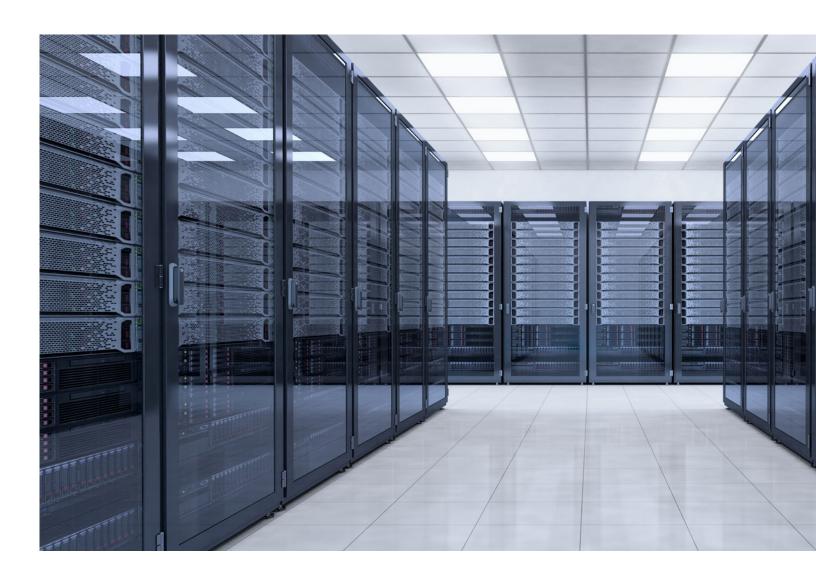


INDUSTRY BROCHURE

Installation Products

Data centers





Installation Products Division

- Wire and cable management
- Cable protection systems
- Boxes and fittings
- Connectivity and grounding
- Medium voltage

Thomas & Betts is now part of ABB's Installation Products Division, but our long legacy of quality products and innovation remains the same. From connectors that support wire buildings on Earth to cable ties that help put machines in space, we continue to work every day to make, market, design and sell products that provide a smarter, safer and more reliable flow of electricity, from source to socket.

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Designed to perform

Data centers

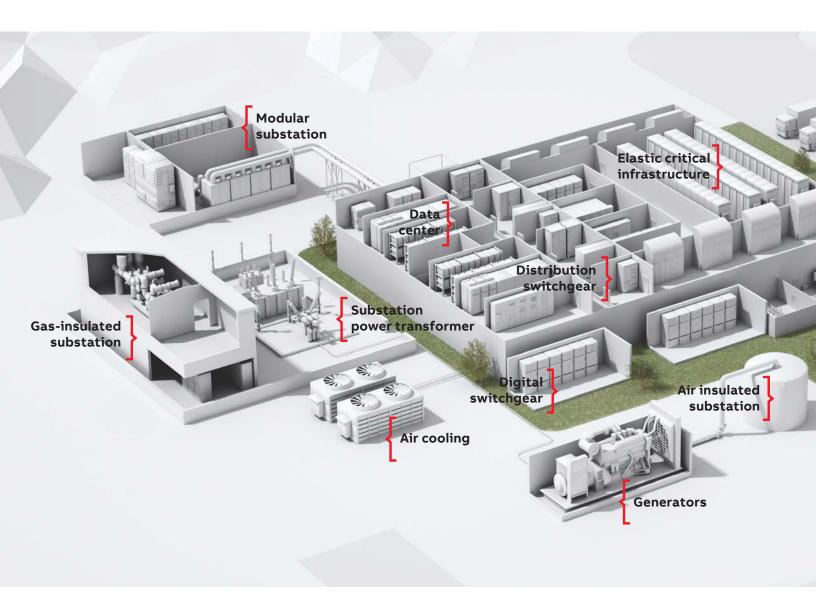
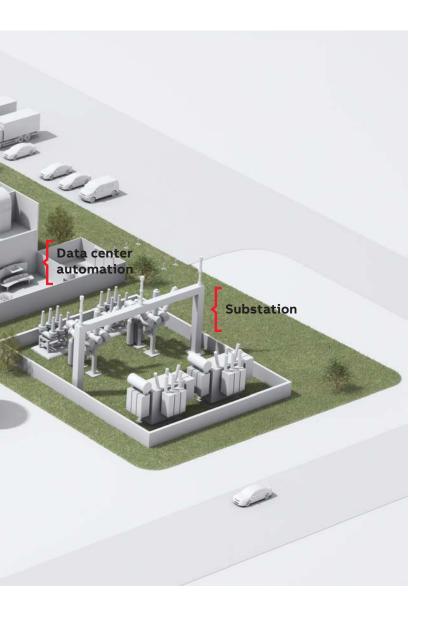
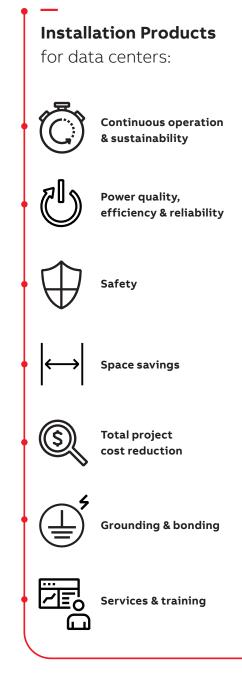


ABB understands the challenges faced in the data center industry and is committed to providing innovative electrical solutions that not only reduce overall project costs, but also increase safety, promote sustainability and even improve cash flow.





Whether it's labor-saving rough-in components, custom-designed electrical prefabrication systems, online cloud-based design tools or even our world-class logistics, ABB can help bring data centre projects in on time, within budget and profitably

Product selection guide

for data centers

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Product selection guide





Product description	Continuous operation & sustainability	Power quality, efficiency & reliability	
АВВ			
ProLine touch-safe panel boards	_		•
AF Series contactors and Tmax and Emax circuit breakers	•		•
Pro M miniature circuit breakers and surge protection devices	•		•
Arc Guard arc flash mitigation system, arc-resistant low voltage switchgear and motor control	-		_
Jokab safety relays, PLCs, sensors, switches, rope pulls and E-Stops	•		_
Jokab safety light curtains and quick guard safety fencing	-		_
SMISSLINE modular power distribution system and compact pilot devices	-		_
Terminal blocks	•		_
Blackburn®			
EZ Ground™ compression and mechanical grounding systems, compression connectors and tools	_		-
Flexible braids and signal reference grid connectors and clamps	-		-
Connectors for finely stranded cable	•		-
Narrow-tongue lugs, 45° and 90° angled lugs, stacking lugs and KUBE® flag, tee and cross	-		-
Carlon®			
ENT System	•		-
Non-metallic enclosures	•		-
Elastimold®			
Solid-dielectric switchgear, switchgear automation packages, molded vacuum interrupters and arresters	_		•
EZCODE®			
Safety labels, tags, signs and barricade tapes	_		-
Fisher Pierce®			
Faulted circuit indicators and voltage and current sensors	_		•
Joslyn Hi-Voltage®			
Capacitor switches	=		•
Kindorf®			
Modular metal framing system and accessories	=		_
Red•Dot®			
Code Keeper® weatherproof while-in-use covers	•		
Russellstoll®			
DuraGard® pin-and-sleeve connectors	•		_











Services & training	Grounding & bonding	Total project cost	Space savings	Safety
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Blackburn°

Carlon®

elastimold

EZCODE°

FISHER PIERCE

♦ JOSLYN

Kindorf*

rededot.

Russellstoll*

Sta-Kon®

Steel City®

Superstrut°

T&B° Cable Tray

T&B° Fittings

Ty-Duct*

Ty-Rap®

Product selection guide

for data centers (continued)

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Product selection guide





Product description	Continuous operation & sustainability	Power quality, efficiency & reliability	
Sta-Kon®			
Crimped wire termination systems	•	_	
Shield-Kon® coaxial grounding connectors	-	-	
Automated, hydraulic, battery-powered and manual application tools	_	_	
Pin terminals and insulated and non-insulated ferrules	_	_	
Steel City®			
Access floor modules	•	_	
Solid and stranded wire grounding pigtails and clips	-	_	
T&B® Cable Tray			
Cable support systems	-	_	
T&B® Fittings			
Blackjack® grounding bushings	_	_	
Revolver® Liquidtight grounding fittings and bonding locknuts	_	_	
TITE-BITE® and STAR TECK® metal-clad and armored cable fittings	_	-	
Multi-Hole cord grips, CHASE® fittings, liquidtight conduit fittings and Ranger® cord connectors	_	-	
Ty-Duct®			
Non-metallic wiring duct, bench-mount cutter, tools and accessories	_	_	
Ty-Rap®			
High-performance cable ties and accessories, Ty-Rap Tote® cable tie dispenser and installation	_	_	
Abrasion-protection sleeving and spiral wrap harnessing	_	_	











Services & training	Grounding & bonding	Total project cost	Space savings	Safety
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Blackburn°

Carlon°

elastimold

EZCODE°

FISHER PIERCE

♦ JOSLYN

Kindorf*

rededot.

Russellstoll°

Sta-Kon®

Steel City®

Superstrut°

T&B° Cable Tray

T&B° Fittings

Ty-Duct*

Ty-Rap®

Challenge and commitment

Data centers are becoming larger and more vital to everyday life with each smart phone, internet-connected computer or Wi-Fi® device sold. The recent emergence of cloud computing is spurring a boom in real-world construction.

Wi-Fi is a registered trademark of the Wi-Fi Alliance. The Green Grid is a registered trademark of The Green Grid Association. Data center operators need to manage a complex infrastructure of power and cooling equipment while providing 24x7 availability of data for commerce, financial transactions, enterprise resources or even streaming video for a night's entertainment. All of this has made the data center industry one of the fastest growing consumers of electrical power, using up to 2% of the U.S. electrical supply and resulting in a global carbon equivalent footprint greater than the entire airline industry.

As a result, greater emphasis has been placed on using all of this power efficiently. One power metric, as defined by The Green Grid®, is Power Usage Effectiveness, or PUE, which is a value to compare total power used divided by the amount of power used for critical loads. The lower the PUE value, the more efficiently power is being used. Some state-of-the-art data centers are reporting PUE levels of 1.2, where only a few years ago, an average PUE value might have been at 2.0 or higher. A PUE value of 2.0 means that for every watt used for critical load, another watt is being used for support systems such as HVAC equipment.

With downtime costs reported as approaching \$350,000 per hour, the need for continuous, quality power is paramount. Given this, how can an owner improve the efficiency of an existing data center? There are several ways to do this. The IT portion of the data center is typically refreshed, or upgraded, every three to five years, but power

systems are part of capital equipment and are on a longer refresh cycle, which makes efficiency gains on the power side more difficult to come by.

Some gains can be achieved by converting from perimeter cooling to segregating hot air from cold air (hot aisle/cold aisle containment) with simple mechanical barriers. Some companies make ducting to focus the cold air into the IT rack itself. Immediately, and perhaps easiest of all, you can follow the ASHRAE recommendations and increase the overall temperature in the white space, requiring less cooling regardless of scheme.

For the designer, electrical contractor or owner of a new data center, the issues can be compounded by the urgency of the construction process. A day that the project is delayed is a day of irrecoverable revenue loss. A data center has 15–30 times the electrical density of a commercial building, and the costs of the electrical system may approach 70% of overall project costs. Coupled with the complexity of a dual-source, concurrently redundant power system, this requires project management skills of the highest caliber.

ABB understands the drive for efficiency at the data center and can provide products that enable you to build or improve your critical electrical systems while maintaining safety and power quality in a 24x7 environment. Today's data center has evolved into a complex data factory, and it needs a quality, reliable and easily maintained electrical system.

Data center users















nce Healt

Technology

Goods & services





Continuous operation & sustainability

A data center operator needs to anticipate future requirements. The power system must be flexible enough for future IT loads but robust enough to meet the 24x7 "always-on" demands of today. ABB offers electrical solutions to meet today's needs coupled with the durability and energy efficiency required for a sustainable future.

01 **ABB**

- · AF Series contactors.
- Tmax and Emax circuit breakers.
- Pro M miniature circuit breakers and surge protection devices.
- · Terminal blocks.
- Jokab Safety Vital 1 safety controllers and relays.

02 Blackburn® Compression

Connectors for finely stranded cable.

03 Russellstoll®

 DuraGard® pin-andsleeve connectors.

04 Sta-Kon®

 Crimped wire termination systems.

Steel City® - Access floor modules

- Highest-quality BIM models for all in-floor electrical and low-voltage needs
- · Hide wire clutter in a convenient, accessible location
- · Easy to install and move
- Nylon covers reinforced with steel plate prevent buckling under heavy weights
- Five sizes range from extremely shallow to industry's largest

Russellstoll® – DuraGard® pin-and-sleeve connectors

- Complete line of 20–60A (600VAC/250VDC max.) connectors, plugs and receptacles
- UL94V-0 flammability-rated, corrosion-resistant non-metallic housings
- · Waterproof whether mated or unmated

Blackburn® compression – Connectors for finely stranded cable

- Connectors and terminals for conductors more finely stranded than Class B and Class C
- Per revised NEC® Section 110.14(1)

Sta-Kon® - Crimped wire termination systems

• Complete line of rings, forks, splices, disconnects, pin terminals and wire ferrules,

- built with materials for high-performance applications
- Longer, selectively annealed barrel for increased pullout strength and lowered crimping force, with funneled terminal barrel entry for faster installation
- Nylon terminals feature metal insulation grip sleeve for strain relief
- UL® listed and CSA certified

ABB - AF Series contactors

- Provides continuous reliable operation, even with voltage fluctuation
- · Modular accessories for reduced downtime
- Full range up to 2,050A; NEMA, IEC and horsepower rated

Carlon®

- ENT System
- · Non-metallic enclosures

Red • Dot®

• Code Keeper® weatherproof while-in-use covers

T&B® Fittings

- Liquidtight cord connectors
- · Liquidtight conduit and fittings systems
- · Wire-mesh strain-relief cord and conduit grips











Sta-Kon

Power quality, efficiency and reliability

From substation to remote power panels, ABB products and solutions enable maximum uptime and control.

01 **ABB**

· AF Series contactors.

- ProLine Touch-Safe panel boards.
- Tmax and Emax circuit breakers.
- Pro M miniature circuit breakers and surge protection devices.
- · Terminal blocks.

02 Elastimold®

- Solid-dielectric switchgear.
 Switchgear automation
- Switchgear automation packages.
- Molded vacuum interrupters and arresters.

Electrical solutions from ABB ensure uptime, improve customer satisfaction and protect stakeholder ROI. This includes:

- Detecting faults and protecting against overcurrent and voltage drops
- Preventing damage due to power quality disturbances
- Eliminating under performance, minimizing system losses and increasing availability

Elastimold® – Distribution Switchgear and Molded Vacuum Interrupters

- Solid EPDM insulating media makes them maintenance-free and environmentally friendly – no oil, no gas
- Compact modular switchgear designs allow for smaller footprint and field assembly inside tight vaults
- Molded vacuum interrupters provide compact, lightweight, submersible protection with predictable tripping for ease of upstream/ downstream coordination

ABB

- ProLine Touch-Safe Panel Boards
- Fully coordinated circuit protection with ABB breakers
- IP20 touch-safe rating
- Tmax and Emax Circuit Breakers
 - True RMS-sensing electronic trip units
 - 200kAIC fuseless versions available
 - Easily coordinated with Pro M miniature circuit breakers
- Pro M miniature circuit breakers and surge protection devices
 - Current-limiting for optimal protection
- The only branch breaker to fit in the ProLine panel board

Fisher Pierce®

- Faulted Circuit Indicators
- Voltage and Current Sensors

Joslyn Hi-Voltage®

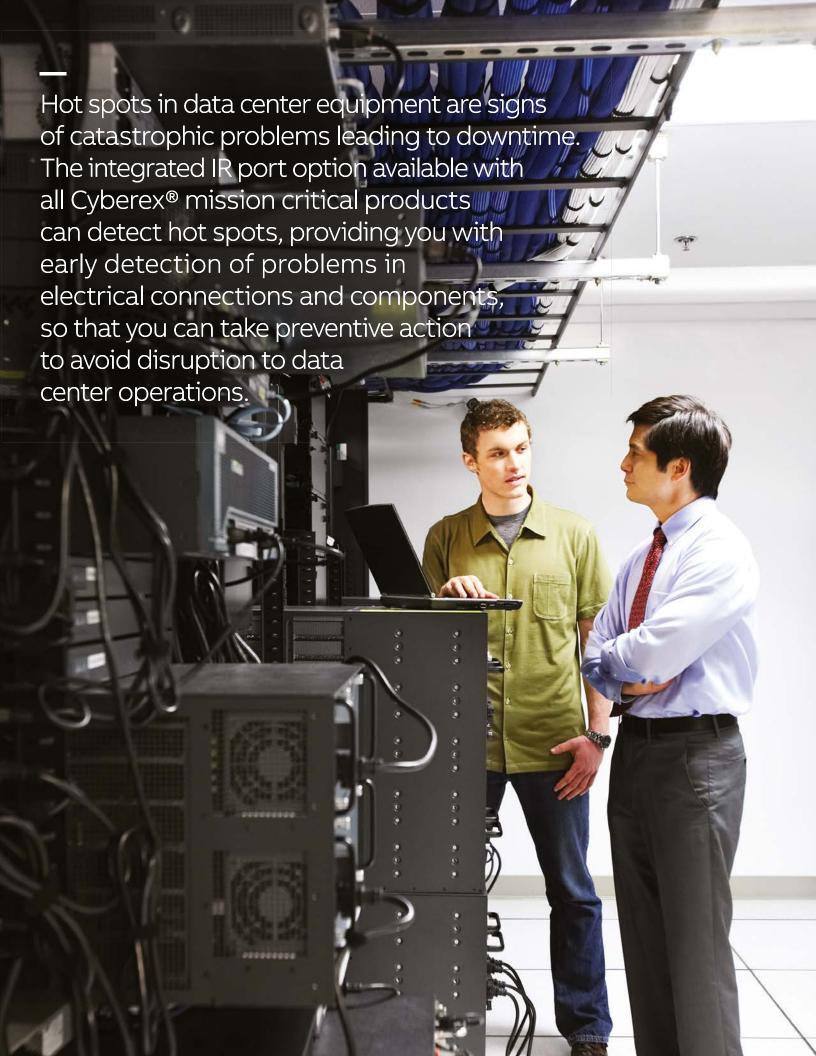
· Capacitor Switches













Safety

As with any electrical system, data centers must be equipped to ensure safe operation. You'll find a complete assortment of safety products from ABB, including labels and warning signs.

01 **ABB**

- Arc Guard arc flash mitigation system.
- Arc-resistant low voltage switchgear and motor control centers.
- ProLine touch-safe panel boards.
- Jokab safety relays and PLCs.
- Jokab safety sensors, switches, rope pulls and E-stops.
- Jokab safety light curtains.
- Jokab safety quick guard safety fencing.

02 Blackburn® Compression

• Ergonomic compression tools.

03 EZCODE®

 Safety labels, tags, signs and barricade tapes.

— 04 Ty-Rap®

- High-performance cable ties and accessories.
- Ty-Rap Tote® cable tie dispenser.
- Ergonomic cable tie installation tools.

NEC and National Electrical Code are registered trademarks of the National Fire Protection Association, Inc.

EZCODE® – Safety labels, tags, signs and barricade tapes

- Help to ensure personnel and workplace safety, as well as regulatory compliance
- Highly visible and long-lasting materials
- Custom labels, tags and signs available

Ty-Rap® - High-performance cable ties

- Hook-and-loop fasteners for bundling low-voltage and fiber optic cabling
- Plenum-rated for use in air-handling spaces above ceilings and under floors
- Weather-resistant for rooftops and other outdoor applications
- UL® Listed for metal-clad cable support in walls
- Stainless steel for corrosive environments

Blackburn® compression / mechanical / grounding – Ergonomic application tooling

- Consistent installation of lugs, terminals and cable ties
- Save time and increase reliability and profitability with hydraulic and pneumatic tooling
- Reduced handle force and ergonomic design lowers the risk of repetitive motion injuries
- Promotes safety by properly matching the correct tool with the electrical component it's designed to install



ABB - ProLine touch-safe panel boards

- IP20 touch-safe rating
- Fully coordinated circuit protection with ABB breakers
- 400A MLO or Tmax main circuit breaker
- · Integrated neutral and grounding bus

Sta-Kon®

Automated, hydraulic, battery-powered and manual application tools















Space savings

When it comes to a data center, space is money. The switch from analog to digital components has resulted in more complexity and density in control systems. ABB offers products designed to maximize panel real estate, enhance wire and fiber optic cable management and help keep personnel safe.

01 **ABB**

- AF Series contactors.
- · Tmax circuit breakers.
- Pro M miniature circuit breakers and surge protection devices.
- Compact pilot devices
- SMISSLINE modular power distribution system.

02 Blackburn® Compression

- Narrow-tongue lugs.
- 45° and 90° angled lugs
- Stacking lugs.
- KUBE® flag, tee and cross connectors.

03 **T&B® Fittings**

- Multi-hole cord grips Metallic and non-metallic.
- Blackjack® grounding bushings.
- CHASE® fittings nipples, conduit hubs, liquidtight conduit and cord fittings.
- Liquidtight conduit fittings.
- Ranger® cord connectors.
- Revolver® liquidtight grounding fittings.
- STAR TECK EXTREME® DIRECTOR™ jacketed metal-clad cable fittings.

04 Ty-Rap®

- Abrasion-protection sleeving.
- Spiral wrap harnessing.
- Cable ties, fasteners and mounting accessories.
- Ergonomic manual and pneumatic cable tie installation tools.

Our space-saving panel solutions are designed to:

- Offer space savings of up to 300%
- · Make your panels easier to build and maintain
- · Keep your technicians and operators safer
- Reduce the size and cost of your panel enclosure and wiring

Blackburn® compression

- Narrow-tongue lugs
- Consistent narrow width from barrel to tongue to fit into tight spaces
- Featuring the Color-Keyed® Installation Tooling System that ensures proper connections

• KUBE® fag, tee and cross connectors

- Space-saving 90°, tee and cross connections
- Use with standard compression lugs and splices and install with standard compression tools

T&B FIttings®

- CHASE® Fittings
- Compact, low-profile fittings ideal for limited space
- Line encompasses nipples and hubs for rigid conduit, as well as liquidtight conduit fittings and cord connectors

Multi-Hole Cord Grips

- Space- and labor-saving metallic or non-metallic cord fittings for panels
- Up to 4-to-1 SKU reduction purchase, stock and install one fitting versus four

Ty-Rap® – Cable ties, mounting accessories and tools

- Rounded, low-profile head and smooth, molded body
- Available in a variety of high-performance materials to handle harsh and plenum environments
- Complete line of mounting bases, spiral wrap harnessing, abrasion-protection sleeving and installation tools

ABB – SMISSLINE Modular power distribution system

- Allows installation of many modular devices in a small footprint
- · Wiring located under devices to save space
- Universal bus system for DIN-mounted power products

Sta-Kon

- · Pin terminals
- · Insulated and non-insulated ferrules

Ty-Duct®

• Non-metallic wiring duct, bench-mount cutter, tools and accessories







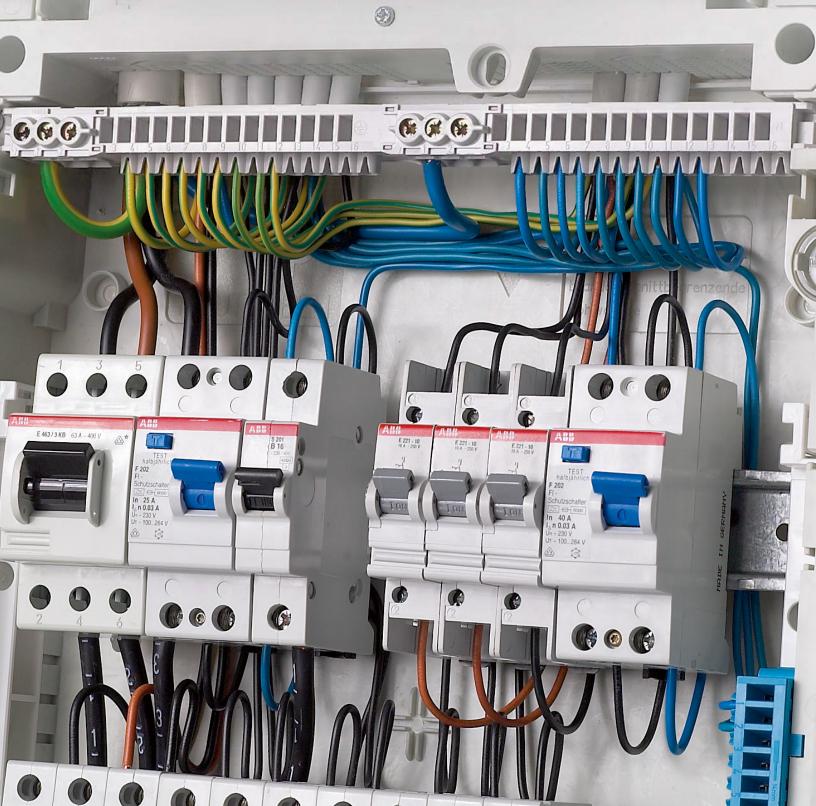






Ty-Rap

In panels, space is money. Innovations like Blackburn® KUBE ® Flag, Tee and Cross Connectors can save significant real estate in your panel, because a KUBE® Connector can achieve a 90° turn in a fraction of the space required by flex cable bending radius restrictions.





Total project cost reduction

ABB offers a wide array of electrical products designed to provide data center installers and operators with significant and measurable project cost savings. These include solutions for labor, material and logistics savings, as well as process improvements.

01 **ABB**

- · AF Series contactors.
- · Tmax circuit breakers.
- Pro M miniature circuit breakers and surge protection devices.
- Compact pilot devices.
- ProLine touch-safe panel boards.
- SMISSLINE modular power distribution system.
- Terminal Blocks.

02 Carlon®

• ENT System.

03 T&B® Cable Tray

Cable support systems.

Kindorf® – Modular metal framing system and accessories

- Labor Savings Unique punched framing channels and innovative hardware products cut installation time by over 40% over typical mechanical framing systems
- Material and Inventory Savings Unique 1½" design requires fewer fittings, lowering jobsite inventory
- Reduced Waste Integral and easy-to-use measuring system means exact cuts and less scrap
- Sustainable Finish Galv-Krom® trivalent finish offers more than double the corrosion resistance of pre-galvanized product and won't form white rust when stored outdoors

T&B® Cable Tray – Cable support systems

- Available in steel, stainless steel, aluminum and non-metallic materials
- Alternating "strut" rungs allow for supported mounting

Carlon® - ENT (Electrical non-metallic tubing) system

- To be used within the air-handling spaces beneath raised
- floors for informational technology equipment as per NEC®
- Sections 300.22(D) and 645.5(E)
- Material-handling savings with lightweight, flexible coils
- · Installs in half the time of comparable EMT conduit





ABB - Compact pilot devices

- · Integrated design speeds installation
- Universal mounting for 22mm and 30mm entrances
- · NEMA 4X rated

Terminal blocks

- DIN-rail modular mounting
- · Layered for higher density capacity
- Vibration-resistant IDC technology 80% faster than screw connections

T&B® Fittings

· Blackjack® grounding bushings













T&B Cable Tray

Grounding & bonding

Grounding and bonding are critical for the safety and operation of any commercial facility, with particular importance in data centers due to the possibility of data corruption.

01 **ABB**

- Pro M residual-current circuit breakers.
- circuit breakers.

 Grounding terminal blocks.

02 Blackburn® grounding

- EZGround™
 compression and
 mechanical grounding
 systems.
- · Flexible braids.
- Signal Reference grid connectors and clamps.

03 Sta-Kon®

 Solid and stranded wire grounding pigtails and clips.

04 T&B® Fittings

- Blackjack® grounding bushings.
- Revolver® liquidtight grounding fittings.
- TITE-BITE® and STAR TECK® metal-Clad and armored cable fittings.
- Bonding locknuts.

ABB provides an extensive range of solutions to fit all grounding and bonding needs, including compression and mechanical products for grounding systems. We also deliver onsite grounding and bonding training along with services to ensure that a data center continues to operate smoothly and safely during installation.

Blackburn® grounding - Grounding systems

- Superior grounding and bonding of electrical systems and equipment
- Compression EZGround™ connectors provide a consistent, irreversible bond
- Mechanical Connectors require no special tools to install

Flexible braids

- Variety of flexible straps and accessories for grounding
- Extra-flexible links for heavy-duty applications to 3,600A
- Standard links for medium-duty applications to 2,350A

Signal reference grid connectors and clamps

- Secures grid grounding to raised floor posts
- · No kinks or bends with lay-in feature
- · Range-taking design
- · Quick and easy installation



T&B® Fittings - Blackjack® grounding bushings

- Dual rated for grounding and bonding of threaded and unthreaded conduit, aluminum and copper wire
- Speeds installation and improves aesthetics
- UL® Listed and CSA Certified

Bonding Locknuts

- Ensure positive bonding of conduit to enclosure
- · Available in steel or aluminum





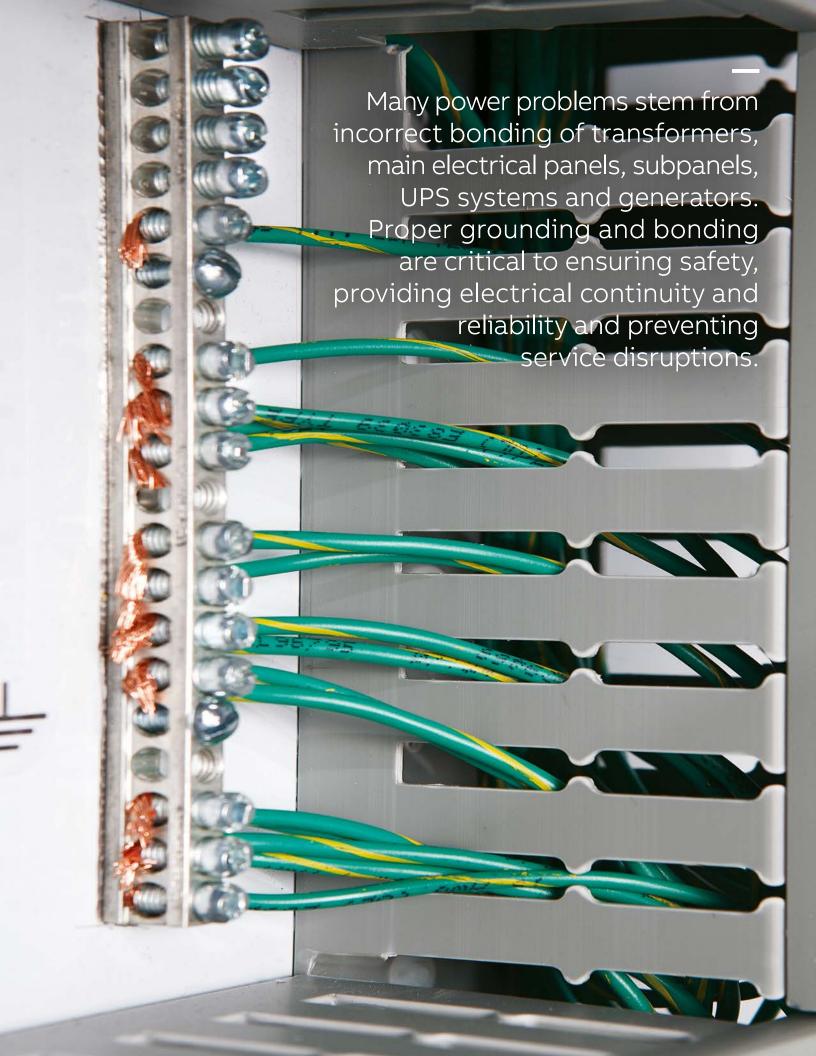




Sta-Kon[®]



T&B°Fittings





Services & Training

ABB provides services and training in the field or classroom to help you maximize efficiency and eliminate wasted time and materials.

01 **ABB**

Field retrofit services.

03 T&B® Tools

 Tool service, loaner and Leasing Programs.

Our services

Blackburn® compression / mechanical / grounding

- The QTP program provides a guaranteed two-week shipment of select products
- Product Configurator enables online design of custom connectors
- Product specification specialists are available nationwide to train in the proper use and installation of Blackburn products
- Inside Tech Support group provides 24/7/365 expertise for Blackburn products
- Full tool service as well as loaner and tool rental programs

Elastimold®

· Field application engineering

Ocal®

• Onsite Installation Certification Training

Steel City®

· Online Prefabricator

ABB

- · Warranty extension for breakers and switches
- · Preventive, predictive and corrective maintenance
- · Field retrofit services

Additional Services & Training

- Free online CAD Library for downloadable 2D and 3D models in more than 90 native CAD file formats
- NEC® Update Training provides an overview of the latest changes to the National Electrical Code®
- Grounding & Bonding Training covers design, layout and connections

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NFC and National

Electrical Code are





Installation Products for applications

01 Continuous operation and sustainability.

02 Corrosion and harsh environment protection.

03 Safety and contamination.

04 Emergency electrical solutions.

05 Total project cost reduction.

06 Liquid ingress protection.

07 Extreme temperature protection.

08 Grounding and bonding.

09 SKU Reduction.







03



04





06

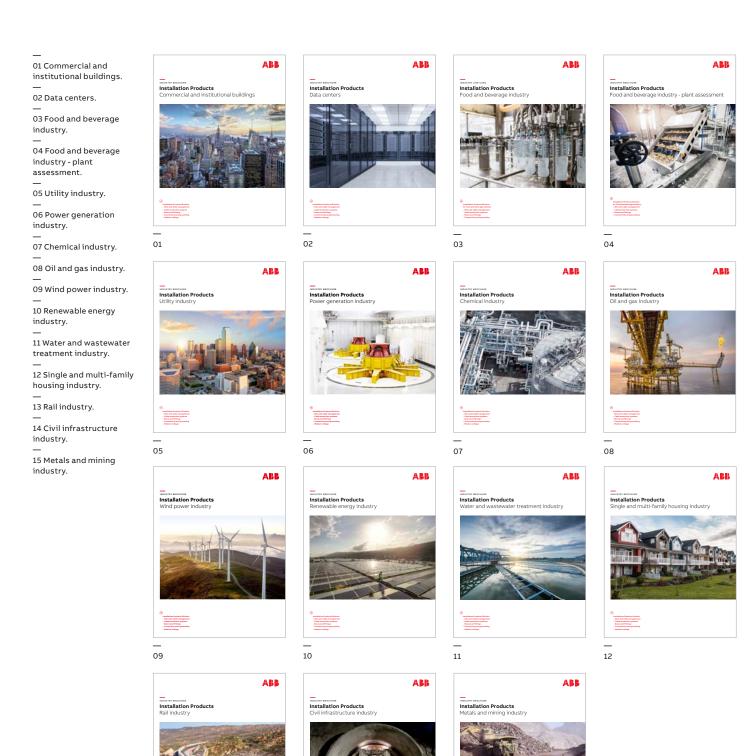






08

Installation Products for industries





US

ABB Installation Products Inc.

electrification.us. abb.com