



# STANDBY BATTERIES TRANSPARENT MONOBLOCK (OPz S SERIES)



## STRUCTURAL PROPERTIES

### 1- Positive Tubular Plates:

Positive plate grids consist of a number of rods, that are lead-antimony alloy, and of a bar that connects these to each other from above. These rods are enveloped by a gauntlet of interwoven tubes.

Each tube groove is filled with the active material. During formation charge, the active material solidifies, and unifies with the wall of the tube and the lead rods. The electrolyte moves freely within the active material and among the tubes. Due to the low resistance and the long life polyester tubes, the deterioration of the positive active material is prevented.

### 2- Negative Plates:

Negative plates are produced, by means of coating the grooves of the specially designed grid of lead-antimony alloy with pressurised active material. They have the same service life as the positive tubular plates.

### 3- Separators:

Micro-porous separators are used. These prevent an internal short circuit during agglomeration and deterioration of the active material. They also have properties that facilitate current flow and electrolyte movement.

### 4- Electrolyte:

The electrolyte, composed of sulphuric acid and distilled water, has a density of 1.24 gr/cm<sup>3</sup> at 20°C within the battery when fully charged.

### 5- Cell Jars:

The cell jars, made up of high quality transparent plastic, are either in 6 or 12 monoblock series.

### 6- Plugs:

Due to the specially designed plugs, all overflow of electrolyte returns to the cells, while the free oxygen and hydrogen can easily exit.

### 7- Cell Outlets and Connections:

Cell outlets of lead-antimony alloy, and low resistance intercellular connections prevent voltage loss. Depending on demand, several connection types are available.

- Welded lead connections
- Lead plated copper bars
- Flexible cable with special connection cap



## APPLICATIONS

- Uninterrupted power sources (UPS)
- Emergency and safety illuminatorse
- Telecommunications
- Electric plants (Powerhouse)
- Radio-ling
- Solar and wind power generators

## MAJOR ADVANTAGES

- Positive tubular plates with single cell wall
- Maximum performance
- Yearly maintenance requirement
- Easy assemblage and maintenance
- Higher safety of operation
- High capacity at small dimensions
- Reduced ventilation requirement
- Long service life
- Shelf systems for saving space



## TECHNICAL FEATURES

### NOMINAL VOLTAGE:

The batteries have a 6 and 12 volts monoblock structure. Minimum voltage during discharge depends on the rate of the withdrawn current. These changing voltage values can be seen in graphic curves.

### CAPACITY:

The actual capacity is indicated as  $C_{10}$ . At 20°C, the current value is indicated as (Ah), over the 10 hours of discharge. Tables, grouped according to the minimum values of voltage, display the currents, batteries may supply for various discharge durations.

### CHARGING

#### • Floating Charge

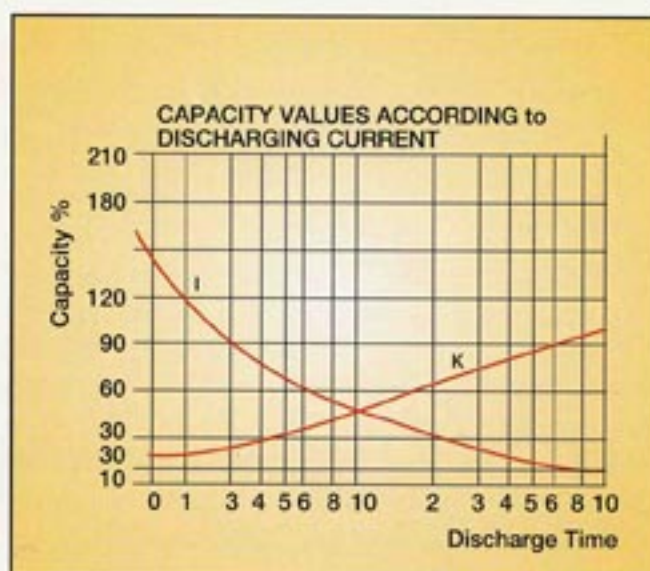
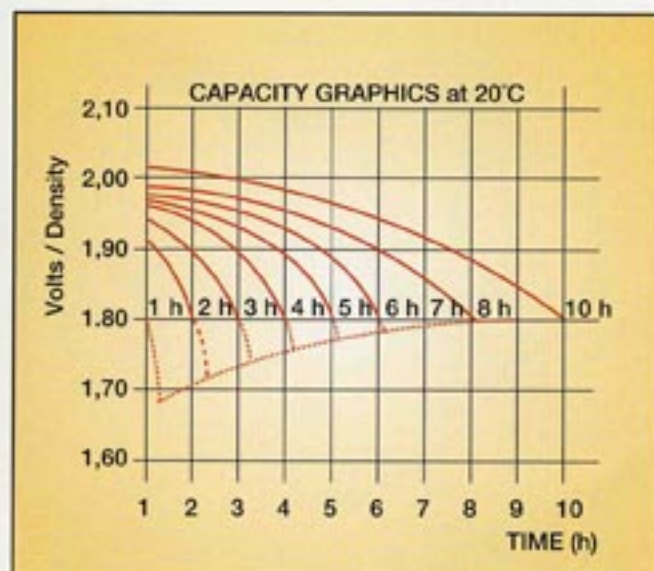
Floating charge is the optimum way of keeping the standby batteries intact. In order to prevent a group of batteries from discharging and to keep them intact, they have to be kept under a floating charge of  $2.23 \pm \%1$  volts per cell.

#### • Accelerated Charge

Various methods of charging are possible. The most commonly used one is the IU system. In this system, a constant current is given until each cell is 2,34 - 2,40 volts, and the voltage is kept stable.

#### • Maximum Charging Current

The maximum charging current has to be, 15% of the initial capacity of the battery, and 5% eventually.





**OPERATION**

The expedient operational floating voltage of high power tubular standby batteries is 2,23 volts per cell. Meanwhile, the voltage per cell should remain between 2,20 and 2,25 volts. 2,23 volts fully compensate the internal losses of the battery. For any floating operation with a lower value, additional charges may occasionally be needed. For the floating operations with a value higher than 2,25 volts per cell, the service life of the battery group would be reduced, and water loss increased.

**HOW to CHOOSE the APPROPRIATE BATTERY - an example**

For an uninterrupted source of power, a battery of 60 volts is required. The DC battery should be capable of providing 44,5 amps continuously for an hour. The voltage should not exceed 66,9 volts, and not drop below 54 volts. How many cells are required for such a task, and what should the value of cell capacity be? If the battery will not be disconnected from load for a recharge, the maximum cell voltage has to be 2,23 volts. Therefore, a maximum battery charge voltage of 2,23 volts per cell is required.

$$\frac{V \text{ max.}}{V/\text{cell}} = \frac{66,9 \text{ V}}{2,23 \text{ V}} = 30 \text{ cells}$$

The required battery should have, 30 cells.  
Since the monoblock battery has 6 cells,

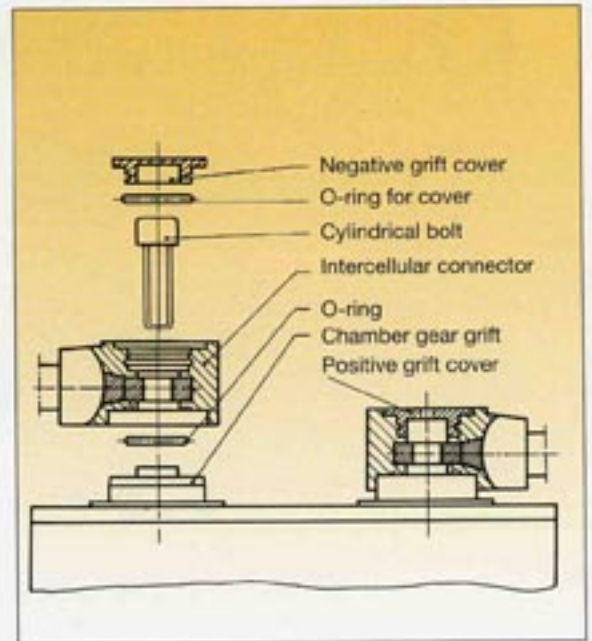
$$\frac{30}{6} = 5 \text{ monoblock batteries of 12 volts or}$$

$$\frac{30}{6} = 10 \text{ monoblock batteries of 6 volts are needed.}$$

$$\frac{V \text{ min}}{\text{Cell number}} = \frac{54 \text{ V}}{30 \text{ cells}} = 1.8 \text{ V/cell}$$

So, checking under the 1 hour column of the table with the discharge voltage of 1,8 volts, the required battery that provides 44,5 amps can be determined. It can also be observed that this battery is a 12 V 2 OPzS 100 battery.

The tables for choosing 6V.2 OPzS 100 and 6V.3 OPzS 150 type batteries are different since internal resistance of these batteries is high and their service life longer.



**MODERN PRODUCTION TECHNOLOGY AND ONGOING RESEARCH**

The new low-maintenance standby batteries are the product of latest technology and ongoing research. Manufacture with state of the art, imported European machinery and mould designs are kept under constant check in the physics and chemistry laboratories equipped to test each and every material or battery. Quality control is done by engineers at every stage of production. Durable, high quality products are the result of long years of research and constant testing.



**ISO 9001 INTERNATIONAL QUALITY CERTIFICATE**

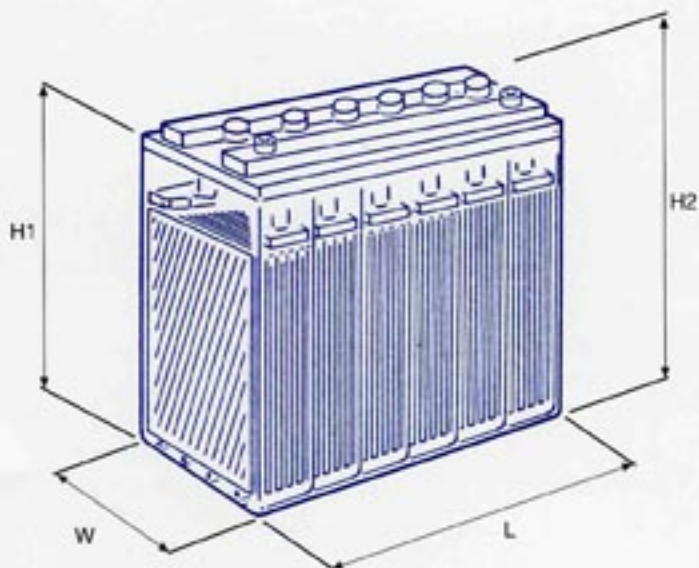
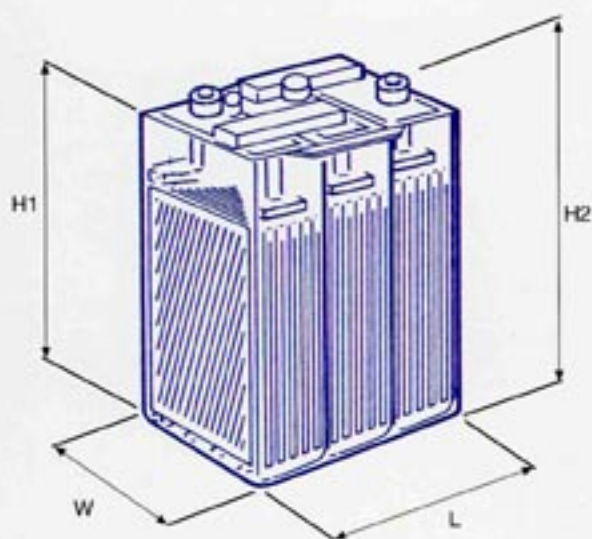
Meticulous attitude in production, has won Mutlu Akü, the most comprehensive international quality certificate of all, ISO 9001. This certificate does not only prove superior and continuous Mutlu quality, but also its recognition by the European countries. Mutlu, is proud to be the first Turkish manufacturer of batteries to have such a certificate.





## DIMENSIONS and WEIGHTS of the OPzS MONOBLOCK SERIES STANDBY BATTERIES

TYPE	Max (mm)				Dry Weight kg (max)	Floatated Weight kg (max)
	L	W	H1	H2		
12V.1 OPzS 25	271	165	240	285	24	30.5
12V.2 OPzS 50	271	165	240	285	30.2	36.2
12V.2 OPzS 100	272	205	330	377	50.8	63.2
12V.3 OPzS 150	380	205	332	377	70.3	87.7
6V.2 OPzS 100	234	204	346	387	35.6	48
6V.3 OPzS 150	234	204	346	387	40.6	51.8
6V.4 OPzS 200	272	205	330	377	48	60.4
6V.5 OPzS 250	380	205	332	377	63	81
6V.6 OPzS 300	380	205	332	377	68	85.4



## SELECTION TABLES

U = 1.83 V/cell

Discharge Current (A)

TYPE	15 min.	30 min.	1 h	2 h	3 h	4 h	5 h	6 h	8 h	10 h
12V.1 OPzS 25	19.5	15	10.5	7	5.5	4.2	3.8	3.2	2.7	2.4
12V.2 OPzS 50	39	30	21.5	14.5	11.5	8.5	7.5	6.8	5.4	4.7
12V.2 OPzS 100	69	56	41	29	25.5	19	15.7	13.7	11	9
12V.3 OPzS 150	104	83.5	64	44	34	28	23	21	17	14
6V.4 OPzS 200	136	110	83	58	44.5	37	32	28	28	18.8
6V.5 OPzS 250	153	131.6	103	73	57	47	40	35	28.6	23.5
6V.6 OPzS 300	185	158	124	88.5	68	56.4	48	42.3	34.4	28.2

U = 1.80 V/cell

Discharge Current (A)

TYPE	15 min.	30 min.	1 h	2 h	3 h	4 h	5 h	6 h	8 h	10 h
12V.1 OPzS 25	22	17	11.5	7.5	6.5	5	4	3.6	2.9	2.5
12V.2 OPzS 50	45	34	22.5	15	12	10	8.5	7	5.9	5
12V.2 OPzS 100	82.5	63	44.5	31	25	19.5	17.5	14.8	12	10
12V.3 OPzS 150	118	96	69	46	36	30	26	22.2	18	15
6V.4 OPzS 200	157	128	93	63	48	40	34	29.6	24	20
6V.5 OPzS 250	182	150	113	76	60	48	42	36.5	30	25
6V.6 OPzS 300	218	180	136	92	71	58	50	44	36	30

U = 1.75 V/cell

Discharge Current (A)

TYPE	15 min.	30 min.	1 h	2 h	3 h	4 h	5 h	6 h	8 h	10 h
12V.1 OPzS 25	23	18	12.5	8	6.8	5.2	4.5	3.8	3	2.6
12V.2 OPzS 50	48	36	24	16	12.5	10.5	8.8	7.4	6	5.1
12V.2 OPzS 100	89	70	49	33	25.5	20.5	17.8	15.2	12	10.2
12V.3 OPzS 150	128	108	77	51	38	32	27	23	18.4	15.3
6V.4 OPzS 200	160	145	103	68	51	42	36	31	24.5	20.7
6V.5 OPzS 250	190	173	130	84	63	52	44	38.4	31	25.6
6V.6 OPzS 300	220	207	155	100	76	62	53.5	46	36.8	31



## SELECTION TABLES

U = 1.70 V/cell

Discharge Current (A)

TYPE	15 min.	30 min.	1 h	2 h	3 h	4 h	5 h	6 h	8 h	10 h
12V.1 OPzS 25	27.5	19	13	8.4	6.4	5.4	4.6	3.9	3.1	2.6
12V.2 OPzS 50	55	38	26	17	12.8	10.6	9	7.6	6.2	5.2
12V.2 OPzS 100	97	75	52	34.2	26	21	18	15.4	12.2	10.4
12V.3 OPzS 150	150	118	82	54	40	32.6	27.2	23.5	18.6	15.7
6V.4 OPzS 200	198	159	110	72	54	43	36.8	31.4	24.8	20.8
6V.5 OPzS 250	240	195	135	88	66	53.8	46	39	31	26
6V.6 OPzS 300	289	225	160	105	79	64	55	47	37	31.2

U = 1.83 V/cell

Discharge Current (A)

TYPE	15 min.	30 min.	1 h	2 h	3 h	4 h	5 h	6 h	8 h	10 h
6V.2 OPzS 100	69	56	41	29	25.5	19	15.7	13.7	11	9
6V.3 OPzS 150	104	83.5	64	44	34	26	23	21	17	14

U = 1.80 V/cell

Discharge Current (A)

TYPE	15 min.	30 min.	1 h	2 h	3 h	4 h	5 h	6 h	8 h	10 h
6V.2 OPzS 100	82.5	63	44.5	31	25	19.5	17.5	14.8	12	10
6V.3 OPzS 150	118	96	69	46	36	30	26	22.2	18	15

U = 1.75 V/cell

Discharge Current (A)

TYPE	15 min.	30 min.	1 h	2 h	3 h	4 h	5 h	6 h	8 h	10 h
6V.2 OPzS 100	89	70	49	33	25.5	20.5	17.8	15.2	12.1	10.2
6V.3 OPzS 150	128	108	77	51	38	32	27	23	18.4	15.3

U = 1.70 V/cell

Discharge Current (A)

TYPE	15 min.	30 min.	1 h	2 h	3 h	4 h	5 h	6 h	8 h	10 h
6V.2 OPzS 100	97	95	52	34.2	26	21	18	15.4	12.2	10.4
6V.3 OPzS 150	150	118	82	54	40	32.6	27.2	23.5	18.6	15.7



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