

DIN-RAILway power supplies – a new standard in the railway sector

## Proven Industry Technology on Rails

Author: Christoph Frodl, Engineer for Special Applications at PULS

For those of you who have sat waiting on a train due to technical problems, you know only too well that more reliable technology on the railway should be the highest priority. A modern train composition is technically highly complex and nothing moves without a reliable power supply. A DIN-RAILway power supply is the answer from PULS for a more robust and reliable DIN-Rail power supply on the railway.



*Power supply for railway technology: The highest standards are met.*

Of course, there have been specialised power supplies for the railway for many years. The demands are high and in several areas: Failures cannot occur, even with high mechanical shock in an even broader temperature range. In general, fans are not allowed because these constitute an increased risk of failure. This in turn requires the highest efficiencies in very compact units that can only discharge heat loss via natural convection.

PULS, as a market leader in the field of industrial power supplies, meets the strict requirements of the various railway standards with a variation of its standard industrial power supply. PULS is known for its quality, reliability and longevity as well as its protection against tough environmental and EMC conditions. This reputation is due to carefully selecting components and a robust design.



The power supplies from PULS are impressive with their compact size, long life, maximum efficiency and easy DIN-rail fixation.

Historically, the input voltages in railways differ from those in industry. However, the voltage adjustments were no problem thanks to PULS' highly flexible circuit designs. A new range of power supplies is now available to the railway sector, whose concept has already been proven in tens of thousands of industrial applications worldwide. PULS technology provides a special feature for railway technology by allowing the devices to be mounted onto a DIN rail. The PULS portfolio includes 1 and 3-phase units as well as DC/DC converters for railway applications.

#### Railway requirements

The EN50155 standard defines the requirements for the use of electrical devices on rolling stock. Compliance with EN 50155 must of course be demonstrated through proper testing.

What tests are required?

- **Vibration resistance** (DIN EN61373): This standard constitutes significantly more severe test conditions than those required for industrial power supplies. This makes it possible for the unit to be installed in the vehicle body, on the roof and even under the floor.
- **Temperature range:** Industrial power supplies from PULS can be operated up to an ambient temperature of +60 °C without derating. For the railway sector, the suitability in accordance with EN50155 could also be demonstrated on some devices at an extended temperature range of up to 70 °C continuously and 85 °C for 10 minutes. QS5.241-60 meets the temperature class T3 and the QS10.241-60 and CPS20.241-60 even meet class Tx (-40°C).

- **EMC resistance (EN50121-3-2):** In the railway sector high requirements apply with respect to dielectric strength and interference. The PULS low-noise circuit topology demonstrates a high degree of EMC resistance.
- **Fire protection** in accordance with EN45545-1: Industrial power supplies from PULS are UL-certified as standard and have been tested in accordance with the new fire safety standard EN45545-1. PULS units are not sealed and thus have a low fire load, which is an additional advantage and makes the unit extremely light.

#### Where specifically does PULS score points?

Anyone who has successfully marketed power supplies for a period of time can only do so by providing units of the highest quality because otherwise it is not possible to remain in the market. In the industrial sector intrinsic properties such as:

- **highest efficiency**
- **smallest dimensions**
- **lowest weight**
- **longest lifetime (> 60 000 h)**
- **maximum availability**

are also key factors to staying in a very competitive market for the long term. Naturally, these factors are also of key importance in the railway sector. To give an example: The CPS20.241-60 unit from PULS has an output power of 400 W throughout the entire temperature range and has an integrated MOSFET decoupling circuit at the output for redundant operation with passive load sharing. It also has an efficiency of 94% and if the input voltage fails - even in the event of a short-circuit - the output voltage remains available for more than 20 ms. Short interruptions can therefore be easily bridged. The vast power density is achieved in a 65mm housing

width and a weight of only 1000g. Even more appreciated are the active input in-rush current limiter and the integrated reverse polarity protection for DC voltages at the input.

But what really distinguishes the new PULS DIN-RAILway power supplies is the extremely simple DIN-rail fixation. The conventional wall mounting used in the past often led to heat conduction through the mounting plate. In industry, such mounting concepts should only be used as an exception. The majority of electronic and electro-mechanical devices are mounted to DIN rails. The industrial concept from PULS therefore also brings great advantages to the railway sector, because vibration-proof mounting on DIN-rails is only possible if the device has a high-quality DIN-rail fixation system and minimum weight.

It is not only the fast mounting on DIN-rails that is an advantage, but also the absolutely vibration-free connection that you get from using spring terminals. Loose screw terminals are one of the most common failure causes in electrical systems and frequently lead to fires. In industry, the use of spring-loaded terminals has, to a great extent, displaced the use of screw terminals. This has occurred because protection against the effects of vibration is inherently controlled by the spring clamp terminals which is why they are more frequently used in the signalling and power supply fields.

### The railway series from PULS

The opportunity to go to a one-stop shop - whether for AC/DC or DC/AC - solutions from a single source are particularly appreciated by users. The PULS spectrum:

1. DC/DC converter in the power ranges 100 W, 200 W and 400 W
2. AC/DC power supplies in the power ranges 240 W and 480 W
3. 3AC/DC power supplies in the power ranges 240 W and 480 W

Almost all DIN-RAILway power supplies have a power boost that enables operation at 150% of the rated load for 4 s or 20% Bonus Power. This is a particularly desirable feature under demanding loads.

### Conclusion

The DIN-RAILway power supplies from PULS represent a new range of railway power supplies whose concept has already been proven in tens of thousands of industry applications worldwide. A complete range of 1 to 3 phase units and DC/DC converters are currently available, all of which can be mounted to DIN-rails. The units are: convection cooled, equipped with vibration-free spring clamp terminals, very compact, extremely lightweight and exhibit the highest level of efficiency. PULS DIN-Railway customers also have the benefit of working with the logistical resources of a large-scale manufacturer.



Din Rail Power Supplies by PULS can be used in the train and on the track.

### Typical applications include:

- Central Power
- Air conditioning
- Communication
- Infotainment
- Signaling Technology
- Train Security