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# Sonnenschein A 700

## Operating Instruction 31700

### Stationary valve regulated lead acid batteries

#### 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 cells or monoblocs and technical data in these instructions)
- Nominal discharge current  $I_N = I_{10}$  :  $I_{10} = C_N / 10h$
- 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: \_\_\_\_\_

Safety 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 50 272-2, 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 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 contact with the electrolyte is impossible. If the cell or monobloc container is damaged do not touch the exposed electrolyte because it is corrosive.



- Bloc batteries are heavy! Always use suitable handling equipment for transportation! Handle with care because blocs are sensitive to mechanical shock!



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



- 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 may be returned to the manufacturer. Batteries must not be mixed with domestic or industrial waste.

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 monoblocs or cells for mechanical damage, correct polarity and firmly seated connectors. The following torque values apply for screw connectors:

M 5	M 8
(6 ± 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 DIN VDE 0510, part 1 (draft) and EN 50 272-2 is mandatory.

Battery installation should be made such that temperature differences between individual units 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). 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. Depending on the installation, charging (acc. to DIN VDE 0510 part 1, draft) may be carried out in following operations.

##### a) Standby Parallel Operation

Here the load, battery and battery charger 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 battery charger is capable, at any time, of supplying the maximum load current and the battery charging current. The battery only supplies current when the battery charger fails. The charging voltage should be set at 2.25 Vpc (Volts per cell) ± 1% x number of cells measured at the terminals of the battery. To reduce the charging time, a boost-charging stage can be applied in which the charging voltage of 2.33 - 2.40 Vpc ± 1% x number of cells can be adjusted (standby-parallel operation with boost recharging stage). Automatic change over to 2.25 Vpc ± 1% x number of cells should be applied.

##### b) Buffer Operation

With buffer operation, the battery charger 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. This results in the battery not fully charged at all times. Therefore, depending on the load the charge voltage must be set at (2.27 - 2.30) Vpc ± 1% x number of cells. This has to be carried out in accordance with the manufacturer instructions.

##### c) Switchmode-Operation

When charging, the battery is separated from the load. The charge-voltage of the battery is max. 2.35 Vpc ± 1%. The charging process must be monitored. If the charge-current reduces to less than 1.5 A/100 Ah with 2.35 Vpc ± 1%, the mode switches to float-charge acc. to item 2.3 (switches after reaching 2.35 Vpc ± 1%).

#### 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 is 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 have to be carried out as follows: Up to 48 hours at max. 2.4 Vpc. The charge current must not exceed 35 A/100 Ah nominal capacity. The cell or 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

When recharging up to 2.4 Vpc under operation modes 2.2 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 or standby parallel operation the actual value of the alternating current must not exceed 5 A(RMS)/100 Ah 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 10 A to 35 A / 100 Ah 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

A temperature related adjustment of the charge voltage within the operating temperature of 15° C to 25° C is not necessary. If the operating temperature is constantly outside this range, the charge voltage has to be adjusted. The following temperature related charge voltages must be used during float charge:

Battery temperature °C	Charge voltage [Vpc]
-10	2.35
0	2.35
10	2.28
20	2.25
35	2.25
40	2.23

#### 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 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 or cells
- Surface temperature of several monoblocs or cells
- Battery-room temperature

If the voltages differs from the average float charge voltage by more than +0,2 V respectively -0,1 V (blocs see table)

blocs	upper	lower
4V	+0.282	-0.141
6V	+0.346	-0.261

or if the surface temperature difference between monoblocs or cells exceeds 5 K, the service agent should be contacted.

#### In Addition, annual measurement and recording:

- Voltage of all monoblocs or cells
- Surface temperature of all monoblocs or cells
- 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.

#### 8. Technical data

##### 8.1 Capacities at different discharge times until the final discharge voltage at 20° C Stationary lead acid batteries A 700 with pos. and neg. grid plates.

discharge time	10 min	30 min	1 h	3 h	5 h	10 h
capacity	C <sub>1/6</sub>	C <sub>1/2</sub>	C <sub>1</sub>	C <sub>3</sub>	C <sub>5</sub>	C <sub>N</sub> /C <sub>10</sub>
	Ah	Ah	Ah	Ah	Ah	Ah
A706/21	7.1	10.3	12.2	16.5	19.0	21.0
A706/42	14.2	20.5	24.4	33.0	38.0	42.0
A706/63	21.3	30.8	36.6	49.5	57.0	63.0
A706/84	28.3	41.0	48.8	66.0	76.5	84.0
A706/105	35.4	51.3	61.0	82.8	95.5	105.0
A706/126	42.5	61.5	73.2	99.3	114.5	126.0
A706/140	42.3	69.5	85.3	117.0	131.0	140.0
A706/175	52.9	86.9	106.6	146.4	163.5	175.0
A706/210	63.5	104.3	128.0	175.5	196.0	210.0
A704/245	74.1	121.7	149.3	204.9	229.0	245.0
A704/280	84.6	139.0	170.6	234.0	261.5	280.0
A702/400	119.7	202.5	244.0	331.8	350.5	400.0
A702/500	143.0	255.0	304.0	405.6	432.0	500.0
A702/600	156.2	281.5	344.0	453.9	492.5	600.0
A702/700	172.0	348.0	441.0	588.3	641.5	700.0
A702/980	245.3	482.0	615.0	832.2	909.5	980.0
A702/1190	274.0	536.5	692.0	933.0	1025.0	1190.0
A702/1470	315.8	687.5	838.0	1160.4	1216.0	1470.0
	V	V	V	V	V	V
Uend cell	1.6	1.6	1.65	1.7	1.7	1.8
Uend 4 V bloc	3.2	3.2	3.3	3.4	3.4	3.6
Uend 6 V bloc	4.8	4.8	4.95	5.1	5.1	5.4

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