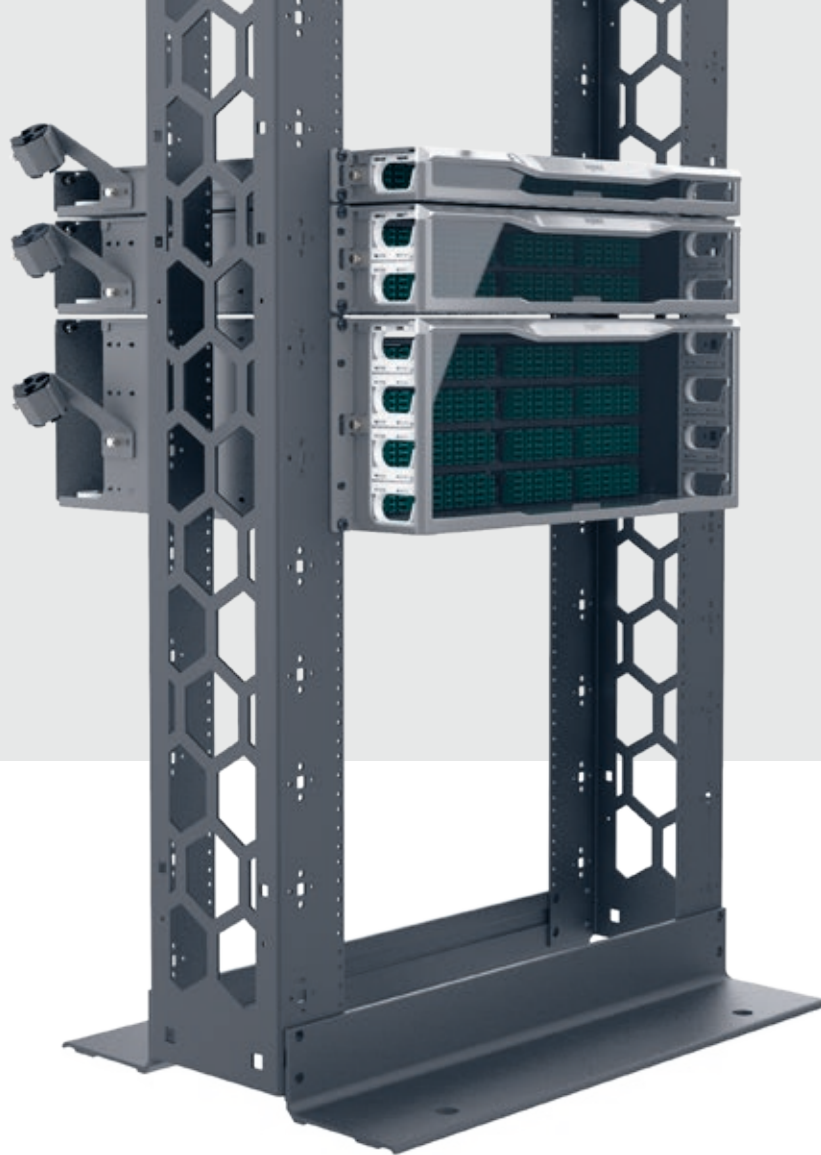
accessing your HPC solution at any time, and define timeframes where the cabinet is open for maintenance enabling a fully auditable access log. Thanks to Raritan’s iX7™ Controller and smartlocks, your HPC solution addresses evolving cabinet-level physical security requirements and improves the workflow management of regulatory compliance mandates from PCI DSS, SOX, SSAE, HIPAA, GDPR, and EN50600.

TEMPERATURE SENSOR (DX2-T3H1). This kit strings together 3 temperature sensor heads (one of them combining temperature and humidity measurements), making it easy to mount them at the bottom, middle and top of the cool air inlet side as per ASHRAE⁵ guidelines.

LEAKAGE SENSOR (DX2-WSF-35-KIT). It is critical to be informed when water or glycol leaks are detected. A 3.5 meter length sensor is included to make sure that you are alerted in case of a leakage at critical points below your cabinet and/or raised floor.

All the sensors previously mentioned can be daisy chained and are field replaceable with RJ45 connectors!





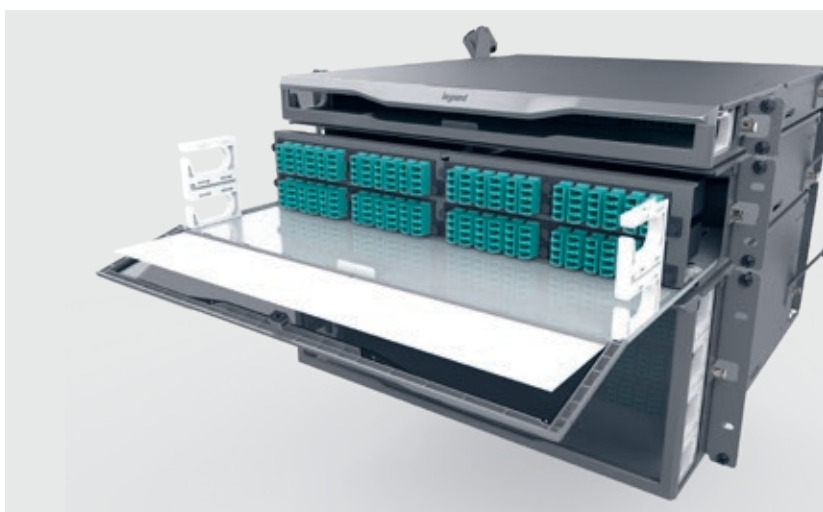
Structured Cabling by Legrand⁶

With increasing density and power in HPC, the requirements for the structured cabling components are growing in two ways:

PERFORMANCE. HPC deals with the highest possible bandwidths and transmissions. Therefore, it sets the highest demands on the quality of the detachable connections (coupling points) of fiber optic connections. Best possible quality and lowest possible insertion loss is the key to getting the highest possible reserves on the transmission line and ensuring safe and stable operation.

DESIGN. The high number of connections and therefore cables must be safely handled on the front and the backside of the connection panels. Cables must be prevented from interfering with the flow of cooling air in HPC racks at all times. In addition, the panel must allow easy access while maintaining high packing density. For this reason, it is also important to use patch cords of different lengths to reach each server in the rack without unnecessary excess length.

⁶ The optimal cabling configuration is highly dependant on the hardware installed for each HPC application, therefore no predefined configuration is proposed, please contact Legrand Sales Engineering to find the most suitable solution.



Legrand's HPC cabling solution offers and combines both in one:

INFINIUM QUANTUM FIBER. Our solution offers the lowest total system loss on the market, opening the opportunity to challenge the limits of what was previously impossible. With a total channel attenuation of 0.75 dB, the Solution is ideal for AI, hyperscale, cloud, supercomputing, and other high bandwidth demand environments.

ACCESSIBILITY. The magnetic latching mechanism of the enclosure door enables a simple one-handed pull to open and push to close access. The enclosure door is attached to the sliding drawer face and tray, allowing easy clearance from equipment or other enclosures mounted below. A tray lock mechanism ensures that the tray stays in place when patching or dressing the fiber. The 60/40 split-top cover allows access from above and features tool-less removal.

INTUITIVE CABLE MANAGEMENT. The unique pivot arms provide an innovative way to manage fiber slack storage. Each arm rotates towards the rear of the enclosure and hosts a pivot disk that may be used with slack storage spools, fan-out kits, or attachment points to secure the Legrand HiLOC harness. The Cable Attachment brackets feature tool-less adjustments for location based on which direction the cable is routed - either side of the enclosure, top or bottom. Simply make the adjustment for cable routing, load the grommet around the cable(s) and close the attachment cover.

SCALABILITY. The scalable jumper management allows layers of management to be added only when needed, making it easy to keep patch cords neatly organized. The drawer faces are removable and replaceable, allowing the enclosure to easily convert between standard LM4 and optional M8 cassette and adapter footprints. This allows the enclosure scalability to support increasing bandwidth and higher speed requirements that utilize different cables, cassettes, or adapters.





ColdLogik CL20 Rear Door Cooler by USystems

⁷ The ColdLogik CL20 Rear Door Cooler can operate with heat densities starting at 0.5kW, therefore bringing all the benefits of a rear door cooling solution to non-HPC applications.

⁸ PUE (Power Usage Effectiveness) is an indicator for measuring the energy efficiency of a data centre. In other words, PUE evaluates the energy performance of the data center by calculating the ratio of the energy used by the entire facility compared with the energy used by just the IT equipment alone.

Not managing heat properly in a data center environment is always critical, but when talking about HPC describing it as critical falls short. A premium precision cooling solution is mandatory to dissipate the heat and allow your equipment to operate at its optimal temperature. With this in mind, Legrand has selected the USystems Rear Door Cooler to provide the cooling solution that your HPC solution deserves.



USystems provides premium Rear Door Cooling units that can dissipate heat loads in the entire range expected for an HPC solution to be operating at, from the starting 10kW⁷ up to a whopping 93kW per cabinet. This solution grants the best efficiency and security for cooling in a HPC package, its rear door cooler removes the waste heat generated by your active equipment at source using water cooling, which can be repurposed to heat the building.

Our HPC package keeps the environment in mind. With the industry moving towards more environmentally friendly deployments, and regulations increasing the pressure on optimizing the energy consumption, USystems is making sure that your HPC energy demands will mostly be those of your IT equipment. ColdLogik CL20 Rear Door Cooler achieves a cooling PUE⁸ of 1.03 where these rear door coolers have been used exclusively as the cooling technology!

The inclusion of ColdLogik CL20 Rear Door as the cooling technology brings numerous benefits when compared to other cooling approaches:

- Maximises free cooling. High operating water temperatures!
- No refrigerant is used
- No costly dielectric coolant solution
- Suits conventional and unconventional Data Center floor plans
- No need for supplementary room cooling
- No need for aisle containment and ensuring optimal room temperature for people to be at
- Over 48% more footprint available when compared to traditional aisle containment deployments
- Sophisticated control & monitoring available





Trust Legrand for High Performance Computing

When choosing Legrand, our customers know that they are selecting the best products to enable their HPC solution - premium brands delivering the best features available in the market. Why is this so important?

Through the previous pages, two things are evident. The first is that HPC is much more than servers running more demanding applications; it is the synergy of several products: a combination of a cabinet and PDUs, the inclusion of structured cabling and precision cooling, and last but not least, monitoring items such as sensors and electronic locks to monitor and manage the solution.

The second thing is that if the products selected are not the right ones; an HPC application is bound to fail through its weakest point. That is why at Legrand, we have preselected for you the items that best fit even the most demanding HPC applications. Our specialists have defined specific configurations of the products previously described to deliver a complete package that will allow our customers to initiate their HPC applications flawlessly.

Instead of customers individually picking the products and being unsure about their performance when combining them, when contacting us for our HPC package, our customers will receive a pre-assembled configuration almost ready to go once the servers are installed. With only cooling, power and network configuration required to have everything up and running.

In our HPC solution all the items are seamlessly integrated, putting together the neatest solution possible for optimal cable and airflow management, with all the connections needed already made to have the products ready to “talk” to one another, for instance the connection of the electronic locking to the SRC-0102. The selection has also been made so that it can easily be integrated into any BMS or DCIM solution.

Legrand can adapt the standard HPC solution to your specific needs. Consulting our sales engineering team is always advised to select the best package that matches your specific requirements.







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