



VERTIV™ KNÜRR®
SPECIAL CATALOG

Networks & Data Centers





Vertiv designs, builds and services mission critical technologies that enable the vital applications for data centers, communication networks, and commercial and industrial environments. We support today's growing mobile and cloud computing markets with our portfolio of power, thermal, infrastructure management products, software and solutions, all complemented by our global service network. Bringing together global reach and local knowledge, and our decades-long heritage including brands like ASCO®, Chloride®, Liebert®, NetSure™ and Trellis™, our team of experts is ready to take on your most complex challenges, creating solutions that keep your systems running—and your business moving. Together, we're building the future of a world where critical technologies always work.

YOUR VISION, OUR PASSION.

VertivCo.com



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Glossary

Adaptive Architecture

Liebert Adaptive Architecture™

The Liebert Adaptive Architecture product and technology family distinguishes itself by delivering an ideal balance between minimal TCO and optimal availability.

Open Architecture/Closed Architecture

Open architecture utilizes cooling coils and the room's air volume as thermal storage to guarantee continuity in the event of power failures.

Closed architecture means that the rack is entirely closed off. The cooling coils are inside the enclosure. Other provisions must be made to bridge power failures.

Redundancy

Measure of a system's failure tolerance and the extent to which maintenance work can be performed on a product in operation without function loss.

- Systems without redundancy can fail as soon as one single component fails; or cannot be operated during maintenance work.
- Redundancy is achieved with the parallel setup of the same components, of which at least one of these is not required for the system to achieve 100 % functionality. Such a setup means that even the failure of important components or planned maintenance work will not impair the product's continuous operation. Redundancy concepts can therefore deliver very high system availability levels.
- The highest level of redundancy is attained with the installation of two independent systems whose incoming and outgoing lines are also separated. Preventive maintenance work or component faults do not impair the system's performance because the second system can take over the entire desired functionality at any time.

Industry Terms and Phrases

Availability

Availability is achieved through proven technology or a system that minimizes malfunction risks and downtimes of your IT system.

Flexibility

"Flexible" products and systems that can be reconfigured or extended to meet the requirements of new technologies, provide even more protection, or meet the requirements of corporate growth or business changes.

Total Cost Of Ownership

All operating costs (TCO) of a solution, including purchase, future changes and maintenance.

Power Supply

Power supply; three-phase (EMEA)

A three-phase power circuit has three conductors, an earth connection, and in most cases, a neutral conductor. Typical voltages for such power circuits are 380 V, 400 V and 415 V.

Power supply; single-phase (EMEA)

Single-phase power circuits have two cables and an earth connection. Typical voltages are 220 V, 230 V and 240 V.

Power density

More power. More heat generation. Less space. Since the performance of processors is constantly growing but the amount of space available is decreasing, power density rises (from less than 50 to more than 300 watt per m²). This generates far more heat, resulting in hot spots that can occur in your data center.

UPS types: Online and Line Interactive

An online UPS is used to back up critical applications and guarantee a continuous, uninterrupted power supply. Frequency and wave form are also regulated. A line-interactive UPS prevents voltage peaks and inadmissible power-supply parameters. This energy-efficient technology regulates the power supply and the battery backup system which is especially ideal for installations that rarely suffer power failures, but frequently suffer supply fluctuations.

Battery capacity

The percentage power capacity of your batteries, depending on their age, usage period, environment, ambient temperature and maintenance status. A normal VRLA battery can achieve 80 % and has to be replaced after 3-5 years.

Battery runtime

The time (in minutes) in which your batteries provide power supply and protect your information in the event of a power or system failure.

kW

Standard measurement unit for electrical power. 1 kW is 1,000 W or power consumption of 1,000 joules per second. (1 joule is the required energy it takes to heat 1 kg of water by 1°C.)

Cooling

Back cooling

Absorbs the heat generated by air-cooled condensers and dry coolers for all ambient temperatures or heights. Hot air or hot water is drawn off; water is cooled and recirculated.

Precision cooling

The precise controlling and regulation of temperatures, moisture or air filtering.

Hot Aisle / Cold Aisle

A highly efficient method of improving performance with existing raised floor systems with high-density rack-based installations.

The racks and frames are set up to create "hot" and "cold aisles". Perforated bottom covers from which the raised floor's cool air flows are only placed in the cold aisles.

Sensible heat

"Sensible" or "tangible" heat can be directly sensed or measured. Sensible heat changes a material's temperature. Essentially, it provides information on temperature, comparable to that of a weather forecast. Sensible heat is measured with a thermometer. Servers, for example, emit solely sensible heat.

Latent heat

"Latent heat" is the heat energy that goes into a material's state change. During a thermally managed cooling process, latent heat is diverted into the air by vapor condensation when the air is cooled below dew point (dehumidification). Latent heat discharge does not have any effect on the temperature you feel.

Total heat

Total heat is composed of the heat content of the air (sensible heat) and the water-vapor mixture (latent heat). It is crucial for the thermal device's nominal power.

BTU

BTU is a heat energy unit. It is the amount of heat required to raise the temperature of 1 British pound of water by 1 degree Fahrenheit (at sea level). One ton of cooling power is equal to 12,000 BTU/hour.

Ton

A ton, in relation to cooling systems, is the amount of heat required to melt 1 ton of ice in 24 hours. A ton is equal to 12,000 BTU/hour or 3,025,900 calories/hour.

Centers of Expertise

When you partner with Vertiv for your business continuity needs across your enterprise, you benefit from more than products to support and protect your technology infrastructure.

Developing such a wide range of technologies gives us in-depth industry knowledge and a “big-picture” understanding of how all systems must work together within any critical environment.

We deliver this knowledge through Vertiv's Centers of Expertise: distinct areas of world-class products and services that help you determine what you need and where, depending on your application.

All so that you can keep your business moving forward for your customers.

■ AC Power

Sustaining critical operations that simply can't go down. We deliver a full range of uninterruptible power systems plus STS devices, providing everything from individual products to integrated power protection solutions that keep network closets, computer rooms and data centers up and running.

■ DC Power

Supporting voice and communication networks through reliable and efficient DC power. The extensive DC power portfolio includes a wide range of -48 V and 400 V DC systems; from sub-racks to large stand-alone systems. Improved reliability, increased energy efficiency and load balancing is enabled through the Intelligent Load Management functionality (patent pending).

■ Infrastructure Management & Monitoring

Managing and monitoring critical environments at multiple sites around the clock. We make it easy in today's ROI-driven business environment, with comprehensive infrastructure management and monitoring systems for both IT and facilities. Solutions and services that provide continuous oversight of data centers, computer rooms and network closets, as well as wireless, wireline and enterprise telecom applications.

■ Power Switching & Controls

Safeguarding facilities from operational disruption due to electrical power interruption. We provide ASCO® power-transfer switches, generator paralleling switchgear/power control systems, and touch screen SCADA for monitoring and control of the utility service and on-site backup power generators; all helping to ensure continuity of supply to essential and mission-critical communications, data-processing, life-safety, and other critical loads. Backed by the largest manufacturers, direct field based project management and service technicians in the industry.

■ Thermal Management

Managing the heat transferred from the data center to the external environment, while assuring the right temperature and airflow for each server. The Thermal Management range of Liebert® solutions answers to all different customer needs and applications, adopting state-of-the-art technologies to achieve the highest efficiency while minimizing energy costs.



■ **Racks & Integrated Solutions**

Optimizing technology and performance needs for indoor IT applications. We deliver standard and customized integrated cabinet solutions that meet unique and specific needs, from Knürr® and Liebert® rack solutions for computer rooms of all sizes to integrated racks with self-contained cooling, UPS and cable management in a solid, lockable cabinet.

■ **Surge Protection**

Defending power, voice and data moving through a network against grid irregularities and dangerous electrical disturbances. Depending on the application, we offer Liebert® and PowerSure™ AC Power Protection, Islatrol™ Active Tracking Filters and Edco™ data/signal surge protective devices; all of which provide power protection to reduce downtime, saving crucial man-hours and extending equipment life.

■ **Service and Solutions**

Delivering assessment, testing and reliability programs backed by the largest global services organization in the industry. We offer engineering, installation, startup services, project management and training together with entire life-cycle management including preventive and predictive maintenance, remote diagnostics, on-site operations management, and energy consumption monitoring.

Vertiv™

Data Center Infrastructure for Large Applications



Vertiv™ SmartAisle™

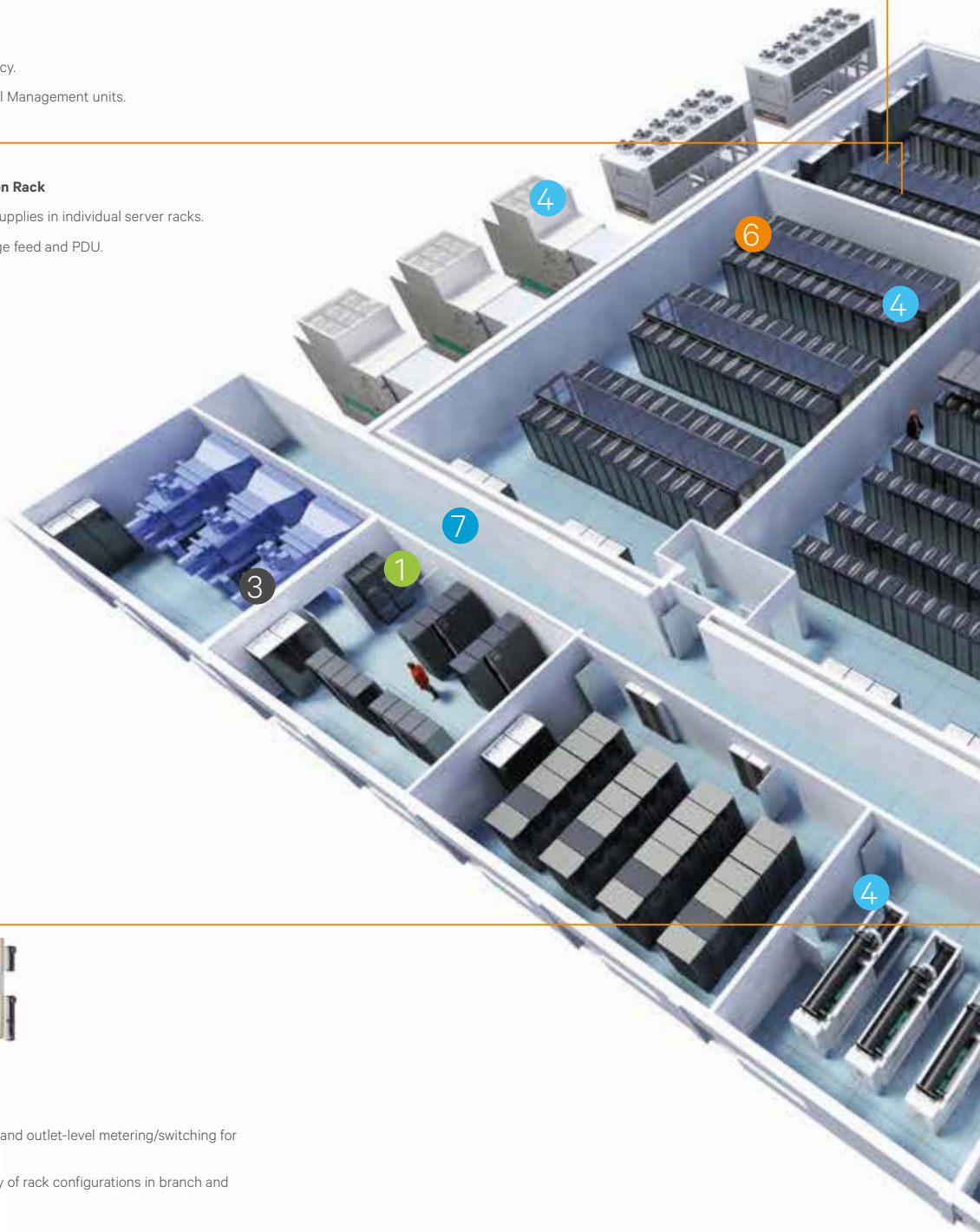
- Aisle containment.
- Provides highest energy efficiency.
- Control compatible with Thermal Management units.



Vertiv Knürr Power Distribution Rack

Central connection unit for power supplies in individual server racks.

- Interface between the low voltage feed and PDU.
- Individual plug-in units.
- Up to 346 kVA/Rack.

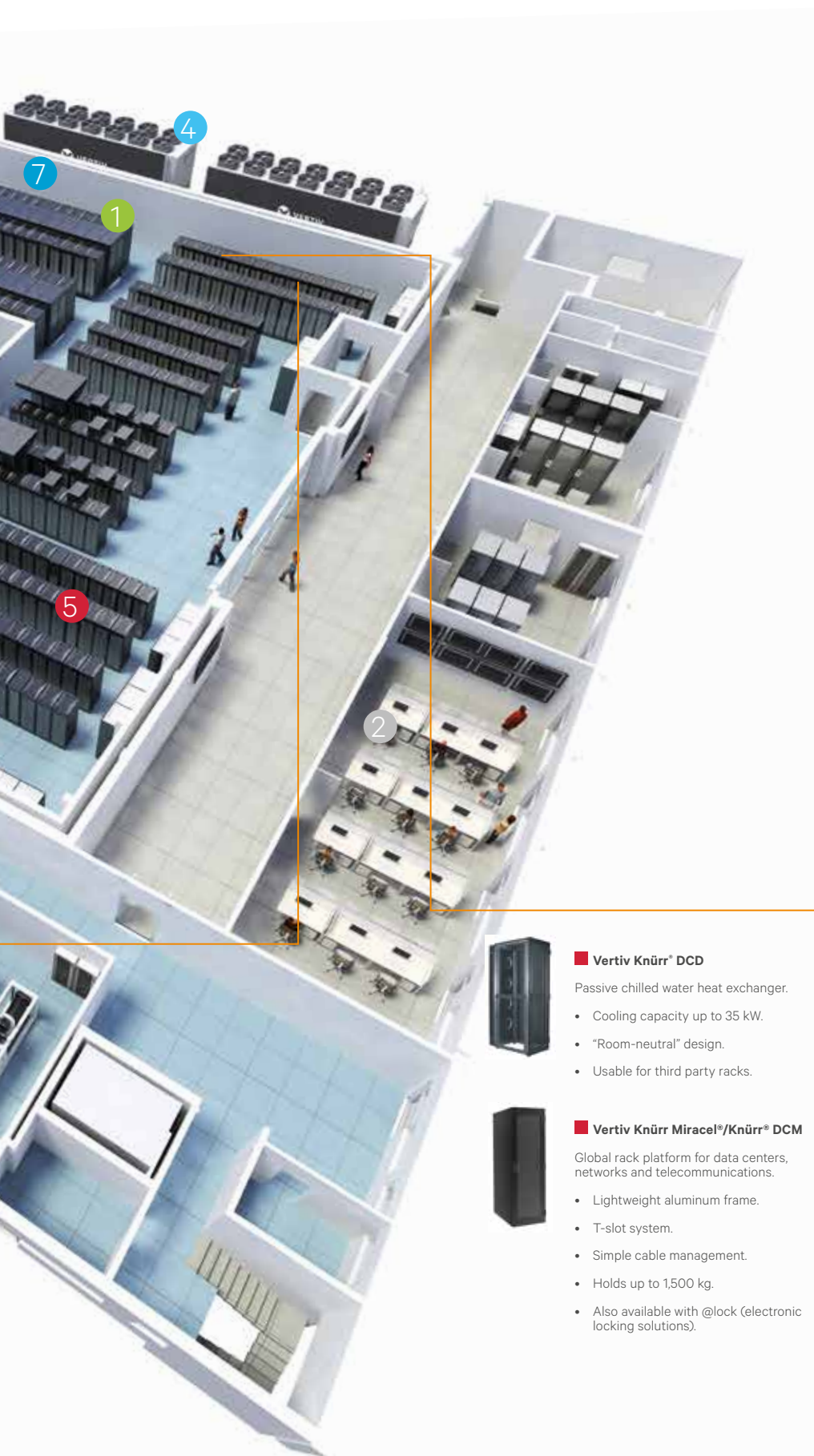


Rack PDU

Rack-based power distribution units.

- Supports strip-level metering, outlet-level switching and outlet-level metering/switching for remote power management and control.
- Horizontal and vertical models designed for a variety of rack configurations in branch and remote offices.

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■ Vertiv Knürr® DCD

Passive chilled water heat exchanger.

- Cooling capacity up to 35 kW.
- "Room-neutral" design.
- Usable for third party racks.



■ Vertiv Knürr Miracel®/Knürr® DCM

Global rack platform for data centers, networks and telecommunications.

- Lightweight aluminum frame.
- T-slot system.
- Simple cable management.
- Holds up to 1,500 kg.
- Also available with @lock (electronic locking solutions).

Service

Vertiv supports entire critical infrastructures with the largest global service organization and an extensive service offering, enhancing network availability and ensuring total peace of mind 24/7.

Our approach to servicing critical infrastructure covers all aspects of availability and performance: from single power and thermal management equipment to entire mission-critical systems.

The most comprehensive insurance for business protection can be obtained with a service program from Vertiv™ which includes access to Vertiv LIFE™ Service.



Vertiv™ LIFE™ Services

Vertiv LIFE Services provides remote diagnostics and preventive monitoring service for UPS and thermal management equipment.

Vertiv LIFE Services delivers increased uptime and operational efficiency by enabling continuous monitoring of your equipment, expert data analysis and field engineering expertise.

Through the data transferred from your equipment via Vertiv LIFE Services, our remote service experts gain the real-time insight and information needed to quickly identify, diagnose, and resolve any irregularities that may arise in operation, ultimately taking responsibility for your critical assets 24/7.

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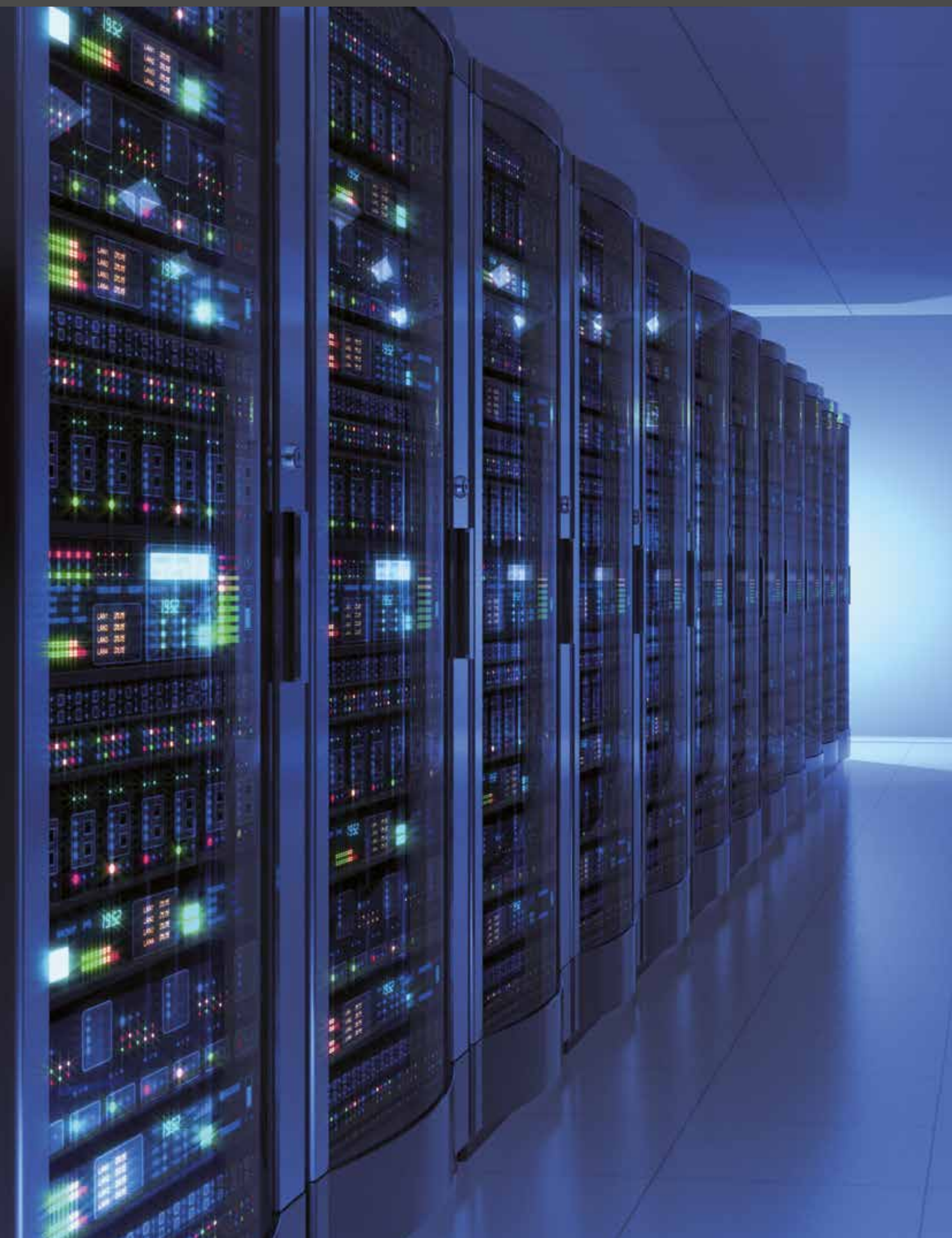
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Vertiv™ – For greater Energy Efficiency in your IT Environment

Really reliable availability of business-critical networks requires a network infrastructure installation you can fully depend on, administration and continuous support.

This in turn depends on the power supply and cooling infrastructure supporting these systems and is based on the following key components:

- **Business-critical power supply**
- **Business-critical cooling**
- **Rack and enclosure systems**
- **Monitoring and management**
- **Proactive maintenance**

Vertiv has developed new power-supply-, cooling-, rack- and enclosure systems, as well as monitoring solutions which further support uninterrupted availability – and offer real added value that goes well beyond the sum of the individual solutions.

With our solutions we provide unsurpassed adaptability, individualization and the ability to integrate into the most diverse products and services.

We acquire extensive knowledge of the challenges you face and are in a position to meet your requirements.

Our exceptionally reliable and comprehensive solutions are tailored to your requirements – thereby providing the benefit of optimized strategic and operational efficiency enhanced reliability, higher flexibility and lower overall operating costs.

Drawing on the combined use of our knowledge, our experience and our resources, we deliver a demand-driven solution from a single source.

The result: an infrastructure that stays abreast of current and future requirements.



VertivCo.com | Vertiv Limited, George Curl Way, Southampton, SO18 2RY, VAT Number: GB188146827

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