

## Ninja 650R (ER-6F) & ER-6N Battery FAQ

By: Kiwi

The OEM battery fitted to the Ninja 650R (ER-6F) and ER-6N is a SLA (sealed lead acid) Yuasa YTX12-BS, this is a maintenance free, 12 volt, 10 Ah (amp hour), 180 C.C.A. (cold cranking amps) model measuring 150mm x 87mm x 130mm (6" x 3.4375" x 5.125") and weighing 3.4 kg (7.5 lbs). Brand new OEM and replacement batteries will certainly solve those slow or no-start problems, but before you buy a battery you need to determine whether you really need a battery, or whether your situation is due to some other cause.

Of course, if you determine that your battery is ready to take that trip to a recycling center then you have a variety of choices for your bike. Alternatives are:



Besco – CTX12-BS  
Adventure Power – UTX12-BS Battery  
Exide – Powerware YTX12-BS  
Power Max – GTX12-BS  
Interstate – YTX12-BS

Basically maintenance free or sealed motorcycle batteries reference numbers usually start with the letters YTX, CTX or GTX (eg. YTX12-BS). Different manufacturers use different 1st letters (eg. CTX12-BS, GTX12-BS & YTX12-BS are all the same battery)

### How do I know if my battery is good?

Is it your battery, or your charging system, or something in-between?

The best way to know for sure is to use a multimeter (voltmeter) attached directly to your battery positive and negative terminals, and observe the following:

1. With the engine and all electrical accessories off, the battery should read a minimum of 12.8 volts DC. If not, the battery is either not fully charged, or it is bad (it is incapable of holding a full charge). Charge the battery fully and check again; if the reading is less than 12.8 volts, the battery is bad and should be replaced.

NOTE: Often manuals describe checking the specific gravity of each battery cell electrolyte (fluid) as the preferred method of checking the condition of the battery. As the battery fitted to these bikes are sealed this is impractical.

2. If the first test above passes, leave the multimeter hooked up to the battery terminals, and press the starter button. While the starter is engaged (but before the bike starts), the battery voltage should be 9.5 volts or greater. If not, then this signals either a bad battery, very dirty or weak electrical connections, or it could be a problematic starter motor (not likely; it's probably the battery!).

3. Your charging system output VOLTAGE should be checked, again at the battery terminals, while the engine is running. The measured voltage should be:

14.2 - 15.2 Volts at about 2,000 rpms for all models. Again, you would measure these voltages at the battery terminals with your voltmeter.

NOTE: If your alternator is outputting more than 15.2 volts to the battery, your regulator-rectifier unit is bad and should be replaced. Over-charging a battery will quickly ruin it, and may cause severe damage or failure of other electrical components, such as the ECU.

Here's your cheat sheet on all of the above:

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## Static Battery Voltage Test

Prior to conducting this test, make sure the battery has not been recently charged. You must wait at least one hour after charging your battery to conduct this test.

1. Adjust voltmeter to DC volts (20 volt range).
2. Place voltmeter leads to the battery terminals (positive to positive and negative to negative).
3. Read voltage and refer to the chart below.

State of Charge:

100% Charged:  
Using a Digital Voltmeter: 12.60 volts

75% Charged:  
Using a Digital Voltmeter: 12.40 volts

50% Charged:  
Using a Digital Voltmeter: 12.10 volts

25% Charged:  
Using a Digital Voltmeter: 11.90 volts

0% Charged:  
Using a Digital Voltmeter: less than 11.80 volts

## Starting Load Test

1. Adjust voltmeter to DC volts (20 volt range).
2. Place voltmeter leads to the battery terminals (positive to positive and negative to negative).
3. Watch the voltmeter as you start your motorcycle, but before the engine is running.
4. If the voltage drops below 9.5 volts, the battery has very low capacity and should be replaced.

## Charging System Tests

1. Adjust voltmeter to DC volts (20 volt range).
2. Place voltmeter leads to the battery terminals (positive to positive and negative to negative).
3. Start the engine.
4. Operate the engine at various engine speeds with the head light on and off (to turn off the headlight, disconnect the headlight connector).

The readings should show nearly battery voltage when the engine speed is low, and, as the engine speed rises, the readings should also rise. But they must be kept under the specified voltage.

5. Compare the voltage reading to the specification given below:

The available charging output voltage should be in the range 14.2 to 15.2 volts DC.

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If your charging voltages are too low and do not rise as engine speed increases, suspect the alternator or Regulator/Rectifier.

If your charging voltages are too high, suspect your Regulator/Rectifier unit first, and perhaps dirty or corroded electrical terminals. The procedure for checking these is too detailed to describe here, and you should consult your service manual for additional details.

6. Check the condition of your main circuit terminals they should be zestfully clean and uncorroded, or you're primed for a variety of problems not only will your circuits not be getting full power out of your battery, but to add insult to injury, your charging system may think that the battery needs more juice, and so it starts cranking out amps like there's no tomorrow. It's pretty safe to say that neither of those two occurrences qualify as a good thing. So start at the beginning, and inspect and clean (and then protect, like with di-electric grease or equivalent) all the terminal connection points:

1. The positive battery post connection to the positive battery cable.
2. The positive battery cable connection to the starter relay (or "solenoid").
3. The main harness terminal connector from the starter relay.
4. The main lead from the starter relay to the starter motor (both ends).
5. The "main fuse" contacts inside the fusebox.
6. The battery ground cable contacts at frame ground and at the negative battery post (poor ground are just as bad as poor positive feeds; after all, it takes two to tango, or to complete a circuit, and electricity doesn't care where the restriction occurs).

### Battery and Charging System Results

Okay, now with all of the above out of the way, you should be able to determine whether you need a new battery, or not. There's no need to waste money on a replacement battery if it's not the root cause of your problems. If your battery is good, but your charging system or electrical system isn't, then spend your time and money on fixing the root causes of the problem. Such efforts will also help prevent you from murdering your otherwise good battery.

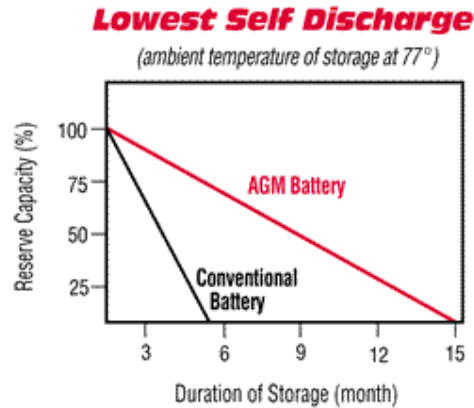
AGM batteries feature cell separators made of fiberglass mats that minimize the movement of electrolyte (acid), and prevent spillage if tipped over on their side. The acid formulation in these also typically a bit stronger compared to flooded cell batteries, which accounts for their typically higher output. AGM batteries are of the permanently sealed, "maintenance-free" design, thus never requiring the further addition of water or acid.

The charging system on the Ninja 650R that comes factory-equipped with an AGM type battery uses a regulator/rectifier that outputs a slightly higher voltage than the old flooded cell battery requires. Using an AGM in almost any motorcycle will usually work well, while using a flooded cell battery in a bike designed for an AGM type will often result in overcharging and quick boiling of the electrolyte solution, it isn't long before the battery is dry and possibly ruined.

In summary don't replace your battery with an older style flooded cell battery!

AGM type batteries are also more tolerant of sitting for long periods with minimum formation of lead sulphate (sulfation) on the plates. They can usually be charged at a slightly higher rate and in general provide better performance over the long haul. However, once AGM batteries are "dead"; they're dead, and cannot usually be brought back to life (even for a short amount of time) like a conventional battery can.

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Finally, be aware that while AGM batteries are sometimes incorrectly called "gel cells batteries", a true "gel cell" type of battery is quite a bit different, and is actually not recommended for motorcycle use.

### Battery FAQ's

#### What is a conventional (or "wet" or "flooded") battery?

These are the standard automotive type design battery, with individual push-in or screw-in battery cell access caps, and normally need the periodic addition of distilled water to "top up" the fluid level.

#### What is a "maintenance-free" battery?

Maintenance-free batteries do not require the addition of water after their initial fill of their water/acid electrolytic solution. It means that it is a "sealed" battery, with no filler caps. Note that while conventional "wet" batteries may be available in a sealed, maintenance-free variety, AGM batteries are always of this sealed, maintenance-free type.

#### What is a "high-performance" battery?

Due to plate design and other factors, high-performance batteries have a denser charge ability and will output more amps for a longer period of time (this is the so-called Cold Cranking Amps or CCA rating number that is used to describe a battery) before full discharge.

Although there have been some interesting technological "enhancements" to the basic conventional battery design over the years, almost all "high-performance" (meaning, higher-capacity) batteries rely on more lead material in their plates, resulting in a physically heavier battery. More lead = more money to manufacture and transport the battery, which is why these batteries cost more.

#### What is an AGM battery?

AGM is an abbreviation for "absorbed glass mat". In this battery design, the acid is completely absorbed into glass mat separators which are sandwiched between the lead plates. It's a totally sealed and maintenance free design. There are no discharge tubes or fillers caps, which eliminates the need to maintain water levels and offers no concern about acid leaks on valuable parts and accessories.

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AGM batteries offer the following advantages over conventional batteries because:

1. Their sealed, maintenance-free design means you never have to worry about checking nor maintaining their fluid levels.
2. AGM batteries, unless physically damaged, will not leak or corrode your paint and chrome.
3. They have less internal resistance which offers more cranking amperage than wet batteries.
4. Their lower self-discharge rate means they can sit for extended periods of time without constant monitoring. A conventional wet battery discharges 15% a month, where our AGM batteries discharge only 2-3% a month.
5. You can expect a longer service life be expected from an AGM battery, the main reason conventional wet batteries fail is due to water levels that are not properly monitored and maintained. Conventional batteries are also not very heat nor vibration resistant. AGM batteries are much more heat and vibration resistant than conventional batteries, and of course are maintenance-free, all of which contribute to their longer service life.

## What is a gel-cell battery?

A type of battery that you do not want to use in your bike!

## How should a battery be maintained?

Good battery maintenance allows you to get the maximum power and life from your battery:

1. Always keep the acid level between lower and upper lines on front side of the container (for conventional type batteries that are not sealed).
2. Do not let the battery remain in a discharged condition for any length of time. Discover and remedy the cause of such a condition immediately.
3. When a bike is stored for over 30 days at a time, use an automatic battery charger to maintain a proper storage charge.

Kawasaki-recommended chargers:

Optimate III  
Yuasa 1.5 Amp Automatic Charger  
Battery Mate 150-9

4. Keep the top of the battery case clean, dry, and free of dirt or moisture.
5. Clean the battery terminals to prevent corrosion, and treat them to some anti-corrosion spray or coat their exposed areas with di-electric grease. Do not over-tighten the terminal cinch bolts!
6. Protect the battery from strong impacts or shocks.

## How long will my new battery live?

Regardless of battery type or manufacture, you can expect a properly activated, and properly maintained battery (meaning it's neither overcharged nor overly or repeatedly allowed to become fully discharged) to give you 2-4 solid years of life.

Heat is the big enemy of motorcycle batteries, they'll last much longer in a cool climate

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than a hot one. The self-discharge rate of a battery can run as high as 3% a day in hot weather with a flooded cell battery to about 1% or less per day with an AGM type. Overcharging a battery also overheats a battery, a double whammy! Make sure your charging system is in good order to get the maximum life from your battery.

Constant, repeated complete discharges of a battery will also reduce their lifespan. There's only so many times you can "drain the well" before a battery electrically gives up the ghost.

### What are some of the best ways to kill a battery?

1. Let a discharged battery freeze. Fully discharged batteries freeze at about +25-F, or just below the freezing temperature of water. Fully charged batteries freeze at about 75-F below zero.
2. Let a battery overheat.
3. Overcharge the battery, either via the use of an incorrect (or poor quality or defective battery charger), a charging system regulator gone bad, or highly corroded (high resistance) wiring harness connections within the system.
3. "Quick-charge" the battery using an incorrect style battery charger.
4. Allow the fluid level (for wet or conventional batteries) to get too low. This exposes the plates to air, which cause the plates to "sulphate", which leads to increased electrical resistance and a drop in power output.
5. Run a battery down into deep-discharge. Each full discharge event causes sulphate build-up on the lead plates. Do this enough times, like when your charging system isn't outputting properly and you'll kill a battery pretty quickly.
6. On conventional batteries, do not use regular tap water to fill or re-fill the battery. Tap water contains minerals and metals that will shorten the life of a battery. Always use distilled or de-mineralized water to fill a battery.

### What are the best battery myths?

1. That putting a battery on a cement floor will cause it to discharge. This may have been true a long time ago, when the battery case was made of a rubber material, which would develop hairline cracks and thus allow moisture to permeate into the case, opening up an electrical circuit which would quickly discharge a battery. Modern batteries use molded plastic cases that do not suffer from such a fate.
2. That bringing a battery inside during the winter will prolong its life. Batteries produce electricity via a chemical reaction, and the chemical reaction results in the production of sulphate deposits on the lead plates within the battery, and these sulphate deposits act as electrical insulators, thus reducing the power output and the overall life of the battery. These chemical reactions slow down dramatically with lower temperatures. As long as your battery does not freeze, the lower the temperature, the less the amount of chemical reactions taking place, thus prolonging the life of the battery!

Remember, heat is one of the things that wears out batteries, because they speed up the amount and intensity of these chemical reactions that creates the sulphate deposition on the lead plates, and those deposits are what really "kills" the battery.

By the way, the main reason why your car or bike cranks over so slowly during winter is not due to "thicker electrolyte", but because of the decreased chemical reactions (meaning less electrical output generation) within the battery due to those lower temperatures.

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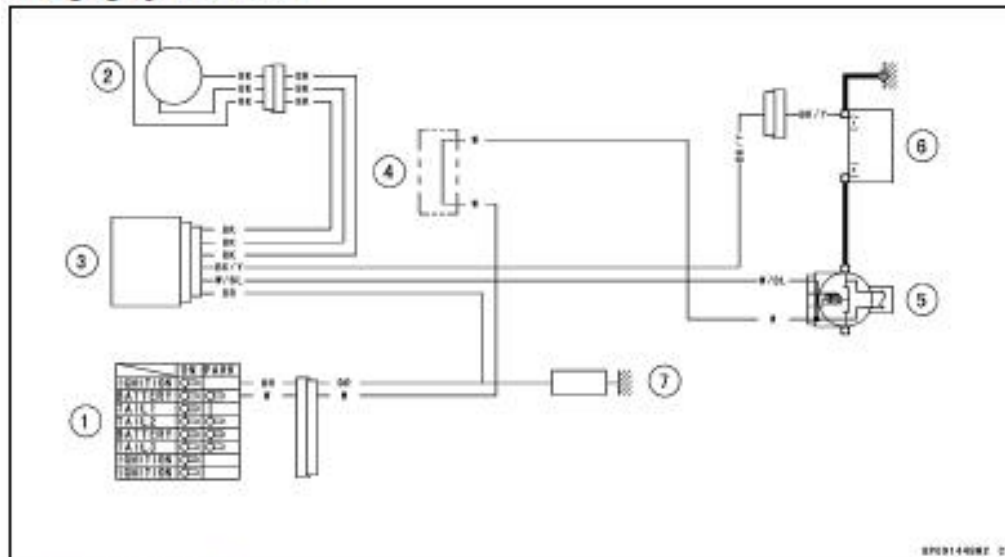
## Can I jump-start my dead motorcycle battery from a car battery?

Yes, but:

1. You need to make sure that you are using the proper gauge jumper cables.
2. hook the jumper cables up incorrectly (+ to -) and if you're lucky, you'll just burn up your ECU. If you're unlucky, you'll blow up your battery, your bike, or yourself.
3. Make sure that your key switch and all electrical power drains are OFF before you hook up the jumper cables.
4. The best sequence of battery connection is to hook up both jumper cables onto the dead battery first, and then connect the positive lead to the good battery, and finally the negative lead to the good battery (or a good ground on the donor battery frame, etc).
5. During the process DO NOT start the car engine, or have the car engine running.

## Wiring Diagram

### Charging System Circuit



1. Ignition Switch
2. Alternator
3. Regulator/Rectifier
4. Water-proof Joint C
5. Main Fuse 30 A
6. Battery 12 V 10 Ah
7. Load