

PHILIPS

CertaDrive

Switching power supply



Design - in Guide

Enabling **future-proof LED technology** for dynamic LED markets

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Introduction to this guide



Examples of CertaDrive SPS

Thank you for choosing Philips CertaDrive Switching power supply. In this guide you will find the information needed to integrate these power supplies into a LED luminaire or LED system.

This edition describes the CertaDrive Switching power supplies optimized for area and flood lighting application. We advise you to consult our websites for the latest up-to-date information.

Applications

The CertaDrive Switching power supplies are designed to operate LED solutions for wide applications, like area and flood lighting, LED strip lighting. If you use Philips LED power supplies, specific datasheets and design-in guides are available from below mentioned technology websites.

Information or support

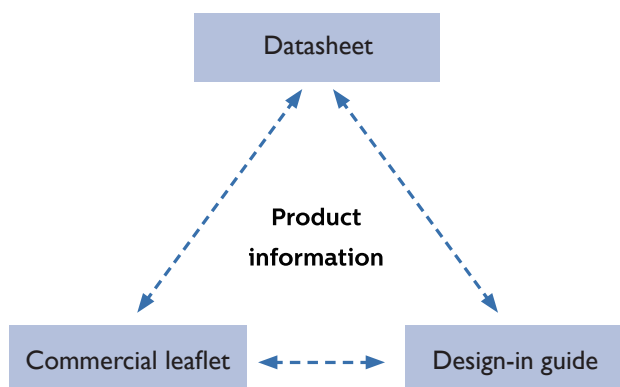
Please consult your local Philips office or visit:
www.philips.com/technology

Determine which documents contain what information

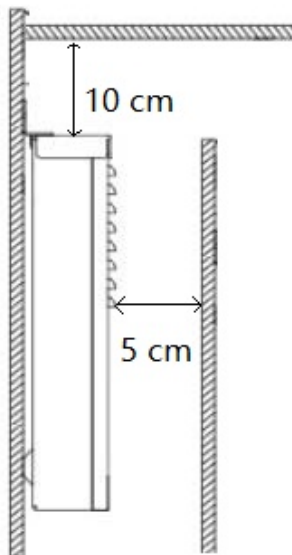
In order to provide information in the best possible way, Philips' philosophy on product documentation is the following.

- **Commercial leaflet** contains product family information & system combinations
- **Datasheet** contains the product specific specifications
- **Design-in guide** describes how the product is to be designed-in

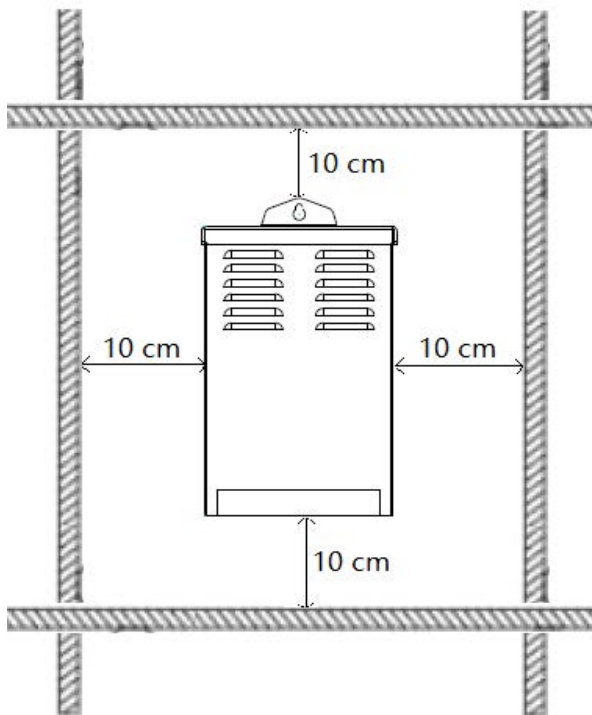
All these documents can be found on the download page of the OEM website www.philips.com/technology. If you require any further information or support please consult your local Philips office.



Safety precautions



Example of switching power supply installation



Leave enough distance for heat dissipation



Warnings:

- Avoid touching live parts!
- Do not use power supplies with damaged housing and/or connectors!
- Do not use power supplies with damaged wiring!
- Class I luminaires must be connected to protective earth!
- Do not service the driver when the mains voltage is connected; this includes connecting or disconnecting the LED load.

Installation

To secure the long term reliability of the driver and application, below instructions have to be followed strictly:

- Please install in a sheltered place
- Please use the vertical wall-mounted installation, do not tilt forward, backward or use the horizontal installation
- Please leave enough space for heat dissipation. Keep at least 10cm from the body and the surround wall. Keep at least 5cm from the top housing and the cover
- Please use mounting screws M4*8mm
- See the picture on the left for details

Safety warnings

- Do not use damaged or defective contacts or housings
- Do not use damaged products
- Cap off all unused wires to prevent accidental contact with the luminaire or driver housing
- The luminaire manufacturer is responsible for his own luminaire design and has to comply with all relevant safety standards
- The CertaDrive switching power supplies should not be exposed to the elements such as snow, water and ice. It is the luminaire manufacturer's responsibility to prevent exposure
- Do not service the SPS when the mains voltage is connected, this includes connecting or disconnecting the LED load
- Please provide adequate earth connection when applicable

Philips Design-in support is available; please contact your Philips sales representative.

Introduction to CertaDrive Switching Power Supplies



CertaDrive SPS

Introduction

CertaDrive Switching power supplies are designed to operate LED solutions for general lighting applications such as area and flood lighting, LED strip lighting to fulfill the market need for essential lighting. The CertaDrive Switching power supplies offer basic specifications such as specific voltage and current settings, optimal to operate with Philips modules. These power supplies are also interesting for OEMs producing and selling their own LED-boards. If the specific V/A specifications of these power supplies do not suit the LED board specifications of the OEM, Philips offers the possibility to create fast derivative power supplies with the required V/A of the OEM.

Naming of the power supplies

Example: CertaDrive SPS 200W 24VDC

CertaDrive:	Brand name for reliable, good enough power supplies
SPS:	Switching power supply
200W:	Output power
24VDC:	DC output voltage

Electrical Design-in

Surge protection

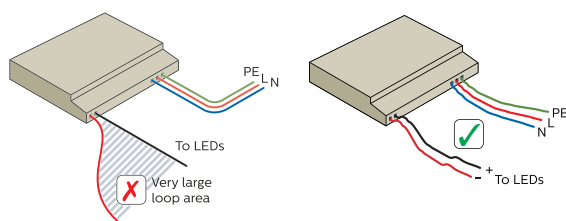
The CertaDrive switching power supplies have built-in surge protection up to a certain limit. Depending on the mains connected, additional protection against excessive high surge voltages may be required by adding a Surge Protection Device. The actual limit can differ per driver and can be found in the driver's datasheet in the download section on www.philips.com/technology.

Touch current

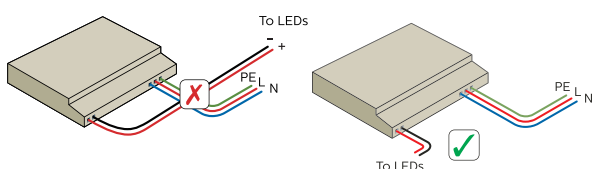
The CertaDrive switching power supplies are designed to meet touch current requirements per IEC 62368-1 standard. The specified maximum values are 0.7 mA peak for IEC. The test is done with the driver alone. In a luminaire, touch current may be higher, since the LED load may introduce additional touch current. Precautions may be required on the luminaire level and if multiple drivers are used in a single luminaire.

Electromagnetic compatibility (EMC)

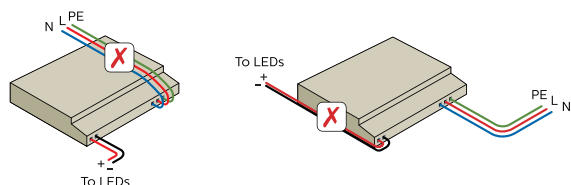
Electromagnetic compatibility (EMC) is the ability of a device or system to operate satisfactorily in its electromagnetic environment without causing unacceptable interference in practical situations. The CertaDrive switching power supplies meet EMC requirements per CISPR32. This test is conducted with a reference setup that includes a driver and an LED load/heat sink combination mounted on a metal plate.



Keeping the wires close together



Keep mains separated from the output wires

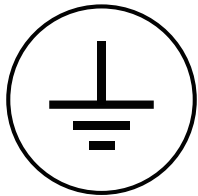


Do not route any wiring over and/or along the power supplies enclosure

Improvement in EMI Performance

The following practical precautions need to be taken into account in a lighting system to minimize EMI:

- Minimize the differential mode loop area of the LED wires going from the driver to the light source by keeping the wires close together (bundling). This will minimize the magnetic field and reduce the radiated EMI. Long linear light sources are also part of that loop.
- Minimize the common mode parasitic capacitance of the output wiring + light source to earth by keeping the length of the wires between power supplies and light source as short as possible. Keep the length of the incoming mains wire inside the luminaire as short as possible.
- Keep mains separated from the output wires (do not bundle).
- Do not route any wiring over and/or along the power supplies enclosure to avoid any coupling/crosstalk with internal components of the power supplies.
- Ground the lighting system chassis and other internal metal parts to protective earth (class I luminaires), do not let large metal parts electrically insulated from functional or protective earth. Always connect the protective/functional earth/equipotential connector or wire from the power supplies and use equipotential bonding wires for all large metal parts like power supply mounting plate, reflector, heatsink etc. Keep the protective/functional earth/equipotential wires as short as possible to maximize their effectiveness and use, as much as possible, large metal areas (chassis, mounting plates, brackets) for earthing purposes instead. Establish a reliable electrical connection by using a toothed washer and screw(s) fastened with adequate torque.



Symbol for Protective Earth (PE)

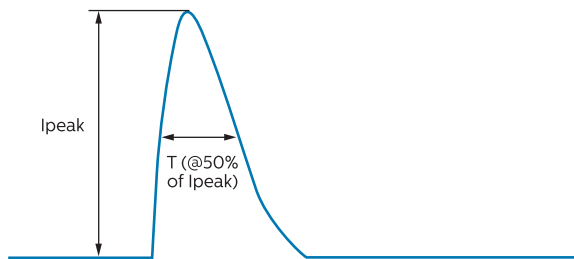
Electrical isolation

Isolated drivers (SELV output)

Power supplies in this group cannot generate output voltages higher than 120VDC. These luminaires have double isolation from the primary to the secondary side and basic isolation (single isolation foil) between all the electronic circuits and the chassis, hence the presence of the Protective Earth (PE) symbol on the driver housing. This means that in case of driver housing accessibility (i.e. touchable by hand without the need of tools to gain access), the driver housing and all other accessible conductive parts need to be connected to PE.

CertaDrive switching power supplies meet the IEC 62368-1 safety standard. In accordance to this standard, the following safety requirements are met:

- Basic isolation between the Primary and Secondary side wires;
- Power supplies output voltage < 1000VDC
- Insulation test voltage $1000V + 2 * U$
- Double isolation between all wires and chassis: Insulation test voltage: 3000V.



Graphical representation of inrush current

Inrush current

'Inrush current' refers to the briefly occurring high input current which flows into the power supplies during the moment of connection to mains; see the illustration on the left. Typically, the amplitude is much greater than the steady-state input current.

The cumulative inrush current of a given combined number of power supplies may cause Mains Circuit Breakers (MCB) to trip. In such a case, either one or a combination of the following measures need to be taken to prevent nuisance tripping:

1. Replace existing MCB for a less sensitive type (e.g. exchange B type for C type)
2. Distribute the group of power supplies over multiple MCB groups or phases
3. Power up power supplies sequentially instead of simultaneously
4. Install external inrush-current limiting devices

Inrush parameters are driver-specific and can be found in the driver datasheet at www.philips.com/technology.

MCB type	Rating (A)	Relative number of LED drivers
B	10	63
B	13	81
B	16	100 (stated in datasheet)
B	20	125
B	25	156
C	10	104
C	13	135
C	16	170
C	20	208
C	25	260
L, I	16	108
L, I	10	65
G, U, II	16	212
G, U, II	10	127
K, III	16	254
K, III	10	154

How to... Determine the number of drivers on a MCB

The maximum amount of drivers on a 16A type B Miniature Circuit Breaker (MCB) is stated in the driver's datasheet on www.philips.com/technology.

In the conversion table on the left that stated amount is used as reference (100%).

The maximum quantity of drivers on different types of MCB can be calculated by the reference (see driver's datasheet) × Relative number (last column).

Example;

If datasheet states: max number on type B, 16 A = 20,
then for type C, 13 A the value will be $20 \times 135\% = 27$.

Notes

1. Data is based on a mains supply with an impedance of $400 \text{ m}\Omega$ (equal to 15 m of 2.5 mm^2 cable and another 20 m to the middle of the power distribution) in the worst-case scenario. With an impedance of $800 \text{ m}\Omega$ the number of drivers can be increased by 10%.
2. Measurements will be verified in real installations; data is therefore subject to change.
3. In some cases the maximum number of drivers is not determined by the MCB but by the maximum electrical load of the installation.
4. Note that the maximum number of drivers is given when these are all switched on at the same time, e.g. by a wall switch.
5. Measurements were carried out on a single-pole MCB. For multiple MCBs it is advisable to reduce the number of drivers by 20%.
6. The maximum number of drivers that can be connected to one 30 mA Residential Current Detector is 30.

Thermal Design-In

Introduction

This chapter describes the relationship between the CertaDrive switching power supplies output power derating in association with ambient temperature.

Ambient Temperature (T_a)

Ambient temperature (T_a): temperature outside the power supply. When switched off >2 hours, SPS case temperature is likely equal to ambient temperature.

To achieve optimal lifetime and reliability, it is critical that the temperature of the components in the driver remains within its rating. In the SPS design, all precautions are taken to ensure that the components within the power supplies are at the lowest possible temperatures.

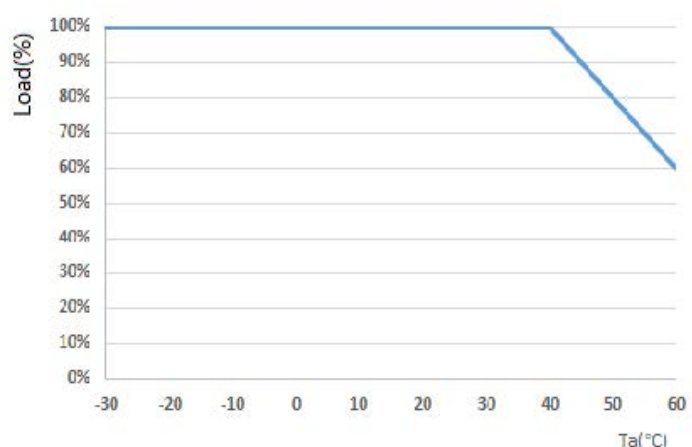
Since there is a direct relation between the ambient temperature (T_a) and the driver components inside the driver, it is important T_a must not exceed the maximum values stated in the associated datasheet in the download section on www.philips.com/technology.

To prevent power supplies damaged due to high ambient temperature, the output power will be derating accordingly when T_a exceeds 40°C. Graph in left shows the relationship between load(%) and ambient temperature.

Driver lifetime

The lifetime of LED power supply depends on the temperature during operation. This means there is a relationship between the T_a and its lifetime. CertaDrive power supplies have a specified minimum lifetime of 30,000 hours, at the specified $T_a = 40^\circ\text{C}$ (see also respective datasheet).

To achieve optimal lifetime and reliability, it is recommended to consider 80% derating for output load. For example, if SPS 200W is used in lighting system, the output load is better not over 160W. Keep 20% margin can guarantee good thermal performance and optimal lifetime.



Graphical representation of Load derating curve

Compliance and approval

EN 55032/CISPR32		Conducted EMI 150 kHz-30 MHz
EN 55032/CISPR32		Radiated EMI 30 MHz-1 GHz
IEC 61000-3-3	GB/T 17625.2	EMC – Limitation of voltage fluctuation and flicker in low voltage supply systems for equipment rated up to 16A

Immunity

EN 55035/CISPR35		EMC immunity requirements
IEC / EN 61000-4-2	GB/T 17626.2	Electrostatic Discharge
IEC / EN 61000-4-3	GB/T 17626.3	Radiated radio frequency, electromagnetic field immunity
IEC / EN 61000-4-4	GB/T 17626.4	Electrical fast transient/burst immunity
IEC / EN 61000-4-5	GB/T 17626.5	Surge immunity
IEC / EN 61000-4-6	GB/T 17626.6	Conducted disturbances induced by RF fields
IEC / EN 61000-4-11	GB/T 17626.11	Voltage dips, short interrupts, voltage variations

Safety standards

IEC / EN 62368-1	GB 4943.1	General and safety requirements
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Please refer to the datasheet of the driver for more information



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