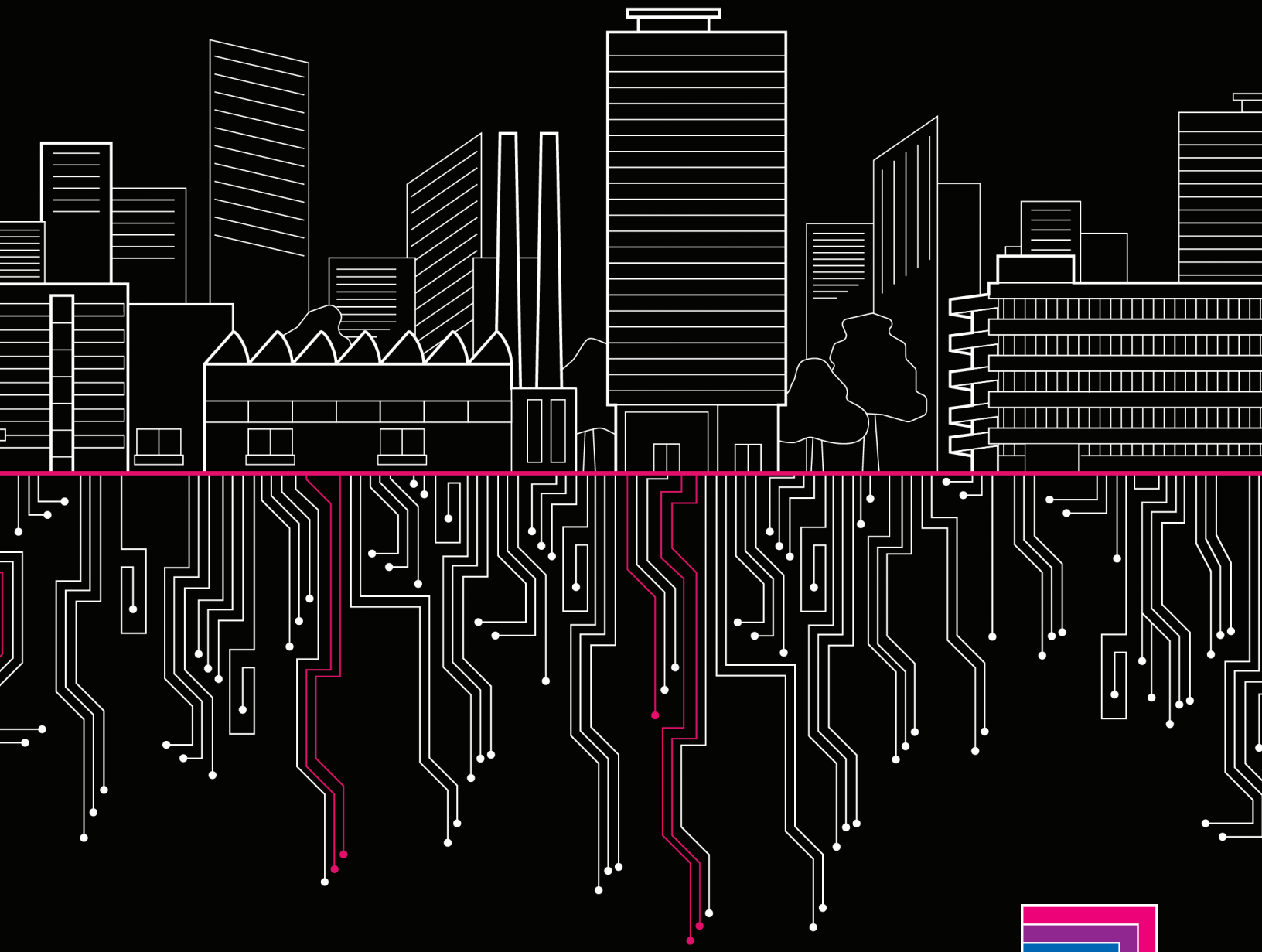
Rittal – The System.

Faster – better – everywhere.

LBS

Edge Infrastructure Handbook



ENCLOSURES | POWER DISTRIBUTION | CLIMATE CONTROL | IT INFRASTRUCTURE | SOFTWARE & SERVICES

RITTAL

FRIEDHELM LOH GROUP

Rittal: A vital partner in edge computing

Edge computing is speeding up IT by bringing the network closer to the data to reduce latency and increase real-time analysis. From the plant floor to the subway tunnel and remote desert solar installations, the Internet of Things (IoT) is integrating sensors, data and systems to help decentralize and localize control over the systems that run the world today.

A 2016 study from Business Insider and BI Intelligence incudes a forecast that 5.6 billion IoT devices will be employed by enterprises to enhance data collection by 2020. At Rittal, we look to the future to help companies decide what to do in the present.

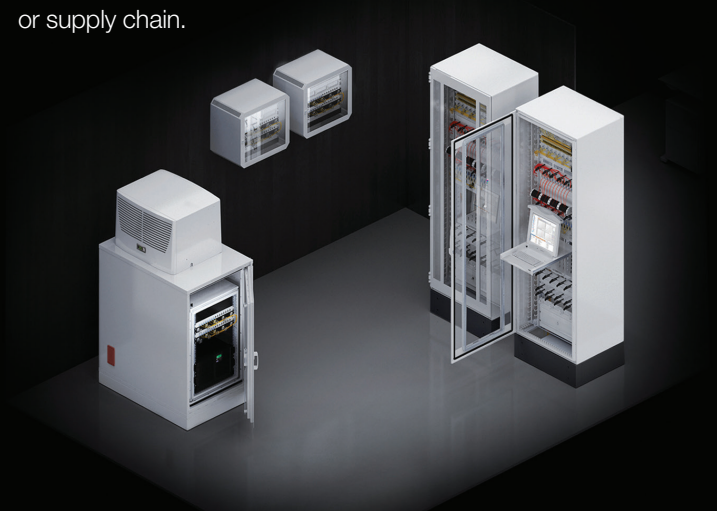
Early adopters have found that edge computing, with gateway networking devices, industrial PCs or even small data centers is faster at collecting and processing data from IoT devices. Near-real-time data analysis takes place on site (or nearer to the site than traditional datacenters), lowering costs in operations and data management. Critical data remains local, addressing bandwidth limitations, and stabilizing latency for predictable speeds. However, security is the chief concern for edge deployments, which are typically unmanned and often located in uncontrolled environments.

Deploying edge computing for IoT devices can be a complex task, but Rittal has the expertise to bring you the equipment and support your need to make edge computing your reality. If your information network model currently has your major processing and storage operations at a home data center, consider moving to the edge.

For many businesses, edge computing represents a big change in both operations and distributed information technology. At Rittal, we can show you how and why this is a change for the better.

Supports the IoT world

Business intelligence has a half-life. Agile companies act quickly on their data to maximize its value. Edge computing enables the connections to process your data directly at the point of its generation. With the deployment of IoT, edge computing speeds the process of transmitting, storing and analyzing data from smart sensors across any applications—factory floor, transit systems, or supply chain.



Speed rules

Process control and efficiency is built on speed. Today, thanks to edge computing, latency is reduced to near-real time at predictable response times. The data is at your fingertips for rapid analysis, to enhance productivity.

Operational savings

Overall cost control in every facet of operations and data management is job one. In edge computing, racks may employ increased processing power, and need a built-in, high-performance cooling system. Long-term savings are achieved through improved cost and inventory control, reduced downtime and enhanced security, which are all heavy operational costs.

Reduced cloud dependence

With terabytes of information processed on location, Edge deployments are challenged with deciding what data to pass along, store or dump. In practice, many companies overstore data or send too much non-essential data to cloud storage. Successful companies employ AI to process only the most important, timely data to the cloud. This “federated” approach to data processing lowers reliance on cloud storage and improves analysis of edge performance.

Local redundancy

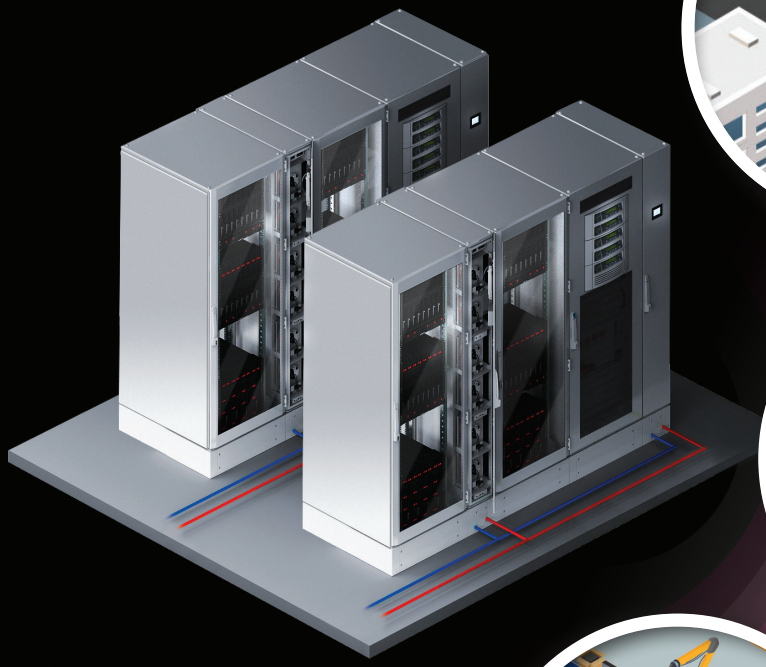
Redundancy in edge systems allows other IT assets to remain fully functional and operational, even if one device fails. Eliminating downtime of the line, preserving key data and rapid response all contribute to a healthier bottom line.

Rittal knows businesses are shifting from enterprise to edge, and we understand the emerging standards to simplify your deployment. simplify your deployment.

Rittal takes the Industrial Internet of Things beyond the borders of possibility

IT and Industrial Converge at the Edge of Computing
From subway tunnels to cruise ships to the manufacturing floor, Edge network computing is enabling the Internet of Things and revolutionizing the speed of control and data analysis. Information from sensors, scanners, tags and other devices cascades without latency into edge-focused servers. Mission-critical decisions are implemented, saving time, resources and energy.

IIoT: Where IT and industrial meet



Edge computing

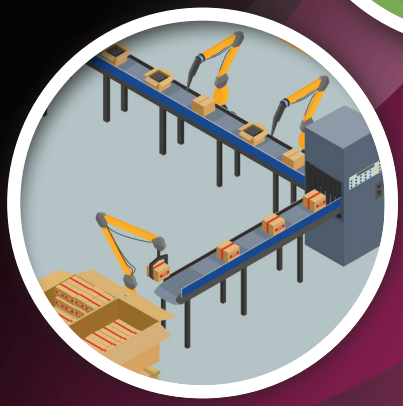
Mission-critical data is close to the gateway. High density computing with a small footprint. Data analysis from the floor in near-real time.

Self-sufficient transportation

From self-driving cars and commercial trucks to subway cars, transportation needs to be connected in real time to GPS satellites, control centers and logistic operations.

Interconnected energy

Everything from oil platforms and pipelines to wind turbines and solar panels provide instant analysis of performance and uptime from the edge to the cloud to centralized operations.



Smart manufacturing

Sensors and scanners provide real-time intelligence and analytics of machinery and inventory to guarantee optimal performance of equipment and facilities.

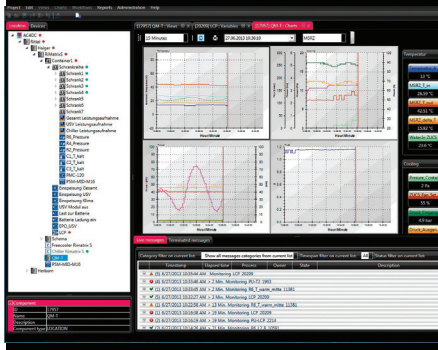
Why choose Rittal? Maximum flexibility delivers maximum cost-efficiency

Over its lifetime, a typical IT enclosure will undergo a variety of modifications and upgrades—some planned, but many unforeseen. In both design and accessories, Rittal builds flexibility into each enclosure to manage modifications efficiently. This helps ensure the enclosure does not have to be taken out of service or replaced to accommodate new hardware, cooling or power solutions.

- Manage increasing enclosure density
- Stand-alone system helps keep your operation running during outages
- Designed for easy maintenance
- Conforms to global certification standards
- Climate control to grow with your application
- Wide range of power distribution systems to meet current and future needs
- Stable power supply, protected from intermittent power disruptions
- Security to prevent unauthorized entry and access
- Environmental monitoring to ensure uptime against the elements

Flexibility in an IT enclosure is standard with Rittal, with customizable features and easy reconfiguration. Rittal provides the maximum adaptability with cost-efficient design.

Modular enclosures grow with your infrastucture needs



Making IT fast and simple

- Reduced complexity saves time from the planning stage onward
- Snap-in technology allows for fast, tool-free assembly of both rack and accessory components
- Quick fastenings, integrated locks and additional internal latching speed the installation of side panels

The TS IT rack is designed to allow a single person to assemble it simply and quickly without the need for tools or specialized training.

Its dimensional flexibility supports the integration of a variety of IT solutions to support numerous network configurations. To adjust the 19-inch levels, just loosen the quick-release fastening, then slide and lock the mounting angles at the required depth. Lateral offset positioning allows for asymmetrical interior installations and makes it easy to select mounting widths greater than 19 inches.

These side walls' quick-action fastenings have integrated locks and additional internal latching mechanisms to enhance security.

TS IT has room for everything. New Ethernet technologies such as 10 GB or 40 GB (with their higher demands on wiring) are easily supported. Cabling can be routed via the roof, from the side or from the base.

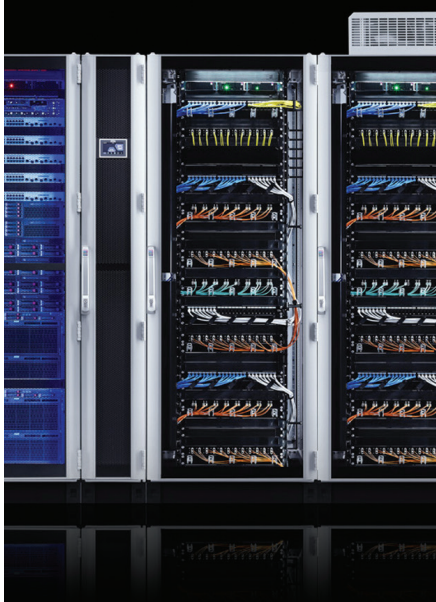
How TS IT makes it simple

- High load carrying capacity—up to 3,300 lbs
- Intelligent cable management system
- Extensive range of accessories

The TS IT can handle a total load of 3,300 lbs. without any additional screw joints, a capability made possible by our depth stays that transmit the load to the enclosure's frame. The quick-release fasteners with snap-in technology simplify initial assembly, any subsequent modifications, and installation of accessory components.

For added safety, the tool-free installation accessories (cable duct, air baffle plate, cable route and floor holder) have integrated holes to allow optional screw fastening. Slide rails, component shelves, telescopic slides and more simply snap into the rear sections and hook into the front sections.

The TS IT supports a wide range of accessory options that make it easy to customize to the needs of your specific application.



Choose the best: Accessories deliver more custom design options

System accessories

Viewing and vented doors

Choose glass for rack climate control or vented for room climate control.

Sidewall and partition walls

Single and split side walls simplify one-person installation.

Air flow options

Baffles, gland plates and blanking panels work together to route cooling air through your enclosure efficiently.

Security options

Flexible access, either 3-digit code keyless or master control functionality.

Cable management

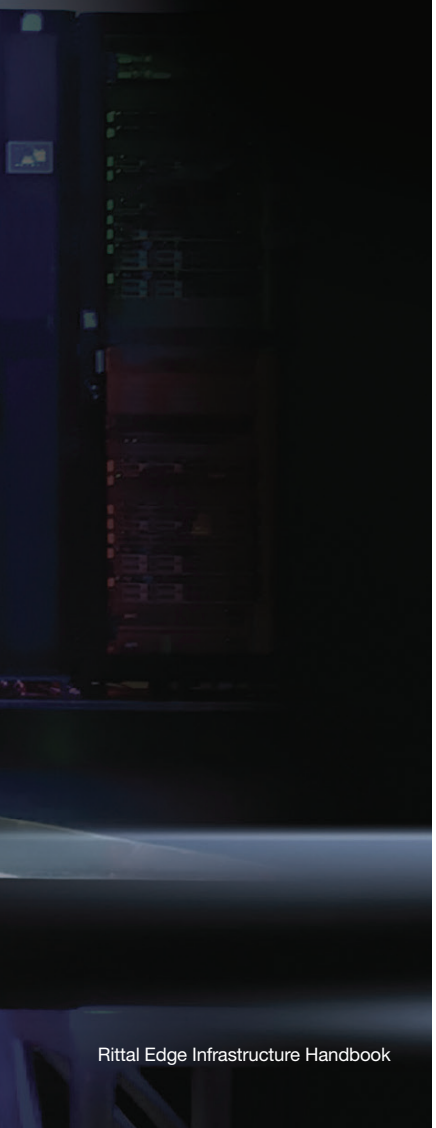
Cable ducts, fingers, cable management panels and walls and D-rings keep cables organized.

Shelving and system chassis

Mount heavy equipment securely within 19" EIA rails.

Climate Control solutions to improve energy efficiency and reduce environmental impact

Your essential equipment protected with Rittal thermal management



Edge network data systems are often located in uncontrolled environments. Temperature and air flow can change from minute to minute, so protection for the components is provided by the enclosure and integrated climate control systems. In particular, climate control these systems need to be able to operate in a closed-loop environment to ensure maximum protection for the network components.

In addition to the challenges of moderating the internal climate against the forces of the external environment, climate control systems have to be scalable and future-proof. As data technology evolves, so do the power loads of the edge systems. And with power comes heat. So a 10kW cooling solution now needs to handle a 30kW load in the same footprint and with the same cooling system.

It's easy to understand why choosing the right cooling system is so critical from the beginning. There is no room for error, and the cost of downtime could be significant. In the case of edge data centers, ASHRAE TC 9.9 standards recommend an ambient temperature range of 70-75°F (or 21-24°C). So, a spike in temperature beyond the healthy range can compromise critical operating information at best, or cause a system meltdown at worst—potentially leaving critical information unrecoverable.

The Rittal solution

Rittal thermal management products answer the demands of data center managers across all industries – from the cruise ship operator to the heavy goods manufacturer. Rittal offers ambient air and liquid cooling systems to meet low-, mid- and high-density requirements.

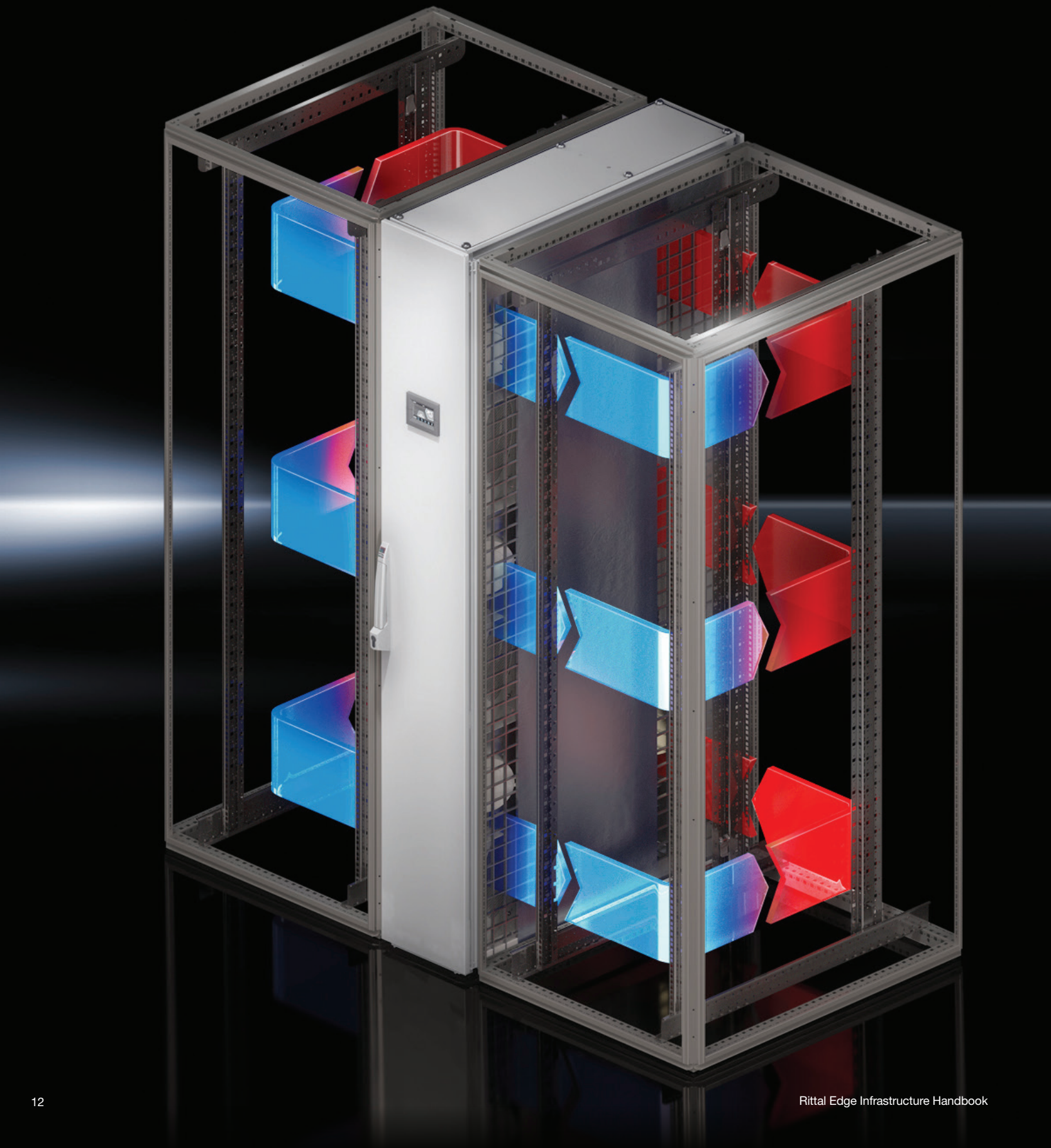
Our ambient air IT cooling solutions

- Filter fans – A complete fan unit for tool-free mounting on surfaces.
- Roof-mounted fans – One system and only one mounting cut-out for all sizes, with clamp fastening for high protection.
- Rack-mounted fans/blower fans – A complete fan unit for mounting on the 19-inch mounting level.
- Air/air heat exchangers – Heat exchangers with two separate air circuits.
- A/C units – High efficiency Blue e+ air conditioning units to manage thermal loads while reducing energy costs.

Rittal is the leading manufacturer of closed-loop cooling, eliminating the need for aisle containment

Understanding closed-loop climate control

Closed-loop climate control systems like the Rittal LCP Inline DX circulate cool air from top to bottom in the cabinet while cooling and recirculating warm air that returns to the direct exchange unit. In addition to being more reliable than refrigerant-based systems, liquid cooling is more sustainable and more energy efficient.



Closed-loop and in-row cooling solutions

LCP DX Rack

In IT data rooms confined in small spaces where chilled water is not available, such as in edge computing, heat buildup is rapid. The LCP DX Rack provides efficient cooling matched to the server rack load in a closed-loop enclosure. With high-performance EC fan technology, refrigerant cooled air is targeted directly within the racks. Servers are cooled independently from the ambient air, with systems designed to adapt easily from a single enclosure to a modular series.

LCP Inline DX

The LCP Inline DX is designed for a bayed enclosure suite where chilled water is not available. Hot air from the room or hot aisle at the rear of the device enclosure is efficiently chilled by the high-capacity variable speed compressor fans, and the refrigerated air is directed back into the room or cold aisle after cooling.

LCP Rack CW

The closed-loop LCP Rack CW units give you total control over the air path. Using a compact 12-inch-wide footprint, this next-generation system may even double your cooling capacity without occupying additional floor space. The high-efficiency fans are located at the front of the LCP – on the cool side away from the highest level of heat – to extend fan life.

LCP Inline CW

In a bayed enclosure suite, LCP Inline CW creates a cold curtain down a row, maximizing efficient cooling. Choose from two configuration options: flush, in which moving air flows into the cold aisle, and protruding, where cold air flows from both sides laterally across the face of nearby enclosures. A higher water inlet temperature increases the proportion of free cooling, reducing operating costs.

Reference Designs Simplify Specification

At Rittal, we look to the future to help companies decide what to do in the present. Early adopters have found that edge computing, with gateway networking devices, industrial PCs or even small data centers is faster at collecting and processing data from IoT devices.

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Low Density Edge Reference Design

	EAC-26M	EAC-26S	EAC-58M	EAC-58S
System Equipment	2.6kW Solution		5.8kW Solution	
TS IT Enclosure with Sidewalls and Cable Management	42U/78.7"H x 24"W x 40"D (2000 x 600 x 1000mm)		42U/78.7"H x 32"W x 40"D (2000 x 800 x 1000mm)	
Overall Dimensions – TS IT Enclosure with Blue e+ Installed	42U/78.7"H x 35.5"W x 40"D (2000 x 900 x 1000mm)		42U/78.7"H x 47.2"W x 40"D (2000 x 1200 x 1000mm)	
Cooling System	1 Blue e+ air conditioner mounted on enclosure			
Cooling Capacity	2.6kW (Max)		5.8kW (Max)	
Voltage	110–240V, 380–480V		380–480V	
Paint Color	RAL 7035 (Light Gray)			
Monitored PDUs and Mounting Brackets	2			
Enclosure Roof Type	3-Part Multi-functional	Solid (NEMA 12)	3-Part Multi-functional	Solid (NEMA 12)
Enclosure Light with Motion Detector	Included			
CMC III Environmental Monitoring & Access System with Pin Pad	Optional			
Base Plinth	Optional			
Start-up Service	Optional			
Preventative Maintenance	Optional			

Medium Density Edge Reference Design

	EDX-1OP	EDX-2OP	EDX-1CL	EDX-2CL
System Equipment	Open loop		Closed Loop	
TS IT Enclosure(s) with Cable Management, Baying Hardware, Sidewalls	1	2	1	2
Enclosure Dimensions	42U/78.7"H x 32"W x 48"D			
Overall Row Width	44"W (1106mm)	76"W (1906mm)	44"W (1106mm)	76"W (1906mm)
Cooling System	1 LCP DX close-coupled unit, 1 external condenser			
Cooling Capacity of System	3-12kW			
Paint Color	RAL 9005 (Black)			
Monitored PDUs with Mounting Brackets	2 per TS IT enclosure			
Enclosure Light with Motion Detector	1 per TS IT enclosure			
CMC III Environmental Monitoring	Optional			
CMC III Auto Door Opening Kit	NA		Optional	
Base Plinth	Optional			
Auto Door Opening Kit	NA		Optional	
Fire Suppression	NA		Optional	
Start-up Service*	Included			
Preventative Maintenance	Optional			

*Estimated Rittal start-up cost including travel – will vary per application.
Installation of the condenser, piping, and electrical are to be completed by a licensed 3rd party.

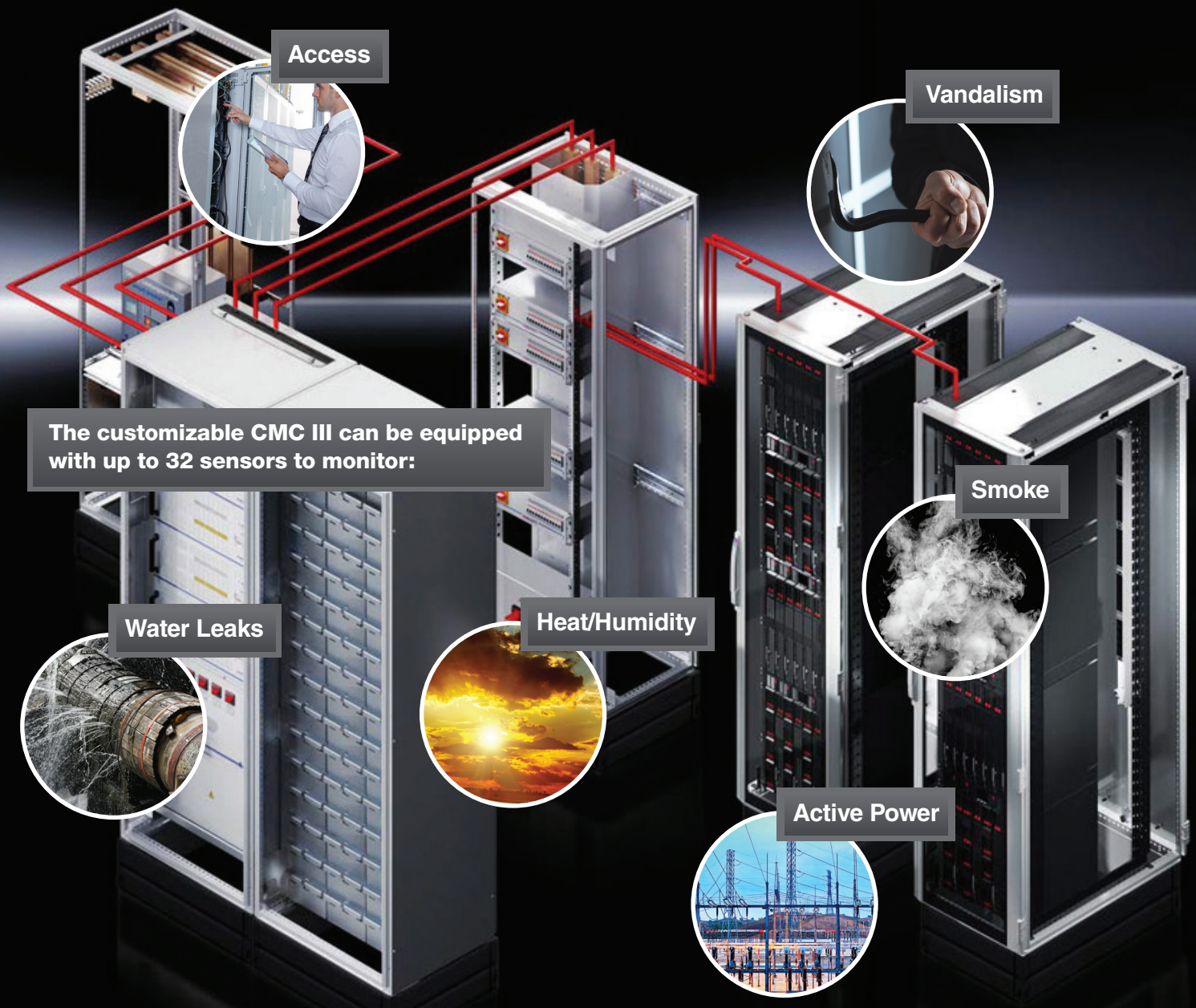
Essential IT
Monitoring & security tools

Edge Monitoring Solutions Keep Data Protected and Secure

Your edge deployment is a critical part of your business. Keeping it safe at all times is vital. Equipment failure, break-ins and thermal spikes can jeopardize the integrity of your equipment and your data, having a comprehensive monitoring solution is crucial.

As a data center's size grows, so can the complexity of the equipment needed to monitor environmental conditions and control access. Rittal's CMC III system solves this problem by using a CAN bus to support serial connection of multiple monitoring sensors to a central point.

The system collects numerous essential statistics, making them available for further processing by the network management system and allowing IT managers to monitor all data center environmental conditions from a centralized position. However, the CMC III also acts independently, automatically initiating countermeasures and triggering alarms or notifying designated personnel.



Choose the best: Monitoring and security solutions

DET-AC fire suppression

To prevent a fire that starts in one piece of hardware inside an enclosure from spreading to the rest, Rittal offers the DET-AC III fire alarm and extinguisher system. This system uses the chemical extinguisher medium NOVEC™ 1230, which is stored in liquid form, and flows into the enclosure as a gas. The extinguisher gas is non-conductive and leaves no residue, so it won't damage the hardware inside the enclosure.

RiZone software

If any parameter exceeds a defined threshold, the central unit sends a corresponding message to a technician. In combination with Rittal's RiZone IT infrastructure management software for data centers, it is even possible to trigger countermeasures automatically, without direct intervention by a technician. This makes it possible to avert hardware failures and the associated data losses in a timely manner.

CMC III system sensor options

Two important sensors are integrated as standard equipment into the CMC III Processing Unit: an infrared sensor that monitors the enclosure door and a temperature sensor that measures the temperature of the inflowing ambient air.

CMC III system configurations can also accommodate up to 32 other sensors, including sensors for:

- Temperature
- Humidity
- Vandalism
- Airflow
- Air pressure
- Smoke
- Water leaks
- Access
- Motion
- Active power
- Apparent power
- Supplied energy

Access control

Not all enclosures hold equally vital components or data, but preventing unauthorized access to equipment is critical in any IT environment. Rittal offers a variety of mechanical and electronic locking systems, as well as different sizes of simple handles without locks.

The CMC III system can act as an operational control unit. The door handle and the doors are constantly monitored, and unauthorized access is immediately reported. Access can also be controlled remotely. Access control can be personalized using a numerical code on a touchpad or an RFID card, making it possible to trace how long a particular person had access to the equipment inside the enclosure. CMC III systems can even be configured to require the "four eyes" or double-checking principle, in which two people have to perform identification at the same time. These capabilities are in addition to the integrated infrared door sensor in the CMC III Processing Unit.

IT Power Overview

Rittal's IT Power Distribution Units (PDUs) and UPSs ensure an uninterrupted supply of power to server equipment racks and other data center applications. The PDUs, UPSs, and their extensive management and monitoring functions are designed to deliver power to equipment within TS IT enclosures reliably and cost effectively.

Simple PDU installation

- Horizontal for half rack and telecom applications
- Vertical (zero-U) for IT applications
- Button mount and direct attach mounting
- Standard and custom brackets available

Versatile functionality

- Measurement of voltage, current, power, apparent power, and power factor
- Measurement at the input and the outlet
- Support for optional temperature, humidity, and dry contact closure sensing
- Programmable thresholds and alarms
- Outlet grouping and outlet naming supported
- Remote outlet control

Comprehensive monitoring tools

- Direct access via embedded web server and browser
- RS232 support for out of band access
- Integrated into open source and proprietary software tools via SNMP
- Natively supported in all major DCIM tools

Rittal power solutions provide unparralled visibility into your power use

Rittal Powers the Edge

Power reliability is the focus of every data center manager. As more equipment is loaded into the confined footprint of Edge data centers, the power load increases. Higher density of power can lead to equipment, and network failure. We can help.

Rittal provides a complete line of basic, switched, smart and high density PDU solutions to ensure uptime and scalability. Rittal's high density solution has the most outlets in a 42U intelligent Rack PDU with industry standard C13 and C19 outlets. It comes with high native cord retention and color-coded alternating-phase outlets for easy cabling.

Alternating phase outlets manage the phased power on a per-outlet basis instead of a per-branch basis. This allows for shorter cords, quicker installation and easier load balancing for 3-phase rackmount PDUs. Shorter cords are less likely to become unplugged during transport of the assembled rack.

Basic

Basic PDUS meet UL, ASHRAE, and IEC requirements including support for the most demanding power and environmental applications. Optional color identification features are available. Basic PDUs provide reliable power distribution for all devices in your equipment cabinet.

Metered

Offering local input current monitoring via LED display, Metered PDUs from Rittal help avoid circuit overloads, and can easily be load-balanced in three-phase power applications. There are numerous mounting options available for all Rittal PDUs including button mount, direct attach, standard and custom mounting brackets.

Smart

Smart PDUs offer input power monitoring at the PDU and remotely via communications over the IP port or the serial port. The easy-to-view LEDs of the Smart PDU provide local information on input current. Like all Rittal PDUs, Smart PDUs offer branch circuit protection in the form of fuses or circuit breakers. Available in single- and three-phase models.

Smart POPS

Combining infeed power measurement with highly accurate outlet-level monitoring, Smart POPS PDUs are for “always-on” applications. Like the Smart, Switched, and Switched POPS PDUs, Smart POPS PDUs can be combined with Expansion units to provide information on primary and secondary rack power feeds from a single IP address

Switched

With the ability to turn on, turn off, or reboot outlets individually or in groups, Switched PDUs provide the remote management capabilities needed for hands off, lights out edge deployments. They also feature smart load shedding, outlet sequencing, and individual outlet lock out support (default to off) to prevent unwanted loads from being added to the rack.

Switched POPS

Switched Per Outlet Power Sensing PDUs feature highly accurate, outlet-level monitoring for your data center power needs. Switched POPS PDUs support optional temperature and humidity probes, along with expansion interfaces that accommodate water sensors and dry contact closure sensing.

Rittal – The System.

Faster – better – everywhere.

- TS IT Enclosures
- IT Cooling
- Monitoring & Security
- IT Power

LBS Power

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