# XP Series

## Owner's Manual

**MOTORINO™ XP SERIES OWNERS MANUAL**

# How to Read This Manual

A "**WARNING!**" label indicates that failure to abide by the following instructions may result in serious personal injury or death to the rider or others, as well as damage to equipment.

A "**CAUTION!**" label indicates that failure to abide by the following instructions may result in damage to your MOTORINO™ and related equipment and/or legal consequences and/or fines and/or denial of warranty coverage.

A "**Note:**" label indicates information that is especially useful but does not have safety consequences.

**WARNING!**
Please fully read and understand all sections of this manual before operating this MOTORINO™ electric vehicle. Do not attempt to charge or operate this vehicle until you have attained adequate knowledge of its features and controls and you have been trained in safe riding techniques. Failure to do so could result in serious injury or death and/or damage to the vehicle and/or denial of warranty coverage.

**CAUTION!**
In our constant efforts to improve and upgrade our products, your MOTORINO™ may incorporate updated components and/or features that are not specifically covered by this version of the Owner's Manual. If you are not clear on how to operate or make use of any components or features, contact your local MOTORINO™ dealer for clarification. Product design, features, and specifications are subject to change without notice.

# Welcome



Your new MOTORINO™ is the culmination of our decade-long experience in the engineering, sale, and maintenance of light electric vehicles. We've put everything we know into our work and want to share, so please read this manual carefully. It will help you to fully enjoy the benefits of, and ensure a long life for, your MOTORINO™.

**"Thank you for purchasing our product!"**
*The Greenwit Technologies Team*

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# General Safety Warnings

**WARNING!**
**Risks Inherent to Operation:** Operating a Light Electric Vehicle (LEV) involves risks and dangers that may cause serious bodily injury. These include, but are not limited to, paralysis, disability, dismemberment, and death. These inherent risks may be the result of purchaser's own actions or non-actions involving themselves, others, specific circumstances of the activity, and/or the negligence of themselves or others. There may be other risks known and/or unknown to the operator. The operator assumes all risks and responsibility for events that may not be foreseeable including economic loss, social distress, losses, costs, and damages caused as a result of operating the vehicle.

USE ONLY MOTORINO™-approved chargers specifically designed for your exact type and voltage of battery pack - severe damage may otherwise result.

DO NOT attempt to open batteries - no servicing is required or possible.

DO NOT switch on ignition until properly seated and ready to ride.

DO NOT attempt to walk bike or place on either stand with ignition on.

DO NOT ride on roadways where the posted speed limit is in excess of 60 km/h.

DO NOT ride on sidewalks or pedestrian-only pathways.

DO NOT ride on sand, grass, gravel, or on bumpy, rough or loose unpaved surfaces.

DO NOT ride in darkness without proper illumination.

DO NOT operate the bike at speeds in excess of 32 km/h (20 mph), with or without motor propulsion (i.e. coasting downhill).

DO NOT ride without two hands on the handle bars.

DO NOT operate while not properly seated.

DO NOT jump ramps, curbs, or otherwise attempt any form of stunt riding.

## Rider Fitness

Rider MUST be tall enough to be able to place feet firmly on ground.

Rider MUST be physically and mentally competent to operate a two-wheeled motorized vehicle.

DO NOT ride while eating, drinking, smoking, wearing headphones, or using any handheld electronic device.

DO NOT ride while under the influence of alcohol or drugs.

DO NOT ride beyond your ability and experience.

## Protective Apparel

DO NOT ride barefoot or with open-toed, high-heeled, platform, loose and/or slip-on footwear.

DO wear an approved helmet, eye protection, highly visible protective clothing, and gloves.

DO NOT wear or carry anything that obstructs your vision or interferes with your complete control of the vehicle or which could become entangled in moving parts.

## Vehicle Fitness

ALWAYS DO thorough pre-ride checks as outlined (Page12).

DO NOT operate the bike if it is materially defective in operation, damaged, or missing safety-related equipment.

## Loading

Total payload, including the rider, is NOT TO EXCEED 135kg (300lbs).

Cargo and accessories MUST BE SECURELY ATTACHED OR STOWED, kept as low on and as close to the centerline of the bike as possible, and weight distributed evenly to avoid imbalance or instability.

FREQUENTLY CHECK all mounts and cargo restraints.

NEVER ATTACH heavy items to the front fork, fender, or handlebar as poor handling and instability may result.

DO NOT carry more than 4.5kg (10lbs) of cargo in the tailbox.

If more cargo capacity is required, a trailer is a good option. Please refer installation to your MOTORINO™ dealer.

# The MOTORINO Code of Rider Conduct

In the interests of harmonious co-existence with other road users MOTORINO™ suggests the following common-sense code of conduct be followed in addition to any formal rules of the road:

**Always assume you are invisible to all other road users**, regardless of the lights and reflectors you may have. Your life depends on it.

Share the road or path with others: motorists, pedestrians and cyclists alike. Respect their rights and try to be forgiving if they infringe on yours. Remember, your MOTORINO™ is probably the largest vehicle on the bicycle path but the smallest vehicle on the road.

**Ride defensively.** You, and only you, are responsible for the safe operation of your vehicle.

**Constantly scan** from nearby to well ahead of where you are so you may anticipate, and be ready to avoid road surface hazards as well as other vehicles. Such hazards include:

- Vehicles slowing or turning in front of you, entering the road ahead, or coming up behind you.
- Car doors opening in front of you.
- Pedestrians stepping out in front of you.
- Children or dogs playing near the road.
- Potholes, sewer gratings, railroad tracks, expansion joints, road or sidewalk construction, debris and other road hazards that could cause you to swerve, catch a wheel, lose traction, or otherwise have a crash.

**Always signal** when turning and stopping.

**Ride in a calm, smooth, predictable manner.** Don't weave through traffic or make sudden moves that may startle, provoke, or require evasive action from other road users or pedestrians.

**Never hitch a ride** by holding on to another vehicle.

# Pre-Operation Checks



**WARNING!**
Failure to perform checks on a regular basis could result in unsafe and/or unreliable vehicle condition leading to serious injury or death and/or damage to the vehicle and/or denial of warranty coverage.

## Before Every Ride

Charge batteries (page 13).

Walk-around inspection. Make sure all parts are securely fastened.

Check tire pressure and condition (page 39).

Check brake operation front and rear; make sure there is no leakage of brake fluid.

Check for smooth throttle grip operation.

Check signals, lights, and horn.

Ensure the wheels spin freely and are well aligned.

Only turn the ignition on once you are seated and ready to ride.

## After Every Ride

Be sure the ignition is turned off.

Plug the charger in and check for twin red lights and fan (page 14).

Be sure the charger will stay dry during operation.

If stored outside, cover the bike and arm the alarm.

# Charging

**WARNING!**
DO NOT plug the AC power cable directly into the charging socket on the bike.

**WARNING!**
Risk of overheating. Maintain air-flow around the charger at all times. DO NOT enclose it in a storage compartment or other unventilated space when charging.

The charger is designed for indoor, dry-area use only.

**WARNING!**
DO NOT expose charger to water.

If absolutely necessary, you could place the charger on the floorboard and drape the bike with its cover allowing for sufficient ventilation. You do so at your own risk.

## Connecting the Charger

**1. Make sure the bike's circuit breaker is ON.**

To charge the battery pack, the bike's main circuit breaker must be ON. If the breaker is off, the charger will only seem like it is charging the battery.

**2. Plug the charger's AC power cable into the charger.**

**3. Plug the charger into a standard household 120V AC Power outlet.**

**4. Plug the charger output cable into the charging socket on the bike.**

## Understanding The Charger's Indicator Lights

The supplied MOTORINO™ charger is fully automatic and has two indicators lights to tell you what is happening. One red LED indicates that it is connected to power, while the second LED changes between red, to indicate "charging" and green, to indicate "full".

Normal charger/indicator behaviour is as follows:

- When the charger is connected to AC power but not plugged into the bike's charge socket, you will see 1 red and 1 green light.
- When the charger is then connected to a bike that needs charging, it will enter the "bulk-charge" mode and both lights will appear red and the fan will run.
- When a full charge is reached, it goes into "float mode" and the lights will return to 1 red, 1 green.

**NOTE:**
Because the un-connected indicator state matches the fully-charged state, always verify that charging has begun by looking for the 2 red lights and listening for the fan. If you are not sure if the bike even needs charging, just ride the bike a for a bit or rev the motor (with the bike on the main stand and rear wheel in the air) to make it start the charge cycle.

**NOTE:**
If you should happen to connect the charger only to the bike but not to AC power, only one red LED will light. This light is being powered by the battery pack and will only help drain it, so don't leave your charger plugged into the bike when not also connected to AC power.

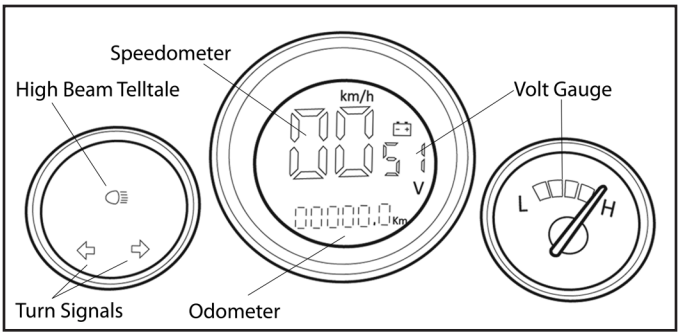
## Approximate Charging Times

Time to fully charge an empty pack:

- 20 A-h lead-acid pack: 8hrs.
- 20A-h with 12 A-h secondary pack: 10hrs with 4A charger.
- 26 A-h $LiFePO_4$ pack: 6 Hrs (3hrs gives 80%).

# Instruments

Whether analog or digital, all MOTORINO™s have gauges that tell you the same basic information. A speedometer, an odometer, and a voltmeter which is the EV equivalent of a gas gauge (but not quite).




*Typical gauge cluster.*

## Speedometer and Odometer

Everybody knows how to read a speedometer and odometer, so we won't go into detail other than to say that speedometers have a specified error margin that is only on the plus side, so you won't unwittingly be going faster than you think. That means that speedometers usually read faster than your actual speed. This is customary in the whole automotive industry. If absolute accuracy is required, a portable GPS or carefully calibrated bicycle computer are your best options.

## Volt Gauge

The battery pack voltage gauge, on the other hand, needs some interpretation in order to gain useful information about how much power you have left. Much of this interpretation will be obvious after some time in the saddle, but here are a few points to keep in mind.

The volt gauge, unlike a fuel gauge, is not a direct reading of how much power or range you have left. It just shows the approximate voltage of the battery pack.

The volt gauge will read "high" for most of the time the bike is switched on but stationary; only when the batteries are very weak will you see lower readings.

The meaningful readings on a volt gauge only happen when a demand is being placed on the batteries.

With gel cells fresh off the charger, you may not notice any swing in the volt gauge off of "high". However, as the batteries are drained, you will notice a larger drop on the volt gauge as the bike is accelerated from a stop or when going up hills.

When the batteries are still mostly charged, the volt gauge reading will recover to full when the bike is cruising on level ground. However, as the batteries drain further, you will notice the voltage reading drop more and more when cruising. Also keep in mind that when regeneration is happening (such as lightly braking down a hill), the volt gauge reading will show "high".

Lithium batteries are a bit tougher to read because one major advantage of $LiFePO_4$ cells is also a slight disadvantage here: their voltage drops (or "sags") far less when under load. This means the volt gauge will almost always show full, only deflecting much in the last 4 or 5km.

**NOTE:**
On models with digital speedometers, there is an additional numerical voltage readout. This is interpreted in the same way as the analog needle or bargraph-style volt gauges.

Optional, more advanced capacity gauge systems that track the total power flowing into and out of the battery during charging and use can provide a much more accurate indication of the state of charge and are especially desirable with lithium packs; ask your MOTORINO™ dealer for details.

Ultimately, only the rider can get a solid feel for what their range is given their usual specific use of the bike. Since range depends on the payload of the bike, the terrain, tire pressures, braking technique, wind and many other factors, there is no one way to interpret the gauge readings. Rest assured that, eventually, you will get a feel for it.

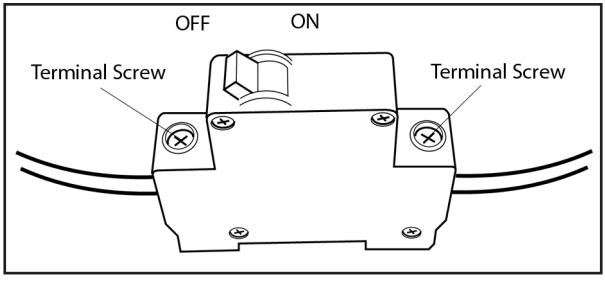
## Indicator Lights

In addition to the gauges, there are lights to inform the rider of turn signal operation, headlight high beam operation, and on some models, additional warnings for low battery.

# Controls and Equipment

The controls of the MOTORINO™ are very similar to traditional motor scooters. However, be sure to familiarize yourself fully before setting off, regardless of your experience with other scooters.

## Main Circuit Breaker




The main breaker has two functions – to protect your MOTORINO™ from excessive damage due to an electrical fault, and to act as a complete disconnect from the battery pack. The breaker is located under the seat on models with an enclosed storage compartment, and under a locking panel in the floor of the XPd.

The breaker does not require maintenance other than checking the tightness of the wire connections. Simply tug on the wires to be sure they are secure, and/or tighten the terminal screws from time to time.

## Ignition Switch and Steering Lock

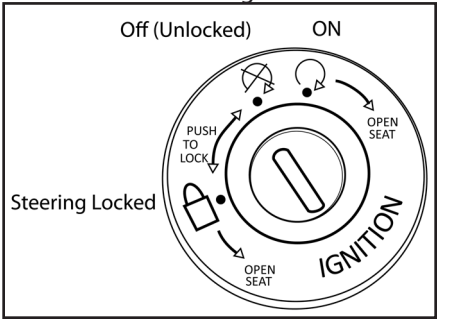
The ignition switch on the inner front cowl of the bike controls locking of the steering, bike power, and on some models, also releases the seat latch for access to the storage area.

**WARNING!**
Always make sure the ignition switch is off before trying to walk or move the bike by pushing or grabbing the handlebars since it is very easy to unintentionally twist the throttle grip.

**WARNING!**
Always firmly apply the brakes when switching the bike on, to avoid unintended acceleration. Do not switch the bike on until properly seated and ready to ride.

On XPd models, there is a protective cover that must be moved out of the way of the lock cylinder using the tool built-in to the head of the ignition keys.

To unlock the steering, turn the key clockwise to the first position. If the key is reluctant to turn, wiggle the handlebars left and right to release the column lock.




Turn the bike on when ready to ride, turn the key clockwise until the Volt Gauge shows "High". Headlights, accessory power, etc are all controlled by the ignition switch.

To lock the steering column, turn the handlebars to the left and then turn the key counter clockwise, pressing the key into the lock. It may be necessary to wiggle the handlebars a bit left and right to help the column lock engage.

To release the seat, turn the ignition switch all the way counter-clockwise and then against the spring until the latch clicks (do not depress the cylinder). On XPn and XPr models, you can also unlatch by turning all the way clockwise to ON and then further against the spring pressure.

## Throttle Grip

Just like most motorcycles and scooters, the right-hand handlebar grip of your MOTORINO™ rotates to control power delivery.

**WARNING!**
Make sure that the throttle grip rotatate smoothly and freely returns to the off position when released.

**WARNING!**
Always make sure the ignition switch is off before trying to walk or move the bike by pushing or grabbing the handlebars since it is very easy to unintentionally twist the throttle grip.

## Brakes

Your new MOTORINO™ XP-Series bike is equipped with high-performance, self-adjusting front and rear hydraulic disc brakes and anti-lock (ABS) pressure dampers. (See diagrams on pages 32 and 33)

**CAUTION!**
UNLIKE the computer-controlled ABS found in automobiles, you can still lock the wheels by applying excessive brake input. The ABS on your MOTORINO™ can help you maintain control in marginal situations but does not do all the thinking for you.

When you squeeze a brake lever, hydraulic fluid (DOT 3 or 4 brake fluid, the same as used in most cars and motorcycles) is forced by the master cylinder through the brake line and into the brake caliper, thus forcing the caliper's piston(s) to push the brake pads into contact with the brake rotor, causing friction that turns kinetic energy into heat and thus slows the bike. At the same time, an electrical brake-light switch is tripped. The right lever controls the front brake, the left controls the rear.

The mechanical ABS works by damping the hydraulic pressure pulses that develop as the rotor locks in the caliper, slightly relieving the pressure and allowing the wheel to continue to rotate, which helps maintain steering and traction.

NOTE:
Under most conditions, maximum braking power and control is achieved by using the front and rear brakes simultaneously.

## Regenerative Braking

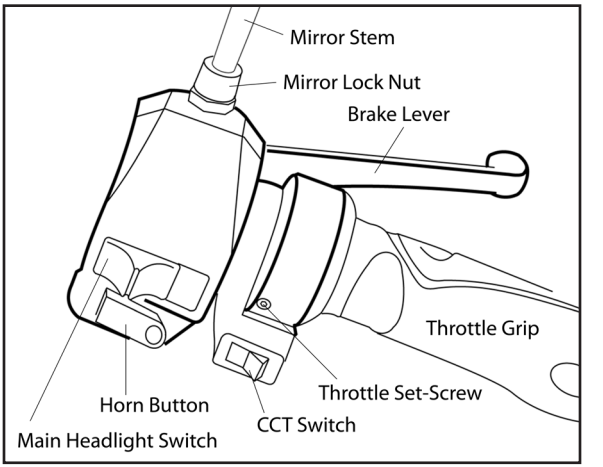
In addition to the mechanical brakes, the motor's regenerative braking helps slow the bike while turning some of the otherwise lost kinetic energy back into electricity. If used as much as possible, it will also help extend the life of the mechanical brake pads and rotors.

Regenerative braking is engaged whenever the brake light comes on with operation of either brake lever. Lightly pulling on either lever just enough to make the brake light come on will cause the regenerative braking to do most of the work.



## Headlight Main Switch

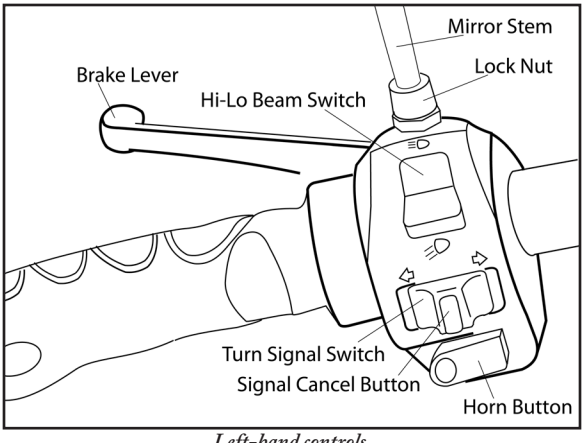
On the right-hand cluster, slide it to the middle position to turn on the running light(s), and all the way left to turn on the headlights.




*Right-hand controls.*

## Headlight Hi-Lo Beam Switch

On the left-hand switch cluster, rock it upward to engage the headlight high beam or downward to select low-beam; the main headlight switch must be ON.




*Left-hand controls.*

## Turn Signal Switch

On the left-hand switch cluster, slide left or right to engage respective directional flashers; press button in center of slider to cancel.

## CCT Switch

Located below the right grip, the CCT switch allows you to tune power use to conditions by selecting one of three "electronic gears": high torque (rocker middle), high speed (rocker rightward), and an economy mode (rocker leftward).

For a detailed explanation of the technology and the advantages of one setting over another, please see the MOTORINO™ web site.

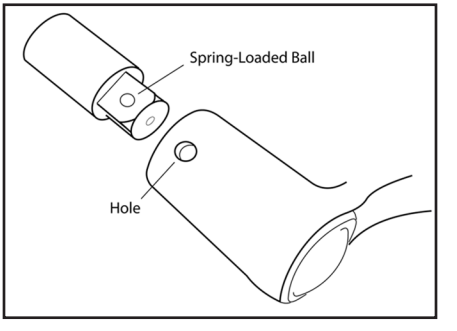
## Horn Buttons

Located on both switch clusters. Press to sound the horn.

## Pedals

Pedals are removable and attach similar to a socket set. They are marked L and R so be sure to put them on the correct side of the bike.

**CAUTION!**
Be sure to align the hole in the crank arm with the spring-loaded ball on the pedal axle.




## Under Seat Storage Compartments

On XPh models, access is by the ignition key via a lock cylinder on the left side of the body under the seat. On XPr, XPn, and XPs models, the seat is released via the ignition switch. On XPd models, the seat is released by means of a hand-operated latch under the left side of the seat cushion (there is no lock).

## Tail Storage Box

The rear storage box is intended for relative light items such as helmets and protective gear. On models so equipped, it is locked by a key that is distinct from the main ignition key. Be careful not to jam the locks with the wrong key.

## Alarm System

Your MOTORINO™ comes equipped with a movement and shock-sensitive alarm system. It is armed and disarmed by the 4-button key chain remote.

Button functions:
Padlock-closed icon = arm
Padlock-closed icon = disarm
Bell icon = sensitivity adjustment
Lightning bolt icon = locator chirp

Sensitivity can be adjusted (alarm must be disarmed) by holding down the "bell icon" button on the remote. Five chirps are heard, followed by a sequence of 1, 2, and 3 chirps, the order depending on the initial setting. Release the button once you hear the desired number of chirps. One chirp is the most sensitive setting, three chirps is the least.

An optional paging alarm system with 2-way remote is available from your MOTORINO™ dealer. This has the advantage of allowing you to receive notice of alarm triggering when you are out of hearing range or have set the alarm to silent mode.

## 12V Accessory Power Outlet

The 12V accessory power outlet is intended for powering mobile electronics such as cellphone chargers and music players, as well as the supplied air compressor. It is only active when the bike is switched on.

**WARNING!**
Be sure the bike is supported on the center stand with the rear wheel clear of the ground and that the throttle grip is in the off position before switching on bike to use the accessory power outlet.

# How it Works

Compared to an internal combustion engine, your MOTORINO™'s drive system is elegantly simple.

Electric power stored in the battery pack is supplied to the motor controller.

The controller converts the battery's direct-current to three-phase alternating-current and sends it to the direct-drive brush-less motor built into the rear wheel. There are no gears or chains involved in transmitting power from the motor to the road.

The controller receives rider input from the throttle grip and CCT switch to determine how much power to send to the motor; the power developed depends on the amplitude, frequency, and shape of the AC waveform the controller produces.

When the controller receives a signal (from the brake light circuit) that the brakes have been applied it engages the regenerative braking function. This puts power (taken from the kinetic energy of the moving scooter) back into the battery by turning the motor into a generator. The drag of the motor now acting as a generator helps slow the bike and has the welcome side-effect of lessening wear on the mechanical brakes.

# E-Riding Tips

Use regenerative braking as much as possible.

Accelerate gradually, ride smoothly.

Avoid starting out on hills.

Avoid steep hills when possible.

Avoid deep battery discharge.

Charge fully after each ride and at least once a month even if not riding.

Turn Circuit Breaker off when in storage, but back on to charge.

# Battery Types and Terms

The XP-series use a 48 V (nominal voltage) battery pack comprised of four 12 V (nominal voltage) batteries. These batteries are electrically connected in series to form the 48 V battery "pack". The battery chemistries presently used are either the standard Sealed Lead-Acid "Gel Cell", or optional Lithium Iron Phosphate ($LiFePO_4$). Both types are maintenance-free, sealed, and leak-proof in any position in normal use.

**What is "Nominal" Voltage?** Batteries are commonly referred to by their "nominal" voltage, which is essentially a shorthand reference usually based on some theoretical average or "natural" voltage related to the particular battery chemistry. In the case of the batteries used in MOTORINO™s, the battery packs are simply referred to as 48 V (4x 12 V) but the actual measured voltages will range from about 55 V when fully charged, down to about 42 V when the motor controller's low-voltage cut-off kicks in.

The "capacity" of the standard XP-series gel cell battery pack is 20 A-h (amp-hours), enough charge for about 50km distance in ideal conditions. It weighs about 27kg (60 lbs). The $LiFePO_4$ battery pack is rated at 26 A-h and also weighs about 50% less, so gives a useful range of 70-80km.

**What is an "amp-hour"?** In the simplest sense, it means a current of one ampere, delivered for one hour. For example, our standard 20 A-h battery pack is theoretically rated to deliver one amp for 20 hours, or 20 amps for one hour. Of course, there is always more to the story. A battery's ability to deliver power varies inversely with the intensity of the power draw, so delivering 20 amps is less-efficient than delivering one amp. Therefore, the qualifier to amp-hour ratings is the intensity of draw used in the test to come up with the capacity spec. This is usually stated as a fraction of the battery's rated capacity. MOTORINO™ gel cells are rated at the C/1 rate, which means they were tested with a 20 A draw to come up with the spec.

But that is still not the whole measure of power capacity. Just like on your home electric bill, power, which is the ability to actually do work, is measured in Watts (which for electricity equals the voltage multiplied by the current) and ultimate power consumption is measured in watts used over time, or watt-hours. So, multiplying the A-h rating by voltage gives watts, which means 20A-h x 48 V = 960 watt-hours of total electric power

in the standard battery pack or 1248 Wh for the $LiFePO_4$ pack. Based on the above calculations, you can get a general idea of the cost of charging your MOTORINO™ by multiplying the watt-hours by your utility rate (usually stated per 1000 Wh aka kWh.



# Caring for your Gel Cell Battery Pack

The lead-acid chemistry is still the most widely used and, for now, cost-effective battery type in light electric vehicles. They will deliver excellent service if used with a few points in mind.

**1. They prefer not to be deeply discharged.**

Your gel-cell battery pack will give more mileage over its lifetime if you minimize the depth of discharge. In practical terms, that means shorter trips between charges will lead to longer battery life. Of course, we have to go where we have to go and the ideal isn't always possible, so do what you can. For example, even if you could make a number of round-trips on a single charge, it is better for your battery pack to charge up between trips. In lab tests, a gel-cell pack always drawn down to 10% remaining will deliver less than half the mileage of a battery that only gets discharged to 50%.

**NOTE:**
There is no such thing as a "memory effect" in relation to lead-acid batteries; the "advice" to fully discharge before recharging only ever applied to NiCad batteries and is actually damaging to lead-acid gel cells!

**2. They like to be fully charged at all times, especially when in storage.**

Left entirely on their own, gel-cells will lose about 40% of their charge in a year. Add the small but steady current draw from something like an alarm system, and they can be flat in just a few months. This is very bad because of a chemical process known as "sulfation" (also spelled "sulphation") that occurs whenever a lead-acid cell is discharged.

In regular use, if you adhere to the "charge at every opportunity" rule above, your batteries won't sit deeply discharged long enough for the non-conductive lead-sulfate layer to become a problem since when it is still very thin, it is removed again by normal charging. This can be ensured

by regular use of a preventive desulfator attached to the normal charger (available as an accessory from your MOTORINO™ dealer).

The real problems with sulfation tend to occur when bikes are not in regular use. When left (or allowed to become) discharged for too long , the lead-sulfate layer builds up to the point that the battery's ability to take a charge and deliver power is negatively affected, often fatally. This can happen in just a matter of weeks if a battery started out low.

A more powerful type of desulfator can sometimes bring back much of a sulfated battery's capacity. Your MOTORINO™ dealer may offer this service, as well as a test for actual battery capacity.

One more important reason to keep them fully charged is to keep them from damage by freezing. Fully charged, they can handle -40 °C but can freeze at much warmer temps if flat.

**3. They don't like to get too hot.**

Heavy current draw for longer periods, or fast charging at high amperages will heat up the batteries. Heat speeds up the chemical degradation of a lead-acid cell and in extreme cases causes serious physical damage.

Keeping your tires inflated and your bike unburdened by unnecessary weight helps a lot. The supplied 3A charger is considered a good compromise between charge time and battery life for the 20 A-h gel cell pack. A 4A charger is ideal when a 12 A-h secondary pack is installed.

**4. They are not especially fond of the cold.**

You can expect about 20% less range at 0 °C compared to 20 °C.

# Caring for your Lithium ($LiFePO_4$) Battery Pack

Compared to lead-acid, there is less to worry about with $LiFePO_4$ batteries. However, keeping these points in mind will help you get the most from them:

**1. They do not like over-charging or under-voltage.**

No batteries really do, of course, but lithium-chemistry cells are particularly picky. The $LiFePO_4$ batteries in your MOTORINO™ have internal protection circuitry that disconnects the cells when at risk of being over or under charged to the point of damage. It is very important that the battery be recharged promptly if the low voltage cut-out is tripped. This is because self-discharge, although very slow compared to lead-acid batteries, can still take the cells into dangerously low-voltage territory.

**2. Lithium batteries give less warning, via the stock capacity gauge, that you are running out of charge.**

Please see the section on interpreting the capacity gauge for more details.

**3. They prefer not to be deeply discharged**

Similar to gel-cells but to a much lesser degree, a Lithium battery pack will give more mileage over its lifetime if you minimize the depth of discharge. The trade-offs are hard to quantify in real world use, so just do what you can.

**NOTE:**
Once again, there is no such thing as a "memory effect" in relation to $LiFePO_4$ batteries; the "advice" to fully discharge before recharging only ever applied to NiCad batteries.

# Battery Lifespan

Replacing the battery pack is an inevitable part of riding an EV. Even when you do everything right, the natural order of things is for the capacity of both lead-acid and lithium batteries to decrease ever so slightly with every charging cycle, and the deeper the discharge, the proportionally greater the loss. They also age chemically when sitting on the shelf, but proper storage will make that far less of a factor than actual use.

"How long will my batteries last?" is almost impossible to answer since it will be highly dependent on how far you ride, both in-total and between charges, and what your needs are. There is no set schedule for replacement; it falls to the owner to decide when the range of the bike can no longer meet their needs.

# A Word on Replacement Batteries

Replacement batteries should be purchased from a MOTORINO™ dealership to ensure they are fresh and up to the demanding job of powering your bike.

With lead-acid, one simple indicator of unsuitable batteries is their weight. A good 12 V 20 A-h battery should weigh 6.86Kg (15.1 lb), making the full 48 V pack 27.44 kg (60.4 lb). Many batteries being marketed

for electric scooters are substantially lighter than this because they are built from thinner plates of lead and/or have less active volume even though they are about the same dimensions.

There is no such simple weight vs. quality indicator for lithium batteries, however.

# Battery Disposal and Recycling

When the battery pack is no longer viable, it should be removed from the bike and delivered to a recycling facility. Laws prohibit disposal of any lead-acid or large lithium batteries in everyday trash. Please contact your local solid waste or recycling authority for recycling information in your area.

# Extending Your Range by Adding Capacity

Any MOTORINO™ can benefit from greater battery capacity, but only some models are capable of conveniently holding extra batteries.

The following capacity figures are for lead-acid gel-cell batteries. Lithium batteries in the 26 A-h capacity are exactly the same physical dimension as the 20 A-h lead-acid and can be used in similar configurations. Other custom options may become possible as more variants and improvements in lithium batteries become available. Please consult your MOTORINO™ dealer regarding upgrading your battery capacity.

**XPr & XPn**: 52 A-h maximum; an extra 20 A-h can be fit within the chassis and 12 A-h under the seat. With some custom fabrication, a full second set of 20 A-h batteries can be fitted.

**XPh:** 32 A-h maximum; extra 12 A-h batteries can be fit under the seat.

**XPd & XPs:** No room within the stock bike.

Additional 48 V packs would be connected in parallel with the primary battery, charging and discharging together. Higher-current chargers are available to keep your charge times around the standard 8 hours.

Purchasing extra batteries to augment a battery that is well into its cycle life is not wise. The best value is achieved by installing all batteries at the same time.

When considering adding capacity, please bear in mind the effect of the added weight, especially if you are uncomfortable on a heavy bike or have very steep hills on your commute.

# Maintenance



Nobody can keep an eye on the condition of your MOTORINO™ like you can. It is up to you keep it maintained and obtain servicing as required. Being fully familiar with your MOTORINO™'s regular operation will also help you spot potential trouble before it becomes a breakdown.

**WARNING!**
Failure to maintain your MOTORINO™ as specified can result in unsafe operation, regulatory non-compliance, damage to components, and possible denial of warranty coverage.

Fortunately, unlike an internal-combustion vehicle, there is very little maintenance required beyond regular inspection.

# Periodic Maintenance Schedule

Maintenance time periods are approximates based on semi-daily use in moderate weather. Heavy use in winter or otherwise harsh conditions may necessitate shorter intervals between checks. Refer to the applicable section of this user guide or the MOTORINO™ Service Manual for detailed service procedures.

## Daily/Every Ride

Pre-Ride Checks (page 12).

## Weekly

Closely inspect tires for tread wear, foreign objects, and damage (page 40).

Closely inspect alloy rims for damage, cracks, and bends.

## Monthly

Check brake fluid level (page 34).

Inspect freewheel and lubricate pedal chain (page 35).

Inspect brake pads and rotors for wear (page 36).

Check axle nuts/bolts, brake caliper bolts (pages 33, 34, 31, and 32).

Inspect wires and cables on front fork and rear swing arms.

Check circuit breaker terminals have not come loose (page 17).

### Every Six Months

Check wheels for bearing play (page 37).

Check steering column for bearing play (page 37).

### Yearly

Purge brake hydraulics with fresh fluid, bleed systems (page 34).

## Maintenance Procedures

**WARNING!**
The instructions here are intended for people with sufficient mechanical aptitude and experience to work on motor vehicles and bicycles. If in doubt about your abilities to carry out any of these procedures, refer inspection and servicing to your MOTORINO™ dealer.

### Brake Rotor Bolts

See diagrams on pages 32 and 33. These are the M8 diameter socket-head bolts that secure the disc brake rotors to the wheel hubs. There are 3 or 4 per rotor and they usually require a 6mm allen hex bit. Use a sharp unworn socket style allen bit to avoid stripping the bolt head.

Check them by applying 18-20 ft-lbs of torque to each one. If a bolt moves, remove that bolt and re-install it with a drop of medium-strength thread locker (LocTite™ 242 or equivalent) on the leading threads and torque to the above spec.

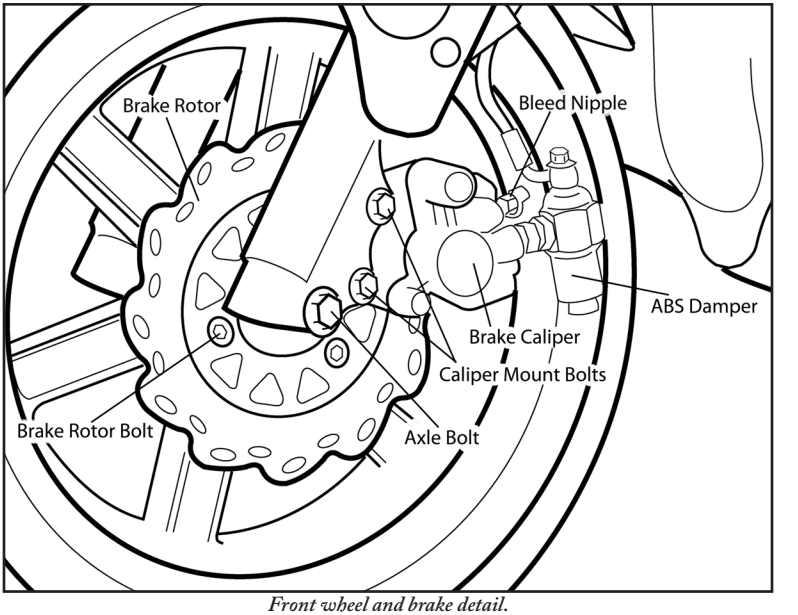
## Caliper Mounting Plate Bolts



See diagrams on page 32 and 33. These are the bolts that secure the brake caliper's mounting plate to the fork (front) or reaction plate (rear). Front bolts are either M10 or M8 diameter, rears are almost always M8, and usually require a 12mm or 10mm socket or wrench. Adjustable wrenches are not suitable tools for this job. In the rear, temporary removal of the chain-guard panel may be necessary to gain access.

Check them by applying 35-40 ft-lb (M10) or 18-20 ft-lb (M8) of torque to each one. If a bolt moves, remove that bolt and re-install it with a drop of medium-strength thread locker (LocTite™ 242 or equivalent) on the leading threads and torque to the above spec.

**NOTE:**
The brake calipers are of a "floating" design and are free to move toward and away from the wheel, allowing alignment with the brake rotor. They move along guide pins that are part of the mounting plate. A small amount of fore-aft play is also normal.

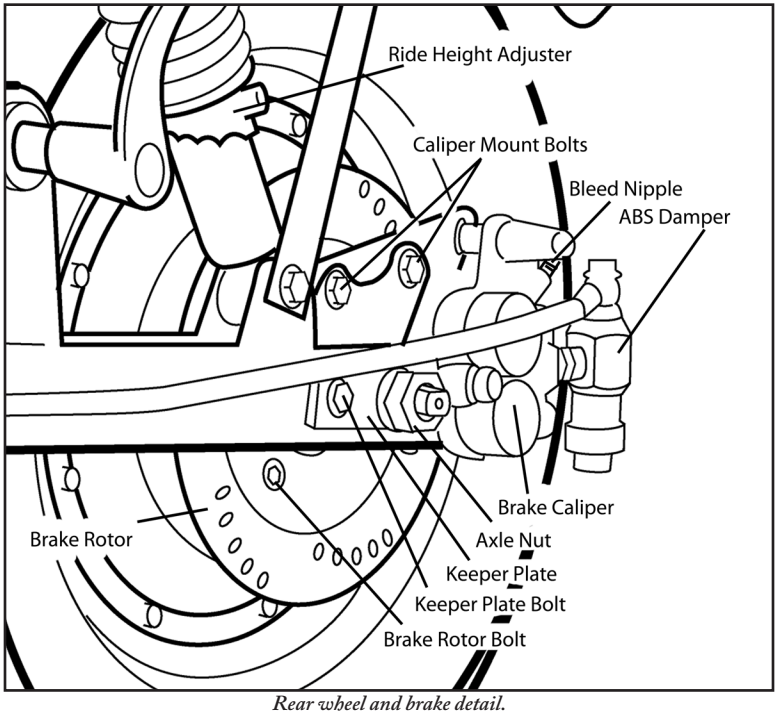



*Front wheel and brake detail.*

## Front Axle Bolt

See diagram on page 32. The front wheel is secured by a long bolt running through the forks, hub bearings and spacers. Required wrench/socket sizes are typically 17mm and 14mm on models with M12 axle bolts or 12mm and 14mm for M10 axle bolts. Adjustable wrenches are not a suitable tool for this job.

Check by holding the bolt head steady and applying 35-40 ft-lb (M10) or 65-70 ft-lb (M12) of torque to the nut. If it moves, remove the nut and reinstall it with a few drops of medium-strength thread locker (LocTite™ 242 or equivalent) applied to the bolt threads nearest the fork where the nut will sit and torque to the above spec.




*Rear wheel and brake detail.*

## Rear Axle Nuts, Keeper Plate Bolt, and Chain Tension

See diagram on page 33. The rear axle (technically, the motor's Stator shaft) is secured by means of keeper plates (to prevent shaft rotation and maintain position for chain tension adjustment) and a large nut on each side.

Before checking torques, make sure that the pedal chain tension is not too tight or loose. The chain should have about 1 cm (1/2" ) of deflection when pulled or pushed in the middle of its run. Adjustment requires loosening the axle and keeper bolts, positioning the rear axle so the wheel is in-line with the frame and the chain has correct amount of deflection, and then tightening keeper bolts and axle nuts as below.

All CCT motors have M16 axles. The axle nut requires a 24mm (SAE 15/16" is also suitable) wrench or socket; the M6 keeper bolt has either an 8 or 10mm head. An adjustable wrench is not a suitable tool for this job. Temporary removal of the chain-guard panels may be necessary to gain access.

Check the keeper plate bolts applying 6-8 ft-lb of torque. If it moves, remove the bolt and re-install it with a few drops of medium-strength thread locker (LocTite™ 242 or equivalent) applied to the leading bolt threads and torque to the above spec.

Check each M16 axle nut by applying 100-110 ft-lb of torque. Be careful not to tip the bike over.

## Front and Rear Wheels

The front wheel has a number of spacers and on some models, a mechanical speedometer drive gear that must be replaced in the correct order. The rear wheel has spacers plus motor wiring that needs to be disconnected, usually requiring body panel removal as well. For these reasons, please refer servicing requiring removal of wheels to your MOTORINO™ dealer.

## Brake Fluid Level, Topping-Up, Flushing and Bleeding

**WARNING!**
Top-up or refill only with DOT3 or DOT4 automotive brake fluid. Using any kind of oil or other hydraulic fluid will likely damage the cylinder seals and could render the bike unsafe.

**WARNING!**
Use protective gloves when handling brake fluid since it is toxic. Heed all container warnings. Dispose of used brake fluid at appropriate waste depots.

The brake fluid level is visible through a round sight glass window on the master cylinders. With the bars level, the fluid should fill at least half of the window. It may be hard to tell if it is full or empty; moving the bars left and right will let you see bubbles or the top of the fluid if it is full. On XPh, XPr, XPs and similar models it is necessary to remove the cowl to see the sight glasses or open the reservoirs.

To be 100% certain and to top up the fluid, the top cover is removed by undoing two screws. Bars must be level and secured to avoid spillage. Have plenty of paper towels on hand and pre-positioned to catch drips around the reservoir. Fill to no more than 7mm (1/4") and no less than 13mm (1/2") below the top edge of the reservoir. Press the rubber seal back into the reservoir lid and assure proper alignment when re-installing.

Flushing and bleeding the hydraulics is beyond the scope of this manual but is done in the same way as traditional automotive systems.

## Inspecting the Freewheel and Lubricating the Chain

The freewheel is located on the passenger side of the motor hub. It allows the motor to run forward without moving the pedals, but also transmits power from the pedals to the wheel as they are used.

Check it to make sure that the freewheel is securely attached (it self-tightens on the hub when pedaled) and indeed allows the wheel to turn without moving the pedals. Be careful not to drive dirt or water into when cleaning. No lubrication is recommended.

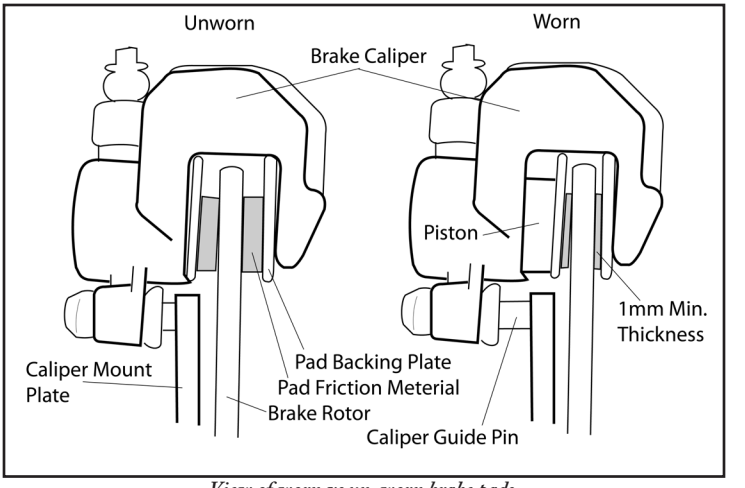
Lubricate the chain the same as on any bicycle. A spray-on chain lube can be used as long as care is taken to keep oil or grease off of the brake parts and tires. Remove excess oil with a rag. Apply it monthly, or if you are riding on salty winter roads, more frequently.

## Checking Brake Pads and Rotors for Wear



Disc brake pads and rotors are critical safety components and should be checked regularly for function and wear. Worn-through brake pads will very quickly ruin the brake rotor, compounding the costs and increasing downtime, so it is a false economy to ever delay replacement.

The brake pads should be replaced at a minimum of 1mm of pad material remaining. They can be checked in-place, with the help of a bright flashlight, by sighting along the surface of the brake rotor. Be sure not to confuse the pad backing plates with pad friction material.




*View of worn vs un-worn brake pads.*

Brake rotor surfaces should be free of deep grooves and show no signs of cracking, in particular around mounting bolt holes. The minimum allowable rotor thickness is marked on the rotor, usually near the hub. Pointed-anvil brake measuring calipers are recommended for an accurate assessment.

Refer brake system service to your MOTORINO™ dealer.

## Adjusting Rear Ride Height

See diagram on page 33. The rear shocks on all XP series models feature an adjuster for the spring preload, which allows some adjustment of the

rear ride height and "hardness". Inserting a suitable 6mm (1/4") lever rod in the socket, the adjusting collar can be rotated to engage the desired step. The factory setting is for minimum preload which suits the vast majority of riders. Please refer adjustment to your MOTORINO™ dealer if you are unsure of the mechanism or what is correct for you.

## Lubricating Brake Lever Pivots

Apply a multi-purpose chassis grease to the pivot bolts where they pass through the brake lever itself, either by means of a spray or by removal and replacement of the bolt.

## Checking Wheel Bearing Play

In normal use, the sealed ball bearings in the front and rear hubs of your MOTORINO™ do not require servicing or lubrication and only need to be checked for wear or damage.

To check, raise the wheel being tested off the ground and then, from one side, grab the top and bottom of the tire and try to rock it perpendicular to the axle axis. Play will be felt as a looseness between two hard stops. Only the slightest perception of play is acceptable.

Once you have ascertained that the play is not because of loose axle nuts, refer bearing replacement to your MOTORINO™ dealer.

## Checking for Steering Bearing Play

The steering column runs on upper and lower ball bearings and is very similar to conventional bicycle headsets. In normal use they do not require servicing other than an occasional adjustment.

To check play, raise the front wheel completely off the ground. Be certain the handlebars turn smoothly with no tight spots. From the front of the bike, grab the bottoms of the front shocks with your respective hands and try to push and pull the wheel away and toward you. Play will be felt as a looseness between two hard stops and should be distinct from a bit of natural flexing of parts.

Refer bearing adjustment or replacement to your MOTORINO™ dealer.

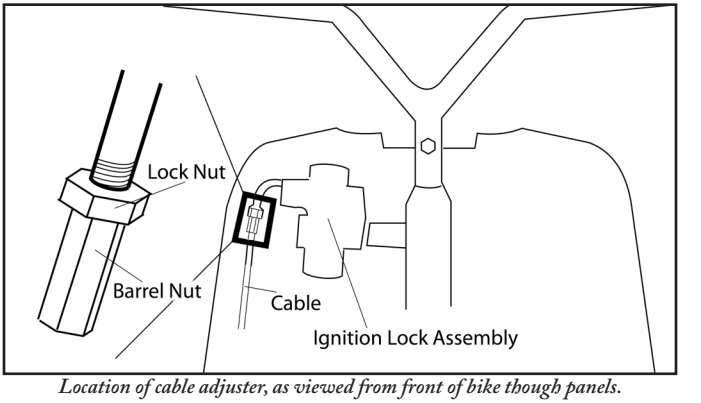
## Lubricating Center and Side Stand Pivot Points

Apply SAE 30W oil or a multi-purpose spray-on chassis grease to the pivot bolts of both sides of the center stand and the side stand.



## Adjusting Seat Latch Release Cable

On models with ignition switch- operated seat unlocking, there is an actuating cable running between the ignition switch and the latch. The tension of the cable must be tight enough to activate the latch mechanism, but not so tight that it holds the latch open.




*Location of cable adjuster, as viewed from front of bike though panels.*

Adjustment is by a threaded collar and locknut at the ignition switch end. Access requires removal of the screws securing the front and rear steering column cowlings, cargo hook, and ignition switch bezel. The ignition bezel is removed by turning it approximately 1/8 of a turn counter-clockwise and then pulling it out.

# Tires

Your MOTORINO™ comes equipped with high-quality tubeless tires because, ultimately, they are the only thing between you, your MOTORINO™, and the hard, unforgiving pavement. All going, turning, and stopping happens through your tires. Take good care of them.

## Tire Pressure

Tire pressure is one of the most critical factors determining the effective range and efficiency of your MOTORINO™. We recommend maintaining the maximum pressure indicated on the sidewalls of your tires for maximum efficiency and handling safety.

**WARNING!**
In addition to poor range and handling performance, low tire pressures can increase the load on the controller and motor causing overheating and possible failure. Riding with the tires at very low pressures can also result in the tire bead coming unseated from the rim, leading to a sudden flat with rim and tire damage, and a possible crash.

**CAUTION!**
Always use a suitable, accurate tire pressure gauge when filling tires from any air source.

## Using the Supplied Air Compressor

The air compressor supplied with your MOTORINO™ plugs into the 12 V accessory power outlet. Operation is straightforward, bearing in mind however that the bike must be switched on for the outlet to be energized and that using the compressor uses up some of your battery power, albeit relatively little.

## Dealing with a Flat Tire

**CAUTION!**
Flat tires must be fixed immediately. Just rolling the bike on a very low or flat tire is a sure way to damage the tire and/or rim. At the very least, you risk unseating the tire beads from the rim which can make re-inflation very difficult.

Flats and slow leaks can come from three locations: damage to the tire itself, a damaged tire valve or loose valve core, and leaks due to wheel corrosion or damage.

The flat tire repair kit provided with your bike can make a quick and simple repair to most punctures. An internal patch is the ideal method for a more permanent repair, but is not practical on the roadside. An inner tube may also be retrofitted but negates the future possibility of repair by plug.

## Checking Tires for Condition and Foreign Objects

Regularly inspect your tires for signs of damage or wear such as penetration by nails and other sharp objects, objects stuck in tread grooves, pinched or bulged sidewalls, cracking, delamination, and flat-spotted or worn-through tread. Minimum tread depth is reached when the Tread Wear Indicators (at points marked "TWI" on the sidewalls near the tread, often with a small triangle) are level with the tread surface.

Most small punctures to the tread area can be safely plugged or patched however damage to the sidewall areas cannot be safely repaired and the tire must be replaced.

**WARNING!**
Replace only with an equivalent-size tire designed and rated specifically for 2-wheeled motorcycle and scooter applications.

## Checking the Tire Valve

The most common problem with a tire valve is a loose valve core, which is the spring-loaded part inside the valve tube. It can be tightened or replaced by use of a standard automotive Schrader valve tool.

Other valve leaks can occur due to tears of the rubber valve body. Repair is only by replacement and should be referred to your MOTORINO™ dealer or a competent tire specialist. In most cases, the wheel should not need to be removed from the bike to replace the stem.

## Using the Supplied Tubeless Tire Plug Kit

Included with each new MOTORINO™ is a tubeless tire plug kit that is capable of repairing small punctures to the tread area of the tire, without having to remove the tire from the rim. However, a tire with any damage to the sidewall area or a slash cannot be safely repaired and must be replaced.

Before attempting to use the kit, be sure you have all three parts in-hand – a puncture prep tool (looks like an awl), a plug needle tool (looks like a large sewing needle with a handle), and a plug rope (looks like a gooey licorice stick, there are usually 5 in a kit and refills can be found at most auto parts stores). Support the bike on firm, level ground using the main stand. Objects that cause flats are usually sharp, so be careful. **Also, wear eye protection since things can unexpectedly go flying when force and/or air pressure are involved.**

1. Locate the puncture and remove the nail or other foreign object.
2. Prepare the puncture for the plug by inserting the prep tool, using all necessary force and slowly twisting the handle clockwise at all times. When the tool is fully through the tread, continue to twist it clockwise while withdrawing the tool.
3. Install the plug by threading one of the plug ropes through the head of the needle tool so that the needle is in the middle of the rope. Insert the needle tool into the puncture until the rope ends protrude no more than one inch but not less than 1/2". Withdraw the needle tool straight back. DO NOT TWIST the needle tool at any time during insertion or removal. Be prepared to exert significant force and brace yourself and the bike accordingly.
4. Re-inflate the tire. Listen/check for leaks. Trim the plug flush with the tread using side cutters (as soon as it's convenient).

## Re-Seating a Tire

In the absence of a high-volume supply of compressed air, a generic nylon-web band-clamp or ratcheting cargo strap can be used. The idea is to place the clamp's band all the way around and centred on the tire tread and then tighten it so that the tire's sidewalls and beads are pushed outward and into contact with the rim to seal enough for air pressure to finally force the tire's beads fully back into the lips of the rim.

## Preemptive Tire Sealant

As a preemptive measure, your MOTORINO™ dealer can install a product which is capable of nearly immediately sealing a puncture, often without you even noticing. Since it remains a liquid until it's forced out of a leak, it also acts as a kind of dynamic balancer, potentially making your bike run even smoother.

# MOTORINO™ Love

Your MOTORINO™ will run even better when it is clean and shiny. :-)



## Washing

Use only a soft cloth, water, and a mild soap suitable for automotive finishes. Gently rain water down onto the bike, especially around the dash or wheels, being careful not to force it into areas it does not normally go. Wash from top to bottom to avoid scratching the more visible parts of the bike with grit from the lower areas. Rinse off any soap residue before it can dry. Dry the finish with a scratch-free, soft, perfectly clean chamois cloth.

Rinsing the bike immediately after riding in on muddy or salted roads is strongly recommended.

**CAUTION!**
DO NOT use a pressure washer or other concentrated jet of water. There is considerable risk of forcing water past seals and into bearings, shocks, the motor, electrical connectors, storage areas, light fixtures, and even damaging the finish.

## Waxing

Wax will help protect painted and chromed surfaces and make it easier to remove dirt and road tar. Only use products suitable for fine automotive finishes.

## Protecting Metal Surfaces

Exposed chromed and other metal surfaces are subject to rust and corrosion, especially when used on salted streets. Regular use of a protective wax or spray product is recommended.

**WARNING!**
DO NOT allow wax, oil, grease, or other contaminants to remain on brake parts or tires. Use brake cleaner or acetone to clean the brake rotors and pads if necessary. Use dish soap and warm water to clean tires.

# Storage

All vehicles seem to do better when in regular use; components have a chance to warm up and air out, batteries stay charged, and tires and other rubber parts are kept pliable.

**CAUTION!**
The battery is the most perishable component on the bike; it must be stored charged to avoid degradation or serious damage. Lead-acid batteries face an additional risk of freezing.

## Short-Term Storage (Under 1 Month)

Fully charge the battery before storing. Switch off breaker if alarm function is not required.

Keep dry.

## Long-Term Storage

Fully charge your battery and turn off the circuit breaker.

At least once a month, turn on the breaker, charge the battery, and turn it off again.

Keep tires fully inflated.

Beware of high humidity; it can cause corrosion of electrical connections and possible internal rusting of the motor magnets. Finding a low-humidity well-ventilated indoor location should be a priority. Beware of using a cover when over moist ground since that can act as a moisture trap and be worse than no cover at all.

Be aware that when the circuit breaker is on, the battery is discharging even with the ignition off. The alarm system, armed or not, will slowly drain power from your battery unless the breaker is off. The alarm will empty a 20 A-h battery in approximately seven months not even factoring-in self-discharge.

# Troubleshooting



The following information is intended to help you get going in the case of a simple problem, and to give an idea if something requires expert attention. The causes/solutions are presented with the most-likely ones first.

**Nothing happens when the ignition is turned ON; the motor does not activate at all, no lights appear on the dash, and there's no reading on the volt gauge.**

1. Main circuit breaker is off or one of its terminal screws is loose (page 17).
2. Check removable battery box connectors if applicable (XPh and XPs).
3. The ignition switch may not be fully in the ON position. Make sure you are using the correct key. Wiggle the key in the ignition watching for volt gauge response. If wiggling works, this could indicate a problem requiring replacement of the ignition switch. Refer repair to your MOTORINO™ dealer.
4. Bad connection to battery pack, controller, or in wiring harness. Refer repair to your MOTORINO™ dealer.

**The motor does not run at all, however lights and capacity gauge respond as normal when ignition is turned ON.**

1. Check that the brake light works normally (be sure it goes on AND off) and is not stuck on. If stuck on, push the brake levers forward to see if one might be sticking.
2. If you do not see the brake light going on at all, replace the bulb. Sometimes, if a dual filament brake/tail light bulb fails, it can cause the controller to think the brakes are on whenever the headlights/taillight is on.
3. If the volt gauge drops then recovers quickly when the throttle is activated, the battery may be too depleted and the low-voltage cut-out is being triggered. Charge the bike.
4. Check circuit breaker connections (page 17).
5. Make sure the throttle body is secure and not turning with the grip (see diagram on page 20).

**The bike has limited range.**

1. Tire pressures may be low. Check and inflate (page 39).
2. Bike is over-loaded. Reduce cargo weight; remove unnecessary items from storage compartments.
3. Check circuit breaker connections (page 17).
4. Review charging procedures, make sure a full charge is being given (page 13).
5. Batteries are failing.

**The bike runs fine on flat ground but dies on hills. The motor pulses on and off.**

1. Low voltage cut-out is being triggered. Charge batteries.
2. See solutions for limited range, above.

**The bike feels slow.**

1. See limited range solutions above.
2. Check CCT switch setting (page 21).
3. Make sure the throttle body is secure and not turning with the grip, and that the grip's range of motion is normal (see diagram on page 20).

**The bike runs, but the lights, horn, signals etc do not work.**

1. DC-DC converter disconnected or failed. Check inline fuses at voltage converter. Fuse failure almost always indicates a short in the circuits fed by the converter, however. Refer repair to your MOTORINO™ dealer.

**Alarm does not arm or disarm.**

1. Check/replace battery in alarm remote.

**A brake is weak and/or lever touches the grip.**

1. Brake fluid level low. Check brake fluid levels (page 34).
2. Flush and bleed system (page 34).
3. Contamination (oil, grease, wax etc.) on brake rotor and/or pads. Clean with acetone or brake cleaner spray.

**Brakes are noisy.**

1. Metal-on-metal contact. Check brake pads for wear (page 36).

2. Non-wear related brake squeal. This is mainly just an annoyance and is quite normal for disc brakes. If the pads are OK and the noise goes away when braking harder, a special anti-squeal spray can be applied to the rotor to suppress the noise.

**The pedals rotate as the bike drives forward.**

1. Freewheel sprocket is seized. Please refer repair to your MOTORINO™ dealer.

**The seat won't open (models with seat release on ignition lock).**

**1.** Latch sticking. Pull up slightly on seat as you operate the release.

**2.** Release cable too loose (page 38 ).

**The seat won't stay latched (models with seat release on ignition lock).**

**1.** Release cable too tight (page 38 ).

**There's a tick-tick sound coming from my front or rear wheel.**

**1.** Interference with tire valve stem. Carefully rotate valve stem to clear the brake components or other hardware.

# Specifications

Our policy is to incorporate improvements in design and features as they become available. Therefore, specifications are subject to change without notice.



## Dimensions & Weight

(Without Batteries)
XPr, XPn: 81 kg (179 lb), 128 cm (50") wheelbase, 190 cm (75") o.a.l
XPh: 70 kg (154 lb), 132 cm (52") wheelbase, 210 cm (83") o.a.l
XPd: 70 kg (154 lb), 140 cm (55") wheelbase, 190 cm (75") o.a.l
XPs: 63 kg (139 lb), 123 cm (48") wheelbase, 190 cm (75") o.a.l

Battery pack:
Standard lead-acid gel-cel 48 V 20 A-h battery pack: 27 kg (60 lb)
Optional $LiFePO_4$ (lithium) 48 V 26 A-h battery pack: 14 kg (31 lb)

Maximum payload capacity, including rider: 135 kg (300 lb)

## Drivetrain

500 W 48 V oversized high-torque CCT brushless AC motor
Max torque: 66 Nm
Motor Controller: CPU controlled inverter, CCT, regenerative braking
Battery (standard): 48 V 20 A-h sealed lead-acid gel-cell
Battery (optional): 48 V 26 A-h sealed $LiFePO_4$ lithium-ion
Battery protection: lLow voltage cut-off, 40 A resettable circuit breaker
12 V subsystem: 48 V to 12 V 10 A DC/DC converter, 12 V accessory socket

## Tires & Wheels

**Rear (all models):**
Tire: 3.5x10" tubeless
Wheel: 2.15x10" steel rim with integral motor, alloy side plates.

**Front (XPr, XPn and XPs):**
Tire: 3.5x10" tubeless
Wheel: 2.15x10" cast alloy

**Front (XPh and XPd):**
Tire: 120/70-12" tubeless
Wheel: 3.5x12" cast alloy

# Warranty



To activate your warranty, visit:

www.motorino.ca/warranty

or fill out the warranty form at your Greenwit-authorized MOTORINO™ retailer.

## Limited Warranty

Greenwit Technologies Inc. (“Greenwit”) warrants to the original retail purchaser (“you”) that the Greenwit MOTORINO™-brand XP-Series scooter for which this warranty has been issued is free from defects in materials and workmanship as follows:

Frame: 24 months (excluding kick stands)
Electric Motor: 12 months
Controller and electric circuits: 12 months
Lead-Acid Batteries and all chargers : 6 months
Lithium Batteries: 24 months

This warranty is not transferable to a subsequent purchaser. Greenwit’s dealers’ sole obligation under this warranty is to repair or replace the product, at their option. Greenwit’s dealer must be notified in writing of any claim under this warranty within 10 days of the discovery of any fault or defect.

Immediately report any abnormal product behavior to Greenwit or a Greenwit-authorized dealer.

## Warranty Limitations

The duration of any implied warranty or condition, of merchantability for a particular purpose, or otherwise, on this product shall be limited to the duration of the warranty expressed above. In no event shall Greenwit or Greenwit dealers be liable for any loss, inconvenience or damage, whether direct, incidental, consequential or otherwise, resulting from a breach of any expressed or implied warranty condition, of merchantability for a particular purpose, or otherwise with respect to this product, except as set forth herein. This warranty gives you specific legal rights, in addition to other consumer rights bestowed by your province or state.

This warranty will be interpreted pursuant to the laws of Canada and USA. The original English language version of this warranty supersedes all

translations and Greenwit is not responsible for any errors in translation of this warranty or any product literature.

This warranty is not intended to confer any additional legal, jurisdictional or warranty rights to you other that those set forth herein or required by law. If any portion of this warranty is held to be invalid or unenforceable for any reason, such finding will not invalidate any other provision. For products purchased outside Canada please contact Greenwit's authorized distributor in that country.



Under no circumstances is Greenwit liable for any consequences of the assembly, inspection, or service work of their dealers.

## Warranty Frequently Asked Questions

**Q. What costs are my responsibility during the warranty period?**
A. The customer is responsible for the cost of all normal maintenance services and parts, non-warranty repairs, accident and crash damage, and items normally considered as consumables such as, but not limited to, tires, brake pads, brake fluid, and lubricants.

**Q. Does the warranty cover costs of towing or transport due to a failure?**
A. No. The warranty is limited to the repair of the machine itself.

**Q. What responsibility does my dealer have under this warranty?**
A. Each authorized MOTORINO™ dealer is expected to set up every new machine before sale; explain operation, maintenance, and warranty at time of sale and upon request afterward; and is responsible for their setup, service, and warranty repair work.

**Q. Can I transfer the warranty to the new owner if I sell my MOTORINO™?**
A. No. The warranty extends only to the original purchaser.

# Legal Classification and Regulatory Compliance



**CAUTION!**
It is entirely the rider's responsibility to know, understand, and obey all applicable vehicle and traffic laws wherever they may go. It is the rider's responsibility to comply with all applicable regulations. Unauthorized modifications made to this bike can result in the vehicle becoming unsafe and/or illegal to use.

**NOTE:**
Neither Greenwit Technologies Inc. nor its retailers are responsible for the consequences of failure to comply with any applicable laws and regulations.

Your MOTORINO™ bike complies with and is classified as a Power Assisted Bicycle as defined under section 2(1) of the Canadian Motor Vehicle Safety Regulation Act (c.1038). It is also compliant with US Public Law 107-319 for importation and use in states where it is in force. In all cases, pedals must be attached and operational to maintain compliance.

Local and regional governments may have additional helmet laws, minimum-age requirements, passenger and cargo limitations, or other restrictions beyond those covered by federal regulation.

Some Canadian and US jurisdictions may classify your MOTORINO™ as a Limited Speed Motorcycle or Moped. Check with the applicable motor vehicle authority and/or insurance company for information specific to your area.

**Owner's Name:**

**Bike Model:**

**Bike Colour:**

**Frame Serial Number:**

**Motor Serial Number:**

**Battery Type:**

# www.motorino.ca

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