Busbars a winner for data centers
SIVACON 8PS busbar trunking systems LI, BD2, and BD01
Totally Integrated Power

Totally Integrated Power (TIP) stands for integrated power supply solutions for industries, buildings, and facilities. Siemens’ comprehensive electrification portfolio enables a reliable, safe, and efficient power supply using software and hardware products, systems, and solutions for all voltage levels. TIP comprises everything it takes to supply power for challenging environments. Smart interfaces to industrial and building automation systems are the key to tapping the full potential offered by an integrated power supply solution. The portfolio is rounded out by comprehensive support throughout the entire lifecycle – from planning to maintenance.

Economical, modular SIVACON 8PS busbar trunking systems are part of the TIP solution

Data centers need a continuous power supply – and under ideal conditions, their operators should be able to perform retrofits and upgrades without interrupting operations. The LI, BD2, and BD01 systems from the SIVACON 8PS product family support this level of reliability in the power supply, and they also allow for easy planning, rapid installation, and a high level of flexibility.
SIVACON 8PS busbar trunking systems: so that data centers can rely on their power supply

Operational safety and continuous availability
SIVACON 8PS busbar trunking systems offer a high level of personal safety and system protection, while providing impressive operational reliability. They are design verified low-voltage switchgear and control assemblies that comply with IEC 61439-1/-6 and minimise the fire load in data centers. The design verified connection to the SIVACON S8 switchboard completes the product range. Their metal housing and conductor configurations offer distinct advantages in electromagnetic compatibility and a high short-circuit rating.

Thoroughly economical
The cost effectiveness of SIVACON 8PS busbar trunking systems is evident in many ways. Their modular design ensures clearly conceived and flexible solutions, and server racks can be connected even while the system is in operation. Busbars incur lower power losses and operating costs than cables. There’s much more, too: The systems’ compact design makes it possible to configure space-saving solutions.

Communications-capable measuring and switching devices can be integrated in the tap-off units, and thus also in energy management systems as well. Busbar trunking systems therefore deliver economic pluses across the board.

Flexible end-to-end support
TIP specialists and planning tools help you create state-of-the-art, sustainable power supply solutions at every stage, from designing, planning, and installation to operation.

SIVACON 8PS Benefits at a glance

System and operational safety
- Design verified low-voltage busbar trunking systems and connections to SIVACON S8 switchboards

Reliability
- High short-circuit rating
- Good electromagnetic compatibility

Economic advantages
- Enhanced planning certainty and quick installation
- Modular design offers great flexibility
- Space-saving solutions
- Energy transparency thanks to communications-capable measuring and switching devices

Innovation
- Standardised modular elements enable easy and rapid implementation; for example, the tap-off units designed especially for data centers

One-stop shop
- A TIP solution developed by specialists offers perfectly coordinated components from a single source – from planning to installation and operation.
Systematically safe and reliable for high availability

SIVACON 8PS busbar trunking systems reduce potential sources of faults in the server room, reducing fire loads and improving access and modification opportunities for the entire power supply. They also improve system availability.

Design verified busbar trunking systems and connections
SIVACON 8PS busbar trunking systems are low-voltage switchgear and controlgear assemblies that are design verified to IEC 61439-1/-6. The safe connection between the transformer and busbar trunking system, the design verified connections to SIVACON S8 switchboards, and the standardised connection components all minimise the risk of faults. And that means safety and reliability.

High short-circuit rating and very low fire load
The systems’ metal housings enhance safety for both people and buildings. Unlike cabled systems, short-circuit rating is already implemented at the factory, with no additional fastener elements and much greater fastener spacing. These systems also bring a much lower fire load compared to cabled equipment.

Good electromagnetic compatibility
Both cables and busbars have an electromagnetic impact on their environment that can be strong enough to disrupt sensitive devices. Here too, busbar trunking systems have the advantage over cables: At identical current levels, busbars exhibit significantly better electromagnetic compatibility (EMC).

Communication improves availability
Communications-capable measuring and switching devices make it possible to record measured values and operational values. For example, phase symmetry evaluations significantly boost availability.
Space-saving design
Cables need more space than busbars due to Joule heating, especially where parallel cable runs are required. Busbar trunking systems don’t require this extra room, and so space is optimised from the outset. This also applies to changes of system direction, because busbar trunking units can be laid out at right angles, saving huge amounts of space – which is both important and economical where small service rooms or narrow cable ducts are involved.

Communication optimises energy consumption
Communications-capable measuring and switching devices for energy management create transparency about power consumption and quality. This information provides a basis for optimising energy costs and consumption, allocating costs to cost centers, and increasing energy efficiency. They also document the actual savings that have been achieved. As a result, these devices can be integrated into company-wide energy management systems in accordance with ISO 50001.

Modular design simplifies planning and expansion during ongoing operation
The modular construction of the busbar trunking systems increases flexibility and makes it much easier to plan electric power distribution in data centers, even when expanding existing facilities – two factors that are decisive for cost efficiency.

Making changes to a cable installation usually involves switching off all the upstream distribution boards and laboriously adjusting the components. Interrupting the supply like this incurs costs when the affected server racks are switched off. On the other hand, with a busbar trunking system and its preconfigured tap-off units, the electric power supply can be easily and quickly adapted to meet any new requirements. The tap-off units can be replaced without having to shut the line down.\(^1\)

\(^1\) In accordance with EN 50110-1 (VDE 0105-1); always observe national regulations/standards.
SIVACON 8PS busbar trunking systems – the innovative alternative

Whether you’re a planner, installer, or operator, you can take advantage of the integrated benefits of the SIVACON 8PS busbar trunking systems. You maintain the decisive competitive advantage: a high level of cost-efficiency, flexibility, and safety. SIVACON 8PS busbar trunking systems are the technologically superior alternative to conventional cable systems.

Busbar trunking systems in the data center
It’s natural for data centers to have a standardised, highly structured arrangement with a high level of redundancy. It was with this in mind that preconfigured tap-off units in multiple variations were developed: for example, including measuring devices, different currents, or different numbers of tap-offs.
### Conformity with standards
- Design verified system
- High current carrying capacity, operational safety, and short-circuit rating ensured by testing in accordance with IEC 61439-1/-6

### Cables
- Customised solution
- Much harder to demonstrate compliance with standards (for example, accounting for reduction factors because of ambient conditions and routing method)

### Fire load
- Very low
- Very high, depending on cable type

### Cost of changes, expansions, or relocation of load focal points
- Very high flexibility thanks to variable tap-off units, which can be modified, added, or replaced as required, even while energised
- No downtime
- Adaptable power supply
- Higher expenses because existing devices in distribution board must be replaced, with consequent changes in cable installation
- Installation expanded using additional feeders in the distribution board, and more cable installations
- Long downtime
- Inflexible power supply

### Space requirements
- Very low, thanks to compact design with contours matching the building structure
- Decentralised power distribution keeps distribution board footprint small
- High due to bending radii, laying method, accumulation, and current carrying capacity
- Centralised power distribution means distribution boards need more space

### Troubleshooting and error correction
- Easy, thanks to clearly arranged installation and switching devices close to the consumers
- Time-consuming, less clearly arranged installation, and switching devices far from the consumers
- Low influence due to appropriate arrangement of conductors
- Relatively high for standard cables
- Communications-capable measuring and switching devices integrated at a local level
- No defined arrangement of conductors
- Communications-capable measuring and switching devices integrated at a central level
- No direct access to measuring and switching devices during local work on the server rack

### Installation time
- Short installation time
- Long installation time

### Transparency thanks to measured-value acquisition
- Communications-capable measuring and switching devices integrated at a local level
- Easier allocation during local work on the server rack
- Communications-capable measuring and switching devices integrated at a central level

### System structure and operation (system lifecycle)
- Preconfigured and standardised tap-off units provide a high level of safety and availability:
  - Planning: certainty about quality and costs
  - Installation: plug-and-play, configuration can be easily adjusted
  - Operation: design verified standard/modular system allows easy changes to configuration, maintenance, and spare parts inventory
- High expenses for cable installation and prefabricated distribution boards (power distribution units, PDUs)
- Planning: detailed advance planning and budgeting necessary
- Installation: local changes or subsequent changes during operation are labour-intensive, plus large space required
- Operation: configuration changes possible only if the plant or entire runs are switched off. If changes to an energised distribution board (PDU) are required, there is a risk that unaffected server racks will be shut down. Work on energised systems always means increased costs and greater personal risk.

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1) In accordance with EN 50110-1 (VDE 0105-1); always observe national regulations/standards.
Two solutions that have proven themselves in practice

Solution 1: Computer room with 500 m² white space (server room), 200 server racks, and an IT load of 600 kW

Benefits of solution 1:
• Single-pole design offers reliable operation; in the event of a fault, the two unaffected server racks remain in operation.
• Design offering N conductor shutdown ensures that all active conductors are disconnected during shutdown.

Features:
• 200 server racks with electrical power of 3 kW each
• Supplied by 68 tap-off units (NL2:800420), or by 136 tap-off units with a redundant configuration
• 3 sockets per tap-off unit
• No measurement
• Up to 3.6 kW per socket
• N-conductor switched

1. 3 x sockets to connect 3 server racks
2. 3 x 16 A miniature circuit breakers, single-phase, double-pole, to shut down the N conductor
3. Tap-off unit NL2:800420 to supply 3 server racks with power of up to 3.6 kW each
Solution 2: Computer room with 250 m² white space (server room), 100 server racks, and an IT load of 600 kW

**Features:**
- 100 server racks with electrical power of 6 kW each
- Power supply from 34 tap-off units (NL2:800438), or 68 units in redundant configuration
- 3 sockets per tap-off unit
- With measurement and communication
- Up to 7.2 kW per socket
- N-conductor switched

Additional benefits of solution 2:
- Recording and evaluating of measured values and operational values for the server racks provides a high level of transparency
- Power value monitoring helps optimise consumption
- Phase symmetry evaluation can increase availability

Tap-off unit NL2:800438 to supply 3 server racks with power of up to 7.2 kW each
Tap-off units for busbar trunking systems

Highly flexible: a range of preconfigured data center tap-off units are available

Select your preferred options from the different tap-off units available:

- With/without measurement and communication
- Up to 3.6 kW, 7.2 kW, 11 kW, and 22 kW power per socket
- N conductor switched or not switched
- Up to 3 sockets per tap-off unit
- Rated breaking capacity $I_{cu} = 25 \text{ kA}$ in accordance with IEC 60947-2

<table>
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<tr>
<th>Measurement</th>
<th>Power per socket/rack</th>
<th>Switching N conductor</th>
<th>Number of sockets</th>
<th>Number and type of MCB</th>
<th>Order No.</th>
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More options are available, as shown in the table, to suit other requirements as appropriate. Your contact person will be happy to advise you.
### Measurement

<table>
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<tr>
<th>Measurement</th>
<th>Power per socket/rack</th>
<th>Switching N conductor</th>
<th>Number of sockets</th>
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### Options:

- Miniature circuit breaker with N conductor protection (2-pole, 4-pole)
- Miniature circuit breaker with characteristic D
- $I_n = 20$ A
- $I_n = 25$ A
- Protection system: fuse protection system, MINIZED in place of miniature circuit breaker
- RCD protection
- Double, triple measurement (2 x 3 x 1-phase / 3 x 3 x 1-phase 230 V AC or 2 x 3-phase / 3 x 3-phase 400 V AC)
- Measurement with bus protocol:
  - Ethernet (Modbus TCP/IP)
  - Profinet
  - M-Bus

* Measurement: PAC3100 with RS485 (Modbus)

** Measurement available on request
Support –
the way you need it

We offer comprehensive support for implementing the SIVACON 8PS busbar trunking systems in data centers, either directly on site or via the Internet, using the right tools – and, of course, always backed by support and advice.

More information
More information on the subject of electric power distribution in data centers is available in the following technical publications:

• Application Models for Power Distribution – Data Centers
• Technical Series Edition 13 Electric Power Distribution in Data Centers Using L-PDUs

Available for download at:
siemens.com/tip-cs/downloadcenter

Data Center website:
siemens.com/tip-datacenter

Support to ensure even greater planning certainty
The professional design, planning, and dimensioning provided by our TIP specialists offer tremendous potential for permanently reducing power consumption and costs – for example, by ensuring that power distribution is optimally dimensioned.

Our SIMARIS software tools also help with planning in compliance with IEC standards. With their straightforward user interfaces and intuitive functions, these tools are easy and convenient to operate. SIMARIS sketch, for example, can create 3D line routing plans for the LI, BD2, and BD01 busbar trunking systems.
SIVACON 8PS busbar trunking systems on the Internet

Our website offers you a wide range of information and helpful tools for the SIVACON 8PS busbar trunking systems. Simply click on the link below to find out more.

siemens.com/busbar

Convenient planning using SIMARIS tools

Planning electrical power distribution for industrial plants, infrastructure, and buildings is becoming increasingly complex. The innovative SIMARIS software tools provide expert support for your planning process to enable you, the electrical designer, to work better and faster on every project.

- SIMARIS design
  Dimensioning electricity networks and selecting components automatically
- SIMARIS project
  Calculating space requirements and budgeting for power distribution
- SIMARIS sketch
  Creating 3D line routing plans for the BD01, BD2, LD, and LI busbar trunking systems

siemens.com/simaris

Technical documentation on the Internet

An up-to-the-minute overview of the available technical documentation on the SIVACON 8PS busbar trunking systems is available on the Internet at:

siemens.com/lowvoltage/product-support

Tender specifications

We offer you a comprehensive range of tender specification texts to assist you:

siemens.com/specifications

Reliable on-site support

Our local experts are there for you worldwide. They help you develop power supply solutions and offer you support with their specialist knowledge in project management and financial services – while always taking important factors like safety, logistics, and environmental protection into account.

TIP Consultant Support

TIP Consultant Support – support from the experts for planning and designing electric power distribution systems.

siemens.com/tip-cs

Building on a secure foundation

Our training courses provide you with a solid foundation for your business success.

Experts give you the theoretical and practical knowledge you need on our SIVACON 8PS busbar trunking systems.

siemens.com/lowvoltage/training