Rittal – The System.

Faster – better – everywhere.

RiMatrix Next Generation

Modular is the way forward

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

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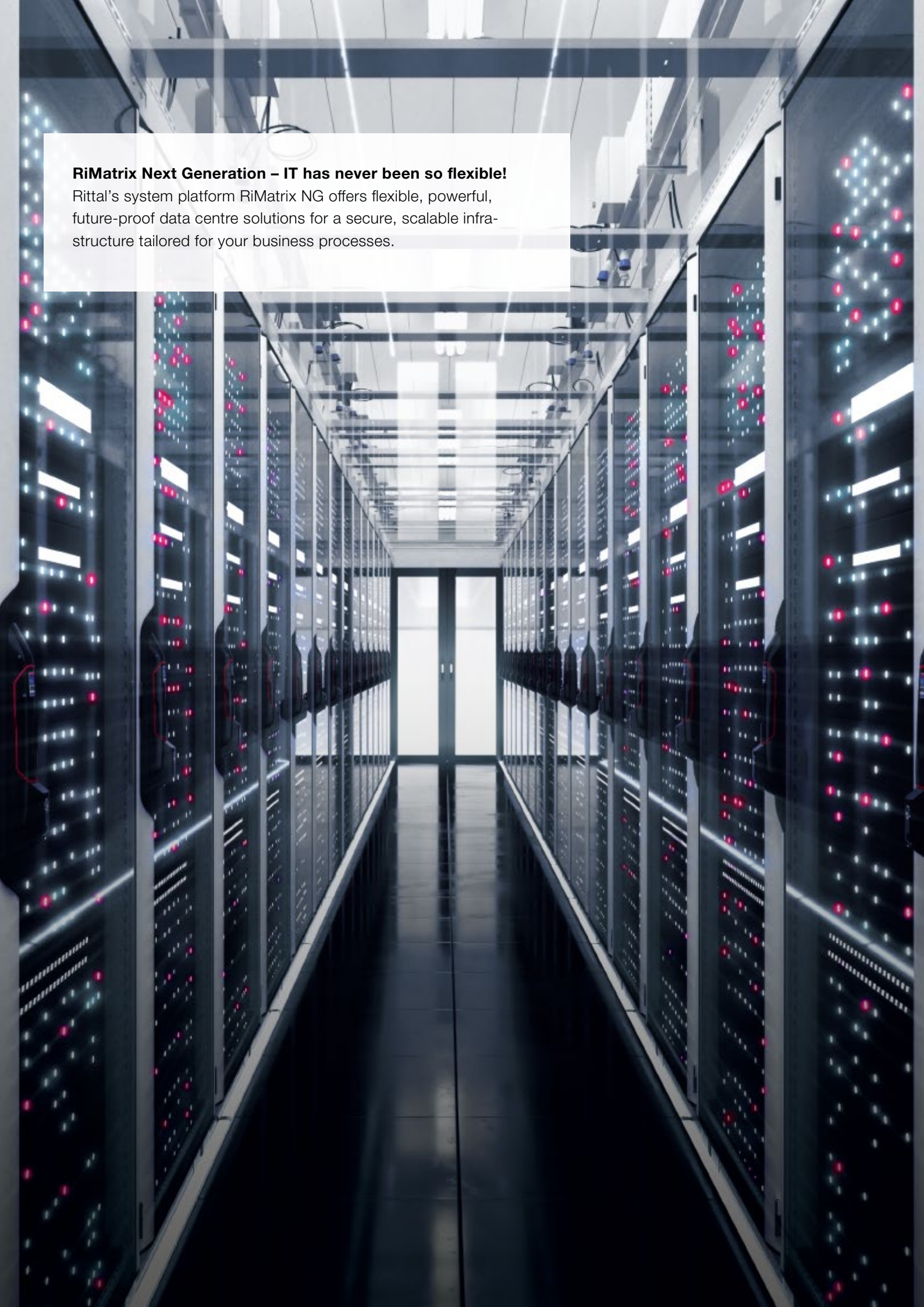


RiMatrix Next Generation – IT has never been so flexible!
Rittal's system platform RiMatrix NG offers flexible, powerful, future-proof data centre solutions for a secure, scalable infrastructure tailored for your business processes.

Contents

Bring on the future

Digital technologies and applications, along with new business models, are developing at an unprecedented speed. If and how the resulting explosion of data can be effectively filtered and used, is a recurring theme. A variety of exceptional situations challenge the IT infrastructure at every level.

IT specialists are being urged to flexibly adapt their IT infrastructures to the ever-changing market requirements so that business-critical processes can operate at maximum performance. This means, the rapid scaling of data centres and infrastructures so that computing performance can meet the changing requirements of relocation or a new application. In short, the ability to top up or consolidate resources quickly and flexibly is crucial.

The next few years will be hugely challenging.
RiMatrix NG has been carefully designed for maximum modularity.

Uwe Scharf,
Managing Director Rittal Business Units
and Marketing, Rittal GmbH & Co. KG

Furthermore, data must often be processed at the point of origin, rather than transmitting it to a remote, central data centre. Companies and organisations must have access to system-relevant intelligence at all times and at every level to guarantee the continuous exchange of information.

Preparing you for the future:
RiMatrix Next Generation (NG)

RiMatrix NG – The next generation of future-proof IT infrastructures:

- An open system platform which is continuously updated to reflect future technology trends
- Modular solutions for customer applications offering fast availability and flexible scalability
- Guaranteed system extendibility and investment protection thanks to compatibility with predecessor data centre versions
- VX IT modular variants provide the basis for a customer-specific configurable enclosure platform
- From planning, to operation, to optimisation of the entire IT lifecycle
- OCP technology in standard applications opens up new efficiency potential

Modular platform – for all IT scenarios

IT infrastructures and data centres provide the basis for smart cities, the work-life environment of the future.

Smart cities are IoT-interconnected, high-tech urban living spaces that will transform the way we live and work. They are based on IT infrastructures and data centres which are designed to ensure a smooth exchange of data between all players. Over the next few years, everyone from local councils, urban planners and transport providers to industrial manufacturing plants will face enormous challenges with their IT infrastructures.

How these challenges are met by the different industry players will depend on their data centres, technical equipment and ability to handle the ever-increasing amount of data. Our response to this challenge is the RiMatrix NG, which combines maximum flexibility, security and efficiency all in one perfectly coordinated solution.

It enables the individual configuration or assembly of data centres from standard components, from stand-alone racks to central data centres, be it cloud, edge or hyperscale. Where a rapid response is needed, or if there is no space in existing buildings, data centres can be supplied in containers and integrated into existing IT infrastructures.

By **2025** some

34,200,000,000

devices worldwide will be connected to the **IoT.**[1]

1 IoT Analytics, “State of the IoT 2018: Number of IoT devices now at 7B – Market accelerating”, Market Update, Knud Lasse Lueth, August 2018.

Maximum flexibility

- RiMatrix NG offers maximum scalability for exceptional efficiency
- There are a range of financing models available for demand-based, scalable investment
- Ongoing updates ensure adaptability to future technology trends
- Energy-efficient components create sustainable, cost-cutting modularity

Reliable solutions

- Tried-and-tested Rittal quality that meets international standards
- Compatible with existing systems with guaranteed extendibility
- International approvals ensure global use
- Support for customers with full documentation, training and a comprehensive service package

Rapid use

- System solutions and OCP integration with their pre-specified set of associated components reduce planning and procurement
- Perfectly adapted for other components, management systems and applications
- Fast, simple configuration and commissioning
- Optimised delivery co-ordinating with your requirements

RiMatrix NG: The basis for successful customer solutions

As an open system platform with exceptional modularity and flexibility, the RiMatrix NG provides the basis for an IT infrastructure tailored to the specific requirements of almost every industry. This helps to ensure that companies can be adaptable and powerful and are well-placed to meet the challenges of the future with an agile IT infrastructure.

Retail
Online shopping and high-street retailer customers expect a broad selection of products that are in stock and available for fast delivery. RiMatrix NG data centres have the technology to profile customer preferences, link regional warehouses to company headquarters, and thereby optimise the customer experience, logistics chains and product availability.

Industry
In industrial manufacturing, it often makes sense to process data streams close to the point of origin, in order to minimise latencies with real-time applications. Modular RiMatrix edge data centres, with their flexibility and versatile applications, are ideally suited to this purpose.

Mobility
Autonomous vehicles are linked to one another as well as to the control system. They collate and supply data and process it in real time, helping to avert critical traffic situations. With maximum flexibility, security and efficiency, the RiMatrix NG infrastructure can handle even highly complex scenarios involving large volumes of data.

Healthcare
The best healthcare provision relies on the immediate processing and secure transmission of patient data. RiMatrix NG guarantees those requisite high performance levels for the IT infrastructure, particularly in emergency situations.

Colocation
For data centre operators, the RiMatrix NG, based on an open system platform, paves the way for the emerging colocation business. In particular, the modular system rises to the challenge of ever-growing data volumes, both now and in the future.

Developed in collaboration with our customers: RiMatrix NG

Telco

Telecommunications providers face an ongoing challenge to adapt their computing power and bandwidth in line with the pace of changing situations. The modular RiMatrix NG system platform permits fast, flexible scalability to tackle current and future requirements.

Finance

In the financial sector, smart IT solutions facilitate automated, accelerated and secure transactions such as smart contracts based on blockchain technology. This is a local database enabling the transparent, manipulation-proof storage of transactions between parties, e.g. in interconnected RiMatrix NG edge data centres.

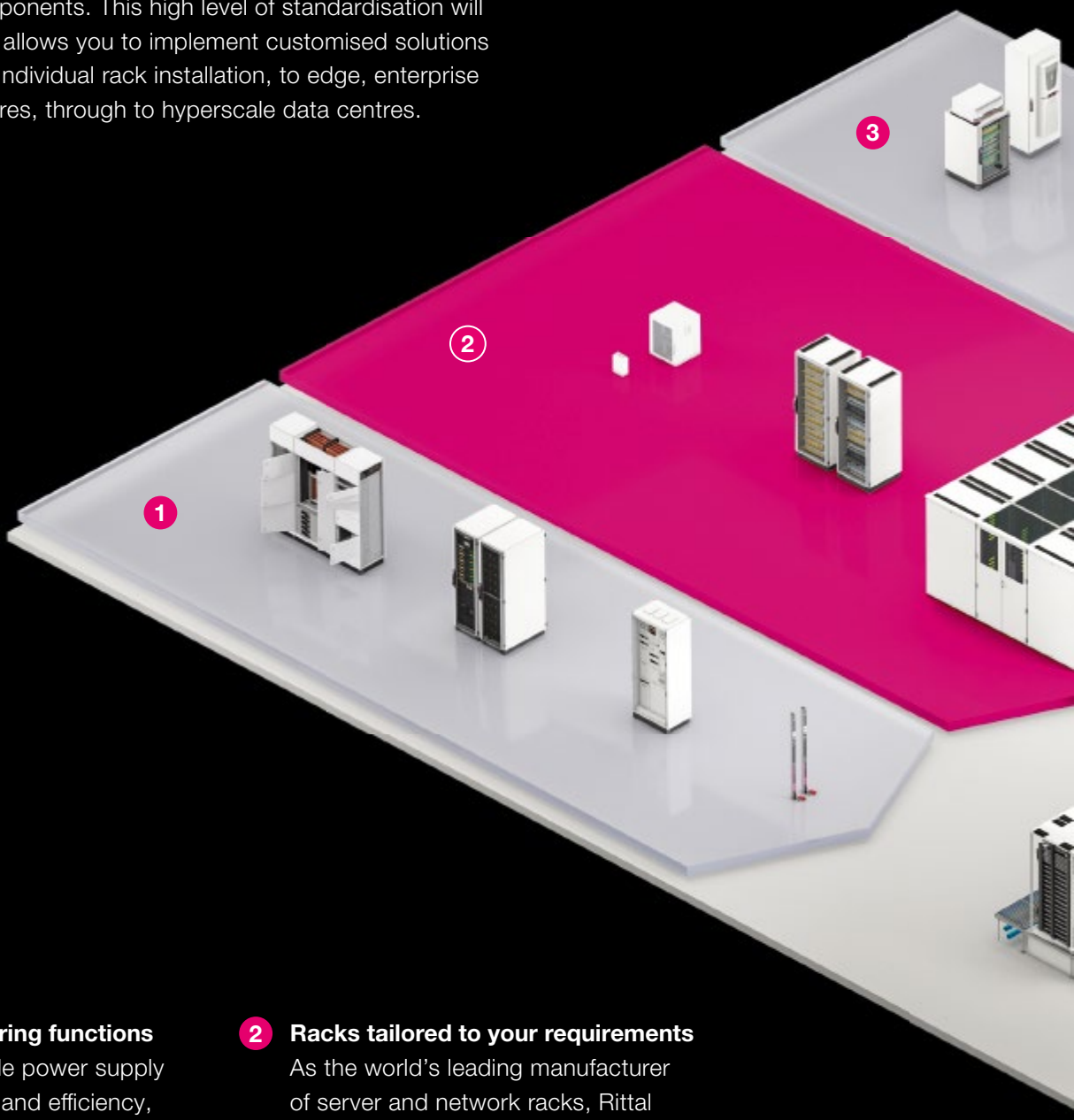
Government

The future of e-government applications is much more than just the digitalization of administrative processes. RiMatrix NG data centres meet the highest security standards needed to protect sensitive citizen data.

Modular is the way forward

The Rittal RiMatrix NG is an open system platform for uninterrupted availability, high data quality, innovative cooling management, optimised energy efficiency and maximised security.

RiMatrix NG allows data centres to be individually configured or assembled using standard components. This high level of standardisation will boost your profitability. It allows you to implement customised solutions for all IT scenarios: from individual rack installation, to edge, enterprise and colocation data centres, through to hyperscale data centres.

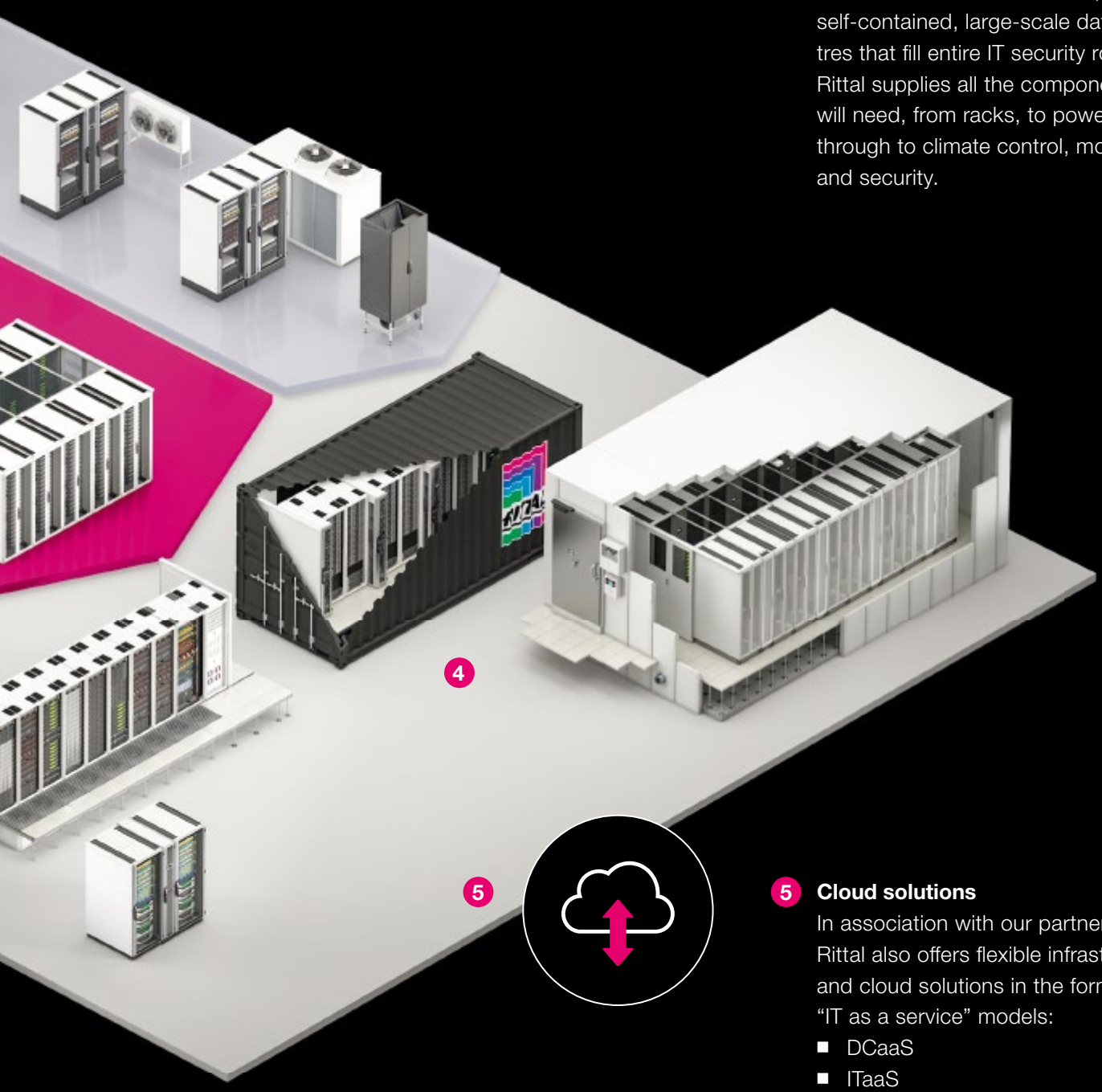


1 **Power with monitoring functions**
Individually adaptable power supply for greater reliability and efficiency, including digital control of voltage, current, power factors, active and apparent power.

2 **Racks tailored to your requirements**
As the world's leading manufacturer of server and network racks, Rittal offers a uniquely comprehensive range of racks and accessories to suit every individual IT application.

3 **Cooling: from racks to rooms**
Scalable climate control solutions such as the Liquid Cooling Package (LCP) allow temperature-neutral expansion of data centres without the need for major modifications.

4 **Rittal edge data centres: Comprehensive solutions for large data volumes**
Depending on the planned location and data volume, our data centres may be used either as compact rack combinations, as larger data centres in location-flexible containers, or as self-contained, large-scale data centres that fill entire IT security rooms. Rittal supplies all the components you will need, from racks, to power supply, through to climate control, monitoring and security.



5 **Cloud solutions**
In association with our partners, Rittal also offers flexible infrastructure and cloud solutions in the form of "IT as a service" models:

- DCaaS
- ITaaS
- CaaS

Lifelong IT partners: Lifecycle IT

RiMatrix NG

Data centres are constantly evolving, driven by Industry 4.0, the IoT (Internet of Things), big data and edge computing. To ensure that today's IT solutions do not become obsolete, RiMatrix NG offers scalable solutions, with Rittal on hand as your reliable partner at every phase: from the initial analysis of your requirements, to defining a suitable strategy, through to the ongoing operation of your data centre.

RiMatrix NG supports the entire IT lifecycle, which is divided into the following phases:

Design: Once the concept has been developed and the solution modules selected, the investment (CAPEX) and operating costs (OPEX) are calculated.

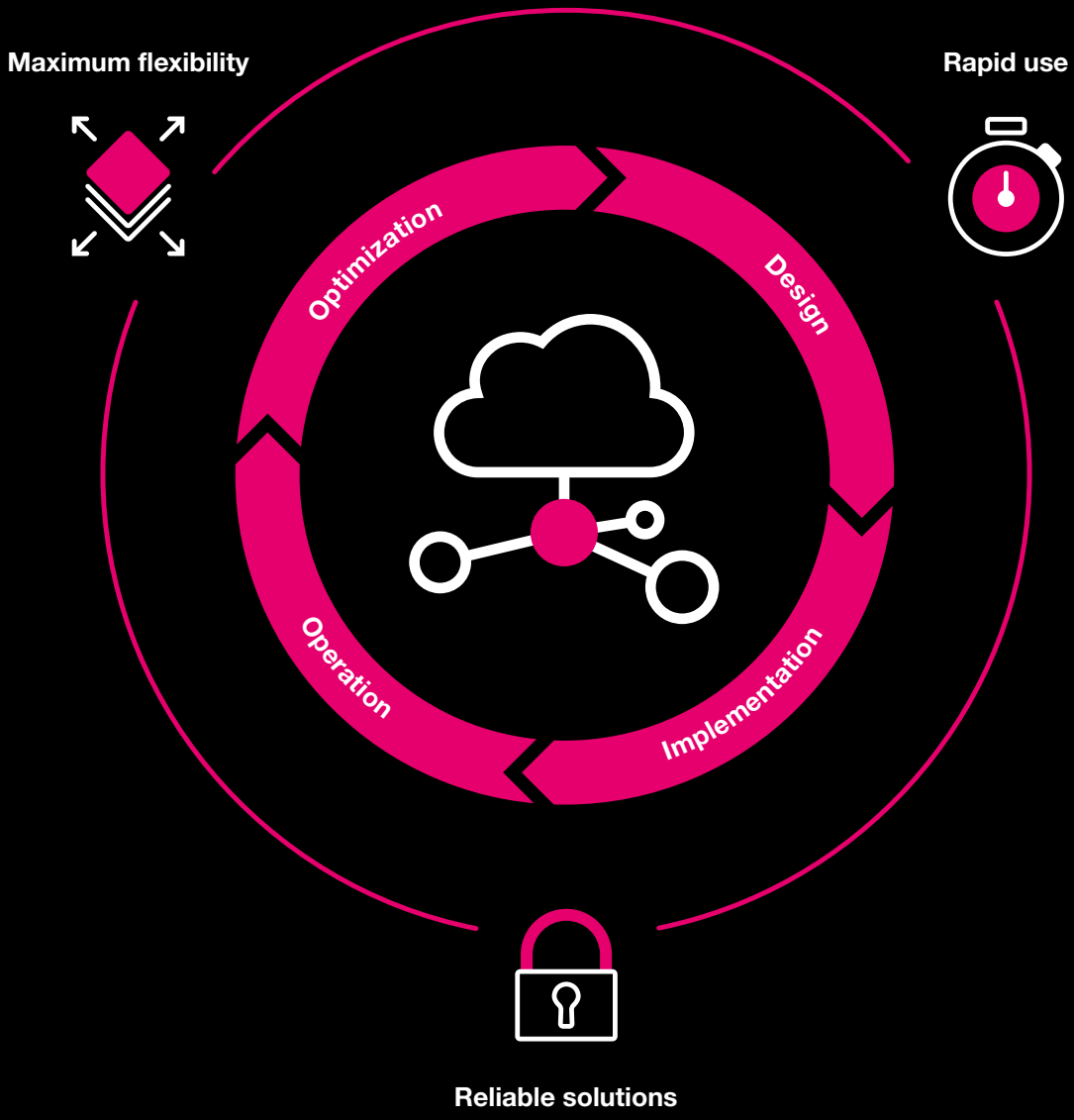
Implementation: The physical infrastructure (power, cooling, monitoring, security) is assembled, followed by commissioning and sign-off.

Operation: The data centre can be operated locally, or by Rittal partners as a managed service.

Optimization: The installed solution is analysed in respect of efficiency, costs and sustainability, to identify further optimisation potential.

What is more, in conjunction with our partners, Rittal offers a comprehensive portfolio of solutions at every integration level, from data centre location, to virtualisation (server, storage, network) through to Data Centre as a Service (DCaaS). In this way, companies are assured of scalable solutions plus flexible services at clearly calculable costs throughout the data centre lifespan.

RiMatrix NG at every stage of the IT lifecycle



Scalable solutions from edge to hyperscale

Fully digitalised order handling: At the Rittal Global Distribution Centre, edge data centres ensure fast, reliable processing of customer and logistics data.

Using data at the point of origin: Edge computing
As the complement to cloud computing, edge data centres support the processing of large volumes of data directly at the point of origin to support real-time applications and analytics. This spatial proximity helps to minimise latencies and enables the more effective use of storage capacity and bandwidths.

Edge computing therefore represents the link between centralised cloud applications and the physical world of sensors, production machines and mobile terminal equipment. Industrial segments such as power distribution, transport management, retail and medicine use edge data centres to optimise their operations, cut costs and improve the customer experience, to name just a few of the benefits.

Rittal supplies adaptable solutions based on RiMatrix NG.

Maximum compatibility for hyperscale scenarios
As data volumes increase, so too does the global demand for computing capacity. In 2021 it is anticipated that hyperscale infrastructures will account for 55% of all data centre traffic.[2] These large-scale systems use cloud infrastructures, connected with a large and expandable number of servers in a network. The server structures are designed to be as simple as possible to allow horizontal scalability for maximum output, efficiency and redundancy.

The RiMatrix NG's open architecture allows large numbers of IT components to be incorporated into the high-quality infrastructure of cloud and hyperscale data centres. What is more, they also boast a high server density, minimal power consumption, limited space requirements and optimum cooling.

By 2021,
hyperscale data centres
will account for
55%
of all **data traffic.** [2]

2 Cisco, News Release, "Global Cloud Index Projects Cloud Traffic to Represent 95 Percent of Total Data Center Traffic by 2021", February 2018.

Hyperscale data centres at Chindata Co. Ltd.,
one of the largest cloud and colocation providers in China

The world’s fastest IT rack

Modular system

Whether you need a network rack to accommodate a distribution board, or server racks for an edge, cloud or hyperscale data centre, the new VX IT is the ideal platform to meet all the demands of a modern IT infrastructure.

Uncompromised customer focus
The new VX IT is based on a modular concept with a customer-friendly configurator to guide you quickly and easily to a solution that is tailored to your individual requirements. Our state-of-the-art production lines and optimised logistics ensure rapid availability and on-time delivery.

Matching modules
The new VX IT is the underlying basis of RiMatrix NG – the NEXT GENERATION of Rittal’s tried-and-trusted IT system, designed to fully accommodate numerous innovative products and features.

Seamless compatibility
A data centre infrastructure is designed to outlive its individual servers. Compatibility with existing RiMatrix systems is therefore crucial. The VX IT and the RiMatrix NG are continuously refined and improved to keep pace with the demands of future IT infrastructures.

Rittal VX IT Configurator

Individual IT racks with the VX IT configurator
Online configuration is based on a modular principle: The first step is to define the basic enclosure, so that the interior installation and customised accessories can then be configured. In this way, the VX IT configurator supports a wide range of configurable rack variants, extending far beyond the standard rack portfolio.

To eliminate errors, all configuration stages are immediately checked for correctness. Recommended accessories are also displayed at each stage of configuration for rapid selection. Delivery times are also clearly shown in the VX IT configurator. The delivery time will depend on the rack's level of customisation.

A perfect fit:
Accessories for your application

The VX IT is supplemented by a wide range of cutting edge accessory products.

Lighting
The racks may be fitted with multi-functional lighting. This includes an integral magnetic attachment and activation via the Computer Multi Control III (CMC III) module, Rittal's monitoring and control system for enclosures and server racks. A quick glance at the server aisle is all you need to ascertain the status of the individual racks from the lights.

Different colours represent the individual status of each rack. Blue indicates normal status but the light will change colour in the event of a malfunction. Amber is a pre-warning, while red indicates an alarm. If a door is opened, the system will switch to a white light.

Multi-functional lighting

VX IT doors with ADO include integral vent flaps and a door control module (DCM) for activation. Possible application scenarios might include excessively high temperatures in the closed rack or to dissipate extinguisher gas when there is an external room extinguisher system.

Automatic Door Opening (ADO)
An integral temperature sensor offers high levels of security and communicates any abnormalities to the CMC III. It has its own separate power supply to ensure the automatic ventilation of closed network/ server enclosures in emergency situations, for example if extinguisher gas enters the rack.

Electronic radio comfort handle VX
The battery-powered radio handle for door locking guarantees a high degree of security with encrypted radio transmission of security-relevant signals to the CMC III wireless unit.

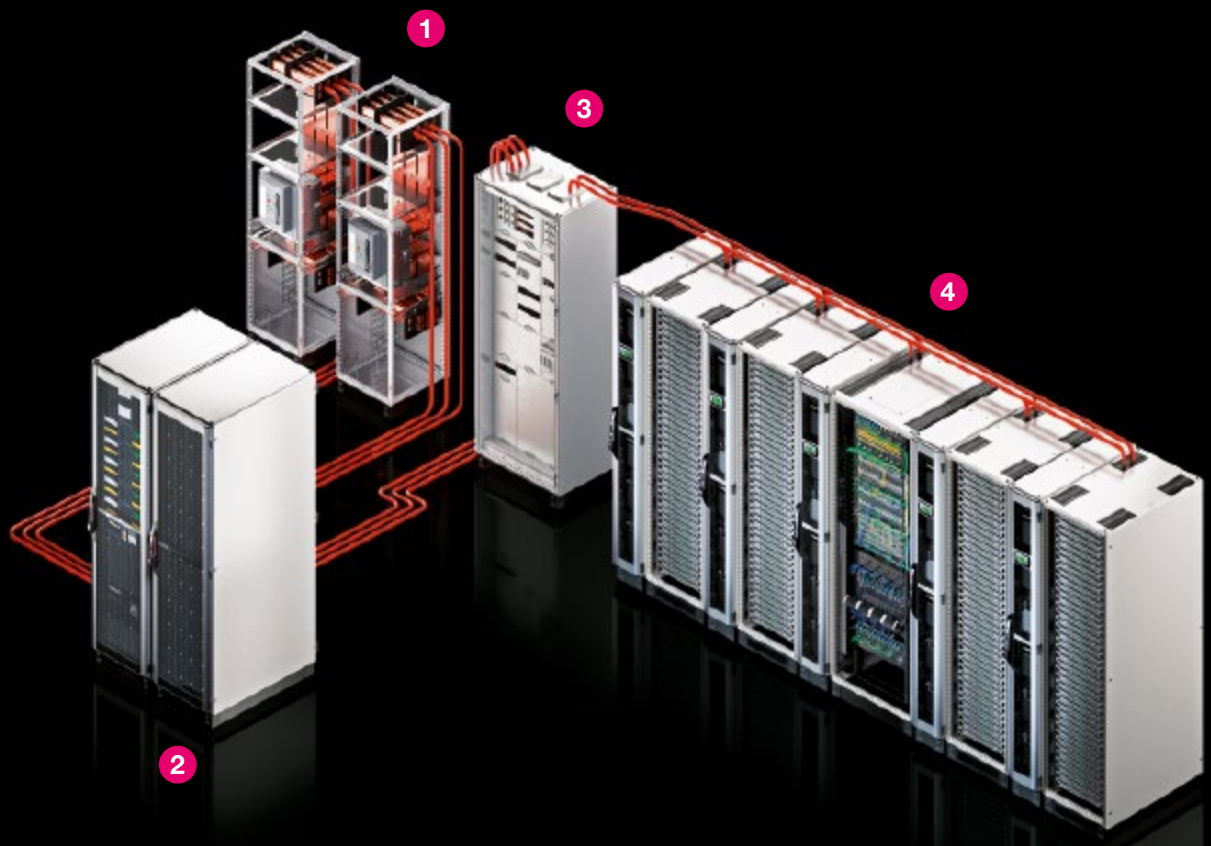
Keyless, contactless access with RFID technology in a new handle system

Reliable, uninterruptible power supply

Optimum energy and cost efficiency with maximum performance and security

The entire infrastructure of the data centre must be monitored to ensure maximum availability. A failure in an IT system or even the data centre itself could have extremely wide-reaching consequences.

IT power: Topology



1 Ri4Power
Reliable main infeed for supplying power to data centres, suitable for use with open and compact circuit-breakers from all well-known manufacturers.

2 Uninterruptible power supply (UPS)
A guaranteed power supply to all connected IT components in the event of a temporary failure in the electricity supply.

3 PDR (Power Distribution Rack)
Distributes the power within a rack suite. Integral energy monitoring available on request.

4 PDU (Power Distribution Unit)
The PDU can be installed in all standard IT racks. Installation in the zero-U space is a special feature of the VX IT and TS IT.

Redundancy and fail-safeness play a crucial role here: Continuous power & cooling describe the concept of bridging a temporary failure in the electricity supply to allow IT equipment to be made safe.

The comprehensive, end-to-end solutions for power distribution and backup are designed to be modular throughout, and allow for flexible expansion at any time, and are controllable at every stage of the power supply path: from the main infeed and UPS systems, to sub-distribution among the enclosures (PDR) through to the socket strip in the rack (PDU).

Sustainable, efficient operation with the new, modular PDU portfolio

The data centre power supply must be guaranteed 24 hours a day, 365 days a year. This means that the PDU (Power Distribution Unit) is in constant operation. Alongside the one-off investment costs, inherent power consumption is therefore also a significant factor. There are usually two redundant network distributors installed in each rack, rising to over 100 in the largest data centres. This is a significant cost factor which must be managed by optimising the energy supply.

High measuring accuracy and additional reliability and safety from measuring the neutral conductor current

Alongside reliable power distribution, the PDU offers a comprehensive range of measurement and management functions. As well as the usual recording of voltages, currents and active and apparent power, this also includes differential current measurement, which can be used to predict possible future problems (such as those attributable to component ageing in the switched power supplies of the server hardware).

PDU – Socket strip in a rack

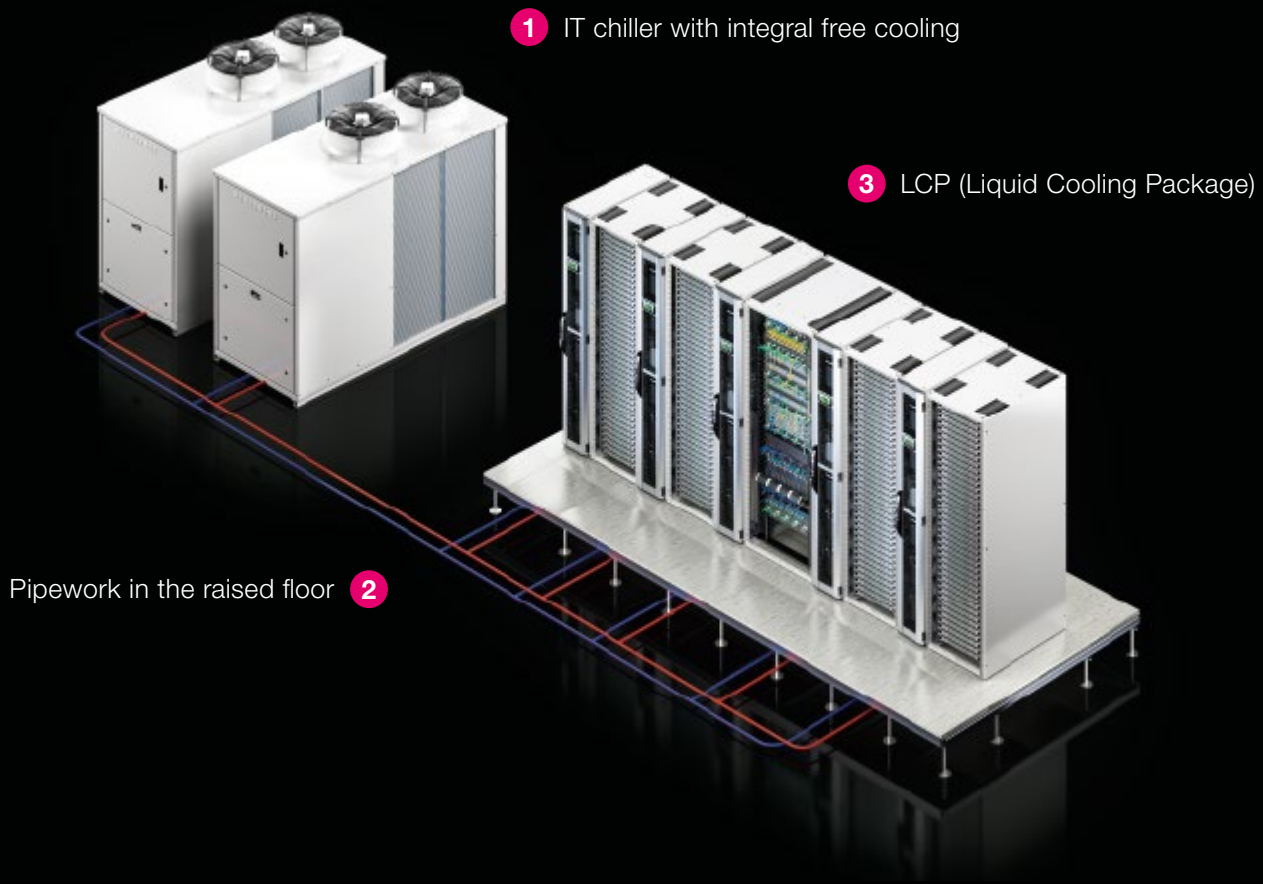
Modular PDU portfolio

Super-efficient cooling management

Cold air in – Heat out
The RiMatrix NG IT infrastructure has been designed to provide optimised cooling performance. Essentially, the cooling circuit works like this: Cooling is generated (1), fed into the data centre (2) and distributed selectively among individual components, while waste heat is absorbed and removed from the data centre (3). A smart control system regulates the IT infrastructure depending on the server load to minimise the amount of energy needed to remove the heat and optimise energy efficiency.

Space requirements are a particular consideration when cooling data centres. The Rittal LCP (Liquid Cooling Package) with its external chillers boasts maximum cooling performance in the smallest possible space, leaving more room for active components.

IT cooling: Sample application



Demand-based, continuous cooling
An intelligently regulated circuit cools the RiMatrix NG racks with fan systems, refrigerant- or water-based solutions depending on their precise requirements. Continuous monitoring protects components from failures caused by overheating. RiMatrix NG supports the use of cooling solutions from individual racks, to suite and room climate control, through to demanding HPC (high-performance computing) with direct chip cooling (DCC).

To offer our customers cutting edge technology, we have combined our adaptable IT rack and cooling systems with high performance powerful direct chip cooling technology.

Dr. Thomas Steffen,
Managing Director Research and Development,
Rittal GmbH & Co. KG

Cooling directly at the hotspot: Direct chip cooling (DCC)
Machine learning, artificial intelligence and augmented reality are pushing cooling technologies to their limits. Direct chip cooling achieves high efficiency ratings for both the VX IT and OCP (Open Compute Project), for data centres with maximum packaging densities.

A new waterless, two-phase liquid cooling system from Rittal and ZutaCore achieves unprecedented heat dissipation levels, currently more than 55 kilowatts (kW) per rack. With full utilisation of the rack, the system uses the latent thermal energy created by refrigerant evaporation directly in the special processor coolers. This enables efficient, reliable operation of high-performance computing even in older data centres. The system cools precisely where hotspots arise, reducing IT failures to a minimum.

Save energy and reduce carbon emissions at every stage of the cooling chain

Average

75%

energy savings with
Rittal Blue e+ IT cooling units

Efficiency begins with planning
For Rittal, efficiency begins with conceptual planning, and entails far more than simply minimising the energy consumption of a single component. Seamless interconnection of all involved components is the key here: efficiency is a matter of integration.

**Save energy and reduce carbon emissions –
The Blue e+ series of IT cooling units**
The Blue e+ IT cooling unit series can achieve huge energy savings and CO_2 reductions with rack climate control.

Further benefits of IT cooling solutions from Rittal:

- Aisle containment and cross-system control concepts in conjunction with energy-efficient cooling by external IT chillers allow a higher density of servers
- Operating costs and complexity are minimised, thanks to superior reliability, energy and cost efficiency
- Resource and energy savings plus reduced carbon emissions make this an eco-friendly choice

Rittal Blue e+ IT cooling unit

OCP: Ground-breaking standards for the data centre of the future

OCP system solution

The Open Compute Project (OCP), initiated by Facebook, Goldman Sachs, Google, IBM, Intel and other partners in 2011, is dedicated to creating a uniform, freely accessible basis for an inexpensive yet highly efficient IT platform for data centres.

As an OCP partner since 2012, Rittal supplies both standardised OCP racks and application-specific racks. Its portfolio includes:

- Accessories: Doors and side panels, as well as compartment racks
- Power supply: PSU (Power Supply Unit) and BBU (Battery Backup Unit), or a central UPS if batteries cannot be housed in the server racks
- Monitoring: Computer Multi Control (CMC) with 482.6 mm (19") mounting kit; the installation of traditional 482.6 mm (19") components in a 21" OCP rack is also capable
- Cooling: Room or suite climate control, use of the new DCC technology with HPC applications

As an innovative extension to the RiMatrix NG, the OCP enables maximum efficiency, by supplying servers directly with DC current and largely avoiding converter effects. What is more, OCP servers support a higher air inlet temperature, leading to significant energy savings.

Time needed for installation and **commissioning:**
Possible within **10** minutes

Smart monitoring: Transparency and seamless data management

CMC III

DCIM

No data centre or manufacturing operation can allow its value creation processes to stall or come to a standstill. To avoid downtime and safeguard availability, malfunctions must be identified promptly and interpreted intelligently with the ultimate aim of cutting costs through greater efficiency and permanently boosting productivity.

Level 1
IIoT sensors play a vital role, by providing comprehensive monitoring to enable problem-free operation of manufacturing machinery and equipment.

Level 2
Rittal offers a wide portfolio of monitoring options. These include PDU and LCP as well as the monitoring of IIoT-connected production systems and physical ambient conditions. The CMC III monitoring unit in the rack collates data from up to 32 sensors that monitor active components. The PLC processes this information in the production line and activates a simple alarm if necessary.

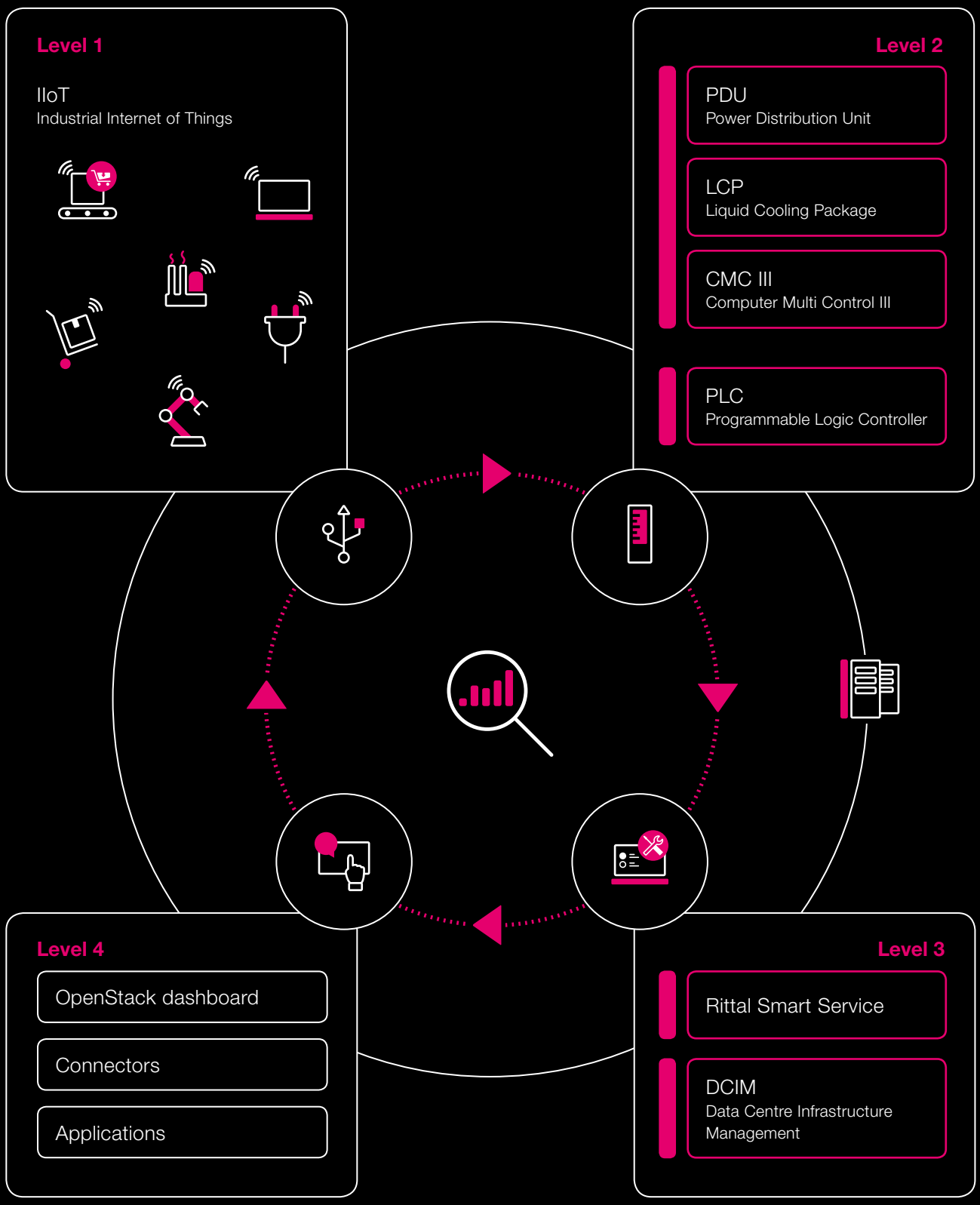
Level 3
All sensor data is forwarded to the DCIM (Data Center Infrastructure Management) or the Rittal Smart Service Portal. At this level, IT administrators and system managers can monitor the overall system status from the control room.

Predictive and prescriptive maintenance means that repair statuses can be anticipated, and corrective action initiated promptly and implemented autonomously. The continuous logging of error and maintenance messages enables optimised planning of servicing and repairs.

Level 4
As well as helping to cut costs, a summarised presentation of all relevant data in dashboards and applications extending through to management level opens up the potential for improved decision-making, new value streams and customer-centric business models.

The findings are incorporated into production and the data centre in the form of improvements and innovations. In this way, ongoing processes are automatically optimised using data-based smart maintenance workflows.

Monitoring topology



Well-protected

Comprehensive security solutions protect data and infrastructures
A failure in an IT system is always a costly business. With this in mind, Rittal offers end-to-end security solutions for your IT infrastructure and components, from basic protection right through to high availability. The options range from electronic handles and automatic door opening, to access control with two-factor authentication.

Modular security solutions from Rittal provide multifunctional protection against physical threats which can be expanded according to your requirements, from IT safes for individual racks through to room-within-a-room concepts.

This supports seamless communication from the sensors to the company's (cloud-based) edge and central data centre, as well as links to superordinate monitoring and energy management systems.

Comprehensive protection from countless threats

Networking the digital factory

Data sovereignty at every stage of production with ONCITE
How do companies retain sovereignty over their sensitive data during the essential exchange of data with clients and partners? As an open system platform, RiMatrix NG provides the basis for ONCITE – your complete solution for processing and analysing industrial data at your production location.

ONCITE is an adaptable solution for your digital factory. It connects an edge cloud IT infrastructure with an open IIoT platform, using services and computing performance that expand to keep pace with your requirements.

Dr. Sebastian Ritz,
CEO German Edge Cloud

As an in-factory edge data centre, ONCITE will aid your rapid transformation into a smart factory. Data is rapidly logged, saved and intelligently evaluated at the point of use. Users retain full control over their data and decide the format in which data is forwarded to customers or supply chain partners. In this way, ONCITE provides an end-to-end digitalization solution for the manufacturing industry – integrated and scalable, affordable, and quick and easy to use with its plug & produce concept.

ONCITE

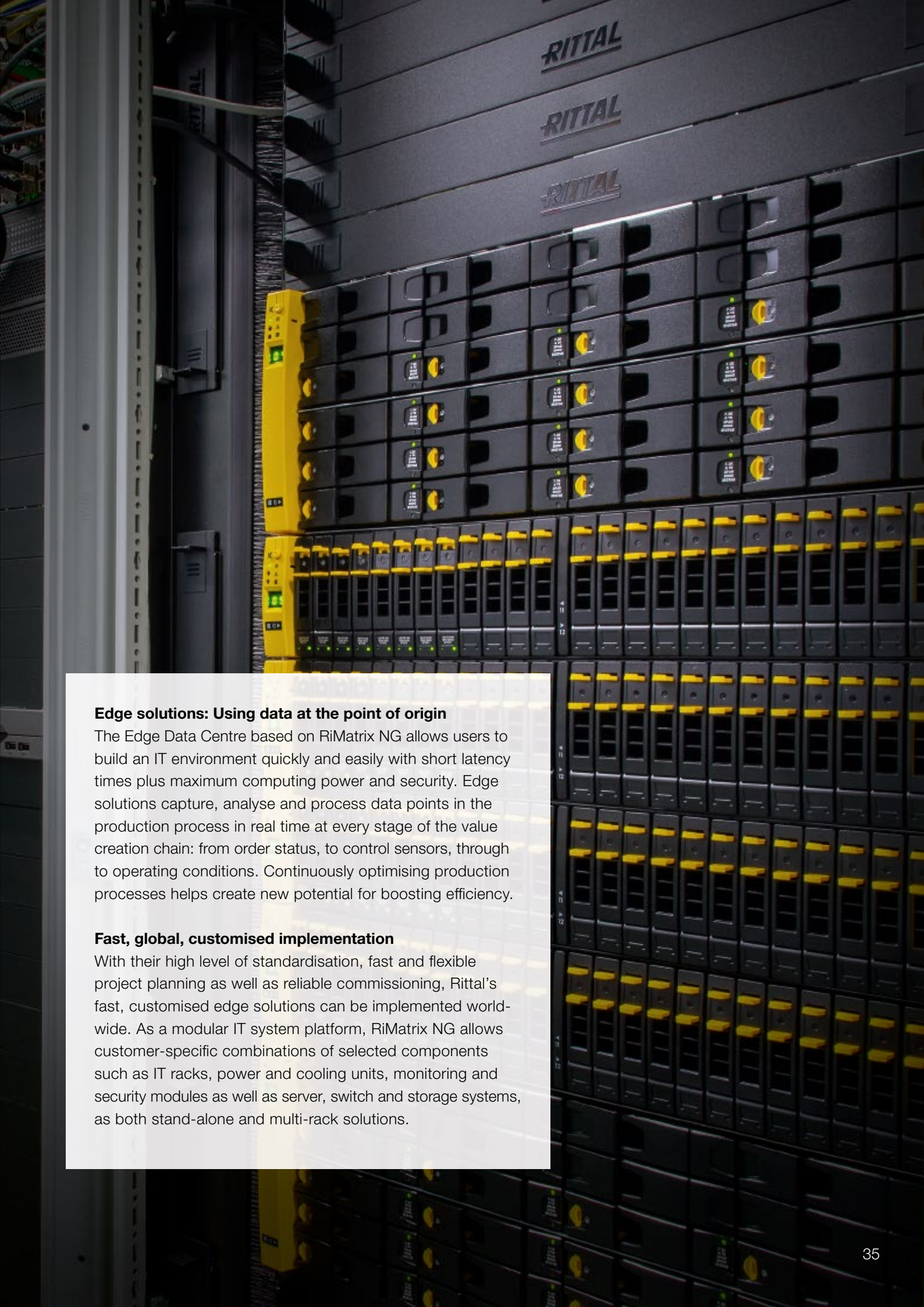
Everything in one container: Fast, scalable and flexible

Container solution

Digital twins, augmented analytics with AI support and VR-assisted product development feature ever more prominently at digitalised production sites. The fast, efficient logging and processing of data is a critical competitive advantage throughout almost all areas of industry, commerce and public life.

Container solutions:
A rapid response to business success
The sudden success of a product or service can push existing data centres to the limits of their capabilities. Using container modules with a pre-specified set of associated components, RiMatrix NG facilitates highly flexible data centre solutions that can be scaled up whenever necessary. This saves time and money compared with building a separate data centre.

Container solutions are ideal for outdoor siting, for example if there is no suitable space available inside the building. Micro data centres and security rooms provide targeted protection from physical threats inside buildings.



Edge solutions: Using data at the point of origin
The Edge Data Centre based on RiMatrix NG allows users to build an IT environment quickly and easily with short latency times plus maximum computing power and security. Edge solutions capture, analyse and process data points in the production process in real time at every stage of the value creation chain: from order status, to control sensors, through to operating conditions. Continuously optimising production processes helps create new potential for boosting efficiency.

Fast, global, customised implementation
With their high level of standardisation, fast and flexible project planning as well as reliable commissioning, Rittal's fast, customised edge solutions can be implemented world-wide. As a modular IT system platform, RiMatrix NG allows customer-specific combinations of selected components such as IT racks, power and cooling units, monitoring and security modules as well as server, switch and storage systems, as both stand-alone and multi-rack solutions.

Rittal – The System.

Faster – better – everywhere.

- Enclosures
- Power Distribution
- Climate Control
- IT Infrastructure
- Software & Services

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