56029045

Sonnenschein SOLAR, SOLAR BLOCK, A 600 SOLAR
Operating Instruction
Stationary valve regulated lead acid batteries

Nominal data

- Nominal voltage U_N : 2.0 V x number of cells
- Nominal capacity $C_N = C_{100}$: 100h discharge (see type plate on cells/blocs and technical data in these instructions)
- Nominal discharge current $I_N = I_{100}$: $I_{100} = C_{100} / 100h$
- Final discharge voltage U_f : see technical data in these instructions
- Nominal temperature T_N : 20° C

Assembly by: _____ EXIDE Technologies order no.: _____ date: _____

Commissioned by: _____ date: _____

Security signs attached by: _____ date: _____

- Observe these Instructions and keep them located near the battery for future reference.
- Work on the battery should be carried out by qualified personnel only.

- 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, EN 50110-1.

- Any acid splashes on the skin or in the eyes must be flushed with plenty of clean water immediately. Then seek for medical assistance. Spillages on clothing should be rinsed out of water!

- Explosion and fire hazard, avoid short circuits.

- Electrolyte is very corrosive. In normal working conditions the contact with the electolyte is impossible. If the cell/bloc container is damaged do not touch the exposed electrolyte because it is corrosive.

- Cells are heavy! Always use suitable handling equipment for transportation! Handle with care because cells are sensitive to mechanical shock.

- Caution! Metal parts of the battery are always alive, therefore do not place items or tools on the battery.

Non-compliance with operating instructions, installations or repairs made with other than original accessories and spare parts or with accessories and spare parts not recommended by the battery manufacturer or repairs made without authorization (e. g. opening of valves) render the warranty void.

Spent batteries have to be collected and recycled separately from normal household wastes (EWC 160601). The handling of spent batteries is described in the EU Battery Directive (2006/66/EC) and their national transitions (UK: HS Regulation 1994 No. 232, Ireland: Statory Instrument No. 73/2000). Contact your supplier to agree upon the recollection and recycling of your spent batteries or contact a local and authorized Waste Management Company.

Stationary valve regulated lead acid batteries do not require topping-up water. Pressure valves are used for sealing and can not be opened without destruction.

1. Start Up

Check all cells/blocs for mechanical damage, correct polarity and firmly seated connectors. Apply the following torques for screw connectors:

G 5	G 6	A	M 8
5 ± 1 Nm	6 ± 1 Nm	8 ± 1 Nm	20 ± 1 Nm

Rubber covers shall be fitted to both ends of the connector cables (pole covers) before installation.

Control of insulation resistance:
New batteries: > 1M Ω
Used batteries: > 100 Ω/Volt.

Connect the battery with the correct polarity to the charger (pos. pole to pos. terminal). The charger must not be switched on during this process, and the load must not be connected. Switch on charger and start charging following item 2.2.

2. Operation

For the installation and operation of stationary batteries EN 50 272-2 is mandatory.

Battery installation should be made such that temperature differences between individual cells/blocs do not exceed 3 degrees Celsius (Kelvin).

2.1 Discharge

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

2.2 Charging

All charging must be carried out acc. to DIN 41773 (IU-characteristic).

Recommended charge voltages for cyclical application: See fig. 1 and item 2.8.

According to the charging equipment, specification and characteristics alternating currents flow through the battery superimposing onto the direct current during charge operation.
Alternating currents 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.

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 is as follows (within temperature range 15 to 35° C):

SOLAR, SOLAR BLOCK:	2.30 Vpc ± 1%
A 600 SOLAR:	2.25 Vpc ± 1%

2.4 Equalizing charge

Because it is possible to exceed the permitted load voltages, appropriate measures must be taken, e.g. switch off the load. Equalizing charges are required after deep discharges and/or inadequate charges. They can be carried out as follows: Up to 48 hours at max. 2.40 Vpc and with unlimited current. The cell/bloc temperature must never exceed 45° C. If it does, stop charging or revert to float charge to allow the temperature to drop.

For system voltages ≥ 48 V every one to three months:

Method 1: IUI

I-phase = up to voltage acc. to fig.1 at 20° C
U-phase = until switching at a current of 1.2 A/100Ah to the second I-phase
I-phase = 1.2 A/100Ah for 4 hours

Method 2: IUI pulse

I-phase = up to voltage acc. to fig. 1 at 20° C
U-phase = until switching at a current of 1.2 A/100 Ah to the second I-phase (pulsed)
I-phase = charging of 2 A/100 Ah for 4-6 hours where the pulses are 15 min. 2 A/100 Ah and 15 min. 0 A/100 Ah.

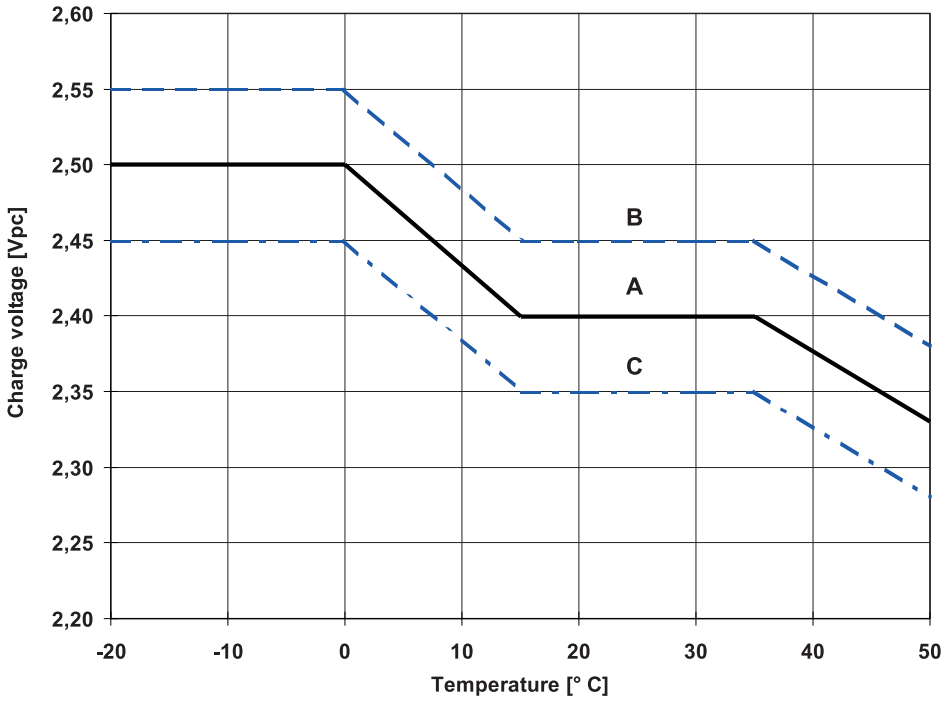

Fig. 1: Charge voltage vs. temperature for solar mode. Charge modes:
1) With switch regulator (two-step controller): Charge on curve B (max. charge voltage) for max. 2hrs per day, then switch over to continuous charge – Curve C
2) Standard charge (without switching) – Curve A
3) Boost charge (Equalizing charge with external generator): Charge on curve B for max. 5hrs per month, then switch over to curve C.

2.5 Alternating currents
When recharging acc. to fig.1 the actual value of the alternating current is occasionally permitted to reach 10 A (RMS)/ 100 Ah nominal capacity. In a fully charged state during float charge the actual value of the alternating current must not exceed 5 A (RMS)/ 100 Ah nominal capacity.

2.6 Charging currents
The charging current should range between 10 A to 35 A / 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 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
The temperature related adjustment has to be carried out acc. to fig. 1. An adjustment of the charge voltage must not be applied within a temperature range 15° C to 35° C.

2.9 Electrolyte
The electrolyte is diluted sulphuric acid and fixed in a gel.

3. Battery maintenance and control
Keep the battery clean and dry to avoid leakage currents. Plastic parts of the battery, especially containers, must be cleaned with pure water without additives.

At least every 6 months measure and record:
– Battery voltage
– Voltage of several blocs/cells
– Surface temperature of several blocs/cells
– Battery-room temperature

If the bloc/cell voltages differ from the average float charge voltage by values more than specified in the following table or if the surface temperature difference between blocs/cells exceeds 5 K, the service agent should be contacted.

Type	Upper value	Lower value
2 V cells	+0.2	-0.1
6 V blocs	+0.35	-0.17
12 V-blocs	+0.48	-0.24

In addition, annual measurements and recording:
– Voltage of all blocs/cells
– Surface temperature of all blocs/cells
– Battery-room temperature

Annual visual checks:
– Screw connections
– Screw connections without locking device have to be checked for tightness.
– Battery installation and arrangement
– Ventilation

4. Tests
Tests have to be carried out according to IEC 60896-21, DIN 43539 part 1 and 100 (draft).

Capacity test, for instance, acceptance test on site: In order to make sure the battery is fully charged the following IU-charge methods must be applied: Option 1: float charge (see item 2.3), ≥ 72 hours. Option 2: 2.40 Vpc, ≥ 16 hours (max. 48 hours) followed by float charge (see item 2.3), ≥ 8 hours. The current available to the battery must be between 10 A/100 Ah and 35 A/100Ah of the nominal capacity

5. Faults
Call the service agents 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 cells for a longer Period of time they should be fully charged and stored in a dry and cold but frost-free room, away from direct sun light. To avoid damage the following charging methods can be chosen:

1. Maximum storage time is 17 months at ≤ 20° C. Equalizing charges will be required at higher temperatures, for instance, after 8.5 months at 30° C.
2. Float charging as detailed in 2.3.

7. Transport
Cells/bloc batteries must be transported in an upright position. Batteries without any visible damage are not defined as dangerous goods under the regulations for transport of dangerous goods by road (ADR) or by railway (RID). They must be protected against short circuits, slipping, upsetting or damaging. Cells/bloc batteries may be suitable stacked and secured on pallets (ADR and RID, special provision 598). It is prohibited to staple pallets.
No dangerous traces of acid shall be found on the exteriors of the packing unit.
Cells/bloc batteries whose containers leak or are damaged must be packed and transported as class 8 dangerous goods under UN no. 2794.

8. Technical data:

Capacities at different discharge times and final discharge voltage.
All technical data refer to 20° C.

8.1 Sonnenschein SOLAR

Discharge time	1 h	5 h	10 h	20 h	100 h
Capacity	C_1 [Ah]	C_5 [Ah]	C_{10} [Ah]	C_{20} [Ah]	C_{100} [Ah]
S 12 / 6.6 S	2.9	4.6	5.1	5.7	6.6
S 12 / 17 G5	9.3	12.6	14.3	15	17
S 12 / 27 G5	15	22.1	23.5	24	27
S 12 / 32 G6	16.9	24.4	27	28	32
S 12 / 41 A	21	30.6	34	38	41
S 12 / 60 A	30	42.5	47.5	50	60
S 12 / 85 A	55	68.5	74	76	85
S 12 / 90 A	50.5	72	78	84	90
S 12 / 130 A	66	93.5	104.5	110	130
S 12 / 230 A	120	170	190	200	230
U_f (cell)	1.7 Vpc	1.7 Vpc	1.7 Vpc	1.75 Vpc	1.80 Vpc

8.2 Sonnenschein SOLAR BLOCK

Discharge time	1 h	5 h	10 h	20 h	100 h
Capacity	C_1 [Ah]	C_5 [Ah]	C_{10} [Ah]	C_{20} [Ah]	C_{100} [Ah]
SB 12 / 60	34	45	52	56	60
SB 12 / 75	48	60	66	70	75
SB 12 / 100	57	84	89	90	100
SB 12 / 130	78	101	105	116	130
SB 12 / 185	103	150	155	165	185
SB 06 / 200	104	153	162	180	200
SB 06 / 330	150	235	260	280	330
U_f (cell)	1.7 Vpc	1.7 Vpc	1.7 Vpc	1.75 Vpc	1.80 Vpc

8.3 Sonnenschein A 600 SOLAR

Discharge time	1 h	3 h	5 h	10 h	100 h
Capacity	C_1 [Ah]	C_3 [Ah]	C_5 [Ah]	C_{10} [Ah]	C_{100} [Ah]
4 OPzV 240	123.6	167.4	193.5	218.0	290.0
5 OPzV 300	154.5	209.4	241.5	272.0	360.0
6 OPzV 360	185.4	251.4	290.0	326.0	430.0
5 OPzV 400	229.5	307.8	342.0	380.0	510.0
6 OPzV 500	275.4	369.6	410.5	456.0	610.0
7 OPzV 600	321.3	431.1	479.0	532.0	710.0
6 OPzV 720	367.3	513.6	626.0	681.0	830.0
8 OPzV 960	489.8	684.6	834.5	908.0	1110
10 OPzV 1200	612.2	855.9	1043	1135	1380
12 OPzV 1400	734.7	1026	1252	1363	1660
12 OpzV 1700	785.7	1161	1336	1519	1910
16 OPzV 2300	1047	1548	1782	2025	2550
20 OPzV 2900	1309	1935	2228	2532	3180
24 OPzV 3500	1571	2322	2673	3038	3820
U_f (cell)	1.67 Vpc	1.75 Vpc	1.77 Vpc	1.80 Vpc	1.85 Vpc

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