

# Coexistence of AC and DC in the Data Center

**The consistent use of direct current in a data center makes sense. Losses can be massively reduced. On the power side, the IEC has defined the frame with TS 62735-1. Now it is the turn of the device side. AC and DC are supposed to coexist in a transition phase.**

The "War of the Currents" at the end of the 19th century was the first format war in industrial history. The proponents of alternating current (Tesla and Westinghouse) vs. Edison, who advocated direct current (DC). We know the outcome. But just a quick glance is enough: In the digital age, entire swarms of DC-powered devices are in use.

The telecom and data industries are powerful drivers for making direct current viable again. The approach of supplying a data center with DC voltage is obvious ([Datacenter](#)<sup>[1]</sup>). If the servers are already working with direct current, it would only be sensible to process it in the same way throughout. From the network to the chip. The DC architecture contains significantly fewer components. This makes it cheaper and less susceptible to faults. The elimination of various transformations and conversions also results in significantly improved energy efficiency.

## AC mode

In the classic power range around 250 VAC, the device connectors are standardized according to IEC 60320 ([White Paper Mating Components](#)<sup>[2]</sup>), proven and perfected in almost all aspects. Here and there you will find approaches for improvements and additional functions. However, there is no reason to expect anything earth-shattering - although higher operating temperatures certainly show potential for renewal ([Application Note IEC Connectors at elevated temperatures](#)<sup>[3]</sup>).

















## DC standards

The power distribution standard IEC TS 62735-1 for DC systems up to 2.6 kW has existed since August 2015. The working group WG8 of the IEC committee TC23, which deals with the extension of the standards for electrical installation material, comprises more than 30 experts from Europe, North America and Asia.



SCHURTER GP21: first commercially available cord plug for 400 VDC systems up to 2.6 kW according to IEC TS 62735-1

IEC Power Connection for 2.6kW AC/DC Systems in Data Centers

PDU	Interconnection Cord Set		Appliance
Appliance Outlet	Plug Connector	Cord Connector	Appliance Inlet
			 250 VAC
 (IEC 60320)			 250 VAC or 400 VDC
			 (IEC 63236)
 (IEC 62735)		 (IEC 63236)	 400 VDC

Compatibility chart between AC und DC plugs/connectors according to IEC

It is precisely in this working group that efforts are being made to develop solutions for DC plug connections based on the previous AC standard IEC 60320 ([Application Note](#) <sup>[4]</sup>).

**Step-by-step transition**

The availability of pure DC components is still in its very beginning. For success, it would undoubtedly be helpful if parts of the existing infrastructure could continue to be used. In other words, if a server cannot care whether it is supplied with AC or DC. Technically this is no witchcraft on the device side. But with the plug connection you are entering new territory. DC connectors differ technically in some points from their AC counterparts. Especially with regard to the dangers of mechanical separation under load.

**Mechanical coding**

It goes without saying that safe power supply has top priority. Whether it is AC or DC. Mechanically coded connector systems are used to ensure that the power supply in the device is tapped correctly. Only the hybrid device plug accepts both AC and DC sockets.

The lifecycles of the supply infrastructure (PDU) are generally longer than those of the devices to be supplied, which are replaced more frequently by technological developments ([Power Distribution Units](#) <sup>[5]</sup>). Regardless of this, the aim is now to provide an AC/DC device plug that allows the device to be operated on both an AC and a DC supply.

This means that the change from the current AC supply can be switched to

DC as required. Only the supply cables have to be replaced.

**About SCHURTER**

SCHURTER continues to be a progressive innovator and manufacturer of electronic and electrical components worldwide. Our products ensure safe and clean supply of power, while making equipment easy to use.

SCHURTER AG  
 Werkhofstrasse 8-12  
 6002 Lucerne  
 CH-Switzerland  
 +41 41 369 31 11  
[contact.ch@schurter.com](mailto:contact.ch@schurter.com)  
[schurter.com](http://schurter.com)

**References / Document Downloads**

- [1]: <https://www.schurter.com/data-center>
- [2]: <https://www.schurter.com/data/download/676167>
- [3]: <https://www.schurter.com/data/download/2515815>
- [4]: <https://www.schurter.com/data/download/2882242>
- [5]: <https://www.schurter.com/pdu>