



QUESTIONS & ANSWERS: SWS-POWERBOX®

GENERAL QUESTIONS

Is it already a market-ready product and a proven concept?

- Yes, the SWS-PowerBox® system has been tested internationally in test runs under various conditions and has been used in operational service for years. Operating data from runs can be provided on request.

Which battery capacity of the SWS-PowerBox® is recommended?

- The selection of the appropriate battery capacity from 9 kWh to 72 kWh is mainly dependent on the train run, the idle times during the train run, the outside temperature, the transported goods and container types. Various transport examples and use cases are listed in the general SWS presentation (available for download on the homepage). We will be happy to provide our expertise for the planning of your transports on request.

How does the outside temperature affect the capacity and the performance of the SWS-PowerBox®?

- The high-performance lithium iron phosphate batteries (LFP) used have hardly any capacity loss within a temperature T1 range of -25° to +40° according to EN 50125-1 for railway applications, low capacity losses and full power is available.

Temperatur	+45°C	+25°C	+10°C	0°C	-10°C	-30°C
Kapazität	100%	100%	>90%	>80%	>70%	>60%

Can a deep discharge of the batteries occur during longer standstill periods?

- The battery monitoring system of the SWS-PowerBox® automatically switches off when the battery is discharged, thus protecting the batteries from damage due to deep discharge.

What should be done if the batteries of the SWS-PowerBox® are completely discharged?

- The SWS-PowerBox® can be charged in the terminal or at the loading track via type 2 charging plug (incl. adapter CEE 32A 5-pole with min. 16A) at the mains. A power of 10 kW at the mains connection is already sufficient to start the charging process.
- The axle generator produces recuperation power of 4.5 kW up to 18 kW at 120 km/h¹ while the vehicle is moving and from a speed of 30 km/h upwards. The control system ensures that the refrigerated container itself is supplied with power first and only recharges the batteries when sufficient power is available.

Is the clearance gauge negatively affected by the installation of the axle generator? Can there be restrictions on routes within Europe?

- No, the axle generator does not affect the clearance gauge and there are no restrictions in Europe.
- The SWS-PowerBox® can be used in the European railway network without any restrictions, the clearance gauge G1 is fulfilled.

¹ These are test values and may vary.



INSTALLATION AND COMMISSIONING

Does the installation of the SWS-PowerBox® on the container wagon represent a significant change to the container wagon?

- No, the adaptation with the additional container pins on the wagon frame is the responsibility of the holder of the wagon registration. A separate approval for the SWS PowerBox® is not necessary. We are happy to provide our expertise to support the vehicle registration upon request and the corresponding approval documents will be created by SWS Power Solutions.

Is the SWS-PowerBox® a load in intermodal transport?

- The SWS-PowerBox® is considered an independent cargo unit. It is equipped with the necessary markings such as the ILU code, the loading example and the manufacturer's information. The ECM (Entity in Charge of Maintenance) of the wagon keeper is responsible for the maintenance. If the SWS-PowerBox® is transported on a carrier wagon, the weight of the SWS-PowerBox® must be added to the load in the freight documents. For weight distribution, see loading method diagram.

How is the SWS-PowerBox® installed on the container wagon? Can it be easily dismantled again?

- Via 2 adapter plates bolted to the trolley frame with container pins and secured with 4 safety bolts. The SWS-PowerBox® can be removed at any time. The adapter plates bolted to the trolley frame remain on the trolley.

Do the mounted adapter plates or the SWS-PowerBox® itself influence the regular operation of the container carrier?

- No, the mounted adapter plates or an attached SWS PowerBox® do not affect regular operation. The container wagon can still be loaded with all container dimensions designed for it.

What are the training requirements for the first operation?

- The operation is simple and does not require any special knowledge or skills. A detailed instruction is carried out when the product is first accepted.
We would be happy to provide you with our expertise in planning your training needs upon request.
- All necessary instructions for a smooth operation are documented and can be taken from the manual. A simple instruction manual is attached to the inside of the service door.



MAINTENANCE AND SERVICING

Within which intervals must the SWS-PowerBox® be maintained?

- The manufacturer recommends 6 years after the first commissioning (electronics, hydraulics) and thereafter every 3 years. A three-year cycle is recommended to keep the battery at full capacity.

What is the battery capacity after several years of use? How can you ensure that a maximum battery capacity of 100% is always available?

- With regular use, the battery capacity is approx. 90% (after 2,000 charging cycles²) of the original capacity after 8 years. The service interval ensures that weak battery elements are replaced when necessary and that complete performance is available even after several years.
- Remote monitoring keeps you constantly informed about the current battery status.

What requirements or certificates must an authorised workshop fulfil in order to be able to carry out the installation and maintenance of the SWS-PowerBox®?

- For the installation of the hydraulic pump on the wheel set, the ECM-certified workshop must have a release permit (VPI / VERS) for this work. The remaining assembly of the SWS-PowerBox® does not require any special certification and can be carried out by an appropriate skilled staff after brief instruction. The instructions for assembly and maintenance are described in detail in the SWS-PowerBox® manual.

SECURITY

Is the SWS-PowerBox® or the batteries themselves flammable or explosive? Do certain safety regulations have to be observed?

- No, no specific safety precautions have to be fulfilled. A documented safety concept is available and the SWS-PowerBox® complies with the applied standards: EMC 50121-3-2, EN 50125-1, EN 45545-5, EN 50155, EN 50153 and ERA/ERTMS/033281 with section: 3.1.3.5.
- Special high performance lithium iron phosphate (LFP) batteries are used, these are not flammable or explosive.

Does the hydraulic system of the axle generator, the amount of oil carried have special safety requirements? Is it a hazardous material?

- No, there is no danger or special safety requirements. The quantity of oil carried is a small quantity of 25 litres. The hydraulic oil is biodegradable and flame retardant.
- A documented safety concept is available and the SWS-PowerBox® complies with all safety-relevant standards.

How stable is the SWS-PowerBox® against external damage due to the risks involved in loading and unloading containers? Can components of the box be easily replaced and repaired?

- Damage in intermodal transport is not an exception, and it was considered in the design and construction of the SWS-PowerBox®. This is made of a robust steel frame that is attached to the container wagon by adapter plates. If the outside cladding is damaged, it can be changed in pieces. Additionally, warning lights are fitted to ensure visibility during loading and unloading.. As standard, we recommend to our customers that the SWS-PowerBox® is painted in an appropriate signal colour.

² One charge cycle = one complete charge and one complete discharge of capacity (100% DOD = Depth of Discharge).



MONITORING

Is monitoring included in the basic version?

- Standard real-time monitoring for operational and functional control, as well as system monitoring, is included in the SWS-PowerBox® system. The SWS-PowerBox® cockpit can be accessed via a URL or QR code to, among other things, query information about the operating status or battery charge status.
- To transfer the data, a cellular router with a SIM card slot is installed. In the nations where the route network is used, a SIM card with a data plan is necessary. SWS GmbH can optionally include the SIM card solution. Data transmission can be linked into customer monitoring systems or fleet solutions by using a defined interface.

For further information and questions about the operation and technology of the SWS-PowerBox® contact:

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