

**SIEMENS**



Totally Integrated Power – SIVACON 8PS

# Safe and efficient power transmission in wind turbines

LDM busbar trunking system

[siemens.com/LDM-system](https://www.siemens.com/LDM-system)

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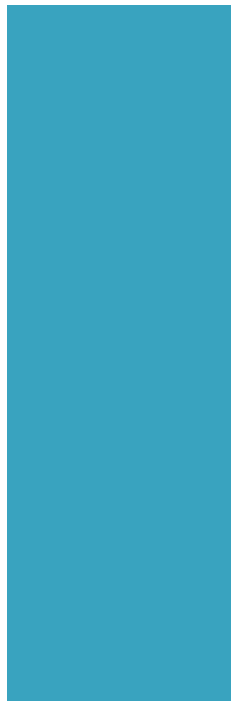
## Totally Integrated Power (TIP)

**A reliable, highly available, and flexible power supply for industries as well as buildings and facilities provides the basis for both industrial processes and infrastructure solutions.**

Siemens' solution is Totally Integrated Power (TIP), our comprehensive power supply portfolio of software and hardware products, holistic systems for all voltage levels, as well as energy management solutions. TIP is closely linked to industrial and building automation systems and is integrated into enterprise IT systems.

This allows to fully exploit all the optimization potential of an integrated solution. TIP meets even the toughest requirements of supply-critical assets. An extensive support throughout the entire lifecycle starting with planning up to services completes our offering.

The LDM busbar trunking system from the SIVACON 8PS product range is an integral part of Totally Integrated Power. The system transmits currents up to 8,200 A in the tower of a wind turbine in a safe, reliable and efficient manner.



## SIVACON 8PS busbar trunking systems – LDM system

The new, efficient busbar trunking system for wind turbines

Within the scope of sustainable power generation, wind energy is becoming more and more important. At the same time, manufacturers of wind turbines are exposed to a constantly increasing cost pressure: Their plants must transmit the generated power in a safe, reliable and cost-efficient way. With the proven LD busbar trunking system, Siemens has more than a decade of experience in safe and reliable power transmission between the nacelle and the tower base of innumerable wind turbines.

### Customer-specific solution

The LDM system, which has been especially conceived to meet the demands of wind turbines, is built upon this experience, adding a special, modular design. This makes it possible to offer wind turbine manufacturers a customer-specific solution for each task.

### Efficient solution

The LDM busbar trunking system conforms to the latest standard IEC 61439-1/-6, and is therefore particularly reliable and safe. As a design verified system it offers – compared with cables – defined electrical and mechanical properties, it is halogen-free, and convinces by its low fire load. The system's compact design, low-loss joining system, pre-assembled busbar elements, optimized use of material, as well as recyclability make planning, installation, commissioning and removal especially cost-efficient.

### Your benefits at a glance

#### Business understanding

- Modular system for individual customer requirements
- Efficient installation
- Compact, maintenance-free busbar trunking system
- Improved, scalable efficiency
- Halogen-free, recyclable

#### Plant and operational safety

- Design verified switchgear and controlgear assembly in accordance with IEC 61439-1/-6
- Low fire load

#### Reliability

- Developed on the basis of the proven LD system
- Pre-defined impedances and stipulated technical features

#### One-stop shop

Competent contact partners from consulting and planning up to commissioning



Significant time saving during installation

## The better solution: The LDM system

### Convincing system

#### Cost-efficient and safe investment

- Safe and reliable installation
- High operational safety
- High availability

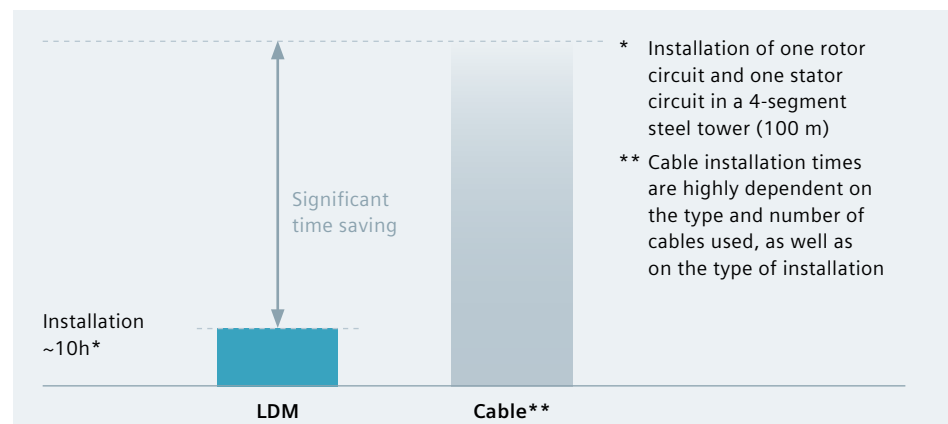
A performance comparison between the LDM busbar trunking system and a cable-based solution shows the numerous benefits at a glance.

No matter whether you are an investor or wind farm operator, a wind turbine or tower manufacturer: Due to its design, the LDM system offers clear advantages without extra costs, e.g. higher safety during installation and operation, as well as secured technical features.

#### Readily installed in a fraction of the time

The LDM busbar trunking system is delivered to your site as a prefabricated assembly – simply join the parts, secure with bolts, and ready. As a difference from cable systems, there is no need for you to cut anything to length, strip or bolt in a complex process.

And: The busbar only requires one support every 3.20 m on the tower wall; the distances for cable systems must be calculated, and are partly below 50 cm. A comparable installation with the LDM system therefore requires much less time.



Significant time saving during installation

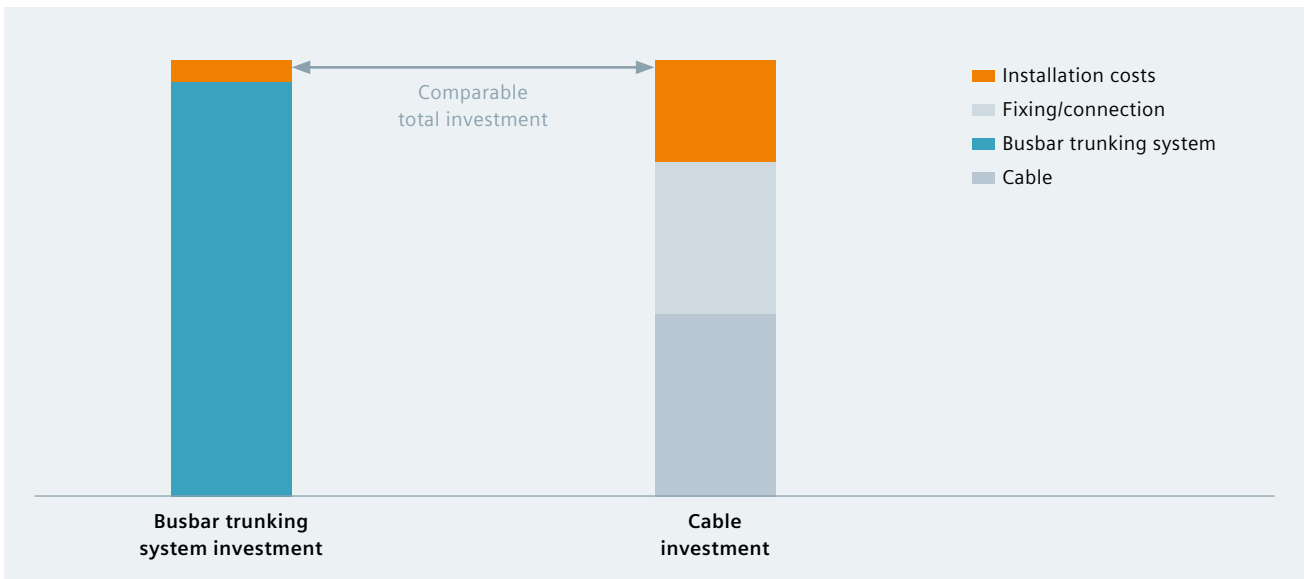
### Higher operational safety

Due to its design, the LDM system offers many advantages compared to cable installations. This starts with verifying conformity with the standards by means of a design verification, which is not performed in this manner for cable installations in the tower, and continues seamlessly as regards the fire load: The complete cable insulation may burn down in case of fault, whereas the LDM system contains only a few plastic parts, e.g. at the terminals. Moreover, the short-circuit rating of LDM is proved in a design verification – for cable installations, the developer of the plant has to calculate and verify the maximum current carrying capacity and the correct short-circuit rating of the entire system.

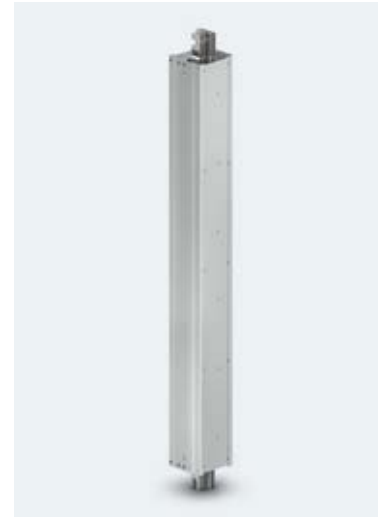
### Improved availability

In wind turbines, failures are mostly caused by electrical components. A system such as LDM with tested, safe and reliable joints can easily be installed in a professional way.

Even if professional preparation and implementation of the installation is taken for granted, the probability of failure is already higher for aluminium cables due to the large number of parallel joints. Further, the LDM system remains highly available in case of external faults, as a failure caused by externally initiated short-circuits is not to be expected.



LDM system: same investment for more technical features



LDM system – Straight length

## Highly performant and cost-efficient: The LDM system

### Faster and more efficient

- Modular for individual solutions
- Well-conceived components
- Compact design
- Efficient support
- High reliability by proven technologies
- High safety: Hardly any combustible materials

Power generation through the generator, and power transmission up to the grid infeed form the main circuit of a wind turbine. Apart from that, high power ratings must be distributed and transmitted safely and with as little losses as possible within the wind turbine.

LDM, the modular and efficient busbar trunking system from the SIVACON 8PS series takes care of that: reliably and efficiently – for currents up to 8,200 A.

### Cost-efficient planning

The LDM system can meet the requirements of every wind turbine precisely, offering all necessary components – with a compact design to simplify configuration.

For double-fed asynchronous generators, the rotor and stator circuits can be laid in one housing, and a PE conductor can optionally be routed as well. An additional advantage: Qualified support by the expert wind power team of Siemens, with competent contact partners able to give you perfect advice and support you during planning and commissioning of future-oriented technologies.

### Efficient installation

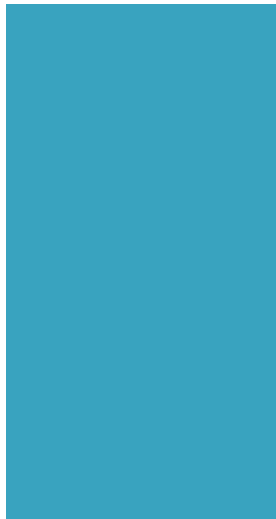
Busbar elements and customer-specific cable infeeds can be pre-assembled in lying tower segments, saving both time and costs. During erection on site, it will just be necessary to establish the connections between the tower segments.

This is done through the design verified single-bolt connections, i.e., all phases of the busbar trunking system including the protective conductor are tightened with only one bolt and with a standard torque wrench – without special tools.





LDM system – Joint bracket



LDM system – Segment connector



LDM system – Cable infeed

Special segment connectors can compensate manufacturing tolerances at the segment transitions of the tower, and can be easily installed after erection. Thereby, fixing brackets with damper elements protect the system in case of tower movements. With busbars, significantly less and simpler connections have to be established in the erected tower than with cables.

Compared with cable installations, the fixing distances of the LDM busbar trunking system are considerably wider, which accelerates installation and saves both space and material. The transitions to other equipment and the loop cable are implemented by means of a custom-specific cable infeed and/or direct connections to the switchboard in the tower base.

#### Safe and reliable operation

Power transmission between the nacelle and the tower base is often the point more prone to failures, and thus to longer interruptions of power generation. To face this, the LDM busbar trunking system satisfies the corresponding standard IEC 61439-1/-6: This standard postulates a design verification of the system, and not only guarantees the permanent fulfilment of the confirmed technical parameters, but also excludes an overload of the system effectively, thus reducing the associated consequential damages. Further parameters beyond the requirements of the standard can be set by the manufacturer's dimensioning and configuration of the busbar trunking system.



Siemens develops and delivers a design verified LDM system in accordance with the electrical characteristics determined and required by the wind turbine manufacturer. Thus, for example, possibly arising short circuits have no influence on the product features of the LDM busbar trunking system, and they do not endanger further operation of the wind turbine. Further, the internal resistances of the busbar are determined, which can simplify the commissioning of the wind turbine and contribute to a high reliability in operation.

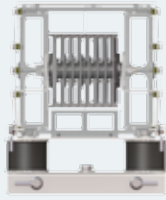
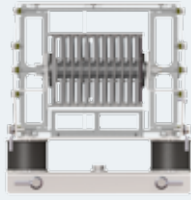
The minimum use of plastics results in a very low fire load, thus increasing the security of operation drastically in comparison with cable systems. In this context, the halogen-free design of a busbar trunking system also has positive effects.

#### **Sustainable working**

The improvement of energy efficiency in conventional power plants, which is already widely discussed today, will also gain more and more importance regarding wind power. Therefore, wind turbine manufacturers will probably also be committed in the future to design equipment with the minimum possible losses.

Siemens already takes account of this aspect today, and has developed the LDM platform to a busbar trunking system with minimized power losses and significantly improved efficiency by means of optimized conductor cross-sections.



	Mono	Twin
		
Voltage level	<= 1,000 V	
Current-carrying capacity at 35 °C	800 A – 4,100 A*)	Rotor: 800 A – 1,000 A Stator: 800 A – 3,050 A
Short-circuit rating	Scalable max. 116 kA	
Degree of protection	IP21	



LDM system: a safe investment

Of course, this is reflected in additional feed-in compensations for the plant operator throughout the entire service life of his wind turbine. Besides that, the LDM busbar trunking system particularly stands for the topics of sustainability and

responsible treatment of the environment. It is non-polluting (because it is halogen-free), energy-efficient, and can additionally be almost completely recycled at the end of the service life.

#### The future in mind

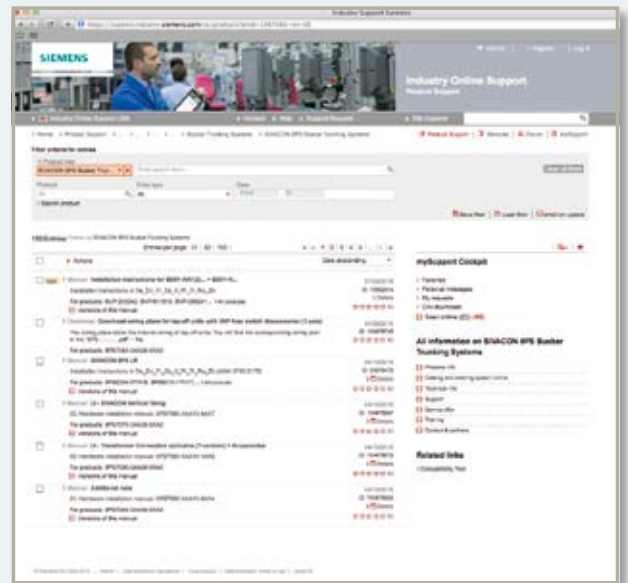
- Technically and economically advantageous solution throughout the entire service life of the wind turbine
- Sustainable technology, higher energy efficiency
- Recyclable

SIVACON 8PS busbar trunking systems – LDM system	
Rated insulation voltage $U_i$	1,000 V AC
Rated operational voltage $U_e$	1,000 V AC
Standards	IEC 61439-1/-6, North-American standard in preparation
Degree of protection	IP21 with saline fog and condensation test
Rated current $I_{nA}$	800 A to 8,200 A
Rated short-time withstand current $I_{cw}$ (1 s)	Up to 116 kA
Adaptability	To standard LD system
Joining system	Hook and bolt system
Mounting position	Vertical
Housing material	Steel-enclosed, separate systems possible for rotor and stator (optional powder coating in RAL colour)
Insulation	Air-insulated
Busbar coating	Epoxy

\*) up to 8,200 A for two parallel systems



Discover SIVACON 8PS on the Internet



Technical documentation on the Internet

## Optimum support by Siemens

### Discover the 8PS busbar trunking systems on the Internet

Visit our website on the Internet. Besides further information about the LDM busbar trunking system, there you will find more about the other products of the SIVACON 8PS family, for example by means of the overview brochure SIVACON 8PS, along with links to technical documents at:

[siemens.com/busbar](https://www.siemens.com/busbar)

### Technical documentation on the Internet

You will find an overview of the latest technical documentation available for SIVACON 8PS busbar trunking systems on our website (updated daily) at:

[siemens.com/lowvoltage/product-support](https://www.siemens.com/lowvoltage/product-support)

### LV Explorer – the Discovery of Low Voltage in 3D

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#### Build on a sound basis

Our courses offer you solid foundations for your business success. Expert lecturers provide you with the necessary theoretical and practical information relating to our SIVACON 8PS busbar trunking systems.

The courses include a lot of multimedia teaching equipment as well as many practical examples. For our current course offer, please visit our website:

[siemens.com/lowvoltage/training](https://www.siemens.com/lowvoltage/training)

#### Reliable local support

Our local experts are there for you around the world, helping you to develop solutions for your energy supply, and providing you with specific expertise on project management and financial services. Important aspects of safety, logistics, and environmental protection are considered.

Especially for planning and conception of electrical power distribution systems, Siemens supports electrical planning engineers in many countries. Technical experts – from the TIP Consultant Support – will provide you with professional consulting, planning tools, specification texts, and planning manuals.

#### Siemens Customer Support Center

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