

APPLIANCES AND SOLUTIONS for SELV applications





Commercial Buildings

When implementing DC microgrids in commercial buildings, the use of different voltage levels for different purposes is general practice. Low voltage DC (LVDC, typically ranging between 350 V and 400 V) for extensive installations and high power loads minimizes conduction losses and reduces costs due to smaller currents and therefore smaller necessary copper cross sections. On the other hand safety extra low voltage (SELV) sub-grids with a nominal voltage of 24 to 48 V connected to these LVDC grid offer ease of implementation and lesser requirements concerning safety measures such as isolation, arc detection and safety devices to address fault conditions.

This again lowers cost for electrical installations in confined areas (e.g. individual office spaces). Fraunhofer IISB offers various devices to implement the entire functionality, from transferring power as well as data between the 380 V grid and a subordinate SELV-grid, distributing power inside the grid and supplying consumer loads.

Connection to LVDC

The suggested solution uses the **Cognitive DC Power Supply**, a bidirectional insulating DC/DC-converter with a nominal power of 600 W developed at Fraunhofer IISB, to serve as a gateway for both power and data between SELV grids and 380 V microgrids. Its key features are a highly efficient topology and outstanding power density. To maximize availability, its controller can be supplied using either the LVDC grid, or the SELV grid as well as Power over Ethernet. **Intelligent algorithms** can be used to learn from load profiles of connected consumers to further improve power distribution and grid regulation using **voltage droop control**.

Office Equipment

To supply office equipment on workdesks from a uniform socket the **Workplace Distribution Unit** is used. This innovative device incorporates three to five independent point-of-load converters, each delivering up to 100 W with a **variable output voltage** between 5 and 22 V. The output voltage is selected using a resistor in the equipment-specific supply cable, allowing retrofitting of existing devices. Any output connector with three or more contacts can be used, if customer-specific requirements have to be met. Additional output modules with USB Type A are available, as well as **USB Type C Power Delivery 2.0 and 3.0** ensuring support of future devices as well as legacy devices. Each channel features comprehensive protection functions and zero standby power consumption.



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1, 3 Individual Office Space

2 Cognitive DC Power Supply

4 Workplace Distribution Unit