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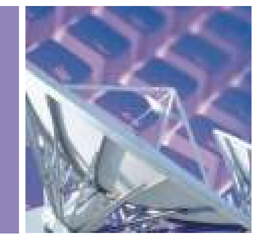
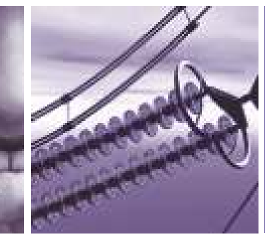
(Edition Apr 2008)

One of the largest VRLA Battery manufacturers in the world

VISION
Rechargeable Products
Valve Regulated Lead-Acid Battery





www.vision-batt.com

CL Series

Shenzhen Center Power Tech. Co., Ltd

Contents

General Features

Stable Quality & High Reliability

VISION battery is well-known for its stable and reliable performance.VISION batteries are easy to maintain;thus,permitting a safe and proper operation of the equipment that the battery powers.The battery can withstand overcharge,over discharge,vibration,and shock.It is also capable of extended storage.

Sealed Construction

VISION's unique construction and sealing technique guarantees that no electrolyte leakage can occur from the terminals or case of any VISION battery. This feature insures safe and efficient operation of VISION batteries in any position. VISION batteries are classified as "Non-Spillable" and will meet all requirements of the International Air Transportation Association. (IATA Dangerous Goods Regulation,41# Edition,Section 4.5A,Special Provision:A67)

Long Service Life, Float or Cyclic

The VISION VRLA battery has a long life in float or cyclic service. The expected life of float service is 20 yeas @ 25^{O}C, and life of cyclic service as shown on Figure 4.

Maintenance-Free Operation

During the expected float service life of VISION batteries, there is no need to check the specific gravity of the electrolyte, or add water. In fact, there is no provision for these maintenance functions.

Low Pressure Venting System

VISION batteries are equipped with a safe low pressure venting system,which operates from 1 psi to 6 psi.The venting system is designed to release excess gas in the event that the gas pressure rises to a level above the normal rate.Afterwards,the venting system automatically re-seals itself when the gas pressure level returns its normal rate.This feature prevents excessive build up of gas in the batteries. This low pressure venting system, coupled with the extraordinarily high recombination efficiency, make VISION batteries the safest VRLA batteries available.

Heavy Duty Grids

The heavy-duty lead calcium-alloy grids in VISION batteries provide an extra margin of performance and service life in both float and cyclic applications, even in conditions of deep discharge.

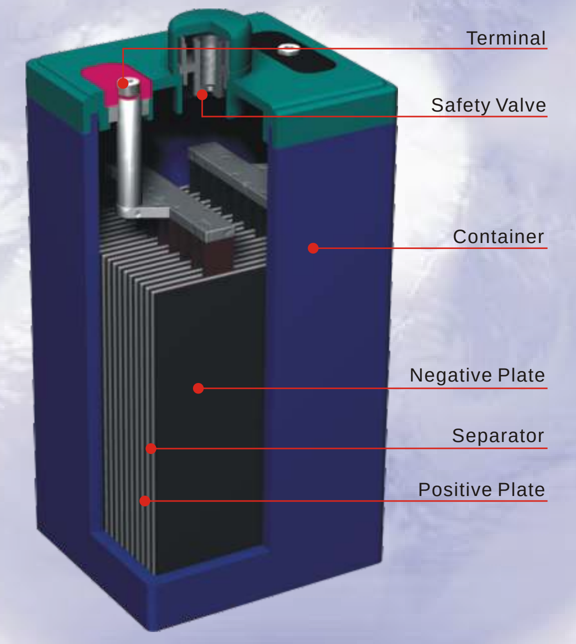
Low Self Discharge

Because of the use of Lead Calcium grids alloy, VISION VRLA battery can be stored for long periods of time without recharge.

Construction

Positive plates

Positive plates are made from a Lead-Calcium system.



Negative Plates

Negative plates are made from a Lead-Calcium system.

Separators

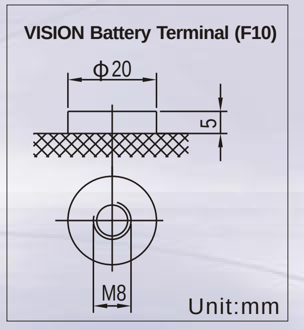
The glass fiber separators in VISION VRLA batteries have high absorbability to acid. The high porosity of the separators retains adequate electrolyte for the reaction of active materials in the plates.

Safety Vents

The venting system, which operates at 1 psi to 6 psi (0.07-0.43kg/cm^2)is designed to release excess gas and keep the internal pressure within the optimum range of safety. At the same time, it protects the negative plates from contamination from oxygen in the air. Vents are 100% visually inspected during battery production.

Terminals

Depending on the battery model, the terminals may be F10......Excellent terminal sealing construction has been achieved by using long mechanical sealing paths and A selection of small shrinkage ratios for the sealing materials.



Case Materials

Standard case and cover are manufactured from ABS resin.

Applications

- Communication equipment
- Telecommunication control equipment
- Emergency lighting systems
- Electric power systems
- Power station
- Nuclear power station
- Solar powered and wind powered systems
- Load leveling and storage equipment
- Marine equipment
- Power generation plants
- Alarm systems
- Uninterruptible power supplies and stand-by power for computers
- Medical equipment
- Fire and security systems
- Control equipment
- Stand-by electric power

Principle of VRLA batteries

During conventional lead acid battery charging, water electrolysis occurs at the final stage ,then(so) hydrogen generates from the negative plates and oxygen from the positive plates.

This causes water loss and periodic watering is needed. However, evolution of oxygen and hydrogen gases does not occur simultaneously, because the recharge of the positive plates is not as efficient as the negative ones. This means that oxygen is evolved from the positive plate before hydrogen is evolved from the negative plate.

At the same time that oxygen is evolved from the positive plate, a substantial amount of highly active spongy lead exists on the negative plate before it commences hydrogen evolution. Therefore, providing oxygen can be transported to the negative plates, conditions are ideal for a rapid reaction between lead and oxygen, i.e. oxygen is electrochemically reduced on the negative plate according to the following formula,

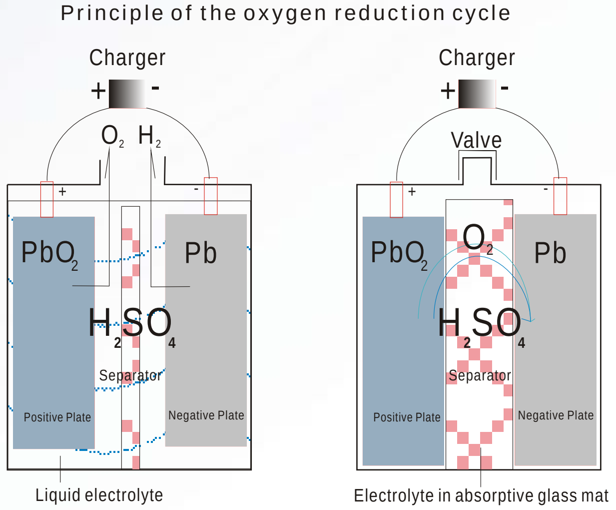
$$2e^- + 2H^+ + 1/2O_2 \rightarrow H_2O$$

and the final product is water.

The current flowing through the negative plate drives this reaction instead of hydrogen evolution, which occurs, in a conventional battery.

This process is called gas recombination. If this process were 100% efficient no water would be lost from the battery. By careful design and selection of battery components, gas recombination efficiency is from 95% to 99%.

Principle of the oxygen reduction cycle



Convention Cell   VISION CL

Recombination efficiency

Recombination efficiency is determined under specific conditions by measuring the volume of hydrogen emitted from the battery and converting this into its ampere-hour equivalent. This equivalent value is then subtracted from the total ampere-hours taken by the battery during the test period, and the remainder is the battery's recombination efficiency and is usually expressed as a percentage.

As recombination is never 100%, some hydrogen gas is emitted from batteries through the safety valve. The volume of gas emitted is very small and typical average values on constant potential float at 25ºC are as follows:

VISION CL hydrogen emissions	
Float Voltage (V/cell)	Volume of gas emitted (ml/cell/C_{10}Ah/month)
2.23~2.28	1.5
2.40~2.45	12

Conventional Cell

Oxygen and hydrogen escape to the atmosphere.

VISION CL

Oxygen from the positive plate transfers to the negative and recombines with lead to form water.

General Specifications

TYPE	Nominal Voltage(V)	10h Rate Capacity(Ah)	L(mm)	L(inch)	W(mm)	W(inch)	H(mm)	H(inch)	TH(mm)	TH(inch)	Wt.(Kg)	Wt.(lbs)	Terminal type
CL100	2	100	171	6.73	72	2.83	206	8.11	211	8.31	7.20	15.9	F10
CL150	2	150	172	6.77	102	4.02	205	8.07	227	8.94	8.20	18.1	F10
CL200	2	200	173	6.81	111	4.37	330	13.0	364	14.3	15.0	33.1	F10
CL300	2	300	171	6.73	151	5.94	330	13.0	364	14.3	20.0	44.1	F10
CL400	2	400	210	8.27	176	6.93	330	13.0	367	14.5	28.0	61.7	F10
CL500	2	500	241	9.49	175	6.89	330	13.0	365	14.4	33.0	72.8	F10
CL600	2	600	302	11.9	175	6.89	330	13.0	367	14.5	40.0	92.6	F10
CL800	2	800	410	16.1	175	6.89	330	13.0	367	14.5	57.0	126	F10
CL1000	2	1000	475	18.7	175	6.89	330	13.0	367	14.5	66.5	147	F10
CL1500	2	1500	400	15.8	350	13.8	345	13.6	382	15.0	100	221	F10
CL2000	2	2000	490	19.3	350	13.8	345	13.6	382	15.0	132	291	F10
CL3000	2	3000	710	28.0	350	13.8	345	13.6	382	15.0	210	463.3	F10

Performance Data

Constant Current Discharge performance (Amperes)

Constant Current Discharge (Amperes) at 25 ℃ to 1.60 volts per cell								
Battery Type	10min	15min	30min	45min	1h	3h	5h	10h
CL100	199	149	99.0	82.0	65.0	27.8	19.5	10.8
CL150	294	221	147	121	97.5	41.7	29.2	16.1
CL200	392	294	196	162	124	56.6	39.3	21.4
CL300	493	443	325	240	195	89.5	58.7	32.1
CL400	732	587	427	325	247	114	77.7	43.0
CL500	937	711	505	383	300	138	96.6	53.9
CL600	1161	887	618	480	364	186	115	65.0
CL800	1576	1281	830	650	496	227	156	86.0
CL1000	1855	1408	1063	758	620	261	195	108
CL1500	2724	2048	1500	1132	930	408	288	161
CL2000	3636	2734	2109	1505	1240	545	384	214
CL3000	5165	4033	2989	2173	1860	836	582	321

Constant Current Discharge (Amperes) at 25 ℃ to 1.65 volts per cell								
Battery Type	10min	15min	30min	45min	1h	3h	5h	10h
CL100	189	142	95.0	79.0	62.6	26.9	19.1	10.6
CL150	279	210	141	116	94.1	40.4	28.5	15.9
CL200	372	280	187	155	120	54.8	38.4	21.2
CL300	467	422	311	230	188	86.8	57.4	31.8
CL400	694	559	408	312	238	110	75.9	42.4
CL500	888	677	482	368	290	134	94.7	53.1
CL600	1101	844	590	461	351	181	113	64.0
CL800	1494	1219	793	624	478	220	152	84.9
CL1000	1758	1340	1016	728	602	256	190	106
CL1500	2583	1950	1433	1087	900	395	282	159
CL2000	3447	2603	2016	1445	1214	527	379	212
CL3000	4896	3839	2857	2086	1803	809	570	318

Constant Current Discharge (Amperes) at 25 ℃ to 1.70 volts per cell								
Battery Type	10min	15min	30min	45min	1h	3h	5h	10h
CL100	178	135	91.0	75.0	60.0	26.1	18.6	10.4
CL150	263	199	134	111	90.2	38.5	27.8	15.7
CL200	350	265	178	148	115	52.9	37.4	20.9
CL300	440	400	296	220	180	84.0	55.9	31.3
CL400	654	530	388	298	229	106	74.0	41.7
CL500	837	642	460	352	278	129	92.5	52.2
CL600	1038	800	562	440	337	174	111	63.0
CL800	1409	1156	755	597	458	213	148	83.0
CL1000	1658	1270	967	696	582	253	185	104
CL1500	2436	1848	1365	1039	870	381	276	157
CL2000	3250	2468	1919	1381	1185	508	371	209
CL3000	4617	3639	2720	1994	1747	785	560	313

(Note)The above characteristics data are average values obtained within three charge/discharge cycles not the mimimum values.

Performance Data

Constant Current Discharge performance (Amperes)

Constant Current Discharge (Amperes) at 25 ℃ to 1.75 volts per cell								
Battery Type	10min	15min	30min	45min	1h	3h	5h	10h
CL100	167	127	86.0	72.0	57.3	25.0	18.0	10.2
CL150	247	188	127	106	86.3	37.5	27.0	15.3
CL200	329	250	169	141	110	50.8	36.3	20.5
CL300	413	378	280	210	173	81.3	54.2	30.7
CL400	614	500	368	284	219	102	72.0	40.9
CL500	785	606	435	335	266	124	90.0	51.2
CL600	974	755	533	419	322	167	108	61.0
CL800	1322	1091	716	568	439	204	144	81.8
CL1000	1555	1199	917	663	546	250	180	102
CL1500	2285	1745	1294	989	833	366	270	153
CL2000	3049	2329	1820	1315	1154	500	360	205
CL3000	4331	3436	2579	1898	1688	750	540	307

Constant Current Discharge (Amperes) at 25 ℃ to 1.80 volts per cell								
Battery Type	10min	15min	30min	45min	1h	3h	5h	10h
CL100	156	120	81.0	68.0	54.6	23.9	17.4	10.0
CL150	230	177	120	100	82.2	35.8	26.0	15.0
CL200	307	235	160	134	104	48.6	35.0	20.0
CL300	385	355	265	199	165	78.5	52.3	30.0
CL400	573	470	347	269	208	98.0	69.4	40.0
CL500	733	570	411	317	253	118	86.5	50.0
CL600	909	710	503	397	307	160	105	60.0
CL800	1233	1025	676	538	418	195	139	80.0
CL1000	1451	1127	866	628	534	243	173	100
CL1500	2131	1640	1221	938	795	350	262	150
CL2000	2844	2190	1718	1247	1125	473	332	200
CL3000	4041	3230	2434	1800	1642	717	530	300

(Note)The above characteristics data are average values obtained within three charge/discharge cycles not the mimimum values.

Performance Data

Constant Power Discharge performance

(Watts)

Constant Power Discharge (Watts) at 25 ℃ to 1.60 volts per cell								
Battery Type	10min	15min	30min	45min	1h	2h	3h	5h
CL100	289	261	199	149	124	74.0	54.0	39.6
CL150	470	386	294	221	184	118	79.8	58.5
CL200	580	524	380	308	245	146	106	78.0
CL300	887	795	608	476	385	247	175	115
CL400	1281	909	740	641	493	310	214	140
CL500	1546	1156	930	771	625	378	270	167
CL600	1911	1424	1123	905	710	483	358	225
CL800	2394	1995	1497	1133	936	632	451	303
CL1000	2965	2421	1804	1360	1114	720	522	360
CL1500	4267	3451	2495	1990	1638	975	745	526
CL2000	5754	4654	3543	2673	2206	1488	1018	706
CL3000	7748	6050	4484	3477	2976	2040	1423	922

Constant Power Discharge (Watts) at 25 ℃ to 1.65 volts per cell								
Battery Type	10min	15min	30min	45min	1h	2h	3h	5h
CL100	272	247	189	142	119	72.0	52.7	38.9
CL150	442	365	279	210	176	114	77.9	57.5
CL200	559	499	364	299	235	142	104	76.6
CL300	835	756	581	460	371	241	171	113
CL400	1206	860	703	610	471	286	209	138
CL500	1457	1094	883	736	599	361	260	164
CL600	1800	1347	1067	864	680	472	349	222
CL800	2255	1887	1422	1081	896	613	432	298
CL1000	2793	2290	1713	1298	1067	702	507	354
CL1500	4022	3266	2368	1899	1563	930	723	520
CL2000	5422	4404	3365	2551	2130	1431	1001	701
CL3000	7344	5759	4286	3338	2895	2017	1386	906

Constant Current Discharge (Watts) at 25 ℃ to 1.70 volts per cell								
Battery Type	10min	15min	30min	45min	1h	2h	3h	5h
CL100	255	233	179	135	114	70.0	51.3	38.1
CL150	415	344	264	200	168	110	75.8	56.3
CL200	538	473	348	289	224	137	101	75.1
CL300	783	718	554	443	357	234	166	111
CL400	1131	810	665	576	449	270	203	135
CL500	1366	1030	836	699	572	345	247	161
CL600	1688	1269	1009	820	649	460	340	218
CL800	2115	1777	1346	1027	855	594	413	292
CL1000	2620	2158	1621	1233	1018	688	497	348
CL1500	3772	3077	2242	1804	1491	887	701	515
CL2000	5084	4152	3185	2422	2052	1368	987	692
CL3000	6926	5459	4088	3199	2814	1942	1346	888

(Note)The above characteristics data are average values obtained within three charge/discharge cycles not the mimimum values.

Performance Data

Constant Power Discharge performance

(Watts)

Constant Power Discharge (Watts) at 25 ℃ to 1.75 volts per cell								
Battery Type	10min	15min	30min	45min	1h	2h	3h	5h
CL100	238	218	168	128	108	67.0	49.7	37.3
CL150	387	323	249	189	160	106	73.5	55.1
CL200	517	446	331	280	213	132	98.0	73.5
CL300	732	679	527	427	342	228	162	108
CL400	1057	760	626	543	425	260	197	132
CL500	1276	967	787	661	543	330	236	157
CL600	1577	1191	951	776	617	446	330	214
CL800	1975	1667	1267	971	812	575	394	286
CL1000	2447	2024	1527	1166	967	676	488	341
CL1500	3524	2887	2112	1705	1446	860	679	501
CL2000	4750	3892	3000	2290	2023	1338	966	678
CL3000	6497	5154	3890	3060	2733	1859	1302	869

Constant Power Discharge (Watts) at 25 ℃ to 1.80 volts per cell								
Battery Type	10min	15min	30min	45min	1h	2h	3h	5h
CL100	221	204	158	121	102	64.0	48.1	36.4
CL150	360	301	233	178	151	101	71.0	53.8
CL200	495	420	315	272	201	126	94.7	71.7
CL300	680	640	500	410	328	221	157	105
CL400	983	710	587	509	401	246	185	125
CL500	1187	903	738	623	514	304	217	149
CL600	1467	1112	892	731	583	418	309	211
CL800	1837	1557	1189	915	769	556	375	271
CL1000	2276	1890	1432	1099	915	661	476	335
CL1500	3276	2695	1979	1609	1335	794	657	492
CL2000	4416	3636	2812	2160	1908	1274	904	663
CL3000	6062	4845	3692	2921	2652	1770	1268	826

(Note)The above characteristics data are average values obtained within three charge/discharge cycles not the mimimum values.

Battery Charging

Correct battery charging ensures the maximum possible working life for the battery. There are four major methods of charging:

- Constant Voltage Charging.
- Constant Current Charging.
- Two Stage Constant Voltage Charging.
- Taper Current Charging.

Constant Voltage Charging

This is the recommended method of charging for VRLA batteries. It is necessary to closely control the actual voltage to ensure that it is within the limits advised.

Float Service: 2.23-2.28 Vpc at 25°C .
Cycle Service: 2.40-2.45 Vpc at 25°C .

SZCPT suggest that the initial current be set within 0.4C Amps. The attached Figure 6 indicates the time taken to fully recharge the battery. It should be noted that the graph illustrated is for a fully discharged battery, i.e; a battery that has reached the minimum cell voltage recommended for its discharge time. As shown on the graph,it is necessary to charge a greater amount of energy into the battery than was taken out of the battery on discharge. The actual current indicating that the battery is fully charged is approx 5mA/Ah under charging voltage is 2.30 Vpc.

Constant Current Charging

This method of charging is generally not recommended for VRLA batteries. It is necessary to understand that if the batteries are not removed from the charger after reaching a state of full charge, considerable damage will occur to the batteries due to overcharging.

Two Stage Constant Voltage Charging

This method should not be used when the battery and load are connected in parallel. If this method is to be used, it is suggested that the VISION technical department is contacted.

Taper Current Charging

This method is not recommended for VRLA batteries. However, if this method is to be used, it is suggested that the VISION technical department is contacted.

Effect of Temperature on Charging Voltage

As temperature rises, electrochemical activity in a battery increases. Similarly, as temperature falls, electrochemical activity decreases. Therefore, conversely, as temperature rises, charging voltage should be reduced to prevent overcharge,and increased as temperature falls to avoid undercharge. In general, to assure optimum service life, use of a temperature compensated charger is recommended. The recommended compensation factor for CL batteries is -3mV/°C/Cell (stand by) and -5mV/°C/Cell (cyclic use). The standard center point for temperature compensation is 25°C. Figure 1 shows the relationship between temperatures and charging voltages in both cyclic and standby applications.

Relationship Between Charging Voltage And Temperature

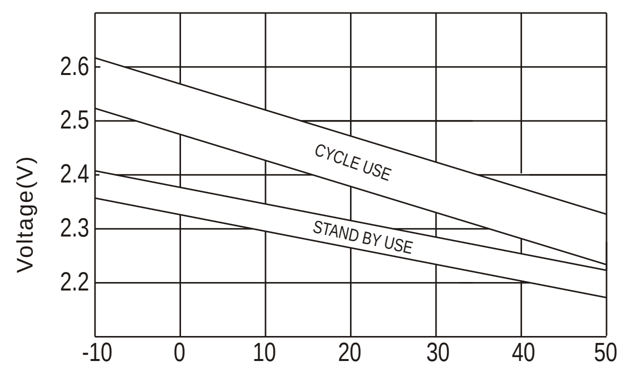


Figure 1 Ambient Temperature(°C)

Effect of Voltage on Battery Gassing

Although the batteries are of the recombination type and the amount of gassing at normal operating voltages and temperature is negligible, if the charging voltage is increased, gassing will occur despite the recombination design of the product. Gassing does not normally occur while the battery is operating under float conditions and normal constant voltage recharge of 2.23-2.28 Vpc at 25°C. Very little gassing occurs when the battery is recharged under normal cycling recharge procedures. However, it can be seen on the accompanying graph the higher voltages that this especially under conditions of constant current charging will substantially increase the volume of gas.

Discharge characteristic

The discharge capacity of a lead acid battery varies and is dependant on the discharge current. VISION CL VRLA batteries use a rate at the 10 hour rate. i.e.the capacity of the battery at 10 hours discharged to an end voltage of 1.80Vpc at a temperature of 25°C.

General Comments

The discharge curves (Figure 2) show the minimum design parameters for each fully charged VISION battery after installation. Full capacity is reached after some initial service.

Float Service.
One month after installation and recharging.
Cycle Service.
Within three to five cycles after initial charge and service entry.

Technical Terms

1. Battery capacity for VRLA batteries by accepted convention worldwide is described in "AMPERE HOUR" at the 10-hour rate C10 when discharged at 25°C. i.e. a CL200 is 200 Ah at C10 that is the battery will deliver 20 amps current for 10 hours to a cut off voltage of 1.80 volts per cell .

2. Battery cut-off voltage is the volts per cell to which a battery may be discharged safely to maximize battery life. This data is specified according to the actual discharge load and run time. As a rule of thumb, high amp loads and short run times will tolerate a lower cut off voltage (eg. 2C at 1.3V/C), whereas a low amps long run time discharge will require a higher cut off voltage (eg. 0.1C at 1.80V/C).

Battery Selection

The battery discharge graph (Figure 2) may be utilized in battery selection. However, it is suggested that a review is made of the data sheet for each battery type or the chart showing the actual ampere hour capacity of each battery type at various discharge times.

Effect of Temperature on Battery Capacity

The nominal battery capacity is based on the temperature of 25°C. Above this temperature, the capacity increases marginally but it must be noted that the working battery should be kept within the temperature design limitations of the product.

Below 25°C, the capacity decreases. This decrease in capacity becomes more prominent at temperatures below 0°C and in heavy discharge rates. Chart 1 illustrates the situation and the decrease in capacity with the decrease in operating temperature. Temperature must be taken into capacity design calculations in applications where the operating temperature of the system is below 20°C .

Characteristic Discharge Curves

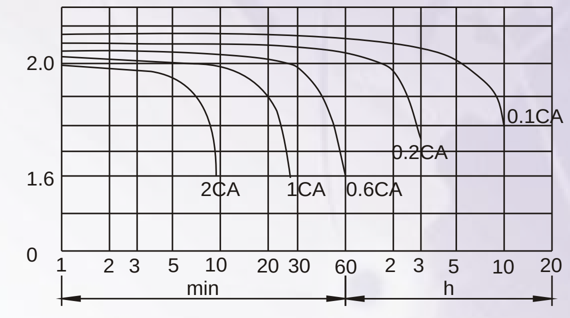


Figure 2

Discharge time	Battery temperature											
	-15°C	**-10°C**	**-5°C**	**0°C**	**5°C**	**10°C**	**15°C**	**20°C**	**25°C**	**30°C**	**35°C**	**40°C**
10min	0.46	0.52	0.58	0.65	0.71	0.78	0.85	0.93	1	1.07	1.15	1.22
1 hour	0.59	0.64	0.69	0.74	0.80	0.85	0.90	0.95	1	1.05	1.09	1.14
10hour	0.71	0.75	0.79	0.82	0.86	0.90	0.93	0.97	1	1.03	1.06	1.08

Chart 1

Self-discharge characteristic

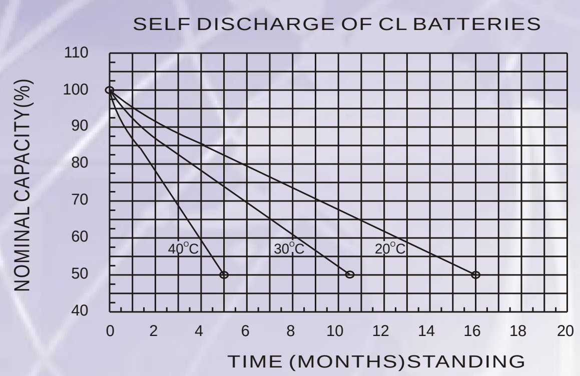


Figure 3

Cycle service life in relation to depth of discharge

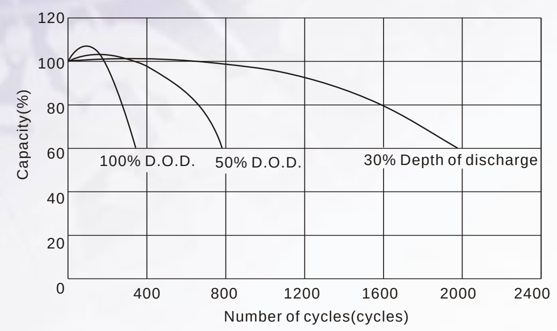


Figure 4

Operating temperature extreme

Discharge	Charge	Storage
-20~60°C	-10~50°C	-20~60°C

The atmospheric humidity for battery should be between 5% and 95%.

Standards and battery storage

You can expect our batteries meet with the standards DIN, IEC & BS6290-4.

We have obtained ISO9001 & ISO14001 certification.

We have obtained UL approval (MH25860) for all types of batteries.

We have obtained CE approval for all type of batteries.

All these render our batteries to be compatible with requirements of world-level equipments.

Shipment and storage

1 When moving batteries, suitable mechanical handing aids should be used. Never drag or roll the battery since damage will be caused.

2 Do not touch the battery terminals or the safety valve during handling.

3 The batteries are fully charged before shipment, do not have a short circuit.

4 The batteries can be stored in an ambient where the temperature range is 0°C to 35°C but the maximum storage time without charging is 6 months. If the storage time is more than 6 months, the batteries must be recharged.

The storage area should be clean, dry and ventilated.

Storage conditions :

The battery should be stored away from any moisture or source of heat.

Storage times :

The self-discharge of VISION CL serie batteries as a function of temperature is as follows :

3 % per month at 20°C

6 % per month at 30°C

10 % per month at 40°C

In order to ensure that the battery can be charged easily after a long period of storage, it is recommended that batteries should not be stored for more than the following periods without recharging :

6 months at 20°C

4 months at 30°C

2 months at 40°C

Failure to comply with these recommendations may compromise the life expectancy of the battery.

Determining the state of charge of the battery

The state of charge of the battery can be determined by measuring the off-load voltage after the battery has been allowed to rest for 24 hours.

% of capacity at 25°C	Voltage per cell at differents temperatures				
	0°C	10°C	20°C	30°C	40°C
100%	2,16	2,15	2,14	2,13	2,13
80%	2,09	2,09	2,09	2,09	2,09
60%	2,06	2,06	2,06	2,06	2,06
40%	2,02	2,02	2,02	2,02	2,02
20%	1,97	1,97	1,97	1,97	1,97

Recharging stored batteries

The batteries should be recharged at the float charge voltage of 2.23~2.28 volts at 25°C per cell for a minimum period of 48 hours.

The battery will be charged when the charging current has remained constant for a period of 3 hours.

Maintenance

- Check the tightening of connections.
- Every month, it is recommended that the total voltage at the battery terminals be measured. It should be 2.23-2.28/cell at a temperature of 25°C.
- Once each year, it is recommended that the voltage of each cell in the battery should be read off.
- A difference of plus or minus 2.0% between these individual voltages and the average voltage may be observed. This is due to the gas- recombination process.
- A check on capacity (independent operation on load) can be performed once or twice per year.

Safety :When carrying out any work on the battery, the applicable safety standards should be followed.

Note :it is recommended that a battery log be maintained , and that records should be kept of the total voltage measurements, any mains failures, major battery discharges (current and time) etc.

The main factors causing reduction in the life expectancy of VISION CL Serie cells:

- Deep discharges
- Poor regulation on the float voltage
- Cycling or micro- cycling
- Poor quality (smoothing) of the charging current
- High ambient temperature.

Installation of the battery

General recommendations

- Do not wear clothing of synthetic material , to avoid the generation of static potentials.
- Use insulated tools.
- Consult the drawing for the correct position of the cell poles (positive=red colour, negative = black colour).
- Before attaching the inter-cell flexible cables, check that all terminals are in the correct position.
- The battery cells are connected in series, which is with a positive pole connected to a negative pole.
- Use only a damp cotton cloth for cleaning purposes
- There is no technical reason for limiting the number of strings but for practical installation reasons. It is recommended not allowed to exceed 3 strings in parallel especially if the battery is used in high discharge rates (Backup time less than 15 mins)

Other cautions

(1) When cleaning the batteries, use soft cloth only. Use of organic solvents such as gasoline or thinner, and application or adherence of oil to the batteries must be avoided. Do not clean the batteries using dirty or oily cloth. Also contact with soft polyvinyl chloride or the like must be avoided.

(2) Batteries may generate inflammable gas in some cases. Do not expose them to flame or excess heat. Do not short batteries.

(3) Do not attempt to disassemble the batteries. Avoid contact with sulfuric acid leaking from broken batteries. If acid gets into contact with clothes,rinse the area generously with water.If acid gets into contact with your skin or eyes,generously wash the affected area with clean water,and consult a physician immediately.

(4) Batteries explode if put into the fire. Never dispose of batteries in the fire.

(5) Mixed usage of batteries differing in capacity, type, manufacturer or history of use (charge/discharge operation) must be AVOIDED for this may damage the batteries and the equipment due to the difference in characteristic values.

(6) While our batteries are exceptionally dependable, we do not recommend use in life support medical applications unless there is an alternate battery or back-up power supply.

(7)Acid leakage and unusual appearance must be avoided before switching on, noting open circuit voltage.

(8)There must be appointed man operating for 24 hs after switching on to solving potential problems in time, noting voltage and current.

(9) When the batteries come to their end of life, discharge duration time becomes shorter. Finally, batteries lose their available capacity by internal short-circuit and/or dry out of electrolyte. Therefore, please consider the design of the charger for the battery with some care regarding above battery damage modes, such as short-circuit protection for out put.