

ASTERION SEALED LEAD ACID BATTERIES WITH REGULATING VALVES



BATTERY PASSPORT AND OPERATING MANUAL

Please read this manual carefully before starting work and keep it for future reference. Failure to follow the instructions or warnings in this document could result in system failure, electric shock, serious injury, or death.

This manual may be subject to changes without prior notice due to product improvements or technical updates. The latest version of the manual can be found on the website www.asterion-batt.com.tr and www.asterion-batt.com.tr.

1. INTRODUCTION

Sealed batteries do not require topping up the distillate throughout the entire service life. Sealing of batteries is carried out by using a valve that relieves excess gas pressure in the battery to prevent deformation of the battery. Opening the lid and sealing valve is strictly forbidden, and leads to damage to the battery.

Rated battery voltage:

$$U_{nom} = U \times m$$

where U=2 V/cell – voltage each battery cell; m – number of series connected cells, are included in the battery. The rated voltage is marked on the battery case.

Rated battery discharge current:

$$I_{nom} = \frac{C_{nom}}{t}$$

где I_{nom} – rated battery discharge current, A; C_{nom} – rated battery capacity, A*h; t – discharge duration, h.

2. SAFETY REQUIREMENTS

This manual uses the following symbols to highlight important information on potential hazards and safety notes.

This symbol indicates important safety notes failure to follow which may result in serious injury or death.

This symbol indicates important safety notes failure to follow which may result in injury or equipment malfunction.

This symbol marks the operation notes.

General safety requirements must be observed according to the standards of IEC 62485-1:2015 during installing and operating batteries.

Lead-acid battery installation, operation and maintenance require corresponding level of technical competence. Any work with the equipment shall be performed only by qualified personnel having adequate permit level.

If the instructions and operating procedures outlined in this manual are followed, the lead-acid battery will not pose a risk to human health.

It is safe for personnel to remain in the same area as batteries at all times, provided the measures outlined in this manual are followed.

Follow the instructions of this manual in order to exclude any mistakes or the equipment malfunction.

Battery shall be used for intended purpose. Do not dismantle or modify the device.

In order to prevent explosive and fire hazards, it is strictly prohibited to use open flames, welding or sparking near the battery.

Batteries are always live. Do not place tools or foreign objects on the battery. Avoid short circuit.

It is strictly prohibited to connect the positive and negative terminals of the battery, as this may result in a short circuit and damage to the battery.

Before beginning any work, please remove wristwatches, rings, and other items that may contain conductive materials.

Wear protection equipment such as steel-toe boots with non-slipping soles, gloves and safety glasses.

To reduce the risk of electric shock, short circuit and injury, use electrical insulation of at least 1,000V during the equipment installation.

Electrolyte – an aqueous solution of sulfuric acid – an aggressive substance! In normal use, contact with electrolyte is excluded. When the case is destroyed, the possibility of leakage of electrolyte. Using damaged batteries is strictly prohibited!

If acid gets into eyes or skin, rinse with plenty of water and seek medical attention immediately. Acid-contaminated clothing should be washed immediately with plenty of water.

Batteries have significant weight. Ensure proper battery placement during installation and operation. Do not put on the edge. To avoid the falls and shock battery. For transportation use only the means intended for this.

3. COMMISSIONING

During installation, batteries must be installed with a temperature gap of 10-20 mm. In the absence of a temperature gap, local overheating of the batteries is possible, which can lead to their failure.

Before commissioning, it is necessary to check all batteries/ group of batteries for mechanical damage, for the correct polarity of the connection and the strength of fastening of all threaded connections.

When operating a group of series-connected batteries, the difference between their temperatures in the group should not exceed 4 °C.

Table 1. Tightening torque for bolted connection.

Connection type	Tightening torque
M5,5/M6	8 Nm ± 1 Nm
M8	10 Nm ± 1 Nm
OPzS, OPzV	12 Nm ± 1 Nm

Protective caps must be installed on the boron.

With the charger turned off and the consumer disconnected, connect the battery to the rectifier equipment according to the polarity. Turn on the charger and charge the battery in accordance with section 4.2 and 4.4.

When commissioning a group of batteries, battery equalization must be carried out in accordance with section 4.3.

Remember that the combined use of old and new batteries, as well as batteries of different brands and series in the same circuit, can shorten the design life of the batteries. The warranty on the battery does not apply in this case, the failure of the batteries is considered as a non-warranty case.

4. OPERATION

When installing and operating batteries, the standards IEC 62485-2:2010 and the regional rules and regulations must be observed.

Battery operation is permissible in any position except turned upside down.

To avoid direct sunlight during operation.

When using the battery, it is necessary to charge it at least 1 time per day or after each use, even with a short idle time.

GEL series batteries must be operated in an upright position after topping up the electrolyte.

It is not allowed to operate the battery in malfunctioning equipment!

4.1. Discharge

The limiting value of the final discharging voltage depends on the discharge current. Do not discharge below a specified value for the final voltage. The battery should not be allowed to discharge more than the rated capacity.

By discharging the battery with low currents, you can get more energy than the nominal value. With such a discharge, the final discharging voltage should be higher. If you discharge the battery with low currents without adjusting the voltage, this can lead to a significant reduction in capacity and shortened battery life.



It is strictly forbidden to take energy more than the nominal value of the battery energy!



After a full or partial discharge, you must immediately begin to charge the battery. Storing a battery in a discharged state leads to its premature failure.



Remember that when discharged, the density of the electrolyte decreases. With a decrease in the density of the electrolyte, its freezing temperature rises. Do not store batteries at low temperatures.



4.2. Charge

Do not charge in a confined space to prevent disturbance of normal heat exchange with the environment. Overheating of the battery may cause it to swell.



When charging, batteries should not deviate from a vertical position in any direction by more than 90 °.



If the maximum temperature of the batteries exceeds 45 °C, the charge should be stopped or switched to the floating mode to reduce the temperature.



Depending on the type of equipment, a charge can be made under the following battery operating conditions:

a) Floating mode

b) Buffer mode

In these modes, consumers, DC power and battery are always connected in parallel. In this case, the charging voltage is simultaneously both the voltage of the battery and the voltage of the consumer equipment.

In floating mode, the DC source always provides maximum consumer current and battery power. The battery only supplies current when the DC source fails.

In the buffer mode, the direct current source cannot provide the return of the maximum load current from the consumers. The load current temporarily exceeds the rated power of the DC source. The battery takes over these temporary load maxima. This means that the battery does not have a constant full charge.

Floating/buffer charging voltage, measured at the battery terminals, is shown in Table 2.

Table 2.

Model	The voltage at the battery terminals, V/cell, at 20 °C	The voltage at the battery terminals, V/cell, at 25 °C
All models OPzS, OPzV	2.27	2.25
All models FT-M, FTS-X	2.30	2.27
All models DTM I, DTM L, HR, HR W, HRL X, HRL W, HW, GEL, GX, CGD, STC, GSC	2.30	2.27
All models DT, DTM	2.30	2.25

After an emergency activation and network recovery, the battery goes into charge mode. The charge values are shown in Table 3.

Table 3.

Model	Charging voltage V/cell, at 20 °C	Charging voltage V/cell, at 25 °C
All models OPzS, OPzV	2.40	2.37
All models FT-M, FTS-X	2.45	2.40
All models DTM I, DTM L, HR, HR W, HRL X, HRL W, HW, GEL, GX, CGD, STC, GSC	2.40	2.35
All models DT, DTM	2.47	2.45

c) Cyclic mode

When working in a cyclic mode, the consumer receives power only from the battery. This mode of operation depends on the characteristics of the operating modes of the system, charge/discharge modes and must be agreed with the manufacturer.



Before using the battery in cyclic mode, it must be fully charged!

If the batteries are used in a cyclic mode in a group of series-connected batteries, it is necessary to carry out either a battery equalization according the section 4.3 or charge each battery separately.

During cyclic mode operation in a group of several series-connected batteries, unbalance may occur over time, i.e. the battery will have a different voltage. To prevent this, it is recommended that once every three months, the open circuit voltage of each battery is checked after a full charge by disconnecting the batteries from the charger.

In this mode, the charging voltage should not exceed the values given in Table 4.

Table 4.

Model	Charging voltage in cyclic mode, V/cell, at 20°C	Charging voltage in cyclic mode, V/cell, at 25°C
All models OPzS, OPzV	2.40	2.37
All models FT-M, FTS-X	2.45	2.40
All models DTM I, DTM L, HR, HR W, HRL X, HRL W, HW, GEL, GX, CGD, STC, GSC	2.40	2.35
All models DT, DTM	2.47	2.45



Batteries cannot be discharged below 1.8 V/cell in cyclic mode.

4.3. Battery equalization

Due to possible deviations of the cell voltages from the median value of the operating voltage in the group, appropriate measures should be taken, for example, to carry out equalizing charge.

This charge mode is carried out after a deep discharge or after a chronic undercharging of the battery. The mode provides a charge with a constant voltage of no more than 2.4 V/cell for no longer than 48 hours.

In certain case battery equalization voltage can be more 2.4 V/cell.

For all models of the OPzV series, the battery equalization voltage is 2.35 V/cell. The battery equalization is completed if the consumption current remains unchanged for 2 hours. The charging current at the initial moment of time should not exceed a predetermined percentage (see Table 5) of C_{nom} (the current decreases over time).



If the maximum battery temperature exceeds 45 °C, the charge should be stopped or switched to the maintenance mode to reduce the temperature.

After a discharge in emergency mode, the batteries should be charged to the voltage of the buffer mode (see section 4.2). After reaching the voltage, apply a battery equalization according to clause 4.3. After equalization, the batteries are returned to normal operation.


4.4. Charging currents

When charging the battery, the currents should not be higher than the values indicated in Table 5.

Table 5

Model	Maximum charging current, % by C _{nom}
All models DT, DTM, DTM I, DTM L, HR, HR W, HRL X, HRL W, HW, FT M, FTS X, STC, CGD	30%
All models GEL, GX, GSC, OPzS, OPzV	20%
All models CGD	50-100%*

* Charging with currents from 50% to 100% is possible by monitoring of battery temperature up to 25°C.


 For all charge modes, the minimum charge current cannot be less than 10% of the rated capacity.


The recommended charging current value is optimal. A deviation to the lower side is allowed, while the value of the charging current should not be less than 10% of the nominal capacity. Exceeding of the maximum charging current leads to damage to the battery.

4.5. Operation temperature

The recommended operating temperature range of lead-acid batteries is 20-25 °C.

High temperatures (over 30 °C) significantly reduce battery life. Lower temperatures reduce the ratings (rated capacity, current and discharge time, etc.).

 It is strictly prohibited to operate batteries in the vicinity of open flames and heat sources.


 It is advisable to avoid battery operation at temperatures above 45 °C. Raising the temperature to +60 °C is unacceptable – this greatly reduces the service life. At a temperature of 60 °C irreversible destruction of the battery occurs!


Intensive operation and high energy consumption from the battery at ambient temperatures below 15 °C reduces the efficiency of the lead-acid battery. For example, when the operating temperature decreases by 5 °C, the distance covered by equipment, operating from the battery, may decrease by up to 50%.

When the battery is discharged, sulfuric acid is consumed, as a result, the density of the electrolyte decreases. The freezing temperature of the electrolyte in fully charged batteries is about -60 °C. As the battery discharges, the freezing temperature of the electrolyte increases: at a 70 percent level of battery charge, the freezing temperature will be about -25 °C.

A high degree of discharge reduces the density of the electrolyte. Any slight decrease in the electrolyte density at low temperatures will lead to the formation of centers of water crystallization (the formation of microcrystals of ice).

Freezing leads to the constructive death of the battery: even if the case remains intact, the plates are damaged under the influence of the formed ice. The battery fails, it is not a warranty case.

 Do not allow the battery to discharge during many hours at negative temperatures, this mode can be regarded as storage in an uncharged state at negative temperatures.

 When operating a group of series-connected batteries, the difference between their temperatures in the group should not exceed 4 °C.

4.6. Dependence of the charging voltage on temperature

To achieve maximum battery life, it is recommended to use chargers with temperature compensation function for charging voltage.

When the temperature changes from + 20 °C to + 25 °C, the use of temperature compensation of the charging voltage is optional.

If the temperature deviates above 25 °C, an adjustment of the charge voltage is required according to the formula:

$$U_1 = U_{25} + (25 - T_1) \times k$$

If the temperature deviates below 20 °C, an adjustment of the charge voltage is required according to the formula:

$$U_1 = U_{20} + (25 - T_1) \times k$$

Где U_1 – charging voltage with temperature compensation, V; U_{25} and U_{20} – charging voltage under standard temperature T_{25} and T_{20} respectively, °C; T_1 – measured temperature, °C; k – temperature correction factor, mV/°C/cell.


Temperature compensation of voltage is 5 mV/(cell x °C) for cyclic mode and 3.3 mV/(cell x °C) for other modes.

When batteries are operating as part of an automated system, temperature compensation is introduced when the temperature deviates from the values shown in Table 2 for each degree.

5. MAINTENANCE

To prevent surface leakage, the battery must be dry and clean. Battery cleaning should be carried out in compliance with safety precautions in accordance with IEC 62485-2:2010, as well as regional and departmental standards.

The plastic parts of the batteries, especially the case, must be cleaned of dust and dirt without the addition of cleaning agents.

 Do not allow water to enter the enclosure to prevent a short circuit.

At least 1 time in 3 months (when operating in floating modes), it is necessary to measure and record in the battery record book:

- voltage on the battery,
- voltage of individual battery/group of batteries,
- surface temperature of individual battery/group of batteries,
- temperature in the battery room.

If possible, conductivity measurements should be carried out regularly. Annually should be measured and recorded in the battery log:

- voltage of all individual battery/group of batteries,
- surface temperature of all individual battery/group of batteries,
- temperature of the room.

Visual inspection should be carried out annually:

- strength of the connection nodes (check threaded connections for a fixed fit),
- installation and placement of the battery,
- ventilation systems.

6. BATTERY CHARGING/DISCHARGING TEST (SDT)

Battery charging/discharging test is carried out in order to determine the residual capacity. SDT consists of five stages:

1. Discharging with nominal parameters (if the nominal capacity is specified at C10, then the discharge parameters will be as follows: 10-hour discharging current, cut-off voltage 1.8 V/cell);
2. Charging with battery equalization parameters (charging current 10-30% of the nominal capacity, charging voltage – 2.4 V/cell);
3. Pause (from 1 hour to 24 hours);
4. Discharging with nominal parameters (if the nominal capacity is specified at C10, then the discharge parameters will be as follows: 10-hour discharge current, discharge termination voltage 1.8 V / cell);
5. Charging with battery equalization parameters (charging current 10-30% of the nominal capacity, charging voltage – 2.4 V/cell).

The temperature of the DCT must correspond to the declared temperature of the battery. It is recommended to conduct DCT every six months, but at least once a year.

7. RECHARGING BATTERIES IN STORAGE

During storage, it is recommended to recharge batteries in accordance with Table 6.


 All charges carried out at normal temperature 20-25°C (see Tables 1-3).

Table 6.

Storage temperature	Period
30-40°C	Every 3 months
25-30°C	Every 6 months
20-25°C	Every 9 months
<20°C	Every 12 months

8. TESTS

Tests should be carried out in accordance with standard IEC 60896-21:2004.







9. TROUBLESHOOTING

If you detected a battery or charger malfunction, contact the supplier's service department. The supplier is not responsible for the consequences of the operation of a malfunction battery, as well as for the consequences of the operation of a serviceable battery in violation of the operating conditions. Records in the battery record book, according to section 5, will help to avoid many problems and facilitate troubleshooting.

10. BATTERY DECOMMISSIONING AND STORAGE

If the batteries are stored or decommissioned for a long time, they should be fully charged in a dry room at a temperature of +20 to +25 °C.

Batteries should be stored fully charged, on racks, in a vertical position, in a dry, cool, frost-free room at an ambient air temperature of +5°C to +20°C.

-  It is strictly prohibited to store batteries in a discharged state.
-  Never store batteries in a discharged state at sub-zero temperatures. The storage below the freezing point will damage batteries.
-  It is strictly prohibited to store batteries in the vicinity of open flames and heat sources.
-  To avoid direct sunlight during storage.
-  You have to charge batteries in storage periodically (see Table 5).
-  A maximum of two recharges are allowed during the storage period. Then it is recommended to use the battery in floating mode.

11. TRANSPORTATION

Sealed and undamaged batteries are not dangerous goods to shipped if they are securely protected against short-circuiting, rolling, tipping or damage and if there are no traces of acid on the casing.

Batteries must be suitably stacked and secured on pallets.

 It is important to take precautions during handling and transportation.

12. BATTERY DISPOSAL

A battery that has reached the end of its service life must be taken to a battery collection point for recycling.

13. NOTES

Battery testing and verification are allowed only in accordance with standard IEC 60896-21:2004. It is permissible to check the capacity and internal resistance of the battery with the help of devices only to control the uniformity of the batteries.

The value of capacity obtained as a result of «analyzers» or «express testers» cannot be accepted as a claim basis.

If an imbalance is detected, a battery equalization or a full charge of each battery should be performed separately as described in section 4.3.

There are special equalizing devices (purchased separately) by the supplier to ensure voltage uniformity of the batteries.


14. SERVICE LIFE

The design life of the battery is shown in Table 7, except for special series.

Table 7.

Model	Service life	Model	Service life
DT (up to 33 Ah including)	5 years	All models HR series (from 26 Ah)	12 years
DT (up to 120 Ah including)	7-10 years	All models HRL X series (up to 33 Ah including)	12 years
DT (from 150 Ah including)	10 years	All models HRL X series (from 33 Ah)	15 years
All models DTM series	8 years	All models HRL W series	15 years
All models DTM I, DTM L, FT M, GEL series	10-12 years	All models FTS X series	12 years
All models HR W series	10 years	All models GX, CGD series	15 years
All models HR series (up to 26 Ah including)	10 years	All models OPzS, OPzV, GSC, STC series	20 years

In cyclic mode, the service life is the number of cycles. For cyclic mode, the determining factor in the service life is the depth of discharge. Depending on the depth of discharge during cyclic mode, the number of cycles for batteries will be different.

 The depth of discharge is determined by the end-of-discharging voltage, discharging time and discharging current.

When the battery is in floating mode, the service time is the number of years. The main factors affecting battery life are: operating temperature (see section 4.5), temperature compensation (see section 4.6), absence of micro-cycling and timely maintenance (see section 5).

15. LCD DISPLAY (ONLY FOR GEL AND DTM SERIES WITH A CAPACITY OF OVER 33 Ah)

GEL and DTM I series batteries are equipped with an electronic chip and an LCD display that displays the battery status: voltage, capacity and number of days in operation. When the battery is low, an audible alarm is automatically triggered, warning the user about the need for maintenance.

The battery is supplied in an inactive form, the indication "E, F" flickers on the LCD display of the battery. In the inactive mode, the duration of operation is not displayed and there is no sound alert.

To activate the battery, press and hold the **PUSH** button for 10 seconds.

When the battery is activated, the "E, F" indication goes out and the days of operation are automatically counted. The number of days of operation is set to 1 and increases by one per day until it reaches the value of 1999. The countdown of the days of operation is irreversible.

The countdown of the days of operation starts automatically also in the following cases:







- The battery voltage is maintained above 13.5 V for 48 hours or more.
- Within 48 hours, the battery voltage first rises above 13.4 V, then drops below 12.8 V and rises again to values above 13.4 V.

The information on the LCD display is displayed in two modes:

- Charge level+voltage;
- Charge level+duration of operation (number of days).

To switch between modes, use the **PUSH** button on the battery case.

Table 8. LCD display indication.

Battery status		Description
Indication	Flicker	
	OFF	Charge level <10%
	OFF	30%< Charge level <60%
	OFF	60%< Charge level <90%
	OFF	Charge level <90%
	Flickering every second	The battery charge is approaching 0%. A charge of the battery is required.
	Flickering every second	The battery voltage is too high. The battery is overcharging.


16. TOPPING UP THE ELECTROLYTE (ONLY FOR GEL AND DTM I SERIES OVER 33 Ah)


To extend the battery life, the batteries of the GEL and DTM I series are equipped with containers with an additional solution of sulfuric acid (electrolyte density 1.20 g/ml) for topping up the electrolyte.


The service life of the battery until the moment of filling the additional solution depends on the intensity of operation and environmental conditions:

- When operating the battery in cyclic mode and at a temperature not exceeding 25 °C, it is recommended to top up the electrolyte after 400 days of operation.
- When operating a battery with a UPS in buffer mode without triggering and at a temperature no higher than 25 °C, it is recommended to top up the electrolyte after 600 days of operation.
- When using the battery in combined mode, it is recommended to top up the electrolyte after 500 days of operation.

In cases of exceeding the operating temperature (see section 4.5), topping up the solution may be required earlier than indicated above.

 Topping up the sulfuric acid solution can be done only once. Use only the solution that comes with the battery pack.

 When working with electrolyte, use protective equipment such as overalls, glasses, gloves and insulated shoes with non-slip soles.

 Work with the electrolyte is carried out in ventilated areas.

To top up the electrolyte, follow the instructions below:

Step 1. Remove the battery carrying handle.

Step 2. Insert a flat screwdriver into the side holes on the removable cover, lift and remove the cover (Figure 1).

Step 3. Pull out the container with the solution and remove the safety valves caps on the battery (Figure 2).

- GEL 12-33, GEL 12-45, GEL 12-55, GEL 12-75, GEL 12-85 models are equipped 2 containers of solution.
- GEL 12-65, GEL 12-100, GEL 12-120, GEL 12-150, GEL 12-200 models are equipped 6 containers of solution.
- DTM 1233 I, DTM 1240 I, DTM 1255 I, DTM 1275 I models are equipped with 2 containers of solution.
- DTM 1265 I, DTM 12100 I, DTM 12120 I, DTM 12150 I, DTM 12200 I; DTM 12250 I models are equipped with 6 containers with solution.

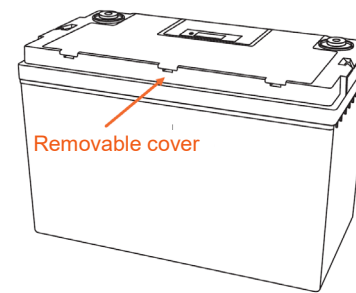


Figure 1.

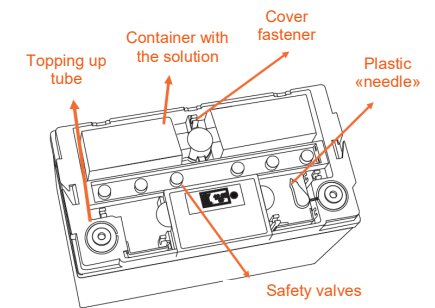



Figure 2.

Step 4. Pierce the protective membrane on the solution container with a needle and insert the topping up tube into the container (Figure 3).

Step 5. Carefully pour the solution into all the cells of the battery:

- For models GEL 12-33, GEL 12-45, GEL 12-55, GEL 12-75, GEL 12-85 in the ratio of one container per three cells (Figure 4).
- For models GL 12-65, GEL 12-100, GEL 12-120, GEL 12-150, GEL 12-200 in the ratio of one container per cell (Figure 4).

 The electrolyte is topped up once in all 6 cells. Avoid overflowing!

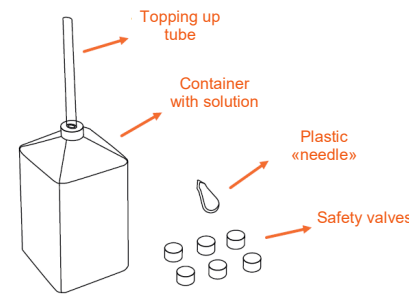


Figure 3.

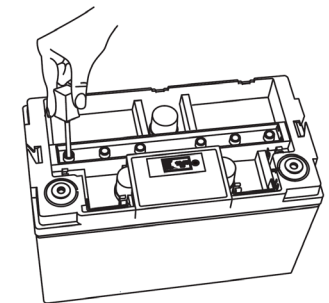



Figure 4.

Step 6. After refilling the electrolyte, return the safety valves to their place. Close the battery with the cover (Figure 5). The electrolyte containers and the topping tube can be disposed of.

 After topping up the electrolyte, use the battery only in an upright position.

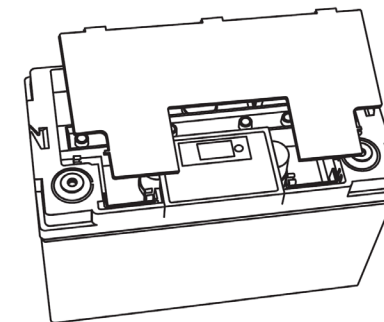


Figure 5.

17. ADDITIONAL INFORMATION

Sulfation of the battery's active mass

When discharging, the active mass is converted into lead sulfate. During charging, the reverse process occurs with the destruction of lead sulfate and the recovery of the active mass.

Crystalline indestructible lead sulfate is formed:

- when a battery is stored and used in discharged condition,
- when charged with less than 10% of the rated capacity,
- when charged with more than the current recommended in the manual.

Sulfation of the active mass leads to a reduction in the service life and a significant decrease in the capacity of the battery.

18. WARRANTY

A warranty card is a document that confirms the warranty obligations of the seller or manufacturer to meet the consumer's requirements within a specified period. It is only valid if all the information provided is fully, correctly, and clearly indicated.

The warranty period and product service life are calculated from the date of purchase. If the purchase date cannot be determined, they are calculated from the product's manufacturing date, which is indicated on the product in the form of a seven-digit code that can be found on the website of the manufacturer.

The service life of the product is specified in the user manual (product passport).

The warranty period for the product is stated on the warranty card.

Warranty obligations will be fulfilled provided that the product is used correctly by the consumer.

The instructions and conditions for proper (effective and safe) use of the product by the consumer are defined in the manual (or other relevant documents) for the corresponding product.

In case of defects, the seller, manufacturer, importer or other authorized party is responsible, unless they can prove that the defects occurred after the product was transferred to the consumer due to the consumer's violation of the instructions, storage or transport conditions, actions of third parties, or force majeure events.

If a malfunction of the product occurs due to no fault of the consumer, to exercise consumer rights, it is necessary to contact an authorized person or seller from whom the product was purchased in accordance with the procedure established by law in order to obtain necessary warranty service.

In specified warranty cases, a consumer can also contact the manufacturer or importer, or their authorized representatives, to replace the product with a similar brand (same model and/or article) or to have defects (repairs) of the product eliminated free of charge.

Warranty repairs of a defective product are carried out by the manufacturer, importer, another authorized person, or at a service center designated by them. The warranty period extends for the duration of the warranty repair of a defective product.

The battery should be presented to warranty service in clean condition, with readable factory markings, and branded stickers.

The battery is not covered under warranty in the following cases:

- Failure to comply with the requirements specified in this user manual;
- Mechanical damage to the battery pack;
- Use of the battery pack for purposes other than those for which it is intended;
- Structural failure of the battery;
- Severe loss of capacity (due to sulfation of the active mass);
- Deep discharge or overcharge of the battery;
- Drying out or boiling out of distillate due to improper operation;
- Decrease of the battery capacity during operation.

BATTERY WARRANTY CARD



Product warranty is _____ month(s)

Model: _____

Sale date: _____

Production code: _____

Battery received, no mechanical damage. I have no claims to the appearance and equipment. I am informed with the rules of operation and warranty obligations and agree with them.

Customer: _____

Name, sign

The battery has been checked by the seller in the presence of the customer

Seller: _____

Name, sign

Stamp