



HOW TO DESIGN A REMOTE POWER PANEL FOR OPTIMUM PROTECTION AND MONITORING OF YOUR IT RACKS

ENGINEERED
TO OUTRUN

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1. Power availability at IT-rack level

The accelerated adoption of digital technologies has led to a rapid increase in not only the number of data centers needed to meet this demand, along with the amount of storage and much-needed IT infrastructure, but also in the **size and scale of data centers**.



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With our increasing reliance on data for everything from online ordering to remote working and smart manufacturing, data centers play an **integral role**.

The top 4 key aspects
that ensure Data Center
continues operation



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The electrical system

Ensuring reliable, safe and continuous operation at IT-rack level, where the most important loads are to be found, is critical in a data center.



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Downtime vs Uptime

Downtime can cause loss of revenues, profits and even customers so high data center uptime levels are essential.



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The electrical system

Ensuring reliable, safe and continuous operation at IT-rack level, where the most important loads are to be found, is critical in a data center.

Optimized

Therefore, a coordinated and optimized facility built with intelligent, highly efficient and highly reliable systems is crucial.

Downtime vs Uptime

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Downtime vs Uptime

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Power

Power is a critical component of a data center, so it relies on the continuous supply of power for almost everything. No power, no working data center.



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Why you need Continuous Power solutions

Outages in data centers can have a huge impact due to loss of data, corrupted files, ruined equipment and the resulting reputational damage.



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Research shows:

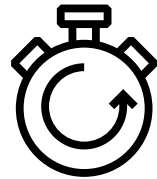


Source: Based on 451 research

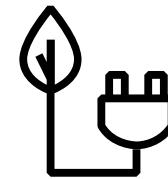
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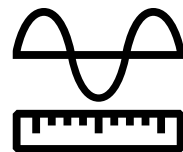
Research shows:



Downtime events are **lasting longer** than at any point in the last 10 years



Only **46% of core data centers** and **64% of edge locations** utilize best practices to **maximize power availability**



\$740K

Average cost of a single data center outage

Source: Based on 451 research



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2. The challenge

When it comes to energy distribution, data center designers, owners and operators start with the following main needs and drivers:



**Continuous
operation**



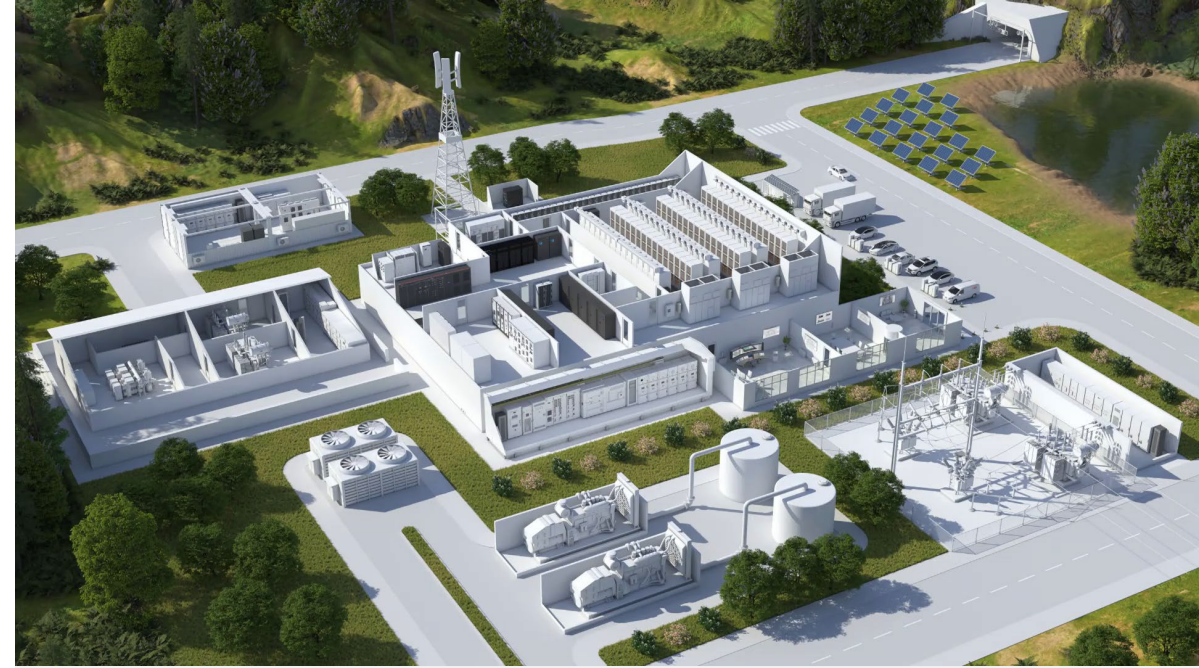
**Energy
efficiency**



Space saving



**Modularity and
flexibility**



All of the solutions planned for use in a data center have to address one or more of the listed needs and key drivers.

**The key to solving these
challenges – Remote
Power Panels (RPPs)**



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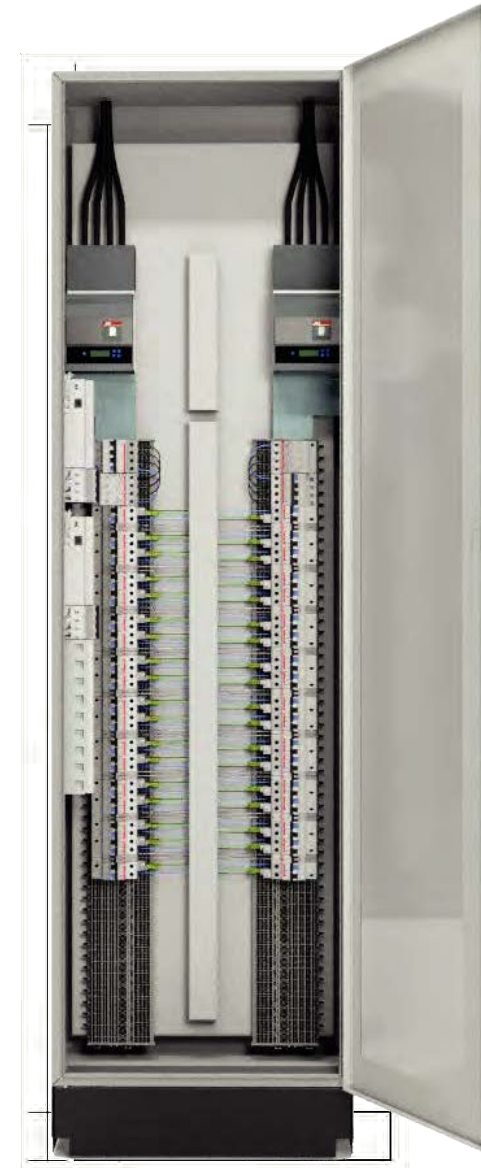
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What are RPPs?

Remote Power Panels (RPPs) distribute power directly to the IT server racks or cabinets.

Usually, RPPs are installed in close proximity to the racks, and typically in the same white space.



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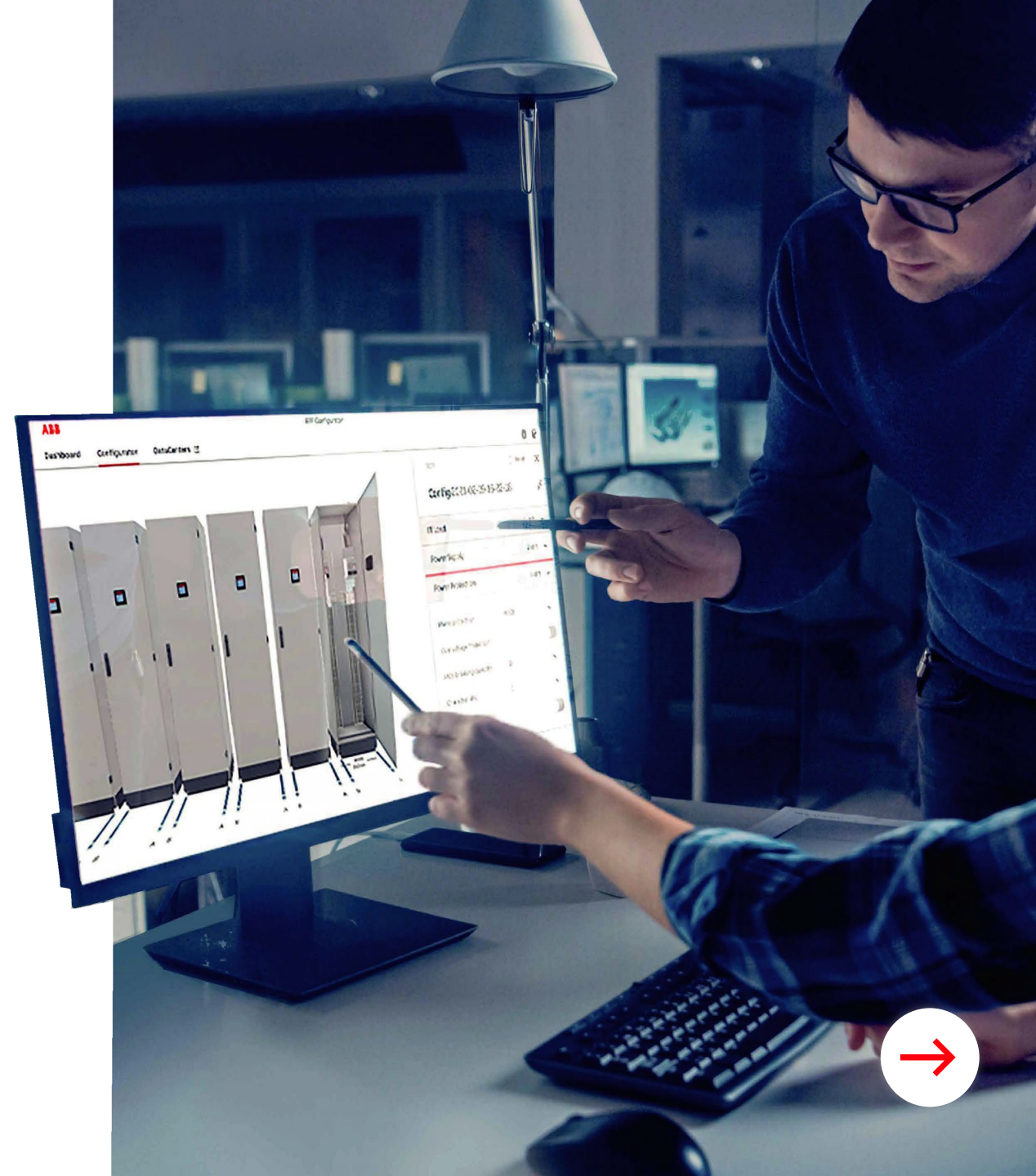
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How to design an RPP?

The design of an RPP needs to meet the power density demands of the server racks, assuring continuity of operation with high energy efficiency, optimized footprint, modularity and flexibility.

In this example, the data center owner wants to design an RPP feeding:



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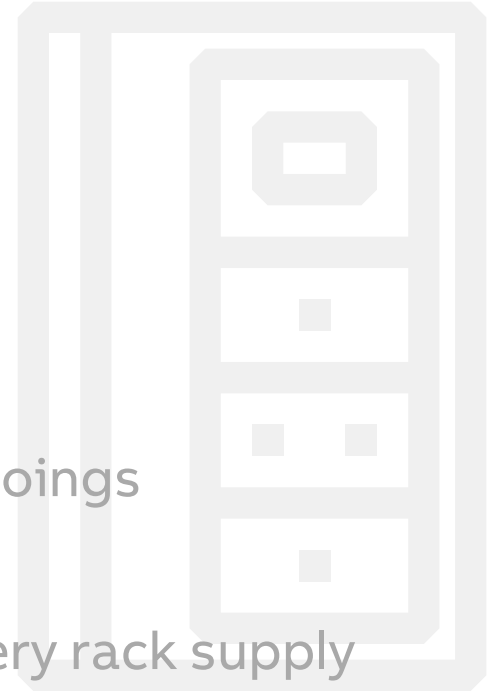
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12 IT racks rated 10KW at 400V

- Each rack to be fed via 2 inputs A & B
- Individual status monitoring for all outgoings
- Current consumption monitoring on every rack supply
- Main incomer monitoring
- Temperature and humidity measurement
- Fan deployment if the temperature does go beyond a set value



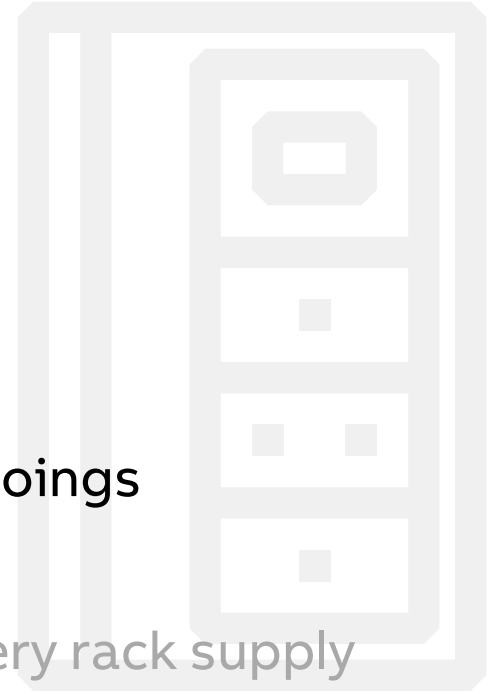
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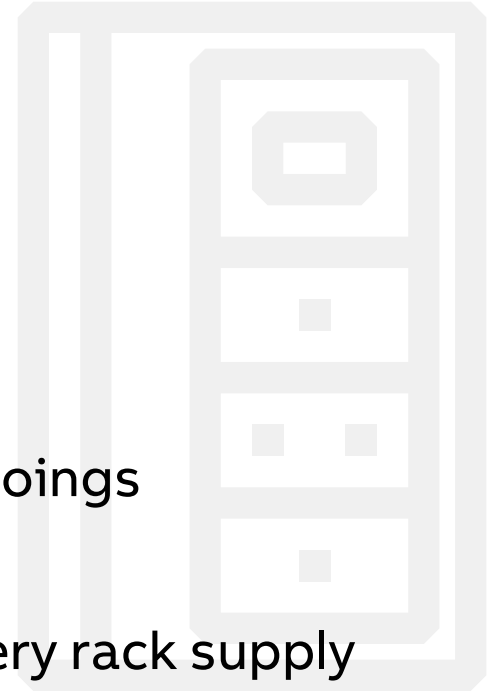
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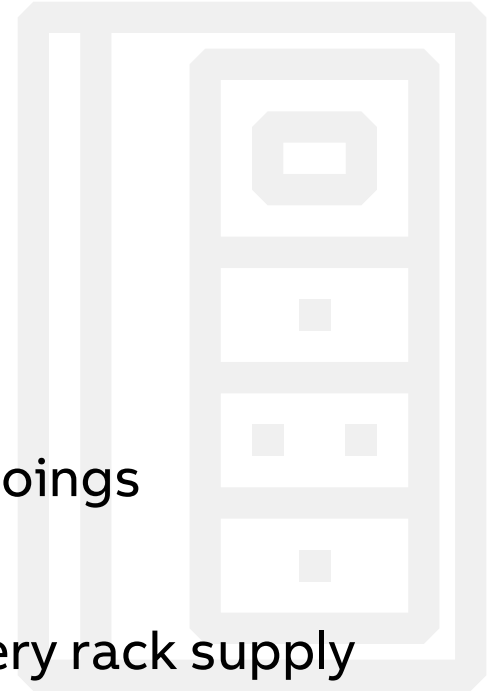
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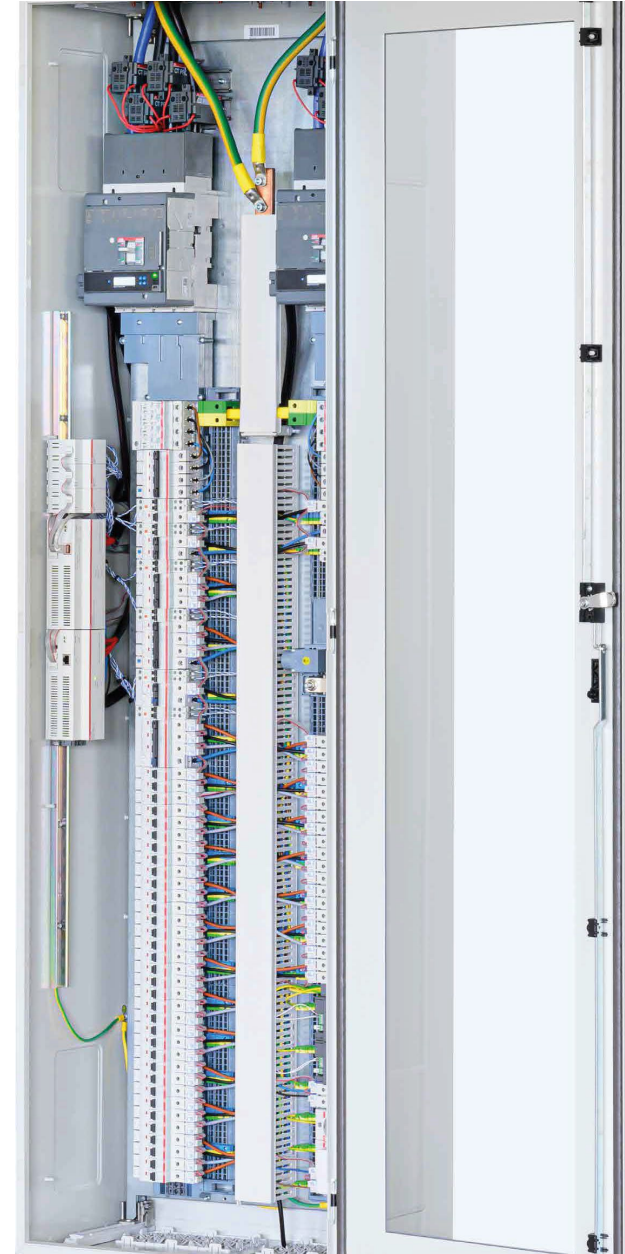
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3. The solution

A combined range of solutions from ABB for an RPP application, including monitoring and measurement tools, makes your installation smart and fully connected.

With our scalable solutions, the RPP can easily be connected to the cloud, or data can be accessed via a web server.



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SMISLINE TP plug-in system

The pluggable socket system is completely finger safe (IP2XB).

The SMISLINE TP product portfolio provides a variety of circuit breakers and residual current devices up to 63A in different variations. With the touch-proof SMISLINE busbar system, devices can easily be changed under voltage without any power interruption.

Significant time savings can be achieved when plugging in devices on SMISLINE socket compared to conventional DIN-rail devices (that needs to be wired either via cable or busbars supply).

Thanks to the movable plug contacts on the device, the load can be easily balanced among L1, L2 and L3 without interrupting the power and minimizing downtime.

KEY BENEFITS

Flexible

Enables rapid replacement, easy expansion, mixed-pole layout possible

Safe

Allows load-free plugging in and unplugging under voltage

Economical

Saves time and space thanks to the plug-in technology

Minimal Downtime

Facilitates changes or extensions without system shutdown, ensuring continuous energy distribution



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SMISLINE TP Pan Assembly and Direct Feed

The Pan Assembly and Direct Feed solution allows a direct connection from the 250A Power Bar System to a plug-in circuit-breaker Tmax XT4 Moulded Case Circuit Breaker. The solution is built for a vertical design with one busbar system for the Direct Feed or two busbar system for the Pan Assembly solution. Vertical mounting with SMISLINE TP results in a compact design.

- Type tested distribution boards acc. IEC and UL508
- Feeding two SMISLINE busbars of 250A with the incomer Molded Case Circuit Breaker XT4
- Complete solution in the same enclosure: incoming breaker and outgoing breakers
- Coordinated and tested back up solution
- Short-circuit rating Icc up to 50kA

KEY BENEFITS

Safe Installation & Continuous Power

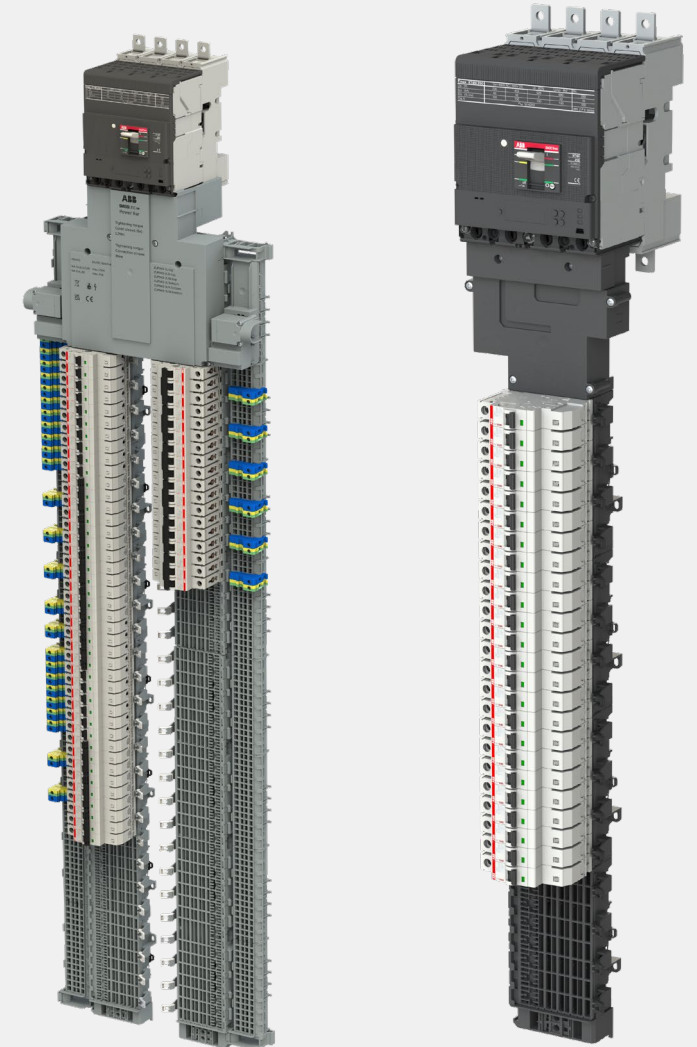
Expands application scope for high-current devices in critical environments.

Flexibility & Power

The Pan Assembly enables easy expansion, pluggable devices and mixed-pole layouts.

Economical & Time-Saving

Allows for quick handling of pluggable devices, reducing maintenance and repair time.



Pan Assembly

Direct Feed



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SACE Tmax XT

Low voltage molded case circuit-breakers

The **SACE Tmax XT** range offers higher performance, better protection and more precise metering than equivalent units, with the ability to handle between 160-1600A.

Combined with the world's most precise electronic trip units in the smallest frames, the new range delivers significant time savings and enhances installation quality.

Reliability is further increased and speed of installation reduced thanks to Bluetooth and Ekip connectivity for mobile devices.

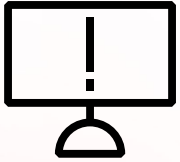


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Selectivity

Selectivity is the key to establishing a good system in facilities that cannot tolerate power cuts in their operations.

WHY?

Because selective systems isolate faults within the shortest time, with minimum damage and ensure that the least number of unrelated loads are affected by the fault.

ABB's cutting-edge solutions achieve fast coordination between devices, avoiding stress and damage to the electrical distribution system by excluding only the minimum zone affected by the fault.

Safety and protection are key values that ABB can provide its customers.

The offering of new coordination and selectivity tables is based on a continuous process which helps end users to make their daily work more efficient and increase the quality of their installation and services. This drives a focus on energy efficiency, continuous operation, optimum interface, and fast commissioning.



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InSite energy management system

The InSite energy management system optimizes your installation by protecting, monitoring, measuring, and ensuring smart connectivity. It is tailored for energy and asset management, allowing users to reduce energy consumption and identify operational risks through an intuitive interface. The system integrates with branch monitoring sensors and digital I/O modules for comprehensive energy consumption monitoring and real-time performance notifications.

The SCU100 control unit connects up to 96 current sensors or smart accessories via the InSite flat cable while maintaining high cybersecurity standards. The SCU200 control unit supports 32 devices natively, expandable up to 160 devices with the INS-HUB modules.

KEY BENEFITS

Comprehensive Monitoring

Full integration with sensors and modules for real-time energy consumption tracking.

Scalability

Supports up to 160 devices with the addition of INS-HUB modules.

Enhanced Operational Efficiency

Facilitates proactive risk management and energy optimization, leading to cost savings and improved sustainability.



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Control unit
SCU100



Control unit
SCU200



Branch monitoring sensors
Cable / DIN-rail mounted



Modules
Digital I/O

Smart accessories



Module
INS-TB



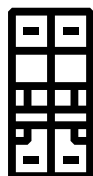
Module
INS-S/H



Module
INS-Hub



Key functionalities of InSite energy management system



Third party field devices

To digitalize an existing installed base, data can also be retrieved from third-party products, such as meters, breakers, RCM modules and environmental sensors, making InSite Energy Management System the perfect solution.



Local monitoring

Embedded WebUI is available together with the SCU100 control unit, allowing for local monitoring of the complete system, as well as access to historical data stored within the flash memory, with full configuration of the solution, real-time supervision and remote actions on the system.



Third party SCADA/EMS

Data aggregation and storage from field devices is also possible with existing or new third-party SCADA energy management systems thanks to communication via Modbus TCP/IP, rest API and SNMP.



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Branch monitoring sensors

Efficient energy use and continuous service are essential, and CMS branch monitoring sensors offer a compact solution for ensuring energy efficiency and real-time system status. These sensors are integral to the InSite energy management system and can be easily mounted in both new and existing installations. Despite their small size, they provide exceptional performance, fitting into an 18- or 25-mm wide unit for accurate measurements.

Each SCU100 InSite control unit can receive data from up to 96 CMS sensors via a flexible wired solution, ensuring high cybersecurity standards. The SCU200, with two INS-HUB modules, can accommodate measurements from up to 160 CMS sensors, maintaining the same connectivity approach.

KEY BENEFITS

Compact Design

The most compact sensors on the market, fitting into narrow units while delivering high performance.

Scalability

SCU200 supports up to 160 sensors with the addition of INS-HUB modules.

Robust Data Security

Ensures high cybersecurity standards for secure data transmission and monitoring.



Solid-core sensor



Open-core sensor



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Smart accessories

The integration of smart and digital devices into the InSite energy management system enhances monitoring, alerts, and control. It provides clear indications of device contacts and faults for MCB, RCBO, and RCCB, improving performance and maintenance.

Smart signaling devices connect via flat cable, offering a plug-and-play solution and compatibility with ABB's MCB and RCD ranges, delivering alerts when adjacent switches trip. Digital I/O modules further expand connectivity, supporting various accessories and enabling features like contact status reading and line control.

KEY BENEFITS

Enhanced Monitoring

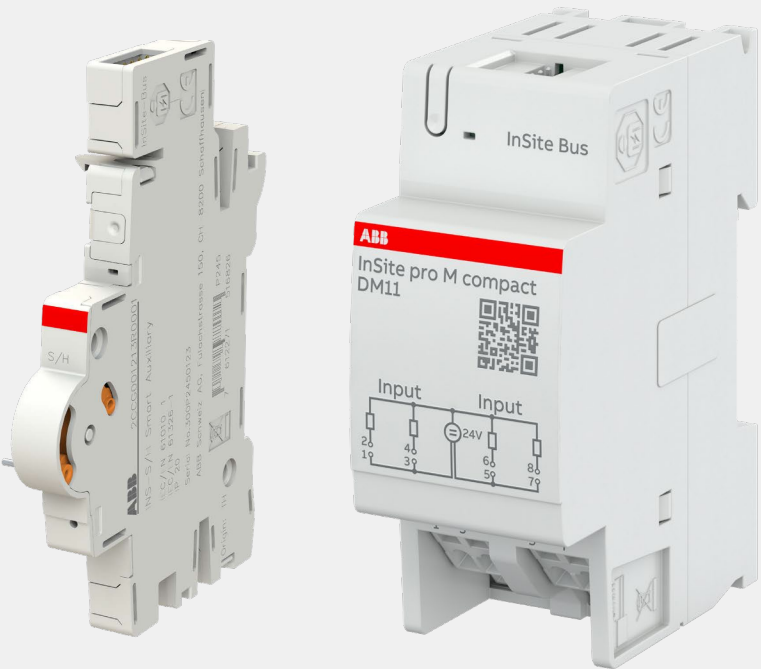
Improved fault indication for MCB, RCBO, and RCCB, facilitating better maintenance.

Space-Saving Design

Smart signaling devices combine multiple functions in a compact form, optimizing installation space.

Versatile Connectivity

Digital I/O modules support a wide range of accessories, enhancing functionality and control within the system.



INS-S/H module

I/O module



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INS-HMI InSite Display 10.1"

The INS-HMI is a 10.1" touchscreen display designed to provide immediate, on-site access to key data from the InSite energy management system – no laptop or external device required.

The INS-HMI is the perfect companion for any SCU100 or SCU200-based setup in RPPs, delivering visibility, control, and confidence – right where it's needed most.

KEY BENEFITS

Plug-and-Play Monitoring

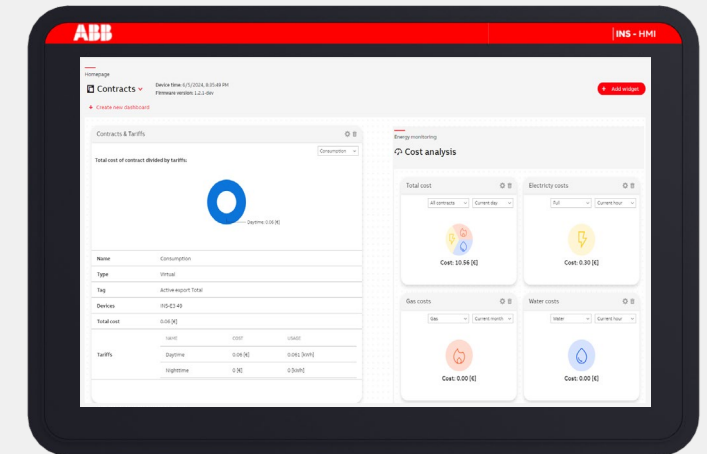
Instantly view electrical parameters and system performance from the web server of SCU100 and SCU200. The HMI can be installed directly on the RPP panel, maintaining with its gasket an IP64 protection.

Field-Friendly Interface

A streamlined, intuitive display sourced directly from the InSite web server – ideal for on-site technicians and maintenance teams.

Optimized for Efficiency

Designed to enhance operational awareness and reduce downtime through immediate, localized access to energy data.



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M4M Network Analyzers

As energy costs rise, tracking electricity consumption is essential for businesses. ABB's network analyzers enable real-time monitoring of power consumption and power quality, helping achieve energy efficiency, cost savings, and improved power quality for sustainable buildings. The M4M network analyzers are compatible with R4M Rogowski coils and standard current transformers, allowing retrofitting without costly downtime. They provide high-accuracy monitoring of electrical parameters and comprehensive power quality analysis.

KEY BENEFITS

Real-Time Monitoring

ABB's network analyzers provide real-time measurement and analysis of electrical parameters and power quality KPIs, enabling businesses to track energy consumption effectively.

Energy Efficiency and Cost Savings

The analyzers support the key goals of energy efficiency, cost savings, and improved power quality, essential for sustainable building operations.

Flexible Retrofitting

M4M network analyzers are compatible with R4M Rogowski coils and standard current transformers, allowing for retrofitting in both greenfield and brownfield sites without costly downtime.

High Accuracy

They offer precise monitoring of electrical parameters and comprehensive power quality analysis through advanced KPIs.



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MID Energy Meters

ABB Energy meters provide a detailed picture of the energy consumption and the specific areas where energy is used. Thanks to the MID Approval it is possible to use the meters to bill customers based on consumptions of defined branches.

The space inside the panel is optimized thanks to the 1-phase meter up to 40A in 1 DIN module, and 3-phase meter up to 65A in 3 DIN modules, allowing fiscal billing of the energy consumption within each branch.

ABB Energy Meters have the following instrumentation values as a minimum:

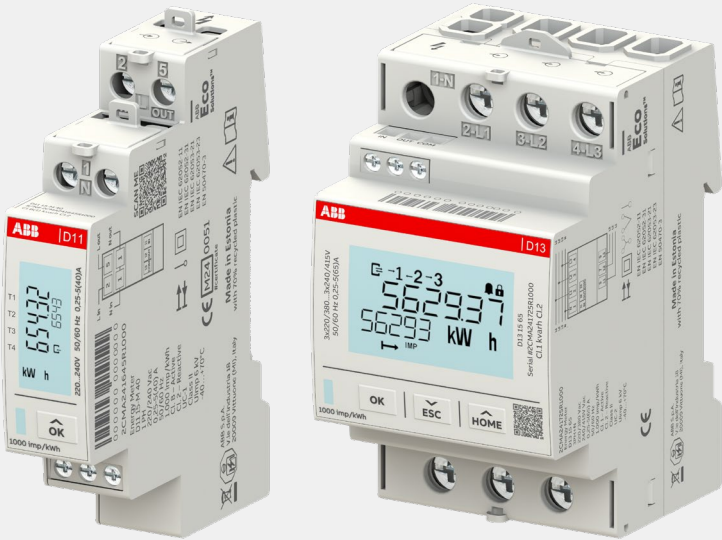
Voltage	Active power
Current	Power factor

KEY BENEFITS

Optimized footprint:
up to 50% reduced footprint in the panel

Complete offer:
broad range of measurement available

Reliable in harsh conditions:
operating temperature from -40° to +70° degrees



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OVR range of Surge Protection Devices

OVR Surge Protective Devices are designed to protect against transient surge conditions. Large single surge events, such as lightning, can reach hundreds of thousands of volts and can cause immediate or intermittent equipment failure. However, lightning and utility power anomalies only account for **20%** of transient surges.

The remaining **80%** of surge activity is produced internally. Although these surges may be smaller in magnitude, they occur more frequently and with continuous exposure can degrade sensitive electronic equipment within the facility.



Key Benefits

They can be installed in industrial facilities for short circuit currents up to 100kA. One range for all installations, to cover wide industrial applications

- No need of dedicated back up protection for OVR T2 and T2-T3 up to 125A, up to 160A for OVR T1-T2 12,5kA and up to 315A for OVR T1-T2 25kA

- Securely fastened; the protector clicks into the base both with audible and tactile feedback. Installation is carried quickly and without tools thanks to the mounting-rail click
- Easy connection; our new SPDs accept both flexible cables and rigid bus bars connections



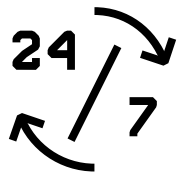
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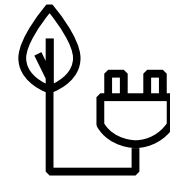
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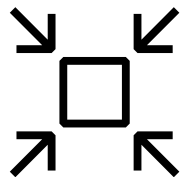
Solution benefits



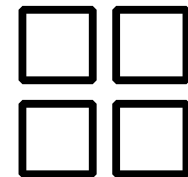
**Continuous
operation**



**Energy
efficiency**



**Space
saving**



**Modularity
and flexibility**



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Solution benefits

Continuous operation

- **The Remote Power Panel** ensures continuous operation through the SMISLINE TP busbar technology enabling load-free devices and components that can be plugged in and out under voltage
- Deep level branch circuit monitoring with the Insite energy management system enables predictive maintenance, resulting in minimized downtime
- Load balance thanks to movable plug contacts on devices. Easy balance between L1, L2 and L3



Solution benefits

Energy efficiency

- **The energy monitoring architecture** has been specifically developed to meet the requirements of energy and asset management
- **Thanks to the branch circuit monitoring system** the energy flow in electrical distribution is made easy
- **Network analyzers and the branch circuit monitoring system** helps users to **detect risks** at an early stage thanks to total transparency, constant diagnostics and **real time notifications**



Solution benefits

Space saving

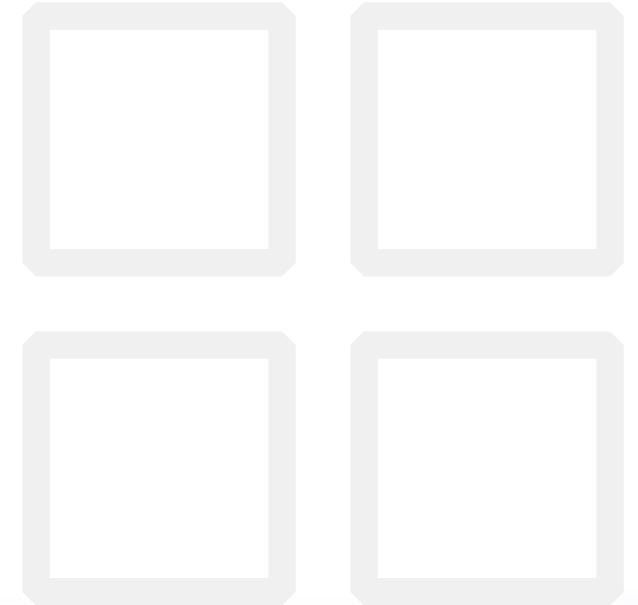
- The RPP has a small footprint thanks to the vertical installation of the **SMISSLINE TP** system, with the input wiring already integrated into the pluggable socket system
- This reduces the number of cables in the RPP and results in a **clean and organized panel layout**



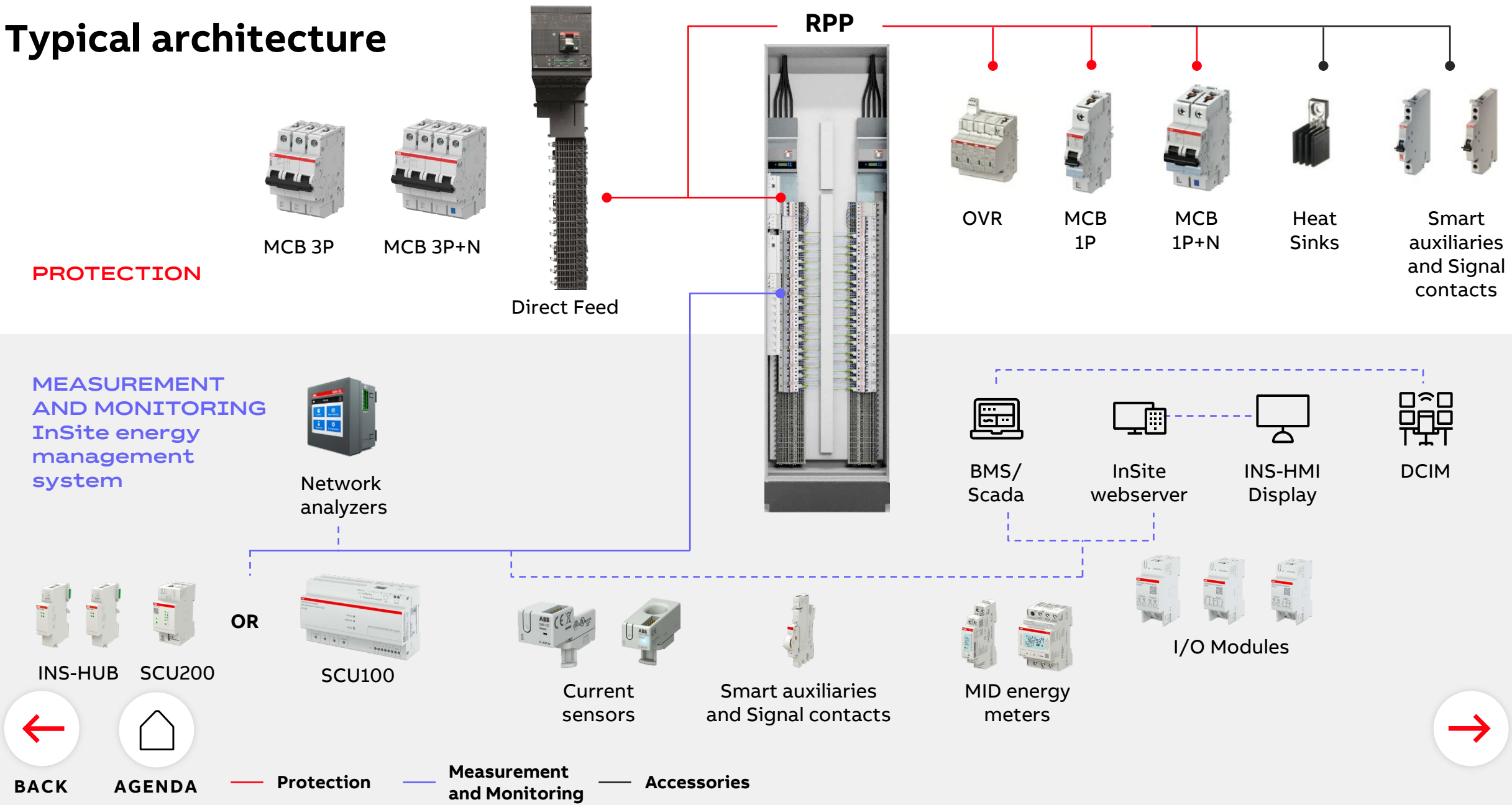
Solution benefits

Scalability and flexibility

- **With SMISLINE TP**, multi-pole devices can be positioned anywhere
- The system provides **flexible architecture** and many different power supply options
- The ability to incorporate **last-minute changes** promptly is another great advantage
- When you need to scale up, **new devices** can be integrated easily and safely
- The system can be **expanded quickly** and is more efficient and fully compatible with existing installations
- **“Pay as you grow”** is made easy by installing empty power distribution units and populating them with devices when your customers rent the rack space



Typical architecture



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Protection

Measurement and Monitoring

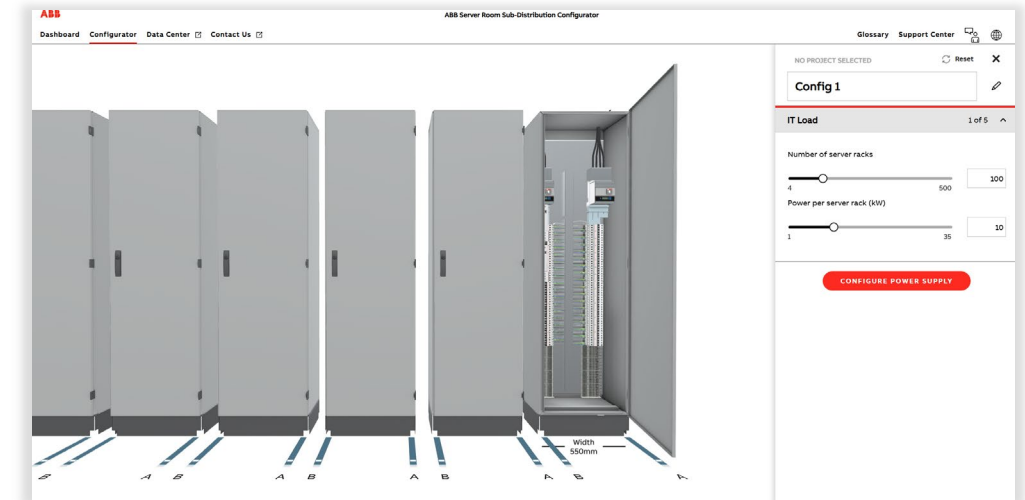
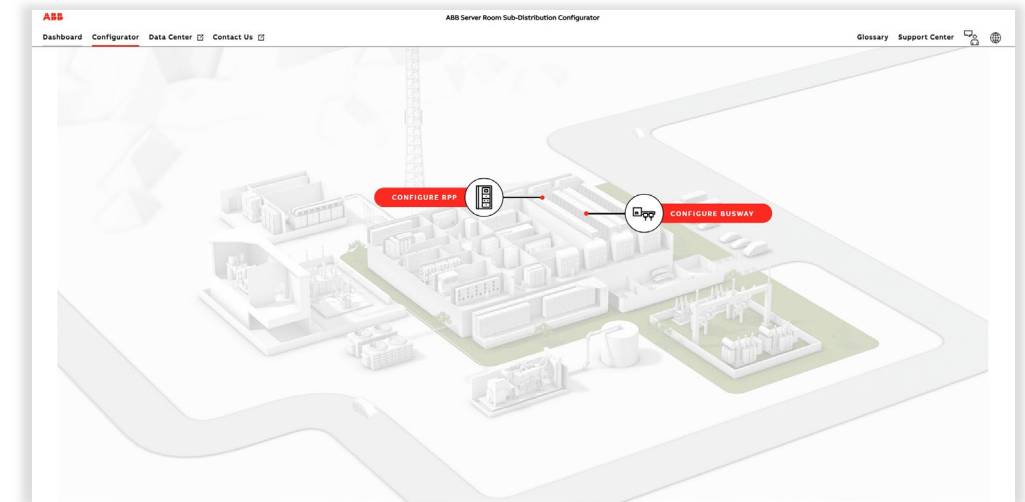
Accessories



Configure your RPP easily

Easily configure all devices in your Data Center's server room installation with **ABB's Server Room Sub-Distribution Configurator**. This tool supports both busways and remote power panels, ensuring a focus on energy density, safety, and flexibility throughout the planning process.

Utilize 3D visualization and detailed wiring diagrams to effectively bring your design concepts to life. The configurator allows for rapid customization in under 10 minutes, enabling you to save configurations locally for future reference. It generates compliance statements, detailed bills of materials, and facilitates easy sharing of designs via email.



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GET READY FOR YOUR NEXT PROJECT WITH ABB'S RPP SOLUTION!

CONFIGURE NOW

SUPPORT MATERIALS

[Wiring diagram](#)

ADDITIONAL LINKS

	Catalogue	Website
Complete Remote Power Panel offering		Link
SMISSLINE TP	Link	Link
CMS Branch monitoring sensors	Link	Link
Pan Assembly and Direct feed	Link	Link
MCCB SACE Tmax XT	Link	Link
MID Energy Meters	Link	Link
Network Analyzers	Link	Link
InSite Energy Management System	Link	Link
Smart Accessories	Link	Link

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