

Ni-Cd batteries Installation and operating instructions

Single cells range

LDP, LP, MP, HP, plastic case

Important recommendations

- Never allow an exposed flame or spark near the batteries, particularly while charging.
- Never smoke while performing any operation on the battery.
- For protection, wear rubber gloves, long sleeves, and appropriate splash goggles or face shield.
- The electrolyte is harmful to skin and eyes. In the event of contact with skin or eyes, wash immediately with plenty of water. If eyes are affected, flush with water, and obtain immediate medical attention.
- Remove all rings, watches and other items with metal parts before working on the battery.
- Use insulated tools.
- Avoid static electricity and take measures for protection against electric shocks.
- Discharge any possible static electricity from clothing and/or tools by touching an earth-connected part "ground" before working on the battery.

1. Receiving the shipment

Unpack the cells immediately upon arrival. Do not overturn the package. Transport seals are located under the cover of the vent plug.

- If the cells are shipped filled and charged, the cells are ready for assembly. Remove the plastic transport seals only before use.
- If the cells are shipped empty and discharged, do not remove the plastic transport seals until ready to fill the cells.

The cells must never be charged with the transport seals in place as this can cause permanent damage.

2. Storage

Store the battery indoors in a dry, clean, cool location (0°C to +30°C/+32°F to +86°F) and well ventilated space on open shelves.

Do not store in direct sunlight or expose to excessive heat.

■ Cells filled and charged

- If cells are stored filled, they must be fully charged prior to storage.
- Cells may be stored filled and charged for a period not exceeding 12 months from date of dispatch from the factory.

Storage of a filled battery at temperatures above +30°C (+86°F) can result in loss of capacity. This can be as much as 5% per 10°C (18°F) above +30°C (+86°F) per year.

■ Cells empty and discharged

- Alcad recommends to store cells empty and discharged. This ensures compliance with IEC 60623 section 4.9 (storage).
- Cells can be stored like this for many years.
- When deliveries are made in cardboard boxes, store without opening the boxes.
- When deliveries are made in plywood boxes, open the boxes before storage. The lid and the packing material on top of the cells must be removed.

3. Electrolyte / cell oil

■ Cells delivered filled and charged :

Check the level of electrolyte. It should not be more than 20 mm below the maximum level mark (upper).

If this is not the case, adjust the level with distilled or deionized water. Cells delivered filled have already the cell oil in place. In case of spillage of electrolyte during the transport, the cells have to be topped-up with E22 electrolyte. Fill the cells about 20 mm above the minimum level mark (lower) with electrolyte. Wait 4 hours and adjust if necessary before commissioning.

■ Cells delivered empty and discharged :

If the electrolyte is supplied dry, prepare it according to its separate instructions sheet. The electrolyte to be used is E22. Remove the transport seals just before filling. Fill the cells about 20 mm above the minimum level mark (lower) with electrolyte. Wait 4 to 24 hours and adjust if necessary before commissioning.

It is recommended to add the cell oil after the commissioning charge, with the syringe, according to the quantity indicated in Table A.

4. Installation

4.1. Location

Install the battery in a dry and clean room. Avoid direct sunlight and heat.

The battery will give the best performance and maximum service life when the ambient temperature is between +10°C to +30°C (+50°F to +86°F).

4.2. Ventilation

During the last part of charging, the battery is emitting gases (oxygen and hydrogen mixture). At normal float-charge the gas evolution is very small but some ventilation is necessary.

Note that special regulations for ventilation may be valid in your area depending on the application.

4.3. Mounting

Verify that cells are correctly interconnected with the appropriate polarity. The battery connection to load should be with nickel plated cable lugs.

Recommended torques for terminal bolts are :

- M 6 = 5 ± 0.5 Nm (44.3 ± 4.4 lbf.in)
- M 10 = 18 ± 2 Nm (159.3 ± 17.7 lbf.in)
- M 20 = 70 ± 7 Nm (619.6 ± 62.0 lbf.in)

The connectors and terminals should be corrosion-protected by coating with a thin layer of anti-corrosion oil.

Remove the transport seals and close the vent plugs.

5. Commissioning

Verify that the transport seals are removed, the vents are closed and the ventilation is adequate during this operation.

A good commissioning is important.

Charge at constant current is preferable.

If the current limit is lower than indicated in Table A, charge for a proportionally longer time.

■ For cells filled and charged by the factory and stored less than 6 months :

• Constant current charge:

Charge for 10 h at 0.2 C₅ A recommended (see Table A).

Note: At the end of the charge, the cell voltage may reach the level of 1.85 V per cell, thus the charger shall be able to supply such voltage.

When the charger maximum voltage setting is too low to supply constant current charging, divide the battery into two parts to be charged individually.

• Constant voltage charge:

Charge for 24 h at 1.65 V/cell, current limited to 0.2 C₅ A or charge for 48 h at 1.55 V/cell, current limited to 0.2 C₅ A (see Table A).

■ For cells filled on location or for filled cells which have been stored more than 6 months :

• Constant current charge:

a) Charge for 10 h at 0.2 C₅ A recommended (see Table A)

b) Discharge at 0.2 C₅ A to 1.0 V/cell

c) Charge for 10 h at 0.2 C₅ A recommended (see Table A)

Note: At the end of the charge, the cell voltage may reach the level of 1.85 V per cell, thus the charger shall be able to supply such voltage.

When the charger maximum voltage setting is too low to supply constant current charging, divide the battery into two parts to be charged individually.

• Constant voltage charge:

a) Charge for 30 h at 1.65 V/cell with current limited to 0.2 C₅ A (see Table A)

b) Discharge at 0.2 C₅ A to 1.0 V/cell

c) Charge for 30 h at 1.65 V/cell with current limited to 0.2 C₅ A or charge for 48 h at 1.55 V/cell current limited to 0.2 C₅ A (see Table A)

Delivering quality

Table A

L Range	Capacity	Charging	Electrolyte		Cell oil	Terminal	M Range	Capacity	Charging	Electrolyte		Cell oil	Terminal	H Range	Capacity	Charging	Electrolyte		Cell oil	Terminal
Cell type	C ₅ A (Ah)	current (A)	per cell liquid (l)	per cell solid*(kg)	ml/vent	per pole	Cell type	C ₅ A (Ah)	current (A)	per cell liquid (l)	per cell solid*(kg)	ml/vent	per pole	Cell type	C ₅ A (Ah)	current (A)	per cell liquid (l)	per cell solid*(kg)	ml/vent	per pole
LD10P	10	2.0	0.30	0.10	15	M 6	M11P	11	2.2	0.52	0.17	15	M 10	H11P	11	2.2	0.39	0.13	15	M 10
LD20P	20	4.0	0.20	0.06	15	M 6	M18P	18	3.6	0.46	0.15	15	M 10	H14P	14	2.8	0.46	0.15	15	M 10
LD30P	30	6.0	0.52	0.17	20	M 6	M25P	25	5.0	0.40	0.13	15	M 10	H18P	18	3.6	0.41	0.13	15	M 10
LD40P	40	8.0	0.35	0.11	20	M 6	M32P	32	6.4	1.0	0.32	25	M 10	H22P	22	4.4	0.36	0.12	15	M 10
LD55P	55	11.0	0.64	0.21	25	M 10	M39P	38	7.6	0.94	0.30	25	M 10	H26P	26	5.2	1.01	0.33	25	M 10
LD70P	70	14.0	0.49	0.16	25	M 10	M45P	46	9.2	0.87	0.28	25	M 10	H34P	34	6.8	0.88	0.28	25	M 10
L75P	76	15.2	1.5	0.49	25	M 20	M55P	53	10.6	0.81	0.26	25	M 10	H38P	38	7.6	0.83	0.27	25	M 10
L90P	89	17.8	1.4	0.45	25	M 20	M60P	59	11.8	0.75	0.24	25	M 10	H46P	46	9.2	0.73	0.24	25	M 10
L100P	102	20.4	1.3	0.42	25	M 20	M65P	65	13.0	1.5	0.49	25	M 10	H50P	50	10.0	0.69	0.22	25	M 10
L130P	128	25.6	1.8	0.58	35	M 20	M80P	83	16.6	1.3	0.42	25	M 20	H60P	58	11.6	1.2	0.39	25	M 20
L155P	157	31.4	3.5	1.13	60	M 20	M100P	101	20.2	1.9	0.61	35	M 20	H65P	67	13.4	1.1	0.36	25	M 20
L190P	189	37.8	3.3	1.07	60	M 20	M120P	118	23.6	1.7	0.55	35	M 20	H85P	85	17.0	1.5	0.49	35	M 20
L220P	221	44.2	3.1	1.00	60	M 20	M145P	145	29.0	3.5	1.13	60	M 20	H95P	93	18.6	1.4	0.45	35	M 20
L250P	252	50.4	2.9	0.94	60	M 20	M165P	167	33.4	3.4	1.10	60	M 20	H100P	102	20.4	2.4	0.78	50	M 20
L280P	284	56.8	3.9	1.26	75	2 x M 20	M190P	189	37.8	3.2	1.04	60	M 20	H110P	111	22.2	2.3	0.74	50	M 20
L320P	316	63.2	3.7	1.20	75	2 x M 20	M210P	211	42.2	3.0	0.97	60	M 20	H130P	128	25.6	2.1	0.68	50	M 20
L350P	347	69.4	4.8	1.55	90	2 x M 20	M230P	232	46.4	4.1	1.33	75	2 x M 20	H140P	137	27.4	2.0	0.65	50	M 20
L380P	379	75.8	4.6	1.49	90	2 x M 20	M250P	254	50.8	3.9	1.26	75	2 x M 20	H150P	147	29.4	3.7	1.20	75	2 x M 20
L410P	411	82.2	4.4	1.42	90	2 x M 20	M275P	276	55.2	3.7	1.20	75	2 x M 20	H170P	168	33.6	3.4	1.10	75	2 x M 20
							M300P	298	59.6	4.9	1.59	90	2 x M 20	H190P	190	38.0	3.2	1.04	75	2 x M 20
							M320P	319	63.8	4.7	1.52	90	2 x M 20	H210P	211	42.2	3.0	0.97	75	2 x M 20
							M340P	341	68.2	4.5	1.46	90	2 x M 20	H245P	244	48.8	3.8	1.23	90	2 x M 20
														H255P	254	50.8	3.7	1.20	90	2 x M 20
														H265P	265	53.0	3.6	1.17	90	2 x M 20

* Value for initial filling (E22)
The cell type shows the rated capacity in ampere hours (Ah)

Cell oil & electrolyte after commissioning :

Wait for 4 hours after commissioning.

For cells delivered filled by the factory:

- Cell oil is already in place.
- Check the electrolyte level and adjust it to the maximum level mark (upper) by adding distilled or deionized water.

For cells filled on location:

- Add the cell oil with the syringe, according to the quantity indicated in Table A.
- Check the electrolyte level and adjust it to the maximum level mark (upper) by adding: electrolyte.

The battery is ready for use.

For capacity test purposes, the battery has to be charged in accordance with IEC 60623 section 4.

6. Charging in service

Continuous parallel operation, with occasional battery discharge.

Recommended charging voltage (+20°C to +25°C/+68°F to +77°F) :

For two level charge :

- float level
= 1.42 ± 0.01 V/cell for L cells
= 1.40 ± 0.01 V/cell for M and H cells
- high level
= 1.47 - 1.70 V/cell for L cells
= 1.45 - 1.70 V/cell for M and H cells.

A high voltage will increase the speed and efficiency of the recharging.

For single level charge :

Float level 1.43 - 1.50 V/cell.

Buffer operation, where the load exceeds the charger rating.

Recommended charging voltage (+20°C to +25°C/+68°F to +77°F) :
1.50 - 1.60 V/cell.

7. Periodic maintenance

- Keep the battery clean using only water. Do not use a wire brush or solvents of any kind. Vent plugs can be rinsed in clean water if necessary.
- Check the electrolyte level. Never let the level fall below the minimum level mark (lower). Use only distilled or deionized water to top-up. Experience will tell the time interval between topping-up.

Note : Once the battery has been filled with the correct electrolyte either at the battery factory or during the battery commissioning, there is no need to check the electrolyte density periodically.

Interpretation of density measurements is difficult and could be misleading.

- Check the charging voltage. If a battery is parallel connected, it is important that the recommended charging voltage remains unchanged. The charging voltage should be checked and recorded at least once yearly. If a cell float voltage is found below 1.35 V, high-rate charge is recommended to apply to the cell concerned.
- Check every two years that all connectors are tight. The connectors and terminal bolts should be corrosion-protected by coating with a thin layer of anti-corrosion oil.
- High water consumption is usually caused by high improper voltage setting of the charger.

8. Changing electrolyte

In most stationary battery applications, the electrolyte will retain its effectiveness for the life of the battery. However, under special battery operating conditions, if the electrolyte is found to be carbonated, the battery performance can be restored by replacing the electrolyte.

The electrolyte type to be used for replacement in these cells is : E13.

Refer to "Electrolyte Instructions".

9. Environment

To protect the environment, all used batteries must be recycled. Contact your local Alcad representative for further information.

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