

Sprinter P



Operating Instruction 42510 Maintenance-free lead acid batteries

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Nominal data:

- Nominal voltage U_N : 2.0 V x number of cells
- Nominal capacity $C_N = C_{10}$: 10h discharge (see type plate on monoblocs and technical data in these instructions)
- Nominal discharge current $I_N = I_{10}$: $C_N / 10$ h
- Final discharge voltage U_S : see technical data in these instructions
- Nominal temperature T_N : 25° C

Assembly by: _____ EXIDE Technologies order no.: _____ date: _____
 Commissioned by: _____ date: _____
 Safety signs attached by: _____ date: _____

	• Observe these instructions and keep them located nearby the battery for future reference. Work on the battery should only be carried out by qualified personnel.
	• Do not smoke. Do not use any naked flame or other sources of ignition. Risk of explosion and fire.
	• While working on batteries wear protective eye-glasses and clothing. Observe the accident prevention rules as well as EN 50272-2, DIN VDE 0510, VDE 0105 Part 1.
	• Any acid splashes on the skin or in the eyes must be flushed with plenty of clean water immediately. Then seek medical assistance. Spillages on clothing should be rinsed out with water.
	• Explosion and fire hazard, avoid shortcircuits. • Caution! Metal parts of the battery are always alive, therefore do not place items or tools on the battery.
	• Electrolyte is strongly corrosive. In normal working conditions the contact with electrolyte is impossible. If the housing is damaged the exposed fixed electrolyte is as corrosive as liquid electrolyte.
	• Batteries/cells are heavy. Always use suitable handling equipment for transportation. • Handle with care because monoblocs are sensitive to mechanical shock.
	• Keep children away from batteries.

Non-compliance with operating instructions, repairs made with other than original parts, or repairs made without authorization (e. g. opening of valves) render the warranty void.

	Disposal of Batteries Batteries marked with the recycling symbol should be processed via a recognised recycling agency. By agreement, they might be returned to the manufacturer. Batteries must not be mixed with domestic or industrial waste.
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Valve regulated lead acid batteries do not require topping up with water. Pressure valves are used for sealing and cannot be opened without destruction.

1. Start up

Check all monoblocs for mechanical damage, correct polarity and firmly seated connectors. The following torques apply for screw connectors:

M 6	M 8
6 Nm ± 1	8 Nm ± 1

Before installation the supplied rubber covers shall be fitted to both ends of the connector cables (pole covers). Connect the battery with the correct polarity to the charger (pos. pole to pos. terminal). The charger should not be switched on during this process, the load should not be connected. Switch on charger and start charging following instruction item 2.2 .

2. Operation

For the installation and operation of this battery DIN VDE 0510, part 1 (draft) and EN 50272-2 is mandatory. In addition according to the usage table 1 is to be applied.

Usage	DIN VDE
Stationary batteries	EN 50272-2
Traction batteries in electric vehicles	0510 part 3
Starter batteries in automobiles	0510 part 4
Onboard batteries in boats, trains and ground vehicles	0510 part 5
Airplanebatteries	0510 part 6
Equipment-batteries	0510 part 7

Table 1

2.1 Discharge

Discharge must not be continued below the voltage recommended for the discharge time. Deeper discharges must be carried out unless specifically agreed with the manufacturer. Recharge immediately following complete or partial discharge.

With battery operation in electrical vehicle applications avoid a discharge beyond 60% of the nominal capacity for the benefit of an optimum of lifetime. Discharge beyond 60% of the nominal capacity for this application are **deep discharges** and shorten the lifetime of the battery. Therefore only by the battery manufacturer recommended charge-condition meters must be used.

2.2 Charging

Applicable is the charging procedure with their limit values according to DIN 41773 (IU-characteristic) or WU-characteristic with a limit value only for the constant voltage-characteristic. According to the charging equipment, specification and characteristics alternating currents flow through the battery superimposing onto the direct current during charging operation. These alternating current and the reaction from the loads may lead to an additional temperature increase of the battery, and strain the electrodes with possible damages (see 2.5) which can shorten the battery life. Depending on the installation charging may be carried out in following operations:

a) Standby parallel operation and buffer operation

Here the load, direct current source and battery are continuously in parallel. Thereby the charging voltage is the operation-voltage and at the same time the battery-installation voltage. With the standby parallel operation the direct current source is at any time capable of supplying the maximum load current and the battery charging current. The battery only supplies current when the direct current source fails. The charging voltage should be set at 2.27 Vpc (Volt per cell) ± 1% x number of cells measured at the terminals of the battery. To reduce the charging time boost charging stage can be applied in which charging voltage of up to 2.35 Vpc ± 1% x number of cells can be used (standby-parallel operation with boost recharging stage). Automatic change over to 2.27 Vpc ± 1% x number of cells should be applied.

b.) Buffer operation

With the buffer operation the direct current source is not able to supply the maximum load current at all times. The load-current intermittently exceeds the nominal current of the battery charger. During this period the battery supplies power. The battery is not fully charged at all times. Therefore, depending on the load the charge voltage must be set at 2.27 Vpc ± 1% to 2.30 Vpc ± 1% x number of cells. This has to be carried out in accordance with the manufacturers instructions.

c) Switchmode operation

When charging, the battery is separated from the load. The charge-voltage of the battery is max. 2.30 Vpc ± 1%. The charging process must be monitored. If the charge-current sinks below 1.5 A/100 Ah with 2.30 Vpc ± 1%, the mode switches to float-charge acc. to point 2.3 respectively it switches after reaching 2.30 Vpc.

d) Battery operation (charge-/discharge operation)

The load is only supplied by the battery. The charging process depends on the application and must be carried out in accordance with the recommendations of the battery-manufacturer.

2.3 Maintaining the full charge

(float charge)

Devices complying with the stipulations under DIN 41773 must be used. They are to be set so that the average cell voltage at 25° C is 2.27 Vpc ± 1%.

2.4 Equalizing charge

Equalizing charges are required after exhaustive discharges and/or inadequate charges. They have to be carried out as follows: Up to 48 hours at max. 2.30 Vpc. The charge current must not exceed 20A/100Ah nominal capacity.

The monobloc temperature must never exceed 45° C. If it does, stop charging or revert to float charge to allow the temperature to drop.

2.5 Alternating currents

On recharging up to 2.30 Vpc under operation modes 2.2 the actual value of the alternating current is occasionally permitted to reach

10A (RMS) / 100Ah nominal capacity. In a fully charged state during float charge or standby parallel operation the actual value of the alternating current must not exceed 5A (RMS) / 100Ah nominal capacity.

2.6 Charging currents

The charging currents are not limited during standby parallel operation or buffer operation without recharging stage. The charging current should range between 5A to 30A / 100Ah nominal capacity. (guide values).

2.7 Temperature

The recommended operation temperature range for lead acid batteries is 10° C to 30° C

(best 20° C ± 5 K).

Higher temperatures will seriously reduce the service life. Lower temperatures reduce the available capacity. The absolute maximum temperature is 55° C and should not exceed 45° C in service.

2.8 Temperature-related charge voltage

A temperature related adjustment of the charge voltage within the operating temperature of 15° C to 25° C is not necessary. Is the operating temperature constantly outside this range the charge voltage has to be adjusted as follows:

Temperature [°C]	Boost charge voltage [Vpc]	Float voltage [Vpc]
-10	2.43	2.35
0	2.43	2.35
10	2.40	2.32
25	2.35	2.27
30	2.33	2.25
40	2.30	2.22

The temperature correction factor is 0.005 Vpc x K.

2.9 Electrolyte

The electrolyte is diluted sulphuric acid and fixed in a glass mat.

3. Battery maintenance and control

Keep the battery clean and dry to avoid creeping current. Plastic parts of the battery, especially containers, must be cleaned with pure water without additives.

At least every 6 month measure and record:

- Battery voltage
 - Voltage of several monoblocs
 - Surface temperature of several monoblocs
 - Battery-room temperature
- If the cell voltage differs from the average float-charge voltage by more than +0.2 V respectively -0.1 V or if the surface temperature difference between monoblocs is exceeding 5 K, the service agent should be contacted.

In addition, annual measurement and recording:

- Voltage of all monoblocs
- Surface temperature of all monoblocs
- Battery-room temperature
- Insulation-resistance according to DIN 43539 part 1

Annual visual check:

- Screw-connections
- Screw-connections without locking devices have to be checked for tightness
- Battery installation and arrangement
- Ventilation

4. Tests

Tests have to be carried out according to IEC 896-2, DIN 43539 part 1 and 100 (draft). Special instructions like DIN VDE 0107 and DIN VDE 0108 have to be observed.

To assure the reliability of the current source the complete battery should be replaced after the end of the expected design life. This should be done under consideration of the application and the temperatures.

Capacity test

Capacity test (for instance, acceptance test on site): In order to make sure the battery is fully charged, the following IU-charge methods can be applied: Option 1: 2.27 Vpc, ≥ 48 hours.

Option 2: 2.30 Vpc, ≥ 16 hours (max. 48 hours) followed by 2.27 Vpc, ≥ 8 hours.

The current available to the battery must be between 10A /100 Ah (max. 20A/100Ah) of the nominal capacity.

5. Faults

Call the service agent immediately if faults in the battery or the charging unit are found.

Recorded data as described in item 3. must be made available to the service agent. It is recommended that a service contract is taken out with your agent.

6. Storage and taking out of operation

To store or decommission monoblocs for a longer period of time they should be fully charged and stored in a dry and frost-free room, away from direct sun light. To avoid damage the following charging-methods can be chosen:

1. Annual equalizing-charge acc. to 2.4. In average ambient temperatures of more than 20° C shorter intervals may be necessary.
2. Float charging as detailed in 2.3.

7. Transport

All monoblocs are to be transported in an upright position. To avoid short circuits the terminals have to be fully insulated.

Batteries without any visible damages are not defined as dangerous goods if they are protected against short circuit, slipping, upsetting or damaging and packed in upright, proper and secure condition onto pallets. In case of damaged battery containers refer to national regulations (dangerous goods).

8. Technical data

The battery is especially designed for high rate discharges. Further details depending on the discharge time and cut off voltage must be taken from the actual product brochure.

All technical data are produced for a nominal temperature of 25° C.

Type	Voltage [V]	Power 15' 1.60 V/cell @ 25° C [W]	Capacity C10 1.80V/cell @ 25° C [Ah]
P12V570	12	570	21
P12V600	12	600	24
P12V875	12	875	41
P12V1220	12	1220	51
P12V1575	12	1575	61
P12V2130	12	2130	86
P 6V1700	6	1700	122
P 6V2030	6	2030	178



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