

Ferak, Nickel-Cadmium batteries

Type KPH, KPM, KPL Installation and operating instructions

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

- **The battery is normally shipped empty and discharged**, do not remove the plastic transport seals until ready to fill the battery.
- **If the battery is shipped filled and charged**, the battery is ready for installation. Remove the plastic transport seals only before use.

The battery 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 empty and discharged**
 - Saft Ferak 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.

■ 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.

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

- When deliveries are made in cardboard boxes, store without opening the boxes.

- **When deliveries are made in plywood boxes, open the boxes before the storage. The lid and the packing material on top of the cells must be removed.**

3. Installation

3.1. 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 N.m
- M 10 = 18 ± 2 N.m
- M 20 = 70 ± 7 N.m

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.

3.2. Electrolyte / cell oil

- **Cells delivered empty and discharged:** If the electrolyte is supplied dry, prepare it according to its separate instructions sheet.

Refer to the table A to select the correct electrolyte to be used.

Remove the transport seals just before filling. Fill the cells about 20 mm above the lower level mark 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 the table A.

- **Cells delivered filled and charged:** Check the level of electrolyte. It should not be more than 20 mm below the upper level mark. If this is not the case, adjust the level with distilled or deionized water. Cells delivered filled have already the cell oil in place.

4. Commissioning

Verify that the ventilation is adequate during this operation.

A good commissioning is important. Charge at constant current is preferable.

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

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

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

- charge 10 h at 0.2 C₅ A (recommended)
- or charge for 30 h at 1.65 V/cell, current limited to 0.2 C₅ A
- discharge at 0.2 C₅ A to 1.0 V/cell
- charge according to the section below.

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

- charge 10 h at 0.2 C₅ A (recommended)
- or charge 24 h at 1.65 V/cell, current limited to 0.2 C₅ A.
- or charge 48 h at 1.55 V/cell, current limited to 0.2 C₅ A.

- **Cell oil & electrolyte after commissioning:** wait for 4 hours after commissioning.

Cells delivered filled by the factory have already the cell oil in place.

For cells filled on location, add the cell oil with the syringe, according to the quantity indicated in the Table A.

Check the electrolyte level and adjust it to the upper level mark by adding:

- distilled or deionized water for cells filled by the factory
- electrolyte for cells filled on location.

The battery is ready for use.

5. 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 KPL
 - = 1.40 ± 0.01 V/cell for KPM and KPH
- high level
 - = 1.47 - 1.70 V/cell for KPL
 - = 1.45 - 1.70 V/cell for KPM and KPH.

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

For single level charge:

1.43 - 1.50 V/cell.

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Table A:

Cell type	Charging current (A)	Electrolyte per cell Liquid (l)	Solid* (kg)	Cell oil ml/cell	Terminal per pole	Cell type	Charging current (A)	Electrolyte per cell Liquid (l)	Solid* (kg)	Cell oil ml/cell	Terminal per pole	Cell type	Charging current (A)	Electrolyte per cell Liquid (l)	Solid* (kg)	Cell oil ml/cell	Terminal per pole
KPH 11 P	2.2	0.39	0.13	15	M 10	KPM 11 P	2.2	0.52	0.17	15	M 10	KPL 10 P	2.0	0.31	0.10	15	M 6
KPH 14 P	2.8	0.46	0.15	15	M 10	KPM 18 P	3.6	0.46	0.15	15	M 10	KPL 20 P	4.0	0.20	0.06	15	M 6
KPH 18 P	3.6	0.41	0.13	15	M 10	KPM 25 P	5.0	0.40	0.13	15	M 10	KPL 30 P	6.0	0.52	0.17	20	M 6
KPH 22 P	4.4	0.36	0.12	15	M 10	KPM 32 P	6.4	1.00	0.32	25	M 10	KPL 40 P	8.0	0.35	0.11	20	M 6
KPH 26 P	5.2	0.98	0.32	25	M 10	KPM 38 P	7.6	0.94	0.30	25	M 10	KPL 55 P	11.0	0.64	0.21	25	M 10
KPH 34 P	6.8	0.88	0.28	25	M 10	KPM 45 P	9.0	0.88	0.28	25	M 10	KPL 70 P	14.0	0.49	0.16	25	M 10
KPH 38 P	7.6	0.83	0.27	25	M 10	KPM 50 P	10.0	0.82	0.27	25	M 10						
KPH 46 P	9.2	0.73	0.24	25	M 10	KPM 60 P	12.0	0.76	0.25	25	M 10						
KPH 50 P	10.0	0.68	0.22	25	M 10	KPM 80 P	16.0	1.4	0.48	30	M 20						
KPH 65 P	13.0	1.5	0.47	30	M 20	KPM 95 P	19.0	1.2	0.41	30	M 20						
KPH 80 P	16.0	1.3	0.41	30	M 20	KPM 105 P	21.0	1.3	0.46	30	M 20						
KPH 100 P	20.0	1.6	0.51	35	M 20	KPM 120 P	24.0	1.4	0.47	35	M 20						
KPH 125 P	25.0	2.7	0.87	50	2 x M 20	KPM 140 P	28.0	1.5	0.52	45	M 20						
KPH 150 P	30.0	2.5	0.81	50	2 x M 20	KPM 160 P	32.0	1.6	0.56	45	M 20						
KPH 170 P	34.0	3.4	1.1	75	2 x M 20	KPM 180 P	36.0	2.7	0.94	60	M 20						
KPH 190 P	38.0	3.2	1.0	75	2 x M 20	KPM 210 P	42.0	2.4	0.82	60	M 20						
KPH 210 P	42.0	2.9	0.9	75	2 x M 20	KPM 230 P	46.0	2.1	0.71	60	M 20						
KPH 245 P	49.0	3.8	1.2	90	2 x M 20	KPM 250 P	50.0	1.7	0.59	60	M 20						
KPH 255 P	51.0	3.7	1.2	90	2 x M 20	KPM 280 P	56.0	3.1	1.1	80	M 20						
KPH 265 P	53.0	3.6	1.1	90	2 x M 20	KPM 300 P	60.0	2.7	0.93	80	M 20						
						KPM 340 P	68.0	2.4	0.83	80	M 20						
						KPM 375 P	75.0	2.2	0.74	80	M 20						
						KPM 360	72.0	3.0	1.0	85	M 20						

* Value for initial filling (E22).
From KPM 80 P to KPM 375 P and KPM 360,
use E40 electrolyte for initial filling.
The cell type shows the rated capacity
in ampere hours (Ah).

■ **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.

6. 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. 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 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.

- 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 at least once yearly. High water consumption of the battery is usually caused by improper voltage setting of the charger.

7. Topping-up for batteries equipped with water filling system

- Remove transport seals and connect hydraulic tubing between cells up to a maximum of 50 cells.
- Make sure that the tubes are completed inserted for a good seal.
- The hydraulic connection of cells must be in parallel to the electrical connection, in order to avoid voltage differences of more than 1.2 V between two hydraulically connected cells.
- The hydraulic connection must be horizontal in order to avoid siphoning.
- The water filling circuit output must not be too close to electrical equipment, electrical circuit, and metallic structure.
- Water filling circuit input must be connected to the self closing inlet.

- Topping-up can be performed by gravity or using adapted pump with a flow rate of 0.7 l/min at a relative pressure of 0.3 bar maximum.

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". Electrolyte must be replaced when carbonation content (K_2CO_3) is > 100 g/liter.

It is recommended to do the changing of electrolyte when the battery is fully discharged (discharge between 0.2 C₅ A to 0.5 C₅ A down to 0 V/cell).

9. Environment

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

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