Classic™

Industrial Batteries – Standby Power
Classic OPzS
Energy storage for economical safety.

Specifications

EXIDE TECHNOLOGIES

Developed from experience produced for safe power supply.

Specifications

- Classic OPzS batteries have been proven energy suppliers for decades, which captivate in robustness, extreme long design life and reliability
- Very high operationally reliability under rough operating conditions
- Low maintenance due to reduced antimony in the alloy and high electrolyte reserve
- Nominal capacity 50–3350 Ah C_{10}; up to 12000 Ah on request
- 15 years design life at 20°C ambient temperature (80% remaining capacity from C_{10})
- Also designed for cyclic applications
- Containers made from high-quality transparent plastics (blocks = ABS / cells = SAN)
- Tubular plates in block and single cell version
- Also available in dry charged condition with separate electrolyte
- Low gassing due to antimony alloy < 3% (EN 50272-2)
- Conforms to DIN 40 736 and DIN 40 737 T3
- Electrolyte: diluted sulphuric acid d_N = 1.24 kg/l
- Optimised plate design produces increased capacities compared to DIN
- Completely recyclable

Applications

Classic OPzS batteries are robust energy storage solutions, with proven technology that has been relied upon for decades in applications such as telecommunications, power supply and power distribution, data, alarm security systems and emergency lighting as well as all other power supplies for safety systems.

Tubular plate

Nominal capacity
50 – 12000 Ah

Block battery

Single cell

Design life:
15 years

Low
maintenance

Recyclable

OPzS block

Type acc. to DIN 40 737 T3	Part number	Nominal voltage V	Nominal capacity C_{10} 1.8 V/C 20°C Ah	Length (l) max. mm	Width (b/w) max. mm	Height* (h) max. mm	Installed length (B/L) mm	Weight block including acid approx. kg	Weight acid** approx. kg	Internal resistance m Ω	Short circuit current A	Terminal	Pole pairs
12V 1 OPzS 50 LA	NVZS120050WC0FA	12	50	275	208	385	285	35	15	18.18	688	F-M8	1
12V 2 OPzS 100 LA	NVZS120100WC0FA	12	100	275	208	385	285	45	14	9.26	1314	F-M8	1
12V 3 OPzS 150 LA	NVZS120150WC0FA	12	150	383	208	385	393	64	19	6.46	1884	F-M8	1
6V 4 OPzS 200 LA	NVZS060200WC0FA	6	200	275	208	385	285	41	13	2.68	2283	F-M8	1
6V 5 OPzS 250 LA	NVZS060250WC0FA	6	250	383	208	385	393	56	20	2.39	2800	F-M8	1
6V 6 OPzS 300 LA	NVZS060300WC0FA	6	300	383	208	385	393	63	20	1.96	3106	F-M8	1

* *The above mentioned height can differ depending on the used vent(s)*

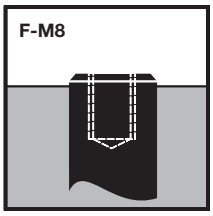
** *Acid density d_N = 1.24 kg / l*

Data are also valid for dry charged version.
Change „W“ (Wet) to „D“ (Dry)
in the part number.
E.g.:

filled and charged	*NVZS120050**W**C0FA*
dry charged	*NVZS120050**D**C0FA*

Container, terminal and torque

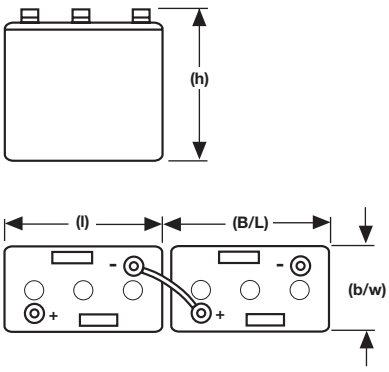
Container: ABS



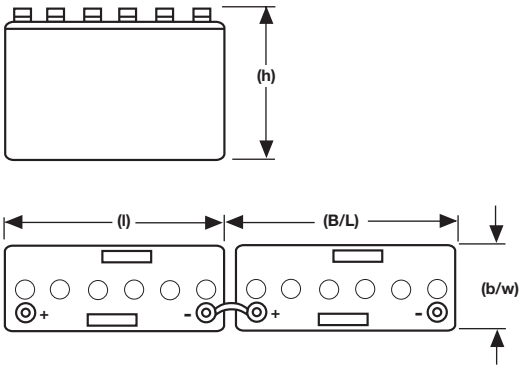
20 Nm

Drawings with terminal position

6 V block



12 V block



Not to scale!

OPzS cell

Type acc. to DIN 40 736 T1	Part number	Nominal voltage V	Nominal capacity C_{10} 1.8 V/C 20°C Ah	Length (l) max. mm	Width (b/w) max. mm	Height* (h) max. mm	Installed length (B/L) mm	Weight cell including acid approx. kg	Weight acid** approx. kg	Internal resistance m Ω	Short circuit current A	Terminal	Pole pairs
2 OPzS 100 LA	NVZS020100WC0FA	2	125	105	208	405	115	13.7	5.2	1.45	1400	F-M8	1
3 OPzS 150 LA	NVZS020150WC0FA	2	165	105	208	405	115	15.2	5.0	1.05	1950	F-M8	1
4 OPzS 200 LA	NVZS020200WC0FA	2	210	105	208	405	115	16.6	4.6	0.83	2450	F-M8	1
5 OPzS 250 LA	NVZS020250WC0FA	2	260	126	208	405	136	20.0	5.8	0.72	2850	F-M8	1
6 OPzS 300 LA	NVZS020300WC0FA	2	310	147	208	405	157	23.3	6.9	0.63	3250	F-M8	1
5 OPzS 350 LA	NVZS020350WC0FA	2	380	126	208	520	136	26.7	8.1	0.63	3250	F-M8	1
6 OPzS 420 LA	NVZS020420WC0FA	2	455	147	208	520	157	31.0	9.3	0.56	3650	F-M8	1
7 OPzS 490 LA	NVZS020490WC0FA	2	530	168	208	520	178	35.4	10.8	0.50	4100	F-M8	1
6 OPzS 600 LA	NVZS020600WC0FA	2	680	147	208	695	157	43.9	13.0	0.47	4350	F-M8	1
7 OPzS 700 LA	NVZS020700WC0FA	2	750	147	208	695	157	47.2	12.8	0.43	4800	F-M8	1
8 OPzS 800 LA	NVZS020800WC0FA	2	910	215	193	695	225	59.9	17.1	0.30	6800	F-M8	2
9 OPzS 900 LA	NVZS020900WC0FA	2	980	215	193	695	225	63.4	16.8	0.27	7500	F-M8	2
10 OPzS 1000 LA	NVZS021000WC0FA	2	1140	215	235	695	225	73.2	21.7	0.26	7900	F-M8	2
12 OPzS 1200 LA	NVZS021200WC0FA	2	1370	215	277	695	225	86.4	26.1	0.23	8900	F-M8	2
12 OPzS 1500 LA	NVZS021500WC0FA	2	1700	215	277	845	225	108.0	33.7	0.24	8500	F-M8	2
14 OPzS 1750 LA	NVZS021750WC0FA	2	1800	215	277	845	225	114.0	32.7	0.22	9300	F-M8	2
16 OPzS 2000 LA	NVZS022000WC0FA	2	2250	215	400	815	225	151.0	50.0	0.16	12800	F-M8	3
18 OPzS 2250 LA	NVZS022250WC0FA	2	2450	215	400	815	225	158.0	48.0	0.14	14600	F-M8	3
20 OPzS 2500 LA	NVZS022500WC0FA	2	2800	215	490	815	225	184.0	60.0	0.12	17000	F-M8	4
22 OPzS 2750 LA	NVZS022750WC0FA	2	3000	215	490	815	225	191.0	58.0	0.11	17800	F-M8	4
24 OPzS 3000 LA	NVZS023000WC0FA	2	3350	215	580	815	225	217.0	71.0	0.11	18600	F-M8	4

* *The above mentioned height can differ depending on the used vent(s)*

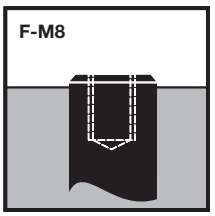
** *Acid density $d_N = 1.24$ kg / l*

Data are also valid for dry charged version.
Change „W“ (Wet) to „D“ (Dry)
in the part number.
E.g.:

filled and charged	*NVZS020200**W**C0FA*
dry charged	*NVZS020200**D**C0FA*

Container, terminal and torque

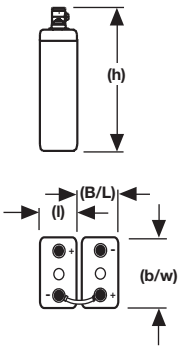
Container: SAN (Styrolacrylnitril)



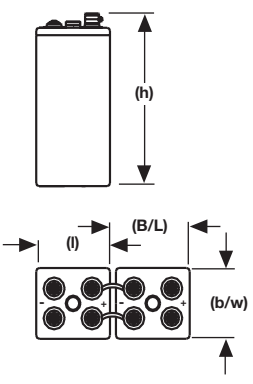
20 Nm

Drawings with terminal position

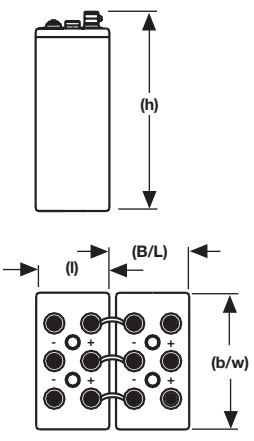
2 OPzS 100 LA up to 7 OPzS 700 LA



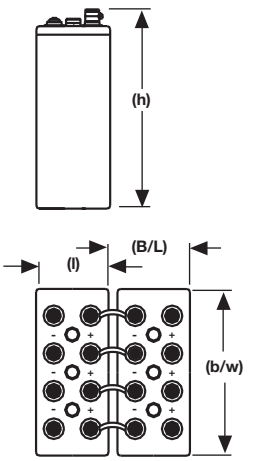
8 OPzS 800 LA up to 14 OPzS 1750 LA



16 OPzS 2000 LA up to 18 OPzS 2250 LA



20 OPzS 2500 LA up to 24 OPzS 3000 LA



Not to scale!

OPzS block

1.90 V/C – Discharge in A at 20°C													
Type	Part number	5min	10min	15min	30min	1h	2h	3h	4h	5h	6h	8h	10h
12V 1 OPzS 50 LA	NVZS120050WC0FA	32.0	29.0	25.0	21.3	16.1	11.7	9.7	8.2	7.0	6.3	5.6	5.0
12V 2 OPzS 100 LA	NVZS120100WC0FA	66.5	58.0	52.2	41.5	31.5	24.5	17.4	15.0	13.7	12.5	10.6	8.9
12V 3 OPzS 150 LA	NVZS120150WC0FA	99.0	84.0	76.0	64.0	47.2	34.1	26.4	22.3	19.7	17.7	14.6	12.0
6V 4 OPzS 200 LA	NVZS060200WC0FA	120.0	105.0	96.0	85.0	62.0	46.0	35.3	30.0	26.7	24.1	19.8	16.1
6V 5 OPzS 250 LA	NVZS060250WC0FA	145.0	132.0	122.0	102.0	70.0	56.0	43.5	34.0	32.0	29.0	25.2	21.7
6V 6 OPzS 300 LA	NVZS060300WC0FA	160.0	147.0	136.0	118.0	91.0	66.0	53.0	45.3	39.0	34.0	28.0	24.5

1.87 V/C – Discharge in A at 20°C													
Type	Part number	5min	10min	15min	30min	1h	2h	3h	4h	5h	6h	8h	10h
12V 1 OPzS 50 LA	NVZS120050WC0FA	40.0	35.0	31.0	25.5	19.4	13.6	11.2	9.3	8.2	7.2	6.0	5.5
12V 2 OPzS 100 LA	NVZS120100WC0FA	80.0	70.0	62.0	50.0	37.9	27.2	19.9	16.9	15.2	13.7	11.5	9.5
12V 3 OPzS 150 LA	NVZS120150WC0FA	120.0	102.0	90.0	75.0	55.0	39.5	30.0	25.4	22.0	19.8	16.4	13.8
6V 4 OPzS 200 LA	NVZS060200WC0FA	150.0	132.0	120.0	100.0	72.4	52.0	40.0	33.2	29.4	26.8	22.2	18.0
6V 5 OPzS 250 LA	NVZS060250WC0FA	180.0	161.0	140.0	118.0	88.7	63.2	50.0	42.0	36.7	33.4	28.1	23.3
6V 6 OPzS 300 LA	NVZS060300WC0FA	195.0	176.0	160.0	135.0	104.0	76.5	59.2	51.0	44.0	38.0	32.0	27.0

1.85 V/C – Discharge in A at 20°C													
Type	Part number	5min	10min	15min	30min	1h	2h	3h	4h	5h	6h	8h	10h
12V 1 OPzS 50 LA	NVZS120050WC0FA	44.0	39.0	35.0	28.2	21.0	14.2	11.7	9.8	8.5	7.5	6.3	5.6
12V 2 OPzS 100 LA	NVZS120100WC0FA	87.5	78.0	69.5	55.0	41.0	28.8	21.4	17.8	15.6	14.3	11.8	9.7
12V 3 OPzS 150 LA	NVZS120150WC0FA	130.0	112.0	102.5	81.0	59.8	42.0	31.5	27.1	23.0	20.7	17.1	14.2
6V 4 OPzS 200 LA	NVZS060200WC0FA	162.0	145.0	135.0	110.0	78.7	55.5	42.2	35.0	30.8	28.1	23.3	18.7
6V 5 OPzS 250 LA	NVZS060250WC0FA	193.0	175.0	155.0	126.0	93.4	67.0	52.5	44.5	38.2	35.1	29.3	23.7
6V 6 OPzS 300 LA	NVZS060300WC0FA	216.0	195.0	177.0	147.0	113.5	79.0	62.0	54.0	46.0	40.5	33.7	28.0

1.83 V/C – Discharge in A at 20°C													
Type	Part number	5min	10min	15min	30min	1h	2h	3h	4h	5h	6h	8h	10h
12V 1 OPzS 50 LA	NVZS120050WC0FA	48.0	43.0	39.0	31.0	22.8	15.3	12.2	10.2	8.8	7.8	6.5	5.8
12V 2 OPzS 100 LA	NVZS120100WC0FA	95.0	85.0	77.0	60.0	44.0	30.6	22.8	18.6	16.1	14.6	12.1	10.0
12V 3 OPzS 150 LA	NVZS120150WC0FA	140.0	122.0	115.0	87.0	64.6	44.4	33.4	28.3	24.1	21.6	17.9	14.6
6V 4 OPzS 200 LA	NVZS060200WC0FA	175.0	158.0	150.0	120.0	85.0	59.1	44.5	36.7	32.3	29.2	24.0	19.5
6V 5 OPzS 250 LA	NVZS060250WC0FA	207.0	190.0	171.0	135.0	102.0	71.4	55.0	46.5	40.3	36.3	30.2	24.5
6V 6 OPzS 300 LA	NVZS060300WC0FA	237.0	213.0	195.0	160.0	123.0	85.7	66.3	56.5	48.3	42.5	34.8	29.0

1.80 V/C – Discharge in A at 20°C													
Type	Part number	5min	10min	15min	30min	1h	2h	3h	4h	5h	6h	8h	10h
12V 1 OPzS 50 LA	NVZS120050WC0FA	57.0	49.0	44.0	34.0	25.2	17.1	13.5	11.0	9.5	8.2	6.9	5.9
12V 2 OPzS 100 LA	NVZS120100WC0FA	110.0	96.0	85.0	66.0	49.0	32.3	24.1	19.6	17.1	15.4	12.5	10.1
12V 3 OPzS 150 LA	NVZS120150WC0FA	160.0	135.0	120.0	95.0	70.4	47.1	36.0	29.8	25.7	22.7	18.6	15.0
6V 4 OPzS 200 LA	NVZS060200WC0FA	205.0	178.0	160.0	130.0	92.0	61.3	47.5	38.5	34.9	30.4	25.0	20.3
6V 5 OPzS 250 LA	NVZS060250WC0FA	240.0	212.0	190.0	150.0	110.0	74.5	59.2	49.0	42.8	37.8	31.2	25.5
6V 6 OPzS 300 LA	NVZS060300WC0FA	260.0	240.0	218.0	177.0	135.0	89.3	70.4	59.5	51.0	44.5	35.8	30.3

OPzS block

1.75 V/C – Discharge in A at 20°C													
Type	Part number	5min	10min	15min	30min	1h	2h	3h	4h	5h	6h	8h	10h
12V 1 OPzS 50 LA	NVZS120050WC0FA	65.0	56.0	48.0	36.0	26.5	18.4	14.0	11.6	9.8	8.6	7.2	6.2
12V 2 OPzS 100 LA	NVZS120100WC0FA	125.0	109.0	95.0	71.0	51.3	34.0	25.9	20.8	18.2	16.2	13.0	10.2
12V 3 OPzS 150 LA	NVZS120150WC0FA	185.0	155.0	136.0	102.0	73.4	50.0	37.5	31.2	27.0	24.0	19.4	15.3
6V 4 OPzS 200 LA	NVZS060200WC0FA	235.0	206.0	185.0	140.0	97.9	66.0	50.0	40.5	35.8	31.2	25.7	20.4
6V 5 OPzS 250 LA	NVZS060250WC0FA	285.0	250.0	220.0	165.0	120.0	81.0	62.0	51.0	44.0	39.1	32.3	26.1
6V 6 OPzS 300 LA	NVZS060300WC0FA	340.0	295.0	260.0	200.0	143.0	98.3	74.5	62.0	52.5	45.8	36.8	30.6

1.70 V/C – Discharge in A at 20°C													
Type	Part number	5min	10min	15min	30min	1h	2h	3h	4h	5h	6h	8h	10h
12V 1 OPzS 50 LA	NVZS120050WC0FA	75.0	62.0	54.0	39.0	27.3	18.5	14.4	11.8	10.0	8.7	7.3	6.3
12V 2 OPzS 100 LA	NVZS120100WC0FA	145.0	122.0	106.0	78.0	54.0	35.0	26.7	21.3	18.8	16.6	13.3	10.4
12V 3 OPzS 150 LA	NVZS120150WC0FA	210.0	174.0	155.0	115.0	79.3	52.0	38.6	32.0	28.2	24.8	19.9	15.6
6V 4 OPzS 200 LA	NVZS060200WC0FA	270.0	232.0	208.0	155.0	108.0	68.0	51.6	41.5	37.5	31.7	26.0	20.8
6V 5 OPzS 250 LA	NVZS060250WC0FA	340.0	287.0	255.0	183.0	131.0	84.0	63.5	52.3	45.0	40.1	33.0	26.5
6V 6 OPzS 300 LA	NVZS060300WC0FA	380.0	333.0	295.0	220.0	159.0	103.0	77.0	63.6	53.5	46.4	37.3	31.2

1.67 V/C – Discharge in A at 20°C													
Type	Part number	5min	10min	15min	30min	1h	2h	3h	4h	5h	6h	8h	10h
12V 1 OPzS 50 LA	NVZS120050WC0FA	80.0	66.0	56.0	40.0	27.7	18.7	14.5	11.9	10.0	8.8	7.3	6.3
12V 2 OPzS 100 LA	NVZS120100WC0FA	156.0	130.0	111.0	81.0	55.0	35.3	26.8	21.6	18.9	16.8	13.4	10.4
12V 3 OPzS 150 LA	NVZS120150WC0FA	229.0	186.0	163.0	118.0	82.0	52.6	39.0	32.2	28.5	25.2	20.1	15.7
6V 4 OPzS 200 LA	NVZS060200WC0FA	293.0	247.0	219.0	160.0	111.0	68.5	52.5	41.8	36.1	32.0	26.1	21.0
6V 5 OPzS 250 LA	NVZS060250WC0FA	362.0	307.0	268.0	193.0	133.0	84.5	63.9	52.6	45.6	40.5	33.3	26.6
6V 6 OPzS 300 LA	NVZS060300WC0FA	417.0	355.0	315.0	231.0	163.0	105.0	78.0	64.1	54.0	46.6	37.5	31.3

1.65 V/C – Discharge in A at 20°C													
Type	Part number	5min	10min	15min	30min	1h	2h	3h	4h	5h	6h	8h	10h
12V 1 OPzS 50 LA	NVZS120050WC0FA	83.0	68.0	58.0	41.0	27.9	18.8	14.5	11.9	10.0	8.8	7.3	6.3
12V 2 OPzS 100 LA	NVZS120100WC0FA	162.0	135.0	115.0	83.0	55.5	35.5	26.9	21.7	19.0	16.9	13.5	10.4
12V 3 OPzS 150 LA	NVZS120150WC0FA	240.0	193.0	168.0	120.0	83.0	53.0	39.2	32.4	28.6	25.5	20.2	15.7
6V 4 OPzS 200 LA	NVZS060200WC0FA	307.0	258.0	226.0	163.0	113.0	69.0	52.9	42.0	36.2	32.2	26.2	21.0
6V 5 OPzS 250 LA	NVZS060250WC0FA	380.0	320.0	278.0	189.0	135.0	85.0	64.1	52.8	46.0	40.8	33.4	26.6
6V 6 OPzS 300 LA	NVZS060300WC0FA	435.0	369.0	326.0	237.0	165.0	106.0	78.5	64.4	54.2	46.8	37.6	31.3

OPzS cell

1.87 V/C – Discharge in A at 20°C															
Type	Part number	3min	10min	15min	20min	30min	1h	1h30	2h	3h	4h	5h	8h	10h	20h
2 OPzS 100 LA	NVZS020100WC0FA	82.4	81.1	76.0	71.5	65.2	51.2	42.7	36.3	28.6	23.4	20.0	14.1	11.7	6.3
3 OPzS 150 LA	NVZS020150WC0FA	106.0	105.0	98.5	91.6	83.4	66.2	55.3	47.5	37.3	30.6	26.2	18.6	15.4	8.4
4 OPzS 200 LA	NVZS020200WC0FA	135.0	134.0	125.0	118.0	107.0	84.3	70.4	60.4	47.5	39.0	33.3	23.7	19.7	10.6
5 OPzS 250 LA	NVZS020250WC0FA	163.0	161.0	151.0	142.0	130.0	103.0	86.3	74.5	58.2	47.9	41.1	29.2	24.3	13.2
6 OPzS 300 LA	NVZS020300WC0FA	189.0	186.0	175.0	166.0	152.0	121.0	102.0	88.4	68.7	56.5	48.7	34.7	29.0	15.7
5 OPzS 350 LA	NVZS020350WC0FA	190.0	187.0	180.0	174.0	160.0	135.0	115.0	99.8	79.8	66.5	57.8	41.7	34.8	19.3
6 OPzS 420 LA	NVZS020420WC0FA	216.0	214.0	207.0	201.0	186.0	157.0	135.0	118.0	95.6	79.7	69.2	50.0	41.7	23.1
7 OPzS 490 LA	NVZS020490WC0FA	247.0	245.0	236.0	229.0	213.0	179.0	156.0	136.0	111.0	92.5	80.6	58.2	48.5	26.9
6 OPzS 600 LA	NVZS020600WC0FA	279.0	277.0	267.0	257.0	239.0	207.0	181.0	163.0	131.0	111.0	98.5	72.9	62.3	34.5
7 OPzS 700 LA	NVZS020700WC0FA	307.0	305.0	295.0	284.0	264.0	228.0	200.0	179.0	144.0	123.0	109.0	80.4	68.7	38.0
8 OPzS 800 LA	NVZS020800WC0FA	403.0	396.0	378.0	365.0	337.0	290.0	252.0	222.0	178.0	152.0	134.0	98.1	83.4	46.1
9 OPzS 900 LA	NVZS020900WC0FA	430.0	427.0	407.0	393.0	363.0	312.0	271.0	239.0	192.0	164.0	144.0	106.0	89.8	49.7
10 OPzS 1000 LA	NVZS021000WC0FA	484.0	480.0	461.0	444.0	412.0	355.0	309.0	276.0	221.0	188.0	167.0	123.0	104.0	57.8
12 OPzS 1200 LA	NVZS021200WC0FA	562.0	558.0	538.0	518.0	482.0	416.0	365.0	328.0	264.0	225.0	198.0	147.0	125.0	69.5
12 OPzS 1500 LA	NVZS021500WC0FA	522.0	521.0	511.0	498.0	479.0	419.0	385.0	352.0	297.0	257.0	230.0	173.0	148.0	79.8
14 OPzS 1750 LA	NVZS021750WC0FA	553.0	552.0	541.0	532.0	508.0	444.0	408.0	372.0	314.0	272.0	245.0	183.0	157.0	84.5
16 OPzS 2000 LA	NVZS022000WC0FA	754.0	752.0	731.0	712.0	676.0	578.0	525.0	473.0	392.0	339.0	305.0	229.0	196.0	105.0
18 OPzS 2250 LA	NVZS022250WC0FA	791.0	789.0	769.0	748.0	712.0	615.0	561.0	507.0	427.0	370.0	333.0	249.0	213.0	115.0
20 OPzS 2500 LA	NVZS022500WC0FA	937.0	936.0	910.0	885.0	779.0	720.0	654.0	589.0	488.0	423.0	380.0	284.0	244.0	132.0
22 OPzS 2750 LA	NVZS022750WC0FA	1005.0	1005.0	976.0	949.0	903.0	771.0	700.0	631.0	523.0	453.0	407.0	305.0	262.0	141.0
24 OPzS 3000 LA	NVZS023000WC0FA	1080.0	1075.0	1050.0	1020.0	972.0	841.0	766.0	693.0	584.0	506.0	455.0	340.0	292.0	157.0

1.85 V/C – Discharge in A at 20°C															
Type	Part number	3min	10min	15min	20min	30min	1h	1h30	2h	3h	4h	5h	8h	10h	20h
2 OPzS 100 LA	NVZS020100WC0FA	93.4	91.2	84.5	79.7	71.4	54.8	45.5	38.5	30.2	24.6	21.0	14.6	12.3	6.6
3 OPzS 150 LA	NVZS020150WC0FA	121.0	118.0	110.0	101.0	90.8	71.0	58.9	50.3	39.4	32.2	27.4	19.3	16.2	8.7
4 OPzS 200 LA	NVZS020200WC0FA	153.0	150.0	139.0	131.0	118.0	90.3	75.0	64.1	50.2	41.0	34.9	24.6	20.6	11.0
5 OPzS 250 LA	NVZS020250WC0FA	185.0	181.0	168.0	159.0	143.0	110.0	92.0	79.0	61.5	50.3	42.9	30.3	25.5	13.7
6 OPzS 300 LA	NVZS020300WC0FA	215.0	210.0	195.0	185.0	167.0	130.0	109.0	93.7	72.6	59.4	50.9	35.9	30.4	16.3
5 OPzS 350 LA	NVZS020350WC0FA	215.0	211.0	202.0	194.0	178.0	148.0	124.0	107.0	84.4	70.2	60.8	43.7	36.5	20.0
6 OPzS 420 LA	NVZS020420WC0FA	244.0	240.0	232.0	224.0	207.0	172.0	146.0	127.0	101.0	84.0	72.8	52.3	43.7	23.9
7 OPzS 490 LA	NVZS020490WC0FA	279.0	274.0	265.0	256.0	237.0	196.0	168.0	147.0	118.0	98.1	84.8	61.0	50.9	27.8
6 OPzS 600 LA	NVZS020600WC0FA	313.0	309.0	296.0	286.0	265.0	228.0	198.0	177.0	140.0	118.0	103.0	76.2	65.3	35.7
7 OPzS 700 LA	NVZS020700WC0FA	345.0	341.0	327.0	315.0	293.0	251.0	218.0	195.0	155.0	130.0	114.0	84.0	72.0	39.4
8 OPzS 800 LA	NVZS020800WC0FA	457.0	446.0	422.0	405.0	373.0	318.0	275.0	241.0	191.0	161.0	141.0	103.0	87.4	47.8
9 OPzS 900 LA	NVZS020900WC0FA	486.0	480.0	455.0	436.0	402.0	342.0	296.0	260.0	206.0	173.0	152.0	111.0	94.1	51.5
10 OPzS 1000 LA	NVZS021000WC0FA	546.0	539.0	513.0	493.0	456.0	390.0	338.0	299.0	237.0	199.0	175.0	128.0	109.0	59.9
12 OPzS 1200 LA	NVZS021200WC0FA	631.0	623.0	597.0	575.0	534.0	459.0	399.0	356.0	282.0	237.0	208.0	153.0	132.0	71.9
12 OPzS 1500 LA	NVZS021500WC0FA	599.0	596.0	583.0	568.0	544.0	469.0	428.0	388.0	323.0	277.0	246.0	184.0	156.0	85.0
14 OPzS 1750 LA	NVZS021750WC0FA	635.0	632.0	617.0	602.0	576.0	497.0	454.0	410.0	342.0	293.0	261.0	194.0	166.0	90.0
16 OPzS 2000 LA	NVZS022000WC0FA	865.0	861.0	835.0	811.0	768.0	648.0	585.0	522.0	427.0	366.0	326.0	243.0	207.0	112.0
18 OPzS 2250 LA	NVZS022250WC0FA	908.0	903.0	878.0	853.0	808.0	688.0	623.0	559.0	465.0	399.0	355.0	265.0	225.0	122.0
20 OPzS 2500 LA	NVZS022500WC0FA	1075.0	1070.0	1040.0	1010.0	956.0	806.0	728.0	649.0	532.0	456.0	406.0	302.0	258.0	140.0
22 OPzS 2750 LA	NVZS022750WC0FA	1155.0	1150.0	1115.0	1080.0	1025.0	864.0	779.0	695.0	570.0	489.0	435.0	324.0	276.0	150.0
24 OPzS 3000 LA	NVZS023000WC0FA	1240.0	1235.0	1200.0	1165.0	1100.0	942.0	852.0	764.0	636.0	546.0	486.0	362.0	308.0	167.0

OPzS cell

1.83 V/C – Discharge in A at 20°C														
Type	Part number	3min	10min	15min	20min	30min	1h	1h30	2h	3h	4h	5h	8h	10h	20h
2 OPzS 100 LA	NVZS020100WC0FA	104	101	93.0	86.9	76.8	57.5	47.4	39.9	31.2	25.4	21.6	14.9	12.5	6.7
3 OPzS 150 LA	NVZS020150WC0FA	134	130	120.0	110.0	97.4	74.3	61.3	52.2	40.8	33.2	28.2	19.6	16.4	8.9
4 OPzS 200 LA	NVZS020200WC0FA	171	166	153.0	143.0	126.0	94.7	78.0	66.4	52.0	42.4	36.0	25.0	20.9	11.3
5 OPzS 250 LA	NVZS020250WC0FA	207	201	185.0	173.0	154.0	116.0	95.7	81.9	63.7	52.0	44.3	30.8	25.9	14.0
6 OPzS 300 LA	NVZS020300WC0FA	241	231	215.0	201.0	180.0	136.0	113.0	97.3	75.2	61.4	52.5	36.5	30.9	16.7
5 OPzS 350 LA	NVZS020350WC0FA	238	232	221.0	213.0	194.0	158.0	131.0	113.0	87.9	72.6	62.5	44.5	37.1	20.3
6 OPzS 420 LA	NVZS020420WC0FA	272	265	255.0	245.0	225.0	183.0	154.0	133.0	105.0	86.8	74.8	53.2	44.4	24.3
7 OPzS 490 LA	NVZS020490WC0FA	310	303	291.0	280.0	257.0	209.0	178.0	154.0	123.0	102.0	87.1	62.0	51.7	28.4
6 OPzS 600 LA	NVZS020600WC0FA	347	341	325.0	312.0	289.0	245.0	211.0	187.0	147.0	123.0	107.0	77.8	66.4	36.4
7 OPzS 700 LA	NVZS020700WC0FA	382	376	359.0	344.0	319.0	270.0	233.0	206.0	162.0	135.0	118.0	85.8	73.2	40.1
8 OPzS 800 LA	NVZS020800WC0FA	505	493	464.0	443.0	407.0	342.0	292.0	255.0	199.0	166.0	145.0	105.0	88.8	48.7
9 OPzS 900 LA	NVZS020900WC0FA	540	531	500.0	477.0	438.0	368.0	315.0	275.0	214.0	179.0	157.0	113.0	95.6	52.4
10 OPzS 1000 LA	NVZS021000WC0FA	605	595	563.0	539.0	497.0	420.0	360.0	317.0	248.0	207.0	180.0	131.0	111.0	61.0
12 OPzS 1200 LA	NVZS021200WC0FA	698	686	655.0	629.0	583.0	494.0	426.0	376.0	295.0	247.0	215.0	157.0	134.0	73.3
12 OPzS 1500 LA	NVZS021500WC0FA	673	668	652.0	633.0	602.0	513.0	465.0	418.0	343.0	292.0	258.0	191.0	162.0	88.3
14 OPzS 1750 LA	NVZS021750WC0FA	713	708	691.0	671.0	638.0	543.0	493.0	442.0	364.0	310.0	274.0	201.0	172.0	93.4
16 OPzS 2000 LA	NVZS022000WC0FA	973	966	934.0	904.0	850.0	708.0	634.0	562.0	454.0	387.0	342.0	252.0	214.0	116.0
18 OPzS 2250 LA	NVZS022250WC0FA	1015	1010	982.0	951.0	894.0	752.0	677.0	602.0	495.0	421.0	373.0	275.0	233.0	127.0
20 OPzS 2500 LA	NVZS022500WC0FA	1205	1200	1165.0	1125.0	1060.0	881.0	790.0	700.0	566.0	482.0	426.0	313.0	267.0	145.0
22 OPzS 2750 LA	NVZS022750WC0FA	1295	1285	1245.0	1205.0	1135.0	944.0	846.0	750.0	606.0	516.0	457.0	336.0	286.0	156.0
24 OPzS 3000 LA	NVZS023000WC0FA	1390	1380	1345.0	1300.0	1220.0	1030.0	924.0	825.0	675.0	575.0	510.0	375.0	319.0	174.0

1.80 V/C – Discharge in A at 20°C														
Type	Part number	3min	10min	15min	20min	30min	1h	1h30	2h	3h	4h	5h	8h	10h	20h
2 OPzS 100 LA	NVZS020100WC0FA	122	116	106	97.7	84.8	61.5	50.1	42.0	32.8	26.6	22.6	15.3	12.8	7.0
3 OPzS 150 LA	NVZS020150WC0FA	155	148	135	124.0	107.0	79.2	64.8	54.9	42.9	34.8	29.5	20.1	16.8	9.2
4 OPzS 200 LA	NVZS020200WC0FA	199	190	174	161.0	140.0	101.0	82.5	69.9	54.6	44.4	37.6	25.6	21.4	11.8
5 OPzS 250 LA	NVZS020250WC0FA	241	230	211	195.0	170.0	124.0	101.0	86.3	66.9	54.5	46.3	31.6	26.5	14.6
6 OPzS 300 LA	NVZS020300WC0FA	281	268	245	227.0	199.0	146.0	120.0	103.0	79.0	64.3	54.9	37.4	31.6	17.4
5 OPzS 350 LA	NVZS020350WC0FA	273	264	251	240.0	216.0	172.0	141.0	120.0	93.1	76.2	65.0	45.6	38.0	20.9
6 OPzS 420 LA	NVZS020420WC0FA	314	303	289	277.0	252.0	200.0	166.0	142.0	111.0	90.9	77.8	54.6	45.5	25.0
7 OPzS 490 LA	NVZS020490WC0FA	358	346	330	316.0	287.0	229.0	192.0	164.0	130.0	106.4	90.6	63.6	53.0	29.2
6 OPzS 600 LA	NVZS020600WC0FA	398	388	368	352.0	325.0	271.0	232.0	202.0	156.0	129.0	112.0	80.2	68.0	37.4
7 OPzS 700 LA	NVZS020700WC0FA	439	428	406	389.0	359.0	299.0	256.0	223.0	173.0	144.0	123.0	88.5	75.0	41.3
8 OPzS 800 LA	NVZS020800WC0FA	572	564	528	501.0	457.0	378.0	319.0	277.0	211.0	175.0	152.0	108.0	91.0	50.1
9 OPzS 900 LA	NVZS020900WC0FA	623	608	568	539.0	492.0	407.0	343.0	298.0	227.0	188.0	164.0	117.0	98.0	53.9
10 OPzS 1000 LA	NVZS021000WC0FA	695	678	639	609.0	559.0	464.0	394.0	343.0	263.0	218.0	189.0	135.0	114.0	62.7
12 OPzS 1200 LA	NVZS021200WC0FA	800	781	741	710.0	655.0	547.0	467.0	407.0	315.0	261.0	225.0	162.0	137.0	75.4
12 OPzS 1500 LA	NVZS021500WC0FA	785	777	756	731.0	690.0	578.0	520.0	462.0	374.0	316.0	277.0	201.0	170.0	93.2
14 OPzS 1750 LA	NVZS021750WC0FA	831	823	801	774.0	731.0	612.0	551.0	490.0	396.0	334.0	293.0	212.0	180.0	98.6
16 OPzS 2000 LA	NVZS022000WC0FA	1135	1125	1080	1040.0	974.0	798.0	709.0	622.0	495.0	418.0	367.0	265.0	225.0	123.0
18 OPzS 2250 LA	NVZS022250WC0FA	1185	1175	1140	1095.0	1025.0	848.0	757.0	666.0	539.0	455.0	399.0	289.0	245.0	134.0
20 OPzS 2500 LA	NVZS022500WC0FA	1390	1375	1345	1300.0	1210.0	993.0	884.0	775.0	616.0	520.0	456.0	330.0	280.0	153.0
22 OPzS 2750 LA	NVZS022750WC0FA	1510	1495	1445	1390.0	1300.0	1065.0	946.0	830.0	660.0	557.0	489.0	354.0	300.0	164.0
24 OPzS 3000 LA	NVZS023000WC0FA	1620	1605	1555	1500.0	1400.0	1160.0	1035.0	911.0	737.0	622.0	546.0	395.0	335.0	184.0

OPzS cell

1.75 V/C – Discharge in A at 20°C															
Type	Part number	3min	10min	15min	20min	30min	1h	1h30	2h	3h	4h	5h	8h	10h	20h
2 OPzS 100 LA	NVZS020100WC0FA	147	137	125	113	96.1	66.4	52.9	44.2	34.3	27.7	23.5	15.9	13.1	7.2
3 OPzS 150 LA	NVZS020150WC0FA	188	175	158	144	122.0	85.3	68.5	57.8	44.9	36.4	30.7	21.0	17.3	9.5
4 OPzS 200 LA	NVZS020200WC0FA	243	226	205	186	158.0	109.0	87.2	73.5	57.1	46.3	39.1	26.7	22.1	12.1
5 OPzS 250 LA	NVZS020250WC0FA	294	274	249	225	193.0	134.0	107.0	90.8	70.0	56.8	48.1	32.9	27.3	15.0
6 OPzS 300 LA	NVZS020300WC0FA	343	319	290	263	226.0	158.0	127.0	108.0	82.6	67.0	57.1	39.0	32.6	17.8
5 OPzS 350 LA	NVZS020350WC0FA	333	316	296	281	247.0	190.0	153.0	129.0	97.3	79.7	68.0	47.1	39.1	21.5
6 OPzS 420 LA	NVZS020420WC0FA	383	364	341	323	288.0	221.0	180.0	152.0	116.0	95.0	81.4	56.4	46.9	25.7
7 OPzS 490 LA	NVZS020490WC0FA	438	416	390	369	328.0	252.0	207.0	176.0	136.0	111.0	94.9	65.7	54.6	29.9
6 OPzS 600 LA	NVZS020600WC0FA	480	462	437	416	381.0	306.0	258.0	220.0	167.0	136.0	116.0	83.0	70.0	38.4
7 OPzS 700 LA	NVZS020700WC0FA	530	510	482	459	420.0	338.0	285.0	242.0	184.0	150.0	128.0	91.5	77.3	42.4
8 OPzS 800 LA	NVZS020800WC0FA	703	677	630	592	534.0	430.0	353.0	303.0	226.0	184.0	157.0	112.0	92.8	51.4
9 OPzS 900 LA	NVZS020900WC0FA	758	730	678	637	575.0	463.0	380.0	326.0	243.0	198.0	170.0	121.0	100.0	55.4
10 OPzS 1000 LA	NVZS021000WC0FA	843	812	761	719	654.0	526.0	438.0	374.0	281.0	229.0	196.0	140.0	117.0	64.4
12 OPzS 1200 LA	NVZS021200WC0FA	968	932	881	838	767.0	617.0	521.0	443.0	336.0	273.0	233.0	167.0	141.0	77.4
12 OPzS 1500 LA	NVZS021500WC0FA	966	952	923	884	824.0	676.0	598.0	524.0	413.0	346.0	301.0	212.0	178.0	97.4
14 OPzS 1750 LA	NVZS021750WC0FA	1025	1010	977	936	873.0	716.0	634.0	554.0	437.0	366.0	319.0	225.0	188.0	103.0
16 OPzS 2000 LA	NVZS022000WC0FA	1395	1375	1320	1260	1165.0	933.0	817.0	705.0	547.0	458.0	398.0	281.0	235.0	129.0
18 OPzS 2250 LA	NVZS022250WC0FA	1460	1440	1390	1325	1225.0	993.0	871.0	755.0	595.0	498.0	434.0	306.0	256.0	141.0
20 OPzS 2500 LA	NVZS022500WC0FA	1735	1710	1645	1565	1450.0	1165.0	1015.0	877.0	680.0	569.0	496.0	350.0	293.0	161.0
22 OPzS 2750 LA	NVZS022750WC0FA	1855	1830	1765	1680	1550.0	1245.0	1090.0	940.0	729.0	610.0	531.0	375.0	313.0	172.0
24 OPzS 3000 LA	NVZS023000WC0FA	2000	1970	1900	1810	1675.0	1360.0	1190.0	1030.0	814.0	681.0	593.0	419.0	350.0	192.0

1.70 V/C – Discharge in A at 20°C															
Type	Part number	3min	10min	15min	20min	30min	1h	1h30	2h	3h	4h	5h	8h	10h	20h
2 OPzS 100 LA	NVZS020100WC0FA	173	157	139	125	105	69.7	54.8	45.2	35.2	28.3	23.9	16.0	13.3	7.3
3 OPzS 150 LA	NVZS020150WC0FA	220	200	177	160	134	89.4	71.0	59.1	46.0	37.0	31.2	21.1	17.5	9.6
4 OPzS 200 LA	NVZS020200WC0FA	284	258	229	206	172	115.0	90.3	75.2	58.6	47.3	39.7	26.9	22.3	12.2
5 OPzS 250 LA	NVZS020250WC0FA	344	313	278	250	210	141.0	111.0	93.0	71.8	57.9	48.9	33.1	27.6	15.1
6 OPzS 300 LA	NVZS020300WC0FA	403	366	325	292	247	166.0	132.0	111.0	84.8	68.4	58.0	39.3	32.9	18.0
5 OPzS 350 LA	NVZS020350WC0FA	394	368	339	316	274	202.0	161.0	134.0	100.0	81.4	69.5	47.1	39.9	22.0
6 OPzS 420 LA	NVZS020420WC0FA	453	423	390	364	319	235.0	189.0	158.0	120.0	97.7	83.3	57.8	47.8	26.4
7 OPzS 490 LA	NVZS020490WC0FA	517	483	446	416	364	269.0	218.0	183.0	140.0	114.0	97.0	67.3	55.7	30.7
6 OPzS 600 LA	NVZS020600WC0FA	562	535	507	479	433	337.0	279.0	233.0	173.0	139.0	118.0	84.3	70.7	39.1
7 OPzS 700 LA	NVZS020700WC0FA	619	590	559	528	478	371.0	308.0	257.0	191.0	154.0	130.0	93.0	78.0	43.1
8 OPzS 800 LA	NVZS020800WC0FA	824	785	728	678	606	471.0	379.0	322.0	237.0	190.0	160.0	114.0	94.6	52.3
9 OPzS 900 LA	NVZS020900WC0FA	888	846	784	730	653	508.0	409.0	347.0	255.0	204.0	172.0	123.0	102.0	56.4
10 OPzS 1000 LA	NVZS021000WC0FA	988	941	881	826	743	577.0	471.0	397.0	294.0	237.0	199.0	142.0	119.0	65.6
12 OPzS 1200 LA	NVZS021200WC0FA	1135	1080	1020	964	873	678.0	562.0	469.0	349.0	281.0	237.0	170.0	142.0	78.8
12 OPzS 1500 LA	NVZS021500WC0FA	1145	1125	1085	1030	950	768.0	665.0	573.0	442.0	367.0	318.0	219.0	182.0	100.0
14 OPzS 1750 LA	NVZS021750WC0FA	1215	1190	1150	1090	1005	814.0	704.0	607.0	468.0	389.0	337.0	232.0	193.0	106.0
16 OPzS 2000 LA	NVZS022000WC0FA	1655	1625	1555	1470	1345	1060.0	907.0	771.0	585.0	486.0	421.0	290.0	241.0	132.0
18 OPzS 2250 LA	NVZS022250WC0FA	1735	1700	1635	1545	1410	1125.0	968.0	826.0	637.0	529.0	458.0	316.0	262.0	144.0
20 OPzS 2500 LA	NVZS022500WC0FA	2060	2020	1930	1830	1670	1320.0	1130.0	960.0	728.0	605.0	524.0	361.0	300.0	165.0
22 OPzS 2750 LA	NVZS022750WC0FA	2205	2165	2070	1960	1785	1415.0	1210.0	1025.0	780.0	648.0	561.0	387.0	321.0	176.0
24 OPzS 3000 LA	NVZS023000WC0FA	2375	2330	2230	2115	1930	1540.0	1325.0	1130.0	871.0	723.0	626.0	432.0	358.0	197.0

OPzS cell

1.65 V/C – Discharge in A at 20°C														
Type	Part number	3min	10min	15min	20min	30min	1h	1h30	2h	3h	4h	5h	8h	10h	20h
2 OPzS 100 LA	NVZS020100WC0FA	196	174	151	135	111	71.8	55.8	46.4	35.7	28.6	24.1	16.0	13.3	7.3
3 OPzS 150 LA	NVZS020150WC0FA	249	221	194	172	142	91.7	72.3	60.1	46.7	37.5	31.5	21.1	17.5	9.6
4 OPzS 200 LA	NVZS020200WC0FA	322	286	249	222	182	118.0	92.0	76.4	59.4	47.7	40.1	26.9	22.3	12.2
5 OPzS 250 LA	NVZS020250WC0FA	392	348	303	270	222	145.0	113.0	94.6	72.8	58.6	49.4	33.1	27.6	15.1
6 OPzS 300 LA	NVZS020300WC0FA	458	407	355	315	261	171.0	134.0	113.0	86.0	69.3	58.6	39.3	32.9	18.0
5 OPzS 350 LA	NVZS020350WC0FA	454	417	379	349	297	211.0	167.0	137.0	103.0	82.9	69.9	47.1	39.9	22.0
6 OPzS 420 LA	NVZS020420WC0FA	522	480	437	402	346	246.0	196.0	162.0	123.0	99.1	83.7	57.8	47.8	26.4
7 OPzS 490 LA	NVZS020490WC0FA	596	548	499	459	395	280.0	226.0	187.0	143.0	115.0	97.5	67.3	55.7	30.7
6 OPzS 600 LA	NVZS020600WC0FA	643	605	576	541	482	364.0	294.0	243.0	177.0	141.0	119.0	86.4	71.4	39.4
7 OPzS 700 LA	NVZS020700WC0FA	710	668	635	596	532	401.0	324.0	269.0	196.0	156.0	131.0	95.3	78.8	43.5
8 OPzS 800 LA	NVZS020800WC0FA	945	890	824	760	673	502.0	399.0	335.0	244.0	194.0	162.0	116.0	95.6	52.8
9 OPzS 900 LA	NVZS020900WC0FA	1015	958	887	818	725	541.0	430.0	361.0	263.0	209.0	174.0	124.0	103.0	56.8
10 OPzS 1000 LA	NVZS021000WC0FA	1130	1065	999	929	826	620.0	496.0	414.0	302.0	241.0	201.0	145.0	120.0	66.1
12 OPzS 1200 LA	NVZS021200WC0FA	1295	1220	1160	1090	971	733.0	592.0	490.0	358.0	286.0	240.0	174.0	144.0	79.5
12 OPzS 1500 LA	NVZS021500WC0FA	1330	1300	1240	1175	1070	853.0	721.0	612.0	462.0	382.0	330.0	223.0	184.0	101.0
14 OPzS 1750 LA	NVZS021750WC0FA	1410	1375	1315	1245	1135	904.0	763.0	648.0	490.0	405.0	349.0	236.0	194.0	107.0
16 OPzS 2000 LA	NVZS022000WC0FA	1920	1875	1775	1675	1510	1180.0	984.0	824.0	612.0	506.0	436.0	295.0	243.0	133.0
18 OPzS 2250 LA	NVZS022250WC0FA	2015	1965	1870	1765	1590	1250.0	1050.0	882.0	666.0	550.0	475.0	321.0	265.0	145.0
20 OPzS 2500 LA	NVZS022500WC0FA	2390	2335	2215	2090	1885	1465.0	1220.0	1025.0	762.0	630.0	543.0	367.0	302.0	166.0
22 OPzS 2750 LA	NVZS022750WC0FA	2555	2495	2370	2235	2015	1570.0	1310.0	1100.0	815.0	674.0	582.0	393.0	324.0	178.0
24 OPzS 3000 LA	NVZS023000WC0FA	2755	2690	2555	2415	2175	1710.0	1435.0	1205.0	911.0	753.0	650.0	439.0	362.0	199.0

1.60 V/C – Discharge in A at 20°C														
Type	Part number	3min	10min	15min	20min	30min	1h	1h30	2h	3h	4h	5h	8h	10h	20h
2 OPzS 100 LA	NVZS020100WC0FA	216	188	162	143	116	73.3	56.4	46.5	36.0	29.4	24.0	16.0	13.3	7.3
3 OPzS 150 LA	NVZS020150WC0FA	275	239	207	182	147	93.4	72.9	60.7	47.0	37.3	31.4	21.1	17.5	9.6
4 OPzS 200 LA	NVZS020200WC0FA	355	309	267	235	190	121.0	92.8	77.3	59.9	47.6	39.9	26.9	22.3	12.2
5 OPzS 250 LA	NVZS020250WC0FA	434	377	325	286	232	148.0	114.0	95.7	73.4	58.3	49.2	33.1	27.6	15.1
6 OPzS 300 LA	NVZS020300WC0FA	508	442	381	335	272	176.0	136.0	114.0	86.6	68.8	58.3	39.3	32.9	18.0
5 OPzS 350 LA	NVZS020350WC0FA	515	466	418	377	319	217.0	171.0	139.0	105.0	83.4	69.2	47.1	39.9	22.0
6 OPzS 420 LA	NVZS020420WC0FA	592	536	481	435	370	253.0	200.0	165.0	125.0	99.3	82.8	57.8	47.8	26.4
7 OPzS 490 LA	NVZS020490WC0FA	676	612	549	496	423	288.0	231.0	190.0	146.0	116.0	96.5	67.3	55.7	30.7
6 OPzS 600 LA	NVZS020600WC0FA	723	673	645	602	528	388.0	305.0	252.0	179.0	142.0	119.0	86.4	71.4	39.4
7 OPzS 700 LA	NVZS020700WC0FA	799	743	712	665	583	428.0	336.0	278.0	197.0	156.0	131.0	95.3	78.8	43.5
8 OPzS 800 LA	NVZS020800WC0FA	1065	992	917	837	737	524.0	416.0	342.0	248.0	195.0	162.0	116.0	95.6	52.8
9 OPzS 900 LA	NVZS020900WC0FA	1150	1070	988	902	794	564.0	448.0	368.0	267.0	211.0	174.0	124.0	103.0	56.8
10 OPzS 1000 LA	NVZS021000WC0FA	1270	1185	1115	1030	905	653.0	516.0	426.0	305.0	242.0	201.0	145.0	120.0	66.1
12 OPzS 1200 LA	NVZS021200WC0FA	1455	1355	1300	1215	1065	781.0	614.0	508.0	360.0	286.0	240.0	174.0	144.0	79.5
12 OPzS 1500 LA	NVZS021500WC0FA	1515	1470	1395	1320	1190	933.0	767.0	642.0	476.0	391.0	337.0	224.0	184.0	101.0
14 OPzS 1750 LA	NVZS021750WC0FA	1605	1560	1475	1395	1260	988.0	812.0	680.0	504.0	414.0	356.0	238.0	194.0	107.0
16 OPzS 2000 LA	NVZS022000WC0FA	2185	2125	1995	1880	1680	1290.0	1045.0	864.0	630.0	518.0	445.0	297.0	243.0	133.0
18 OPzS 2250 LA	NVZS022250WC0FA	2290	2225	2100	1975	1765	1370.0	1115.0	926.0	686.0	564.0	485.0	323.0	265.0	145.0
20 OPzS 2500 LA	NVZS022500WC0FA	2725	2645	2485	2340	2090	1600.0	1305.0	1080.0	784.0	645.0	554.0	370.0	302.0	166.0
22 OPzS 2750 LA	NVZS022750WC0FA	2920	2835	2660	2510	2240	1715.0	1395.0	1155.0	840.0	690.0	594.0	396.0	324.0	178.0
24 OPzS 3000 LA	NVZS023000WC0FA	3135	3045	2870	2705	2415	1875.0	1525.0	1265.0	938.0	771.0	663.0	442.0	362.0	199.0

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Installation instruction
for stationary lead acid batteries (Batteries / Stands / Cabinets)

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- Observe these Instructions and keep them located near 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 50 272-2, DIN 50110-1.

- An acid splash 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 short circuits.

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

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

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

1. Installation preconditions and preparations

1.1
Prior to commencing installation, ensure that the battery room is clean and dry and that it has a lockable door. The battery room must meet the requirements in accordance with EN 50 272-2 and be marked as such. Pay attention to the following aspects:

– Load bearing capacity and nature of the floor (transport paths and battery room)
– Electrolytic resistance of the area where the battery is to be installed
– Ventilation

To ensure trouble free installation, coordination should be made with other personnel working in the same area.

1.2
Check delivery for complete and undamaged components. If necessary, clean all parts prior to installation.

1.3
Follow instructions in the documentation supplied (e.g. installation drawings for battery, stand, cabinet).

1.4
Prior to removing old batteries always ensure that all of the leads have been disconnected (load-break switches, fuses, insulations). This must be carried out only by personnel authorised to perform circuit operations.

<u>WARNING:</u> Do not carry out any unauthorised circuit operation!

1.5
Carry out open circuit voltage measurements on the individual cells or monobloc batteries. At the same time, ensure that they are connected in the correct polarity. As for unfilled and charged batteries, these measurements can only be taken after commissioning. The open-circuit voltages for fully charged cells at an electrolyte temperature of 20 °C are as follows:

OPzS-cells	DIN 40736	2.08 ± 0.01 [Vpc]
OPzS-monobloc batt.	DIN 40737	2.08 ± 0.01 [Vpc]
OCSM-cells		2.10 ± 0.01 [Vpc]
GroE-cells	DIN 40738	2.06 ± 0.01 [Vpc]
OGi-monobloc batteries		2.10 ± 0.01 [Vpc]
OGi-cells	DIN 40734	2.10 ± 0.01 [Vpc]
OGiV-monobloc batt.	DIN 40741, part 1	2.10 ± 0.01 [Vpc]
Other OGiV-batteries monobloc	Depending on construction	2.08 - 2.14* [Vpc]
OPzV-cells	DIN 40742 (draft)	2.08 - 2.14* [Vpc]
OPzV-monobloc batt.	DIN 40744 (draft)	2.08 - 2.14* [Vpc]

* according to manufacturer's information

The open-circuit voltage of the individual cells must not vary from each other by more than 0.02 V. With regard to monobloc batteries, the maximum deviations of the open-circuit voltage are as follows:

4 V	monobloc batteries	0.03 V/bloc
6 V	monobloc batteries	0.04 V/bloc
12 V	monobloc batteries	0.05 V/bloc

Higher temperatures cause the open-circuit voltage to be lower, whereas lower temperatures cause it to be higher. At a deviation of 15 K from the nominal temperature, the open circuit-voltage changes by 0.01 Vpc. If the deviation is any higher, contact the supplier.

2. Stands

2.1
Locate the stands/racks within the battery room in accordance with the installation plan. If an installation plan does not exist, observe the following minimum distances:

– From the wall: 100 mm all around, with regard to cells or monoblocs, or 50 mm, concerning of the stands.
– At a nominal voltage or partial voltage >120 V: 1.5 metres between non-insulated leads or connectors and grounded parts (e.g. water pipes) and/or between the battery terminals. During the installation of the batteries, ensure that EN 50 272-2 part 2 is observed (e.g. by covering electrically conductive parts with insulating mats).
– Width of aisles: 1.5 x cell width (built-in depth), but not less than 500 mm.

2.2
Balance battery stands horizontally, using the balance parts supplied, or adjustable insulators.

The distances of the base rails must correspond to the dimensions of the cells or monobloc batteries. Check the stands for stability and all screwed and clamped joints for firm connection. Earth (ground) the stand or parts of the stand, if required. Screwed joints must be protected against corrosion.

2.3
Check cells or monobloc batteries for perfect condition (visual check, polarity).

2.4
Place cells or monobloc batteries on the stand one after another, ensuring correct polarity. For large cells it is useful to start installing the cells in the middle of the stand:

- Align cells or monobloc batteries parallel to each other. Distance between cells or monobloc batteries approx. 10 mm, at least 5 mm.
- If necessary, clean the contacting surfaces of the terminals and connectors.
- Place and screw intercell or monobloc connectors, using an insulated torque wrench (for correct torque value refer to battery operating instructions). If applicable, observe special instructions with regard to the intercell connectors (e.g. welded connectors).
- Place the series, step or tier connectors supplied and screw them together, observing the given torque values.
- Avoid short circuits! Use leads of at least 3 kV breakdown voltage or keep an air distance of approx. 10 mm between the leads and electrically conductive parts, or apply additional insulation to the connectors. Avoid applying any mechanical force on the cell/battery poles.
- If applicable, remove transport plugs and replace by operational plugs.
- Check electrolyte level. (Observe operating instructions / commissioning instructions).
- Measure total voltage (nominal voltage: sum of open circuit voltages of the individual cells or monobloc batteries).
- If necessary sequentially number the cells or monobloc batteries in a visible place between the positive terminal of the battery and the negative terminal of the battery.
- Apply polarity signs for the battery leads.
- Attach safety marking, type lable and operating instructions in a visible place.
- If necessary, fit insulating covers for cell / monobloc connectors and terminals.

3. Cabinets
3.1
Cabinets with **built-in** battery:

- Install the battery cabinet at the location assigned, observing the accident prevention rules.
- Leave additional space from the wall for possible or planned cable entries.
- If applicable, remove transport protection from the built-in cells or monobloc batteries.
- Check cells or monobloc batteries for correct positioning and for any mechanical damage.

3.2
Cabinets with **separately delivered** cells or monobloc batteries:

- Only filled and charged cells and/or monobloc batteries (vented or valve regulated) are built into cabinets.
- Assemble cabinet, place and align at the assigned location (observe the accident prevention rules).
- Place cells or monobloc batteries in the cabinet, in accordance with the installation plan and the defined distances, connect electrically and apply markings (see point 2.4).

4. CE marking
From 1 January 1997, batteries with a nominal voltage from 75 V onwards require an EC conformity declaration in accordance with the low voltage directive (73/23/EWG), which entails that the CE marking is applied to the battery.
The company installing the battery is responsible for supplying the declaration and applying the CE marking.

WARNING:
Prior to connecting the battery to the charger, ensure that all installation work has been duly completed.

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Temperature Effects on Batteries
Battery capacity (how many amp-hours it can hold) is reduced as temperature goes down, and increased as temperature goes up. This is why your car battery dies on a cold winter morning, even though it worked fine the previous afternoon. If your batteries spend part of the year shivering in the cold, the reduced capacity has to be taken into account when sizing the system batteries. The standard rating for batteries is at room temperature - 25 degrees C (about 77 F). At approximately -22 degrees F (-27 C), battery AH capacity drops to 50%. At freezing, capacity is reduced by 20%. Capacity is increased at higher temperatures - at 122 degrees F, battery capacity would be about 12% higher.

Battery charging voltage also changes with temperature. It will vary from about 2.74volts per cell (16.4 volts) at -40 C to 2.3 volts per cell (13.8 volts) at 50C. This is why you should have temperature compensation on your charger or charge control if your batteries are outside and/or subject to wide temperature variations. Some charge controls have temperature compensation built in (such as Morning-star) - this works fine if the controller is subject to the same temperatures as the batteries. However, if your batteries are outside, and the controller is inside, it does not work that well. Adding another complication is that large battery banks make up a large thermal mass.

Thermal mass means that because they have so much mass, they will change internal temperature much slower than the surrounding air temperature. A large insulated battery bank may vary as little as 10degrees over 24hours internally, even though the air temperature varies from 20 to 70degrees. For this reason, external (add-on) temperature sensors should be attached to one of the POSITIVE plate terminals, and bundled up a little with some type of insulation on the terminal. The sensor will then read very close to the actual internal battery temperature.

Even though battery capacity at high temperatures is higher, battery life is shortened. Battery capacity is reduced by 50% at -22degrees F - but battery LIFE increases by about 60%. Battery life is reduced at higher temperatures - for every 15 degrees F over 77, battery life is cut in half. This holds true for ANY type of Lead-Acid battery, whether sealed, gelled, AGM, industrial or whatever. This is actually not as bad as it seems, as the battery will tend to average out the good and bad times. Click on the small graph to see a full size chart of temperature vs. capacity.

One last note on temperatures - in some places that have extremely cold or hot conditions, batteries may be sold locally that are NOT standard electrolyte (acid) strengths. The electrolyte may be stronger (for cold) or weaker (for very hot) climates. In such cases, the specific gravity and the voltages may vary from what we show.

Cycles vs. Life
A battery "cycle" is one complete discharge and recharge cycle. It is usually considered to be discharging from 100% to 20%, and then back to 100%. However, there are often ratings for other depth of discharge cycles, the most common ones are 10%, 20%, and 50%. You have to be careful when looking at ratings that list how many cycles a battery is rated for unless it also states how far down it is being discharged. For example, one of the widely advertised telephone type (float service) batteries has been advertised as having a 20-year life. If you look at the fine print, it has that rating only at 5% DOD - it is much less when used in an application where they are cycled deeper on a regular basis. Those same batteries are rated at less than 5 years if cycled to 50%. For example, most golf cart batteries are rated for about 550 cycles to 50% discharge - which equates to about 2 years.

Battery life is directly related to how deep the battery is cycled each time. If a battery is discharged to 50% every day, it will last about twice as long as if it is cycled to 80% DOD. If cycled only 10% DOD, it will last about 5 times as long as one cycled to 50%. Obviously, there are some practical limitations on this - you don't usually want to have a 5-ton pile of batteries sitting there just to reduce the DOD. The most practical number to use is 50% DOD on a regular basis. This does NOT mean you cannot go to 80% once in a while. It's just that when designing a system when you have some idea of the loads, you should figure on an average DOD of around 50% for the best storage vs. cost factor. Also, there is an upper limit - a battery that is continually cycled 5% or less will usually not last as long as one cycled down 10%. This happens because at very shallow

cycles, the Lead Dioxide tends to build up in clumps on the positive plates rather in an even film. The graph above shows how lifespan is affected by depth of discharge. The chart is for a Concorde Lifeline battery, but all lead-acid batteries will be similar in the shape of the curve, although the number of cycles will vary.

State of Charge
State of charge, or conversely, the depth of discharge (DOD) can be determined by measuring the voltage and/or the specific gravity of the acid with a hydrometer. This will NOT tell you how good (capacity in AH) the battery condition is - only a sustained load test can do that. Voltage on a fully charged battery will read 2.12 to 2.15 volts per cell, or 12.7 volts for a 12-volt battery. At 50% the reading will be 2.03 VPC (Volts Per Cell), and at 0% will be 1.75 VPC or less. Specific gravity will be about 1.265 for a fully charged cell, and 1.13 or less for a totally discharged cell. This can vary with battery types and brands somewhat - when you buy new batteries you should charge them up and let them sit for a while, and then take a reference measurement. Many batteries are sealed, and hydrometer reading cannot be taken, so you must rely on voltage. Hydrometer readings may not tell the whole story, as it takes a while for the acid to get mixed up in wet cells. If measured right after charging, you might see 1.27 at the top of the cell, even though it is much less at the bottom. This does not apply to gelled or AGM batteries.

"False" Capacity
A battery can meet all the tests for being at full charge, yet be much lower than it's original capacity. If plates are damaged, sulfated, or partially gone from long use, the battery may give the appearance of being fully charged, but in reality acts like a battery of much smaller size. This same thing can occur in gelled cells if they are overcharged and gaps or bubbles occur in the gel. What is left of the plates may be fully functional, but with only 20% of the plates left... Batteries usually go bad for other reasons before reaching this point, but it is something to be aware of if your batteries seem to test OK but lack capacity and go dead very quickly under load.

On the table below, you have to be careful that you are not just measuring the surface charge. To properly check the voltages, the battery should sit at rest for a few hours, or you should put a small load on it, such as a small automotive bulb, for a few minutes. The voltages below apply to ALL Lead-Acid batteries, except gelled. For gel cells, subtract .2 volts. Note that the voltages when actually charging will be quite different so do not use these numbers for a battery that is under charge.

Amp-Hour Capacity
All deep cycle batteries are rated in amp-hours. An amp-hour is one amp for one hour, or 10 amps for 1/10 of an hour and so forth. It is amps x hours. If you have something that pulls 20 amps, and you use it for 20 minutes, then the amp-hours used would be 20 (amps) x .333 (hours), or 6.67 AH. The accepted AH rating time period for batteries used in solar electric and backup power systems (and for nearly all deep cycle batteries) is the "20 hour rate". This means that it is discharged down to 10.5 volts over a 20-hour period while the total actual amp-hours it supplies is measured. Sometimes ratings at the 6-hour rate and 100 hour rate are also given for comparison and for different applications. The 6-hour rate is often used for industrial batteries, as that is a typical daily duty cycle. Sometimes the 100-hour rate is given just to make the battery look better than it really is, but it is also useful for figuring battery capacity for long-term backup amp-hour requirements.

State of Charge
Here are no-load typical voltages vs. state of charge
(Figured at 10.5 volts = fully discharged, and 77 degrees F). Voltages are for a 12-volt battery system. For 24-volt systems multiply by 2, for 48-volt system, multiply by 4. VPC is the volts per individual cell - if you measure more than a .2 volt difference between each cell, you need to equalize, or your batteries are going bad, or they may be sulfated. These voltages are for batteries that have been at rest for 3 hours or more. Batteries that are being charged will be higher - the voltages while under charge will not tell you anything, you have to let the battery sit for a while. For longest life, batteries should stay in the green zone. Occasional dips into the yellow are not harmful, but continual discharges to those levels will shorten battery life considerably. It is important to realize that voltage measurements are only approximate. The best determination is to

measure the specific gravity, but in many batteries this is difficult or impossible. Note the large voltage drop in the last 10%.

S/No	State of Charge	12V Configuration (V)	2V Configuration (V)
1.	100%	12.7	2.12
2.	90%	12.5	2.08
3.	80%	12.42	2.07
4.	70%	12.32	2.05
5.	60%	12.20	2.03
6.	50%	12.06	2.01
7.	40%	11.9	1.98
8.	30%	11.75	1.96
9.	20%	11.58	1.93
10.	10%	11.31	1.89
11.	5%	11	1.83
11.	0%	10.5	1.75

Battery Charging

Battery charging takes place in 3 basic stages: Bulk, Absorption, and Float.

Bulk Charge - The first stage of 3-stage battery charging. Current is sent to batteries at the maximum safe rate they will accept until voltage rises to near (80-90%) full charge level. Voltages at this stage typically range from 10.5 volts to 15 volts. There is no "correct" voltage for bulk charging, but there may be limits on the maximum current that the battery and/or wiring can take.

Absorption Charge: The 2nd stage of 3-stage battery charging. Voltage remains constant and current gradually tapers off as internal resistance increases during charging. It is during this stage that the charger puts out maximum voltage. Voltages at this stage are typically around 14.2 to 15.5 volts.

Float Charge: The 3rd stage of 3-stage battery charging. After batteries reach full charge, charging voltage is reduced to a lower level (typically 12.8 to 13.2) to reduce gassing and prolong battery life. This is often referred to as a maintenance or trickle charge, since it's main purpose is to keep an already charged battery from discharging. PWM, or "pulse width modulation" accomplishes the same thing. In PWM, the controller or charger senses tiny voltage drops in the battery and sends very short charging cycles (pulses) to the battery. This may occur several hundred times per minute. It is called "pulse width" because the width of the pulses may vary from a few microseconds to several seconds. Note that for long term float service, such as backup power systems that are seldom discharged, the float voltage should be around 13.02 to 13.20 volts.

Chargers: Most garage and consumer (automotive) type battery chargers are bulk charge only, and have little (if any) voltage regulation. They are fine for a quick boost to low batteries, but not to leave on for long periods. Among the regulated chargers, there are the voltage regulated ones, such as Iota Engineering and Todd, which keep a constant regulated voltage on the batteries. If these are set to the correct voltages for your batteries, they will keep the batteries charged without damage. These are sometimes called "taper charge" - as if that is a selling point. What taper charge really means is that as the battery gets charged up, the voltage goes up, so the amp out of the charger goes down. They charge OK, but a charger rated at 20 amps may only be supplying 5 amps when the batteries are 80% charged. To get around this, Sam A&E has come out with "smart" or multi-stage chargers. These use a variable voltage to keep the charging amps much more constant for faster charging.