



# The Nikonians Battery Guide

*Selecting the right batteries for your Nikon® Camera*

Bo Stahlbrandt





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## Preface

The fascination for photography thrives. The success of photography communities, such as [Nikonians.org](http://Nikonians.org) is related to the global interest in taking photographs.

One of the topics commonly discussed amongst Nikonians<sup>1</sup> these days is about batteries.

Digital cameras are revolutionizing the world of still images, and these cameras need lots of energy for their backlit color LC-Displays, CCD's and other electronics.

The most modern analog cameras tend to use more energy too. Mainly for fast auto focus and film advance motors, advanced metering systems and backlit LCD's. Tomorrow's "analog" cameras will likely be hybrid cameras; mixing digital and analog capture technologies.

Modern flash systems consume substantial amounts of energy. To achieve an optimum of artificial lighting, we often end up using several of our dear Speedlights at once, remotely synchronized.

All these components must be supplied with enough energy to safely sustain operation. No matter if you're taking pictures of a lizard under the desert sun or running loads of film through your F100 at home to get that *special* shot of your newly born, you want that picture! The last thing you should have to worry about is the reliability of your batteries.

### For whom is this guide?

You're a photographer, probably a Nikonian, but that's not a must. Well, it's a must if you want to register and become a member at [Nikonians.org](http://Nikonians.org) ☺.

This guide does not dwell too deep into technical issues, so you won't need to be an engineer to understand it. We have focused on discussions with existing battery technologies from a users perspective.

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<sup>1</sup> The members at Nikonians.org and the name of a Nikon® user



We will try to make it easier for you to select the right batteries for your Nikon camera – depending on your requirements.

## **We want to hear your opinion**

Should you want to give us any feedback on this guide, we'd be more than happy to hear about it.

If you want to get in contact with us, get in touch with us at: [feedback-on-guides@nikonians.org](mailto:feedback-on-guides@nikonians.org)

## **Acknowledgments**

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This guide has been brought to you free of charge – thanks to the donations we receive. If you want to help the Nikonians Community helping other photographers, make a small donation:  
<http://www.nikonians.org/html/donations/>

Remember, sharing your photographs with others is the best way of learning. Nikonians is a great platform to help you improve your own skills and to find friends for a lifetime.

*Bo Stahlbrandt, Germany, May 2003*



## Before we really get started

Let's look at some general things we need to know before we can dig into the material.

### What IS a battery?

Surely everyone knows what a battery is, but can you define "battery"?

*Very simply put, a battery is a device that stores electrical energy in the form of chemical energy.*

### Material & size provides a complete description of the battery:

- The materials that make up a battery are normally part of the name of the battery, e.g. "Alkaline", "Lithium", "Ni-Cd (Nickel-Cadmium)", etc.
- The size of the battery is the other most common way to define a type of battery, e.g. "AA", "2CR5", "Mignon" or "Micro".

A combination of the two provides a complete description of the battery, e.g. "Lithium AA".

Batteries can also be classified as rechargeable or non-rechargeable (disposable). Normally, the materials making up a battery dictate whether or not it can be recharged.

Batteries also have a positive and a negative pole. It sounds trivial, but it is a must to pay attention to the polarity, or otherwise there is the potential risk that you will damage your equipment.

### Volts, mAh and "C"

There are some common units used throughout this guide and a battery generates electricity, so common electrical terms are applicable here.

#### V

Stands for Volts. Voltage is the measure of the power of the batteries. For Nickel Metal Hydrid (Ni-MH) and Ni-Cd batteries, the voltage is 1.2V per cell. For Alkaline and other non-rechargeable batteries, it is typically

1.5V per cell. The voltage of a battery must match the specification for the device it is used in. Using batteries of incorrect voltage can cause severe damage to a device.

### **mAh**

Stands for milli-Ampere hours. It's the measure of the capacity of the batteries. For example, a capacity of 1000mAh (= 1Ah) means that the batteries will last for one hour if subjected to a 1000mA (= 1A) discharge current. This number allows you to compare batteries to evaluate which ones should allow you to shoot more pictures or get more flashes.

### **C**

Defines the rate at which a battery is charged or discharged. It is the capacity obtained from a new battery subjected to a constant-current discharge at room temperature.

For example, draining a battery at 1C means to drain the capacity of a cell completely in one hour ( $1/1C=1h$ ). Likewise, draining a battery at 0.2C means discharging a battery in 5 hours ( $1/0.2C = 5h$ ).

For nickel metal hydride cells, the rated capacity is normally determined at a discharge rate that fully depletes the cell in five hours, or 0.2C.

Another way to write this is to say C/n where n is typically from 1 to 10. C/1 is then equal to 1C and C/5 is equal to 0.2C etc.

## **New batteries and manufacturing date**

Between manufacturing and first use, all batteries exhibit some drain. Therefore, care should be taken to purchase the newest (and freshest) ones possible. To help you do this, some manufactures stamp the date of manufacture on the bottom of each battery. Ask your camera dealer for assistance in interpreting the codes.

## **Load capability is important**

Other internal processes take place in parallel with the self-discharge, leading to an increase of the batteries internal resistance, i.e. the battery delivers less current, or milli-Ampere's (mA), under a large demand, which equals to reduced ability to deliver electrical current.

Load capability is something of great importance to photographers, since we often use motor drives with high load factors (motors often needs lots of current when they start) and flashlights.

For anyone not using motor drives, nor auto focus and who doesn't care too much if his Speedlight takes ages to recharge, the increased internal resistance shouldn't be too much of an issue 😊.



## Storage life of batteries

Let us have a look at what parameters affect the storage, or shelf life of different batteries.

Basically speaking, no battery can be stored without loss of energy, although some battery systems may be stored for longer periods of time compared to others.

Internal electrochemical processes cause a gradual, but unavoidable loss of usable energy, which, however is predictable.

This self-discharge limits storage life of any battery. Self-discharge in secondary batteries (accumulators, rechargeable batteries) is particularly high compared to primary (non-rechargeable) batteries and is at approximately the rate of 15-25% per month at room temperature.

Primary batteries (non-rechargeable batteries) on the other hand have a considerably lower self-discharge, sometimes as low as 1.5% per year at room temperature.

### Long term storage in the fridge

When you are storing primary batteries for extended periods in the refrigerator, it is important to know that the relative humidity in the fridge is low (remember that cheese in your fridge which dried out?).

The low temperature in the fridge causes the water vapor to condense on cold surfaces and especially on metallic surfaces, resulting in overall lower humidity in your fridge.

Consequently, the water condenses on the battery and gradually penetrates its seal. This finally leads to a noticeable increase in the battery's internal resistance while decreasing its load capability. Best thing is to store primary batteries in vapor-proof packaging if you want to keep them in the fridge for more than a year.

Before you use your "fridged primaries", you should let them stay at room temperature for an hour or two to let them warm up. Of course you should also wipe off any condensation before you insert them. It is never recommended to deep freeze batteries.



## Depletion of your batteries

Many variables will affect the battery life. Here are some issues to consider if you want to save energy, i.e. don'ts.

- Long shutter open times: Electronically-governed shutters consumes energy when the shutter is open.
- Enabled auto focus, especially frequent focus changes consumes energy – This is also known as the “Auto focus play factor”.
- Using big lenses with auto focus, such as telephoto lenses: The elements of these lenses are often large and heavy and the long way to drive the lens consumes more energy.
- Using 3D Color Matrix Metering, e.g. the F5's 1300 CCM consumes quite a lot of energy.
- Long time out value of the metering system: The longer the metering system is enabled, the more energy it consumes.
- Power rewinding the film: Most cameras do not allow you to manually rewind the film. Motorized rewinding consumes substantial amount of energy.
- Continuous use: Batteries are drained much more quickly by continuous use than by intermittent use.
- Too cold or too hot. The ambient temperature plays an important role too: Too cold and you don't get any energy out of the battery. Too warm, the battery discharges too fast by it self. Battery life ratings are based on operation at around room temperature (20°C/68°F). At around 0°C (32°F) for instance, the battery life may be shortened with over 60%. You should therefore always have spare batteries with you if you plan on shooting at low temperatures.



## Ball-park figures on battery life

These are rough figures, since they really depend on the factors outlined on the previous page.

This is just to give you some ideas. Some Nikonians have been known to get out as much as 80 rolls of film from a single pack of Lithiums, but they may not be using large AF lenses, or changing focus that much.

If you “fiddle around” a lot with your lenses, as most of us probably do, then these figures may work for you:

- F5 with Lithiums: 25-35 rolls
- F5 with Alkalines: 20 rolls
- F5 with MN-30: 20 rolls

Film rolls with 36 frames





## Rechargeable or primary batteries?

To power your dear Nikon friend, you can either use:

- primary (non-rechargeable) batteries, such as Alkalines and Lithiums
- or rechargeable batteries (also known as “Secondary batteries” or “accumulators”), such as rechargeable Alkalines, Nickel Metal Hydride (Ni-MH), Nickel Cadmium (Ni-Cd), or Lithium-Ion (Li-ion).

Most serious amateurs and pros will end up with a combination: using rechargeable batteries most of the time and primaries, such as Lithiums as backup.

### Why rechargeables?

There are two main advantages with using rechargeables:

1. It's cheaper in the long run.
2. It's better for the environment.

The number one disadvantage is:

The lack of warning - well in advance - of the batteries going empty.

Another disadvantage is the need for access to a charger. This can be a non-issue if you are at home, or a huge one if you are on an extended field trip in the wild. That reminds me about a cartoon where the guy in the field is pulling a long cable behind him. That's for another time.

Before we go into comparing the two different types of batteries, let us start by having a look at them and checking out the pros' and cons'.

We will start by having a look at the Alkalines and Titaniums followed by the Silver Oxides, Zinc Chlorides and Zinc Carbons.

These are batteries we can find in any store for a couple of Dollars, or Euros, per blister.

We will then have a look at the masters of primary batteries, the Lithiums.

After the section on non-rechargeables we will take a plunge into the world of rechargeables. Nickel Metal Hydrides (Ni-MH), sometimes also referred to as Metal Hydrides and the Nickel Cadmiums (Ni-Cd) take up a decent part of that section. We will then discuss the different ways we can charge these batteries.

Having had a good look at different chargers, we're coming up with a conclusion on batteries in general. A reference section on the power supply available for our different Nikon bodies and battery sizes sums up the guide.



## Primary batteries

### Alkaline-Manganese (Alkaline) batteries

#### Not much bang for those bucks?

Alkalines are the low budget version. You get them everywhere and they are reasonably cheap. Don't expect a long battery lifetime with Alkalines though and especially not if you're using digital cameras. Don't even bother to think about the MB-D100 AA battery holder filled with Alkalines if you have a D100.

For non-digital users, there are though very good Alkalines on the market: Fuji's and Duracell's Alkalines being good examples on well performing Alkalines.

If you're willing to experiment, you should try out some different brands of Alkalines: Using them under similar conditions with the same equipment can you give you a feel if Alkalines are for you.

So, for many of us who do not need top of the line performance, the shortcomings of Alkalines are still compensated by their lower cost compared to Lithiums: For the price of four Lithiums, you can probably get between 16 to 20 Alkalines.

Typically for this type of primary batteries is that - during discharge - its voltage and thus load capability decrease gradually. This results in the user recognizing the end of discharge in good time and has the advance warning to change the battery. That is a good thing.

The basic characteristics of Alkalines are:

- Low internal resistance, i.e. good for high-drain equipment.
- Sloping voltage discharge characteristics, i.e. you are normally aware when your batteries go weak.
- Good storage life, can be stored for years.



- Good low temperature performance: -20° to 54°C (-4° to 129°F).

## Storage lifetime

The self-discharge rate of the common Alkaline-Manganese (MnO<sub>2</sub>/Zn), round cells is typically 2%/year.

Kodak and many other manufacturers also applies a freshness date on the battery cell itself, space permitting. Typical freshness dates for Alkaline batteries is 7 years to approximately 80% of capacity.

## Alkalines are normally not rechargeable

Most Alkalines in the stores are non-rechargeable. If you don't know if the Alkaline batteries you just bought are rechargeable or not, I bet on that they're not.

You should never try to charge non-rechargeable single use batteries such as Alkalines.

## Common brands

Some of the most common brands of Alkaline batteries include:

Kodak Max Alkaline

<http://www.kodak.com/global/en/consumer/products/batteries/photoAlkaline.jhtml>

Duracell Coppertop

<http://www.duracell.com/batteries/coppertop.asp>

Duracell Ultra M3

<http://www.duracell.com/batteries/ultra.asp>

Energizer Max

<http://www.energizer.com/products/energizermax.asp>

## PowerEdge batteries

Panasonic introduced a new high-performance line of batteries at this years PMA show in Las Vegas. These "PowerEdge" batteries are specifically for digital cameras according to the company, and should last



43% longer than traditional high-drain Alkaline batteries. During tests, Panasonic noted that its new batteries lasted for 764 exposures, as opposed to 589 shots using Duracell M3 batteries, and 480 exposures with Energizer e2 batteries.

## **Titanium batteries**

Titaniums are batteries with a Titanium core. Titaniums are improved Alkalines and should not be compared with Lithiums.

If you want something a bit better than Alkalines, you might buy those.

You find the Energizer e<sup>2</sup> Titaniums here:  
<http://www.energizer.com/products/e2.asp>  
<http://www.energizer-e2.com/default.htm>



## Silver Oxide batteries

These have flat voltage discharge characteristics, good lower temperature operation (-10° to 54°C / 14° to 129°F), low internal resistance, good shelf life, good high rate and intermittent pulse capability.

Silver Oxide batteries are highly toxic and not very common. One reason why they're not that common is the price; they are expensive. Silver Oxide batteries are normally being the smallest batteries on the market, like those for watches, hearing aids, and cameras with a low electrical demand.



## **Zinc Chloride and Zinc Carbon batteries**

These are good for medium to low drain applications, i.e. not suitable for photo equipment. They are excellent value though. Due to their high internal resistance, you should stay away from these for your photographic equipment.

Discharge rate for Zinc-carbon (MnO<sub>2</sub>/Zn, slightly acid), round cells is max. 4%/year.



## Lithium (Li/MnO<sub>2</sub>) batteries

Lithiums are the best way to go when you are not using rechargeable batteries and need reliable, constant discharge.

Lithiums come with high cell voltage, high energy density, are lightweight, operate under a wide temperature range (-40° to 60°C / -40° to 140°F), have excellent storage life, provide you with faster flash recycle times in between flashes and have a long service life.

### Lightweight

Lithiums are lightweight, definitely much lighter than Alkalines and they deliver more current (= more energy). Compared to Alkaline batteries, Lithiums are made differently. Energizer, for example, contain their Lithium as a “jelly roll”.

The lower weight of Lithiums is a nice side effect if you’re using an F5: You really notice the difference with the eight lightweight AA’s inserted compared to any other type of batteries.

### Never mix batteries

You should never mix Lithium batteries with other batteries in your camera since the Lithiums have a very different discharge curve compared to other batteries. If you mix your batteries, you would probably end up with having the Lithiums charging your other batteries.

### High energy

Lithium batteries offer relatively high volume-specific energy (approx. 800 mWh/cm<sup>2</sup>). In addition, Lithium batteries, with their spirally wound large-surface electrodes, have a high load capability and high capacity retention during storage.

Both the Lithium battery's longer operating time and higher cell voltage of 1.5V (and 3V respectively) are important in camera applications.





## **Lithiums cost more**

The Eveready AA Lithiums at the US chain Home Depot are priced at about 4.79 USD for two (new, blue label Lithium) and 8.95 USD for four. The large USA Warehouse clubs (Sam's, Costco) do not offer Lithium cells at all.

Energizer's e<sup>2</sup> Lithium Photo batteries are very good and many Nikonians swear upon their performance.

<http://www.energizerphoto.com>

## **Better to the environment**

Another nice thing with Lithiums are that they are much better for the environment compared to the heavy metals found in most batteries (Lithium is the lightest known metal).

They are also resistant to leaks and corrosion, which protect your equipment.

## **In cold weather**

Lithiums operate under a wide temperature range since they do not have a water-based electrolyte and they are perfect for cold-weather photography.

When you are taking pictures in extremely cold weather, you should also keep the camera warm inside your jacket until you are ready to use it.

By the way, F4 and F5 users should also use the DK-2 rubber eyecup for more comfortable viewing when it is cold outside.

## **Long storage retention**

Lithiums retain 90% of original service-life capacity after up to ten years in storage.

Kodak also applies a freshness date on the battery cell itself. Typical freshness dates for Lithium batteries is 10 years to approximately 90% capacity.



A vapor-proof packaging is also recommendable for long-term, high humidity storage of Lithium batteries with plastic seals to protect them from water vapor getting inside, which would reduce their load capability over time. See also our discussion at the beginning of this guide on storing batteries in the refrigerator.

## **Common brands**

Duracell Ultra Photo

<http://www.duracell.com/batteries/camera.asp>

## **Feeding your F5 with both Lithiums and Ni-MH**

If you use both Lithiums and Ni-MH do yourself a favor and buy a second battery holder.

The price for the F5's MS-30 is about 35 USD or 49 EUR in Europe and the F100's MS-12 is about 17 USD or 29 EUR in Europe.

You should stuff your second MS-30 or MS-12 full with Lithiums, which you then carry with you as spares.



## Rechargeable batteries

### Ni-Cd (or “NiCad”)

Ni-Cd's have about half the internal resistance of the newer Ni-MH batteries, so Ni-Cd's are excellent for Speedlights (faster recycle times). However, Ni-Cd's are highly toxic!

Since Ni-MH came onto the market, the reason for using Ni-Cd's in your photographic equipment is depleting fast.

One of the most annoying things with accumulators, such as Ni-Cd's and Ni-MH's are the sudden voltage break-down at the end of the discharge. Unlike Alkalines, you will get little warning that the batteries are near the end of their life.

The breakdown of Ni-Cd's is not as fast as with the Ni-MH's, but it's significantly faster than Alkalines.

Especially with older cameras, you can end up with a flashlight dying on you suddenly or the camera just stopping-dead, possibly resulting in you missing a good scenery.

You should always carry some spare prime batteries with you. Lithiums are perfect for this purpose.

### The memory effect of Ni-Cd's

The memory effect is a phenomenon, which can quickly end the useful service life of a Ni-Cd battery if handled incorrectly.

The technical explanation for this is: If you trickle charge a Ni-Cd battery (i.e. you are charging it with a low current) or charge it before it is fully drained (i.e. perform only partial discharges), certain chemical compounds are formed on the negative electrode.

If you continue to charge the battery in this manner, the compounds build up. This has the effect of gradually reducing the available energy until the battery only supplies the required voltage for a few minutes. The best



way to avoid this is to fully discharge the battery when it is used, or “condition” your Ni-Cd’s.

## Conditioning your Ni-Cd’s

To ensure top performance, conditioning is recommended every time you charge your Ni-Cd’s batteries. This simply involves discharging the battery until it is very nearly fully discharged. Putting the cells in a flashlight and leaving it on till the bulb is very dim is a common way to do this. The battery should **not** be completely exhausted, though, since polarity reversal of the internal cells can result from total discharge.

Many chargers now have the provision to condition batteries at the press of a button. The charger will draw current from the battery until the voltage is very low, and then automatically begin the charging cycle.

Note that this is different compared to Ni-MH’s, which should only be conditioned approx every tenth time.



## Rechargeable Alkalines

Another version of Alkalines exists, the so-called “rechargeable Alkalines”. These batteries can typically be recharged 50 times.

We will not discuss these types of batteries in this guide since they are not really interesting for the serious amateur or pro.



## Ni-MH (Nickel Metal Hydride)

You can use Ni-MH batteries in two basic fashions with your Nikon Camera:

1. You either buy separate Ni-MH AA cells and stuff them in the battery compartment of your camera, or
2. You buy an original rechargeable Nikon battery, such as the MN-15 for the F100 or the MN-30 for the F5 camera.

The "AA" format fits most electronic devices and are a direct replacement for the Alkaline and Ni-Cd batteries. Note, however, that Nikon does not officially approve the use of Ni-MH batteries in all devices that use AA batteries.

Ni-MH's come with high capacity and a long cycle life. They are excellent for cold-weather performance and have a very low internal resistance.

Ni-MH batteries are fast becoming the most popular choice among digital camera users and analog photographers alike, because these batteries have a much higher capacity compared with Ni-Cd's and are virtually memory free.

These batteries do not need to be discharged every time before recharging. Ni-MH batteries though can be damaged through heat by overcharging, but using a high quality, microprocessor-controlled battery charger or a charger designed for Ni-MH batteries and charging as directed easily avoid this.



With Ni-MH you get:

- No memory effect like Ni-Cd batteries.
- Higher capacity at smaller size: 50-100% increase in capacity compared to Ni-Cd batteries.
- Long operational life: 500-1,000 charge/discharge cycles.
- Flat discharge curve: The battery will remain at full voltage in 80% of the usage.
- Low weight: Ok, not as light as the Lithiums, but light.
- Lasting 2-3 times as long as Ni-Cd.
- Environmental friendly.
- C/10 overcharge and reverse polarity protection.

## **Lots of energy**

Most modern “AA” format Ni-MH delivers 1800mAh nominal (typically 1840-1865mAh fully charged) and they make your camera work 1.5 – 2 times as long as compared to if you’d been using Ni-Cd’s.

They used to come as 1400, 1450 or 1550 mAh. Now, you find them as 1600, 1700, 1800mAh and some manufactures, such as Sanyo now even have them as high as 2100 and 2200mAh.

If you are buying loose Ni-MH, you should buy 1800mAh or higher since everything below is older technology.

The Kodak Max AA Ni-MH rechargeable batteries offer 1850 mAh capacity, which is good. They also have excellent cold weather performance.



## Long lifetime

If you are using a rapid charger (average charge rate of 1C), the Ni-MH's can have about 450-600 charge/discharge cycles.

If you are though using a slow charger (average charge rate of 0.1C), you will have about 500-1000 charge/discharge cycles at the best.

These are just estimates and your mileage may vary, but Ni-MH batteries are often an alternative to Alkalines.

## First time Ni-MH's

For new Ni-MH batteries, you should cycle them three to five times before you use to let them reach their peak performance.

## Conditioning your Ni-MH's

You should not overdo the conditioning of your Ni-MH's, since conditioning them too often is worse than none at all. There are two "rules" here:

1. Condition your Ni-MH batteries when they fail to charge or do not operate properly, and
2. Condition your batteries every ten charges

Note that Nikon recommends conditioning your MN-30's each 5 times. We recommend though, that you follow the rule of thumb mentioned above.

Battery cycling is achieved by simply using the batteries to exhaustion and recharging them, or by using a battery conditioner.

Most modern chargers, such as the Maha MH-C204F have a built-in battery conditioner.

## Charging your Ni-MH's

First off, you should not use older chargers designed for Ni-Cd's to charge your Ni-MH's. Many chargers exist, being made in the pre Ni-MH



era. Make sure your charger can be used for Ni-MH to save yourself a burnt charger, exploded batteries and a fire in the house.

The number of times you can recharge your batteries depends on operating parameters, such as drain rate, battery care, etc.

Under desirable conditions, Ni-MH batteries can be recharged up to 500 times. At absolute best conditions, they can last up to 1000 recharges.

Never mix batteries with very different discharge levels in the charger at the same time, i.e. one half-full battery should not be mixed in with three nearly empty batteries since this may damage the batteries.

Always use and recharge the batteries together.

Always use a high-quality charger, such as the Maha C204 or the Ansmann ACS410 to make sure that you are really fully recharging your Ni-MH's batteries! Some cheap chargers are not charging your batteries fully, making you buy expensive batteries, which you never use to their full potential.

### **Slow vs. Rapid chargers**

Most modern Ni-MH batteries can work both with a slow charger or a rapid charger. A slow charger/wall adapter is a unit delivering a charging rate of less than 0.1C or 1/10<sup>th</sup> of the battery capacity whereas a rapid charger deliver a charging rate of 0.5C to 1C.

### **Slow chargers**

For example: If you use a battery with a nominal 1800mAh energy output, the charging current should not exceed 180mA (=0.1C). Same goes for the older 1300mAh Ni-MH batteries, which should not be charged with a current larger than 130mA.

Charging at 0.1C standard rate for 14-16 hours will greatly enhance the Ni-MH battery's service life.

Most Ni-MH batteries can withstand overcharge at 0.1C rate indefinitely. Charging at or below 0.1C rate is suitable across a temperature range from 0°C to 45°C (32° to 113°F).



### *Trickle charge*

At 0.1C or a lower charge rate, most modern Ni-MH batteries can be continuously overcharged without damage. This is also known as “C/10 overcharge protection.”

### **Rapid chargers**

Before you use your Ni-MH batteries in your rapid charger, check that it meets any of these termination methods:

- Temperature Cut-off termination (TCO)
- Negative Delta V termination (-dV), with 10-15 mV per cell
- Peak Voltage Cut-off
- Rate-of-temperature rise (dT/dt)

If the battery charger does not meet any of the above termination methods, most Ni-MH battery packs are equipped with built-in temperature cut-off termination and can be charged by such a charger anyway.

Beware though, that once the battery pack temperature rises to approx. 55°C (131°F), the charging circuit will be shut-off. The charging circuit though will reactivate after one to two hours, after the temperature drops.

A timer control set at 105% of nominal capacity can be used as an additional protection. For maximum capacity, a trickle charge can be applied after fast charging.

Some manufacturers recommend top-off trickle charging at 0.1C for 2 hours or 0.2C for 1 hour. Fast charging can be done at temperatures from 10°C to 45°C (50° to 113°F).

### **Too hot to hold**

During the quick-charge cycle, the Ni-MH can become very hot, over 120°C (248°F), so while you’re charging your batteries:



1. Do not close the cover (if your Ni-MH battery charger has one). It is best to allow any heat to dissipate as much as possible.
2. You may also wish to use a small fan to help keep the batteries cool, and prevent excessive heat build-up during charging.

### **Don't leave them in the charger**

The company Eveready says leaving batteries on a charger after being charged will “dry them out”. We have not verified how well thought-through this argument really is.

### **The Ansmann line of chargers**

The Ansmann charger ACS410 comes with a “Multi-Adapter” which fits perfectly to the MN-30 battery pack. You can see it at:

[http://www.anis.de/Merchant2/merchant.mv?Screen=PROD&Store\\_Code=AN&Product\\_Code=L5410](http://www.anis.de/Merchant2/merchant.mv?Screen=PROD&Store_Code=AN&Product_Code=L5410)

It costs about 45 USD incl. the Multi-Adapter.

At this years PMA show in Las Vegas, HP Marketing, N.J., introduced several new Ansmann battery products. The microprocessor-controlled PowerLine 4 Digi Cam Charger set, which comes supplied with power plugs to operate in any country with currents from 90 volts to 240 volts, and 50-60 Hz AC outlets.

The charger automatically detects and switches current according to the outlet being used. It tests, rapid charges and switches each cell to trickle charge, as the cell reaches its full capacity.

The Ansmann Digi Cam Power Set Traveller charges one to four “AA” or “AAA” (Micro or Mignon) batteries. It charges the Ni-MH 1800mAh cells without problem and is listed at [www.technikdirekt.de](http://www.technikdirekt.de) in Germany for EUR 63,- incl. four 1800mAh cells (Art. No: 391 830).

[http://www.anis.de/Merchant2/merchant.mv?Screen=PROD&Store\\_Code=AN&Product\\_Code=L5414](http://www.anis.de/Merchant2/merchant.mv?Screen=PROD&Store_Code=AN&Product_Code=L5414)

Some companies, such as MediaMarkt in Germany, are selling chargers coming with four AA 1800mAh cells as low as approx. 25 EUR.

Ansmann 2000 mAh, Ni-MH AA batteries now are available in a four pack, and also come with the Powerline 4 DigiCam Charger set.



The Ansmann Energy 8 charger accepts AAA, AA, C, D or 9-volt Ni-MH and Ni-Cd cells, and can charge up to six batteries at a time, no matter the combination of sizes. A battery of one size, once fully charged, can be removed from the unit, without affecting the remaining batteries. The unit acts as a battery tester, and for 5 seconds, and the LED for that cell indicates the state of charge.

For more Ansmann production information, you may want to consult <http://www.ansmann.de/eansmann1.html>

## **General warning**

Be aware that Ni-MH batteries deliver power with little voltage drop until they start to fall off rapidly. This means you really can't trust your battery level indicators to give you much if any warning.

Rechargeable batteries drop very quickly at the end of their energy output curve, since they deliver their energy at a nearly constant 1.2V until they're nearly empty. On many cameras such as the F5, when the battery symbol flashes "halfway", the camera may stop after 10 frames using Ni-MH compared to maybe one roll with Alkalines or maybe first after more than three rolls of film with Lithiums.

Lithiums have full performance almost until end of battery life.

Other than that Ni-MH cells are great. No memory, high load power delivery - they make living with a digital camera tolerable.

## **Environmental friendly**

Ni-MH batteries are labelled "environmentally friendly" because they contain no cadmium, lead, Lithium or mercury, but of course you should never drop batteries, no matter what type. You should always leave the place at least as tidy as it was when you got there.

## **No Memory effect**

Ni-MH cells are far easier to live with than Ni-Cd batteries since there isn't a "memory" problem to deal with. This memory problem is normally addressed as "Memory effect".



That means you can remove the batteries from the charger or device at any time and recharge them at any time. That is what is great about Ni-MH batteries. Of course, you will not get as much usage out of your batteries when they are not fully charged, but it's good to know that you can do it with no adverse effects or problems.

## **Low shelf life**

Fully charged Ni-MH batteries lose charge at about 1% per 24 hrs on the shelf at room temperature. This gives us a “shelf-life” of approx one month (!) for Ni-MH, i.e. after one month on the shelf they're empty.

In other words, if you leave the batteries on the shelf for more than 30 - 60 days, you should recharge the batteries before using them. It is normal for batteries to be fully depleted of power after long term storage.

This is the one only real drawback compared to Alkalines or Lithium cells. A Ni-MH cell will cost much less than the Alkaline cells it replaces over its charge lifetime.

So, Ni-MH's loose charge over time much like Ni-Cd's do. Not a big deal with a camera or flash you're using often, but something to keep in mind when you leave your gear idle for some time

Maha and some other manufacturers claim that their batteries have a shelf life of 2 months. We have not been able to verify this yet.

## **Refresh your batteries**

There are companies who are able to replace the cells of your battery packs. This is especially of interest for expensive battery packs, such as the EN-EL4 packs for the D1.



## **More information on Ni-MH batteries on the net**

You can find more information on Ni-MH right here:

<http://www.Ni-MHbattery.com/mh-c204f-4aa160dc.htm>

Anyone in the US interested in Ni-MH cells and chargers should check out Thomas Distributing online. Excellent prices and service:

<http://www.thomas-distributing.com>

Thomas Distributing, 128 East Wood St., Paris, IL 61944

Phone : (217) 466-4210 Fax : (217) 466-4212



## Lithium-Ion (Li-Ion) batteries

The Li-Ion batteries are the most modern rechargeables you will find out there. They are capable of holding more energy (more “mAh’s”) than Ni-MH and Ni-Cd, but they are more expensive. The manufacturing process is complex due to the aggressive, combustive chemicals used.

You will mainly find Lithium-Ion batteries as battery packs, such as the EN-EL1 from Nikon. The packs contain a charge-electronic circuit to control the precise charging required.

The Li-Ion batteries are loosing quality by time, no matter if used or not, so make sure that you buy your Li-Ion’s fresh – or at least not stored for a longer period of time.

Each time you recharge your Li-Ions, you are slowly killing them, no matter if they’re empty or not. Only recharge them if you know you’ll need them soon!

There are many manufacturers on the market producing replacement battery packs for the original Nikon ones. These battery packs are normally delivering more energy and are cheaper. Some of the manufacturers are:

Maha Energy

[www.mahaenergy.com](http://www.mahaenergy.com)

Varta

[www.varta.com](http://www.varta.com)

Hähnel

[www.hahnel.ie](http://www.hahnel.ie)

Vivanco

[www.vivanco.com](http://www.vivanco.com)

Hama (in German only)

[www.hama.de](http://www.hama.de)

Bescor

<http://www.bescor.com/>

Fuji

<http://www.fuji.com>





## **Lithium-Polymer (Li-Po) batteries**

The hope for the future digital camera user. It's still hard to find any Li-Po's on the market, but they should take over in the next couple of years. The Li-Po's have a fix-substance electrolyte compared to the fluid-electrolyte of most other batteries. That means, that they can be manufactured in nearly any form and are much lighter compared to other batteries.

Li-Po's deliver a lot more energy compared to any other battery technology mentioned in this guide.

Maha and Varta are some of the manufacturers producing these new batteries.



## External camera battery packs

For semi-pro's and pro's who needs lot of power, not only for the camera, but also for the flashes, there are several manufacturers on the market providing larger, external battery packs. Some of the better packs can be mounted to your tripod.

Some of these manufacturers are:

Quantum with their Battery 1 Compact and Turbo Battery

<http://www.qtm.com>

Electric Fuel with their Instant Power Battery

<http://www.electric-fuel.com/>

Digital Camera Battery

<http://www.digitalcamerabattery.com>

Ansmann

<http://www.ansmann.de/eansmann1.html>

Maha Energy

[www.mahaenergy.com](http://www.mahaenergy.com)

HotShot

[http://www.batteryprice.com/BigToe/showprod.cfm?&DID=8&CATID=14&ObjectGroup\\_ID=196](http://www.batteryprice.com/BigToe/showprod.cfm?&DID=8&CATID=14&ObjectGroup_ID=196)



## Conclusion

We have had a look the different technologies used for manufacturing our batteries.

The Alkalines are still very much in use, are cheap and can be found everywhere. Main disadvantage with them is that you don't get too many pictures on a set of batteries. Using Lithiums on the other hand, significantly reduces weight and ads battery life. Lithiums are though more expensive.

If you are out shooting a lot, you should consider rechargeable batteries. You should probably **not** invest in rechargeables, if you are infrequent shooter, since the storage life of rechargeables is short and you'd end up with empty batteries each time you want to go out.

Best bet for infrequent use is to go with primary batteries and standard Alkalines are often a good approach.

For frequent use, you would probably pick the rechargeables, such as Ni-MH's and having a set or two of primary Lithiums as spare.

Also, make sure you understand the impact the voltage difference between Ni-MH's (1.2V) and Alkalines or Lithiums (1.5V) has on your equipment. With less voltage, you will have less shots until your equipment goes dead. You may also get a reduced film transportation and auto focus speed.

With the upcoming of Ni-MH's, you probable won't consider ever using Ni-Cd's again. Some may swear on using Ni-Cd's for Speedlights though. Ni-MH's have several distinct advantages compared to the older Ni-Cd technology.

## Power for various camera models

### F5

#### The MN-30 battery pack

The MN-30 battery back is heavier than the eight cells battery holder MS-30. This is due to its ninth cell. You don't get the max frames per second (FPS) nor the max rewinding time with normal batteries on the F5 if you don't use the MN-30's (or any third-party nine cell battery holders).

Many Nikonians probably don't care that much if their F5 rewinds a 36 frames roll of film in 6 or 4 seconds, nor if the max FPS is 7.4 as with normal batteries, or 8 FPS as it is with the MN-30.

Main convenience is that you don't have to buy new batteries the whole time.

The F5 has (as many other cameras) a pretty strict low-voltage level control at approx. 9.0V. That is, below this voltage it will stop functioning completely. This low-voltage detection level prohibits the F5 to malfunction due to low batteries, whereas short drops below this level does not disturb the F5.

The MN-30 battery pack street price is 130 USD.

#### The MH-30 charger

Not much to say about this charger, it's robust, foolproof to use and ridiculously expensive. The adapter can charge two MN-30 battery packs at once.

The charger has two buttons for discharging each MN-30. This type of "refreshing" should be done every once in a while, since even the MN-30 sometimes seems to get the "Memory effect".

The MH-30 charger street price is 300 USD.

*How does the MH-30 works?*

Attach one MN-30 battery and the green light on the charger lights up steady. When fully charged it starts to flash. From empty to full takes about 2 hours.

If you follow the manual you should fully discharge the battery ones every five charges. See our previous discussions on how often to discharge a battery. To discharge an MN-30, do like this:

1. Attach the battery to the charger
2. Press the "Refresh" button and the yellow light comes on. The battery is now discharging, which takes anything between two and eight hours. When the discharge cycle is finished, the charger starts to charge the battery automatically (green light for charging turned on)

You can easily attach two batteries at the same time and follow the above procedure, but the charger will only work on one battery at the time.

### **Using MN-15's and MN-30's**

If you're using the F100's MN-15 or the F5's MN-30 accumulators (the MN-15 is approx. 110 USD), you can either buy the Nikon MH-15 or MH-30 charger (for approx. 250 USD and 290 USD resp.) or, you can save yourself some bucks by buying a third party charger.

One such charger is the MH-777 from Maha ([www.maha.com](http://www.maha.com)), sold through Radio Shack as the "Deluxe Charger" Model #23-250 for around 50 USD.

Not only will the MH-777 charge the MN-15 or MN-30 battery for your F100 or F5, it will charge just about any other rechargeable battery you can find.

It has a universal connection system and its reverse polarity protection protects anything from going wrong. It automatically senses the battery voltage, so you don't even have to know the rating of the battery you are charging.

The Radio Shack charger is more fragile and somewhat “fiddly” compared to the Nikon chargers – and it probably won’t travel well, but it comes at quarter or less of the cost.

### **1.2V NiCd’s or NiMH’s in your MS-30**

The battery holder for the F5, the MS-30, can hold 8 batteries. Using 1.2V Ni-Cd’s or Ni-MH’s in this holder is obviously not a very good combination if you want to get out lots of rolls from your F5.

With Ni-Cd’s, you have  $8 \times 1.2V = 9.6V$  which is lower than the MN-30 pack, which nominally delivers 11.8V. The MN-30 contains 9 x 1.2V/1450mAh Ni-MH cells.

Operating range of an F5 is approx. 9-14V. Continuously being below 9V and the camera stops working.

You can put loose Ni-MH batteries in a normal battery holder, such as the MS-30 for the F5 and you can charge them with a charger such as Maha MH-777.

Beware though, since the original MN-30 Ni-MH battery pack comes with 9 cells, these “AA” Ni-MH will give you less battery life since you can only stuff 8 of them into the MS-30 battery pack. Actually, you get a lot less “camera” life and this approach is not really recommended.

Nikon writes “12V” on the MN-30 since each cell delivers approx. 1.36 V fully loaded ( $9 \times 1.36V = 12.24V$ ). This voltage drops to 1.2V (the nominal voltage) per cell pretty fast though, giving you a steady voltage of 10.8V for the most of the MN-30 battery life.

With 8 cells, you end up a short period with 10.88 volts ( $8 \times 1.36V = 10.88V$ ), though the cells drop pretty fast to the nominal voltage of 1.2V giving you 9.6 volts ( $8 \times 1.2V = 9.6$ ), being very close to the shut-of threshold voltage of the F5, which is somewhere around 9.0 volts.

### **Third party nine cells adapters for the F5**

A German company called “enough energy” (<http://www.energy-enough.com>) supplies a battery holder for the F5 that can take 9 batteries instead of the 8 which fit into the MS-30. Using their holder, you can get approx 12V peak ( $9 \times 1.36V$ ) or 10.8V ( $9 \times 1.2V$ ) nominal out of 9 loose

Ni-MH AA's. So far, we have though not been able to order from them and it's not clear to us if the company is still in operation.

There is also a Nikonian who built his own 9 cells adapter stuffed with Ni-Cd's. You may want to check the separate article on this. Basically, he has taken a standard MS-30 eight cells adapter and put a ninth cell in series with one of the Ni-Cd batteries.

He has also built a charger based upon the drawings provided in the ARRL handbook and adjusted it for the somewhat unusual 12.96 volts which is required to charge the nine batteries.

You can find his article here:

<http://users.vianet.ca/~mjrobert/battery.htm>

### **MC-32 power cable**

Yes, right, there is also the MC-32 12V connection cable for the F5.

## **F100**

### **The MH-15 charger**

Looks like a duplicate of the F5's MH-30 charger – see below.

The MH-15 street price is 250 USD.

The MN-15 street price is 110 USD.

### **The MB-15 battery holder**

This holder has the nice feature of providing your F100 with the often-needed vertical shutter release. It also gives you easy access to an additional AF-ON button and main command dial. The MB-15 carries six batteries, such as Alkalines or Lithiums, or the Ni-MH accumulator pack MN-15.

The MB-15 street price is 165 USD.

Separate battery container for the MB-15 comes at a street price of 35 USD.

### **The MS-12 AA battery tray**

The MS-12 AA Battery Tray comes at a street price of approx 20 USD



### **The MS-13 Lithium battery tray**

The MS-13 street price is 35 USD.

Allows the F100 to operate with two CR-123A Lithium batteries. This is lighter than the standard 4 x 1.5V AA Alkalines and offers better performance in low temperatures.

### **The MS-15 AA battery tray**

The MS-15 AA battery tray for the MB-15 comes at a street price of approx 30 USD

### **The MH-17 Car Battery Charger**

The MH-17 works with the MN-15 and EN-4 batteries. Street price approx. 220 USD

### **F90/N90 and F90X/N90s**

Uses four AA Alkalines (Ni-Cd recommended)

### **MB-10 Multi Power Vertical Grip**

Street price is 150 USD

### **MS-10 Battery Tray**

The MS-10 AA Battery Tray for the MB-10 comes at a street price of approx 24 USD

### **MS-8 Battery Tray**

The tray replacement for eight AA batteries. Street price is 20 USD

### **MS-11 Battery Holder for 3V Lithiums**

The MS-11 3V Lithium Battery Tray (2 x CR123A) for the MB-10 comes at a street price of approx 35 USD

### **NB-100 Ni-Cd Battery Pack for MB-10**

Street price is 80 USD incl. The NC-100 charger

### **NC-100 Ni-Cd charger**

The NC-100 Ni-Cd charger comes at a street price of approx 30 USD.





### **DB-6 External Battery Pack**

This is the “anti-cold” battery pack. It uses six type D batteries and connects via the MC-29 external power cord. Street price is 230 USD

### **F/N80**

Uses two CR123A Lithium batteries.

### **MB-16 Battery Holder**

Street price around 100 USD.

### **MS-16 Battery tray**

The MS-16 AA battery tray for the MB-16 comes at a price of approx 15 USD.

### **F/N70**

No external battery pack available.  
Uses two CR123A Lithium batteries.

### **F/N65**

Uses two 3V CR2 Lithium batteries.

### **MB-17 Battery Pack**

Uses four AA Batteries. Street price is around 50 USD

### **F/N55**

No accessory battery pack available.  
Uses two 3V CR2 Lithium batteries.

### **F301 / N2000**

Uses four 1.5-Volt AAA (Micro) Alkalines

### **MB-3 Battery Pack**

Uses four 1.5-Volt AA batteries

### **F401 / N400 and F401s / N4004s**

Uses four AA Alkalines, or four Ni-Cd Type KR-AA Batteries



## **F401x / N5005**

Uses four AA Alkalines, or four Ni-Cd Type KR-AA Batteries

## **F501 / N2020**

Uses four 1.5-Volt AAA (Micro) Alkalines

## **MB-3 Battery Pack**

Uses four 1.5-Volt AA batteries

## **F601 / N6006**

Uses one 2CR5 6-volt Lithium battery block

## **F601 M / N6000**

Uses one 2CR5 6-volt Lithium battery block

## **F801 / N8008 and F801s / N8008s**

Uses four AA batteries or four Ni-Cd KR-AA batteries

## **MS-7 AA Battery Tray**

Street price approx 20 USD

## **F4**

## **MB-20 Standard Battery Pack**

## **MB-21 High-Speed Battery Pack**

## **MB-21B Bottom Portion MB-21**

## **MB-21G Grip Portion MB-21**



## **MB-22 External Power Reg**

### **MB-23 Multi High Speed Battery Pack**

The MS-23 AA battery tray for the MB-23 comes at a street price of approx. 40 USD

## **F3, F3H, F3HP**

Choice of one 3V Lithium battery CR-1/3N type, two 1.55V silver-oxide batteries SR-44 type, or two 1.5V Alkaline batteries LR-44 type; optional

Anti-Cold Battery Holder DB-2 accepts two AA Alkaline, Ni-Cd or manganese batteries.

Considering the much higher speed of the F3H, its interesting that the special MD4H motor is not that much bigger than the regular MD4 drive. The High Speed F3 will take the standard MD4 drive, but the MD4H drive will not fit standard F3's.

You can only achieve the famous 13.5 fps with your F3H if you're using the MH-2 Ni-Cd battery pack. Using AA batteries, 7.5 fps is still possible.

The two 1.55V silver-oxide button type cells installed in clip fit into the camera's baseplate. With the MD-4 Motor Drive attached, the camera gets battery power entirely from batteries located in the motor drive.

### **MD-4 Motor Drive**

The motor drive MD-4 for the F3 cameras uses eight AA Alkaline batteries. It can also be driven by the MN-2 Ni-Cd battery, which can only be used together with the F3

### **MH-2 Ni-Cd Battery Charger**

The Ni-Cd MN-2 delivers 16.8 volts compared to the 12 volts you get out of 8 primary AA batteries.

### **MS-3 battery tray**

The MS-3 AA battery tray for the MD-4 comes at a street price of approx. 25 USD



## **FM3A**

Choice of one 3V CR-1/3N Lithium battery, two 1.55V SR44 silver-oxide batteries, or two 1.5V LR44 Alkaline batteries; optional Anti-Cold Battery Holder DB-2 accepting two 1.5V LR6 (AA-type Alkaline), 1.2V KR-AA (AA-type Ni-Cd) or 1.5V R6 (AA-type manganese) batteries available

### **MD-12 Motor Drive**

Uses eight AA Alkaline batteries.

The Md-12 Motor Drive works with FA, FE2, FM, FM2 and FM3. Street price approx 330 USD

### **DB-2 Anti-Cold Battery Holder**

Uses two AA Alkaline batteries.

## **FM10**

Uses two SR44 button cells (1.55V) or two LR44 (1.5V)  
No accessory battery pack.

## **FM**

Uses two 1.5-volt silver oxide button cells

### **MD-11 Motor Drive**

Uses eight AA Alkaline or rechargeable batteries

### **MD-12 Motor Drive**

Uses eight AA Alkaline or rechargeable batteries

## **FM2**

Uses two 1.55-volt silver oxide button cells (such as Type SR-44) or two 1.5-volt Alkaline manganese button cells (such as Type LR-44), or one 3-volt Lithium battery

### **MD-11 Motor Drive**

Uses eight AA Alkaline or rechargeable batteries

### **MD-12 Motor Drive**

Uses eight AA Alkaline or rechargeable batteries



## **FE**

Uses two 1.5-volt silver oxide button cells

### **MD-11 Motor Drive**

Uses eight AA Alkaline or rechargeable batteries

### **MD-12 Motor Drive**

Uses eight AA Alkaline or rechargeable batteries

## **FE2**

Uses two 1.55-volt silver oxide button cells (S-76, SR-44) or two 1.5-volt Alkaline manganese button cells (LR-44), or one 3-volt (CR 1/3N) Lithium power cell.

A fresh installation can last for about a year, but it depends of course on usage. Shutter is locked at battery exhaustion and unlocks by turning the shutter speed dial to M250 or B setting, which are mechanical and works independent of battery power.

### **MD-11 Motor Drive**

Uses eight AA Alkaline or rechargeable batteries

### **MD-12 Motor Drive**

Uses eight AA Alkaline or rechargeable batteries

## **FG**

Uses two 1.55-volt silver oxide button cells (such as Type SR-44) or two 1.5-volt Alkaline manganese button cells (such as Type LR-44), or one 3-volt Lithium battery

### **Motor Drive MD-14**

Uses eight AA Alkaline or rechargeable batteries

### **MD-E Winder**

Uses six AAA batteries



## **FG-20**

Uses two 1.55-volt silver oxide button cells (such as Type SR-44) or two 1.5-volt Alkaline manganese button cells (such as Type LR-44), or one 3-volt Lithium battery

### **Motor Drive MD-14**

Uses eight AA Alkaline or rechargeable batteries

### **MD-E Winder**

Uses six AAA batteries

## **EM**

Uses two 1.5-volt silver oxide button cells

### **Motor Drive MD-14**

Uses eight AA Alkaline or rechargeable batteries

### **MD-E Winder**

Uses six AAA batteries

## **FA**

Uses two 1.55-volt silver oxide button cells (such as Type SR-44) or two 1.5-volt Alkaline manganese button cells (such as Type LR-44), or one 3-volt Lithium battery

### **Motor Drive MD-15**

Uses eight AA Alkaline or rechargeable batteries

## **D1**

### **EN-4 Ni-MH Rechargeable Battery**

Street price of approx 100 USD



## **MH-16 Charger**

## **AC Adapter EH-4**

## **D1X**

### **EN-4 Ni-MH Rechargeable Battery**

## **MH-16 Charger**

## **MH-17 Charger**

## **AC Adapter EH-4**

## **D1H**

### **EN-4 Ni-MH Rechargeable Battery**

## **MH-16 Charger**

## **MH-17 Charger**

## **AC Adapter EH-4**

## **D100**

### **MB-D100**

The MB-D100 Multi-function battery pack comes at a street price 300 USD. The optional MB-D100 AA battery holder comes at 30 USD.

Most D100 users seems to be pretty disappointed with the MB-D100 AA battery holder since loading it with AA primes (no matter if Lithiums or Alkalines) gives you really poor performance compared to using EN-EL3's. Often the camera doesn't even work properly with brand new primes, displaying the infamous ERR after you fire off.

A rough guess is that you will not get out more than maybe thirty pictures with fresh prime batteries in your AA battery holder.

A basic recommendation is to buy more EN-EL3's, always keep two inserted into the MB-D100 and two charged as spares.



### **EN-EL3**

EN-EL3 Rechargeable Lithium Ion battery  
Street price 45 USD.

### **MH-18 Charger**

### **MH-19 Charger**

This charger is not only good for the D100, but also for the F5 (MN-30's using the optional adapter MC-E1) and for the D1 and F100 (MN-15's, EN-4's and EN-3's using the optional adapter MC-E2). The MH-19 is priced at approx 240 EUR and the optional adapters MC-E1 and MC-E2 are priced somewhere around 25 EUR in Europe.

### **AC Adapter EH-5**

### **MB-D100 Multi-Functional Battery Pack**

## **General on the Coolpix batteries**

The MH-51 charger was replaced by the MH-53 in the US or MH-52 in most parts of Europe. The MH-51 obviously had several problems and it used to be supplied with the Coolpix 775, 885, 995 and the Coolpix 5000's.

The new charger now supplied with Coolpixes that use the EN-EL1 Lithium Ion battery is the MH-53. It is a small charger with the outlet prongs built-in to it, i.e. it's no longer a two-piece set consisting of the charger base and the transformer.

## **Coolpix 5700**

### **EH-53 AC-Adapter**

### **EN-EL1 Rechargeable Li-Ion battery**

Same as for the Coolpix 5000. The EN-EL1 is approx. 35 USD on the street.

### **MH-53 Battery charger for Li-Ion batteries**

### **MB-E5700 Battery Pack**

The MB-E5700 holds 6 x AA Alkalines, 1.2V Ni-MH's or 1.2 V Ni-Cd's





## **Coolpix 5000**

### **EN-EL1 Rechargeable Li-Ion battery**

Same as for the Coolpix 5700. The EN-EL1 is approx. 35 USD on the street.

### **Battery charger for Li-Ion batteries MH-52**

### **Battery charger and AC-Adapter EH-21**

### **Battery Pack MB-E5000**

6 x AA Alkalines, 1.2V Ni-MH's or 1.2 V Ni-Cd's

## **Coolpix 4500**

### **EN-EL1 Rechargeable Li-Ion battery**

Same as for the Coolpix 5700. The EN-EL1 is approx. 35 USD on the street.

### **Battery charger for Li-Ion batteries MH-53**

### **Battery charger and AC-Adapter EH-53**

## **Coolpix 4300**

### **EN-EL1 Rechargeable Li-Ion battery**

Same as for the Coolpix 5700. The EN-EL1 is approx. 35 USD on the street.



## **Battery charger for Li-Ion batteries MH-53**

## **Battery charger and AC-Adapter EH-53**

## **Coolpix 3500**

### **Rechargeable Li-Ion battery EN-EL2**

## **Battery charger and AC-Adapter EH-60**

## **Coolpix 995**

### **EN-EL1 Rechargeable Li-Ion battery**

Same as for the Coolpix 5700. The EN-EL1 is approx. 35 USD on the street.

## **Battery charger for Li-Ion batteries MH-51**

## **Battery charger and AC-Adapter EH-52 or EH-21**

### **“MH-51 kit”**

includes one MH-51 charger and one EN-EL1 battery

## **Coolpix 885**

### **EN-EL1 Rechargeable Li-Ion battery**

Same as for the Coolpix 5700. The EN-EL1 is approx. 35 USD on the street.

## **Battery charger for Li-Ion batteries MH-52**

## **Battery charger and AC-Adapter EH-52 or EH-21**

## **Coolpix 775**

### **EN-EL1 Rechargeable Li-Ion battery**

Same as for the Coolpix 5700. The EN-EL1 is approx. 35 USD on the street.

**Battery charger for Li-Ion batteries MH-52**

**Battery charger and AC-Adapter EH-52 or EH-21**

**Coolpix 2500**

**Rechargeable Li-Ion battery EN-EL2**

**Battery charger and AC-Adapter EH-60**



## Coolpix 2000

Four AA-size Alkaline, Ni-MH or Ni-Cd batteries

According to a press-release made by Nikon August 13<sup>th</sup> 2002, any owner of a Nikon Coolpix 2000 with the following serial numbers (stamped on the bottom of the camera body):

2010001 ... 2042816  
2510001 ... 2543248  
3010001 ... 3060980  
3510001 ... 3561916  
4010001 ... 4063334  
4510001 ... 4555696  
5010001 ... 5014664  
5510001 ... 5512592

Should remove the batteries and get in touch with Nikon directly for replacement!

Contact: <http://www.nikon-image.com/eng/Network/index.html>

## Power for Speedlights

The Nikon Speedlights are even more “power hungry” than the camera body – An optimized battery usage is even more critical.

### Nikon flash battery packs

The Nikon Flash Battery packs are the SD-7 and SD-8A and Power Bracket SK-6.

#### SD-7

The SD-7 operates on six C-type batteries and offers a separate power source for SB-80DX, SB-28, SB-28DX, SB-27 and for the Power Bracket SK-6. It shortens flash recycling time and dramatically increases flash capacity.

#### SD-8A

The SD-8A shortens flash recycling time by as much as 60-75% and more than doubles flash capacity. The SD-8A operates on six AA-type Alkaline, Lithium, or Ni-Cd batteries and can be used with the SB-80DX, SB-28, SB-28DX and SB-27 Speedlights as well as Power Bracket SK-6.

#### SK-6

This convenient combination external power unit and mounting bracket reduces flash recycling time by about half while nearly doubling the number of available flashes. It requires 4 AA batteries and is compatible with the SB-80DX, SB-28, SB-28DX, Nikon D1 series, F5, F100, N90x, N80, N65, and other camera models.

## Compatibility table

Below is a battery compatibility table for all Nikon speedlights.

<b>Speedlight Model</b>	<b>Quantity</b>	<b>Battery Type</b>
SB-1	6	D-type in SD-2
	1	SN-1 Ni-Cd Batt Back (SA-1 Batt Charger)
		Optional SD-3
SB-2	4	AA-type
SB-3	4	AA-type
SB-4	2	AA-type
SB-5	1	SN-2 Ni-Cd Batt Pack
		Optional SD-4 Battery Pack
SB-6		AS-3 AC Power Unit
		Optional SD-5 Battery Pack
SB-7E	4	AA-type
SB-8E	4	AA-type
SB-9	2	AA-type
SB-E	2	AA-type
SB-10	4	AA-type
		Can also use SD-7 Battery Pack
SB-11	8	AA-type
		Optional SD-6 Battery Pack
		Optional SD-7 Battery Pack
		Optional SD-8/SD-8A Battery Pack*
SB-12	4	AA-type
SB-14		Optional SD-6 Battery Pack
		Optional SD-7 Battery Pack
		Optional SD-8/SD-8A Battery Pack*
SB-140		REQUIRES SD-7
SB-15	4	AA-type
SB-16A & SB-16B	4	AA-type
SB-17	4	AA-type
SB-18	4	AA-type
SB-19	4	AA-type
SB-20	4	AA-type
		Optional SD-7 Battery Pack
SB-21A & SB-21B	4	AA-type
		Optional SD-7 Battery Pack
SB-22 & SB-22S	4	AA-type
		Optional SD-7 Battery Pack
		Optional SD-8/SD-8A Battery Pack*
SB-23	4	AA-type
SB-24	4	AA-type
		Optional SD-7 Battery Pack
		Optional SD-8/SD-8A Battery Pack*



Speedlight Model	Quantity	Battery Type
SB-25	4	AA-type Optional SD-7 Battery Pack Optional SD-8/SD-8A Battery Pack*
SB-26	4	AA-type Optional SD-7 Battery Pack Optional SD-8/SD-8A Battery Pack*
SB-27	4	AA-type Optional SD-7 Battery Pack Optional SD-8/SD-8A Battery Pack*
SB-28 & SB-28DX	4	AA-type (Alkaline, Lithium, Ni-MH or Ni-Cd) Optional SD-7 Battery Pack Optional SD-8/SD-8A Battery Pack*
SB-29	4	AA-type (Alkaline, Lithium, Ni-MH or Ni-Cd)
SB-30DX	1	CR123A or DL123A
SB-50DX	2	CR123A or DL123A
SB-80DX	4	AA-type (Alkaline, Lithium, Ni-MH or Ni-Cd) Optional SD-7 Battery Pack Optional SD-8/SD-8A Battery Pack*

*\*SD-8A is similar to SD-8, but has a UL Approval.*

## Battery sizes

Here is a list of the most common battery sizes used by Nikon photographers.

### AA (Mignon)



This format is also known as “Mignon” in Europe.  
Other format codes (IEC) with same physical size: LR6, HR6, MN1500.

### AAA (Micro)



This format is also known as “Micro“ in Europe  
Other format codes (IEC) with same physical size: LR03, HR03, MN2400.

### CR123A



For example: K123LA 3 Volt Kodak Photolife Lithium Battery with code: K3VKPLB. Approx. price is 4.00 USD/each.



## CR V3



For example the 3 Volt Maxell CR-V3 Camera Photo Lithium Battery. Approx. price is 9.00 USD/each.

## CR2



For example the 3 Volt Kodak Photolife Lithium Battery with code: C3VKPLB. Approx. price is 4.00 USD/each.

## CR2P2



For example: K223LA 3 Volt Kodak Photolife Lithium Battery with code: K3VKPLB1. Approx. price is 6.25 USD/each.

## 2CR5



You can get Kodak's 6 Volt 2CR5's at for example Costco for approx 2 USD each. Many drugstores charge over 10 USD for a 2CR5.

The 6 Volt 2CR5 is found in several cameras, such as the Coolpix 880 and the Coolpix 995.



## Good resources on the Net

The Nikonians F5 users forum

<http://www.nikonians.org/usergroups/f5.html>

The Nikonians D1/D2/D100 users forum

<http://www.nikonians.org/usergroups/d1.html>

The Nikonians Coolpix users forum

<http://www.nikonians.org/usergroups/coolpix.html>

Kodak Battery Specifications

<http://www.kodak.com/global/en/consumer/products/batteries/specs.jhtml>

Energizer Batteries

<http://www.energizer.com/products/default.asp>

Sanyo Batteries

<http://sanyo.wslogic.com/>

The Varta Battery Knowledge Base

<http://www.varta.com/eng/navigation/index-knowhow.html>

The battery adapter of <http://www.criscam.com> for old MF cameras previously using mercury batteries for the meters

<http://www.criscam.com/mr9.htm>



## About Nikonians.org

**Nikonians** (<http://www.nikonians.org>) is the forum for all passionate Nikon® users. We are a community for all of you who either suspect or know that a Nikon makes a difference. It is a privately funded community, supported by donations made by the members, owned by Bo Stahlbrandt and José Ramón Palacios.

We believe in the Nikon technology and we use Nikon photography equipment extensively. The community is not related or affiliated in any way to Nikon Corporation nor to any of its subsidiaries and/or affiliates.

We believe you are a professional or amateur photographer, that you want to share ideas and opinions, have fast access to the latest Nikon product information, to be able to digest real hands-on experiences and facts - and that you know what you want - Nikon.

Nikonians is a humble tribute to:

- The Nikon brand that has given us and so many others so much joy in photography.
- The pioneering efforts of all those anonymous engineers who have made, and continue to make extraordinary advances possible within photography.
- The generous Nikon corporate loyalty to all the users world-wide, clearly manifested through the possibility to use nearly any Nikkor® lens on any Nikon camera ever made.

By supporting the Nikonians community you are helping other photographers. Donate anything from 5 USD and up:

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