ZERO XB™



ZERO MOTORCYCLES
SERVICE MANUAL

8812060-AE

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Identification Numbers

Vehicle Identification Number (VIN)



The VIN is a 17-digit number stamped on the head tube of the frame. Do not alter or remove this number as it is the legal identifier for your motorcycle.

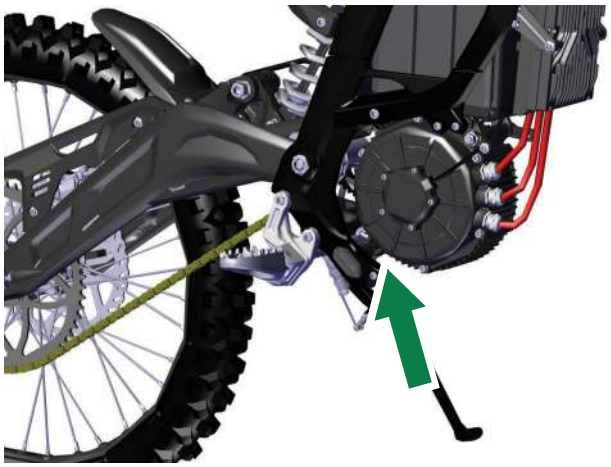
Vehicle Nameplate



The vehicle nameplate is located on the frame just above the battery.

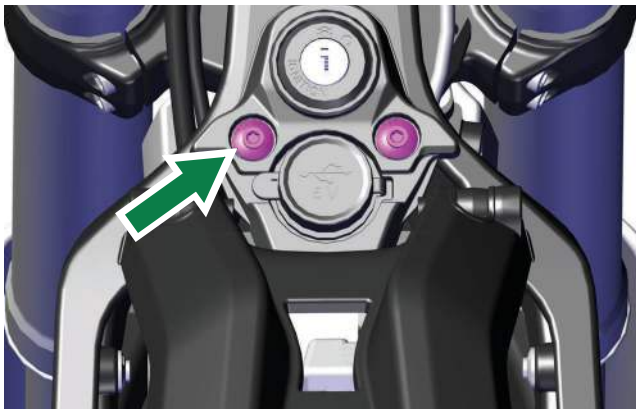
Motor Serial Number

The motor serial number is stamped on the right hand side of the motor housing.

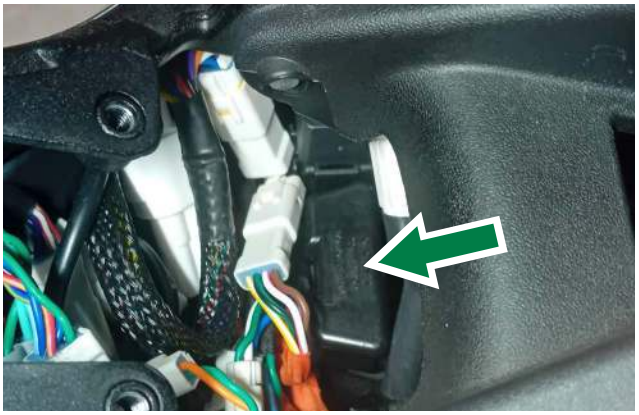


On-Board Diagnostic (OBD) Connector Location

The OBD connector is used to connect a laptop to the motorcycle via the Tuner app for diagnostic purposes and updating firmware. See the following steps to locate the OBD port.



1. Remove the two screws from the key switch assembly. Set the assembly aside.



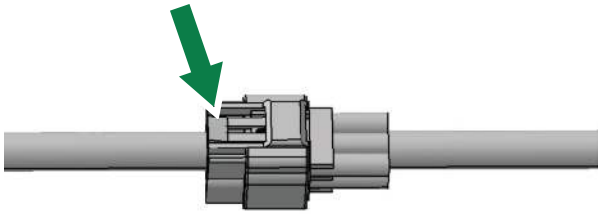
2. Locate the OBD connector and remove the cover.

General Maintenance Guidelines

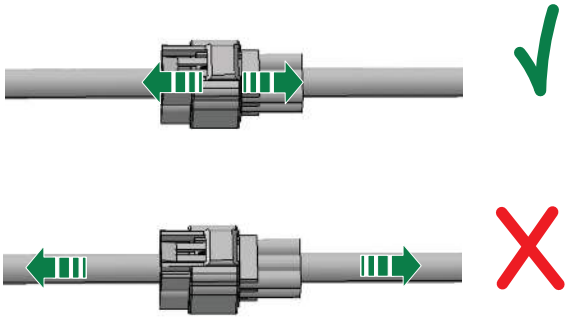
- Parts, accessories, lubricating oil and other auxiliary materials produced by or recommended Zero Motorcycles shall be used when performing repairs. If replacement parts do not meet specifications or requirements, the motorcycle may be damaged.
- When reassembling after a repair, replace any washers, seals and cotter pins that were removed.
- After any parts are disassembled, clean them before inspection and measurement. When cleaning parts, use a non-combustible cleaning agent.
- Before assembly, the sliding surface of parts shall be applied with the specified lubricating oil or grease. The specified or equivalent grease (oil) must be applied or injected at the specified location.
- After assembly, check whether all parts are installed correctly. Check the rotation, movement, and operation of each part that was removed.
- Only use proper tools when repairing the motorcycle.
- When multiple people are performing repairs on the same motorcycle, adhere to proper safety and communication guidelines.
- Always turn the key switch off and remove the key when working on the motorcycle. Only turn the power on when necessary to validate repairs.

Electrical Connector Guidelines

- Firmly mate connectors with their corresponding connector. Make sure that the colors of the harnesses and the connector correspond.



- Release the locking tab before trying to disconnect a connector.



- When disconnecting a connector, hold the connector housings when trying to pull apart. Do not pull on the wiring harnesses.
- Before connecting a connector, inspect the terminals for signs of damage or wear. Make sure all terminals are properly seated in their cavities.
- If any terminals are rusted, clean with emery paper before connecting.
- Ensure that all harnesses are properly secured to the chassis using proper harness ties. Do not allow a harness to interfere with operation in any way.
- Ensure harnesses are clamped in places that are not sharp or heat-producing. Do not route harnesses where the wiring can contact the head and/or front part of bolts and screws.
- Do not pull on harnesses by force. If a wire harness must be in contact with an edge or corner, protect it with sheathing or tape at the contact point.
- Do not damage the coating/sheathing of a wire harness. If a wire harness is damaged, it should be repaired by winding with electrical tape.
- Do not press on wiring harnesses when installing parts or performing repairs.
- Do not twist wiring harnesses, cables or hoses.
- When securing any wiring or hoses from the handlebar, make sure there is sufficient slack to allow full rotation of the handlebar.

Maintenance Intervals

Initial 60 mi (100 km)

- **Drive chain:** Check tension and adjust. Inspect for wear. Refer to Adjusting the Drive Chain, page 30-10.

Every 300 mi (500 km)

- **Drive chain:** Check tension and adjust. Inspect for wear. Refer to Adjusting the Drive Chain, page 30-10.

Every 1,250 mi (2000 km)

- **Various hardware:** Check hardware torque. See Component Fastener Torques, page 10-2. Replace hardware as necessary.
- **Drive belt:** Inspect the drive belt and check the belt tension. Refer to Belt Adjustment, page 30-6.
- **Sprockets:** Inspect for wear.
- **Wiring harnesses:** Inspect and check that harnesses are properly secured along the bike.
- **Bike tip-over protection:** Check operation.
- **Wheel, steering, suspension linkage and swingarm bearings:** Check bearings for smooth operation. Replace as necessary.

Every 3,100 mi (5000 km)

- **Drive chain:** Replace. Refer to Adjusting the Drive Chain, page 30-10.

Every 6,200 mi (10000 km) or 12 months

- **Brake fluid:** Replace. Refer to Brake Bleeding - Vacuum Method, page 45-4.
- **Front suspension:** Replace as necessary. Refer to Front Suspension, page 40-3.

Tire Pressure Check

1. Check the tire pressure with a tire pressure gauge to see if it meets the recommended tire pressure requirements.

Note: Check the tire pressure when the tire is at the normal temperature.

FRONT	REAR
29 psi (200 kPa)	29 psi (200 kPa)

2. If the tire pressure is low, check the tire for cuts, embedded nails or other sharp objects.

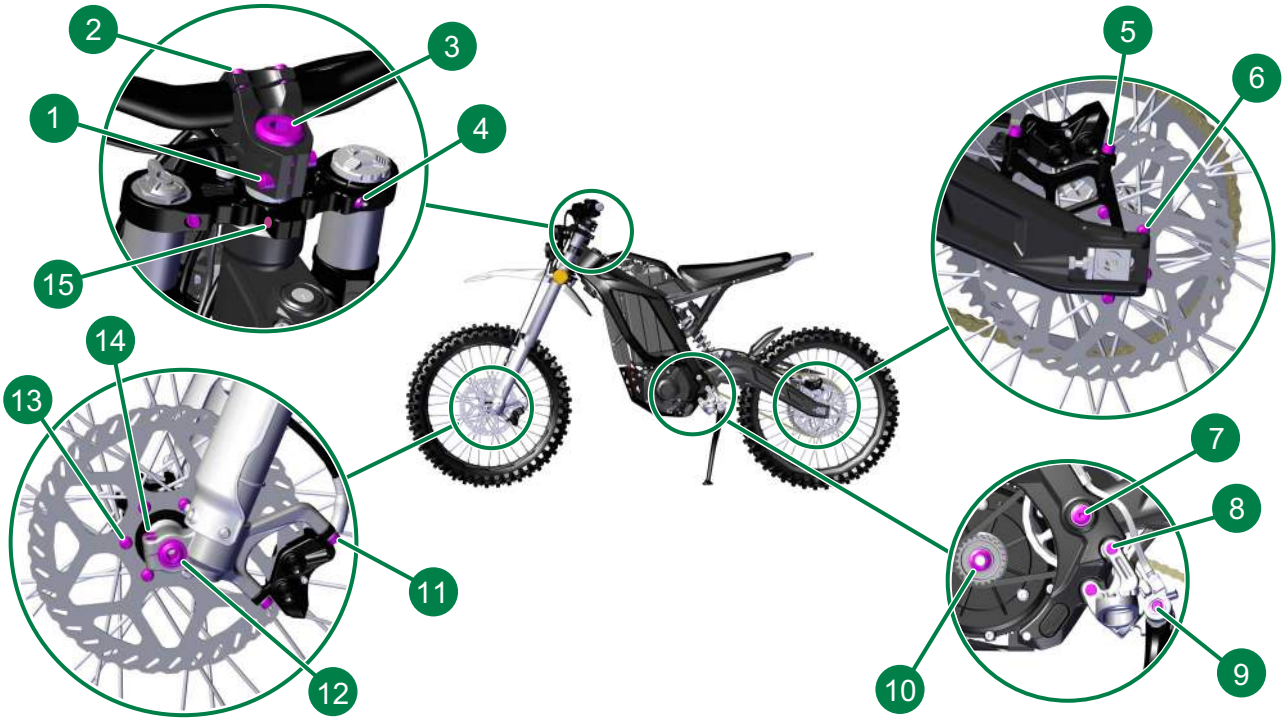
Lubrication Points



1. Steering Bearings - See Steering Column, page 40-2
2. Front Axle - See Front Wheel, page 50-1
3. Drive Chain - See Drive Chain, page 30-8
4. Rear Axle - See Rear Wheel, page 50-2

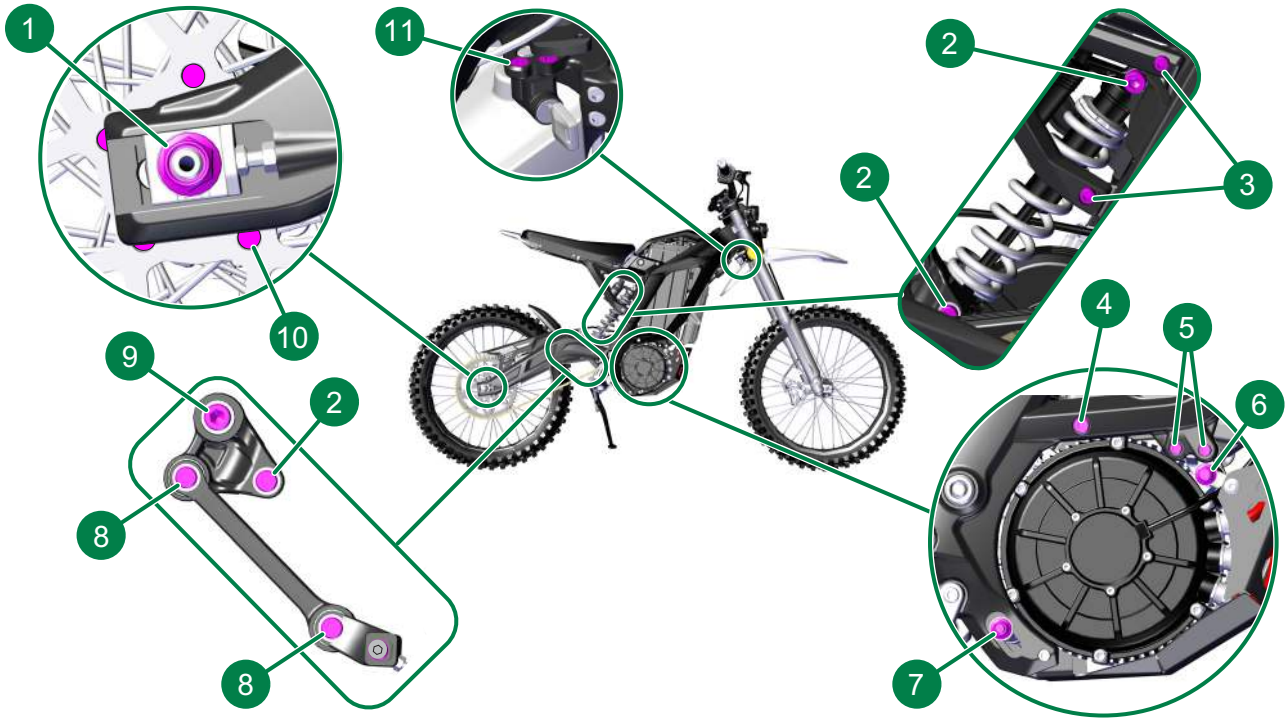
Component Fastener Torques

Left Side of Motorcycle



ITEM	DESCRIPTION	TORQUE
1	Handlebar riser pinch bolts	9 ± 1 lb·ft (12.5 ± 1.5 Nm)
2	Handlebar clamp bolts	7 ± 1 lb·ft (9 ± 1 Nm)
3	Steering column adjusting bolt	28 ± 2 lb·ft (37.5 ± 2.5 Nm)
4	Fork mounting bolts	8 ± 1 lb·ft (10.5 ± 1.5 Nm)
5	Rear brake caliper	Apply Loctite 243 7 ± 1.5 lb·ft (10 ± 2 Nm)
6	Rear brake rotor	Apply Loctite 263 7 ± 1.5 lb·ft (10 ± 2 Nm)
7	Swingarm to frame	55 ± 4 lb·ft (75 ± 5 Nm)
8	Left and right foot pegs	Apply Loctite 243 22 ± 1.5 lb·ft (30 ± 2 Nm)
9	Kickstand	30 ± 4 lb·ft (40 ± 5 Nm)
10	Motor sprocket nut	Apply Loctite 263 55 ± 4 lb·ft (75 ± 5 Nm)
11	Front brake caliper	Apply Loctite 243 7 ± 1.5 lb·ft (10 ± 2 Nm)
12	Front axle shaft	17 ± 2 lb·ft (22.5 ± 2.5 Nm)
13	Front brake rotor	Apply Loctite 263 7 ± 1.5 lb·ft (10 ± 2 Nm)
14	Front axle pinch bolts	8 ± 1 lb·ft (10.5 ± 1.5 Nm)
15	Triple clamp to steering shaft	7 ± 1 lb·ft (9 ± 1 Nm)

Right Side Of Motorcycle



ITEM	DESCRIPTION	TORQUE
1	Rear axle	55 ± 4 lb·ft (75 ± 5 Nm)
2	Rear shock mounting bolts	Apply Loctite 243 37 ± 4 lb·ft (50 ± 5 Nm)
3	Tail frame to frame bolts	22 ± 1.5 lb·ft (30 ± 2 Nm)
4	Rear battery support to frame	Apply Loctite 243 22 ± 1.5 lb·ft (30 ± 2 Nm)
5	Front battery support to frame	Apply Loctite 243 7 ± 1.5 lb·ft (10 ± 2 Nm)
6	Front motor mount	Apply Loctite 243 37 ± 4 lb·ft (50 ± 5 Nm)
7	Rear motor mount	22 ± 1.5 lb·ft (30 ± 2 Nm)
8	Front (dogbone) linkage	Apply Loctite 243 37 ± 4 lb·ft (50 ± 5 Nm)
9	Rear (triangular) linkage connected to swingarm	Apply Loctite 243 55 ± 4 lb·ft (75 ± 5 Nm)
10	Rear sprocket	Apply Loctite 263 22 ± 1.5 lb·ft (30 ± 2 Nm)
11	Steering lock bolts	Apply Loctite 243 4 ± 1 lb·ft (5 ± 1 Nm)

Standard Torque Values

Use the following table for hardware that is not specified in the previous table.

Hardware Size	TORQUE
M5 bolts/nuts	4 ± 1 lb·ft (5 ± 1 Nm)
M6 bolts/nuts	7 ± 1.5 lb·ft (10 ± 2 Nm)
M8 bolts/nuts	22 ± 1.5 lb·ft (30 ± 2 Nm)
M10 bolts/nuts	30 ± 4 lb·ft (40 ± 5 Nm)
M5 screws	4 ± 1 lb·ft (5 ± 1 Nm)
M6 screws	6.5 ± 1.5 lb·ft (9 ± 2 Nm)

Battery Guidelines





WARNING

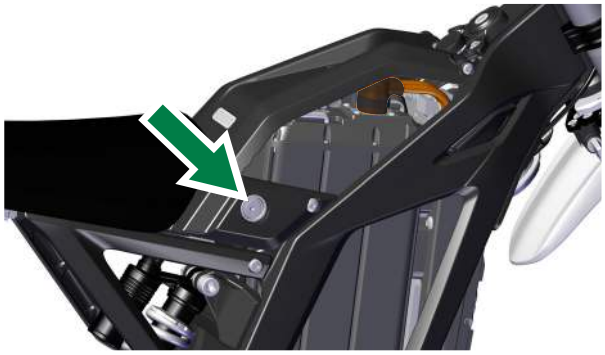
If the battery pack has been dropped or damaged, the waterproof structure of the battery pack may be damaged and the seal affected. To avoid danger in this instance, contact Zero Customer Support. The battery pack is a waterproof battery, but it has high voltage and precision circuits inside. It is strictly prohibited to allow water intrusion and moisture into the battery. Only Zero-trained technicians can service a battery.

1. Due to certain logistical issues, battery power may be insufficient, or the battery power display may be different from the actual power. The motorcycle may have problems such as short battery life, weak power, and inaccurate power display. Fully charge the battery before using.
2. The recommended temperature range for lithium batteries is 5° F to 113° F (-15° C to 45°C) with best performance between 50° F to 86° F (10° C to 30° C). If the ambient temperature is too low or too high, it will affect the performance and service life of the battery. Do not operate the motorcycle while temperatures are beyond the allowable range. Do not charge the battery below 32° F (0° C).
3. When the ambient temperature is too low or too high, battery performance will be affected, as stated above. As temperatures move into the normal operating range, battery performance will automatically recover.
4. Avoid deep discharge of the battery as this will diminish the service life of the battery. Charge the battery when the power indicator is low. The controller on this motorcycle is equipped with an under-voltage protection device. When the charge level is too low, the power drop and under-voltage protection are normal. It will automatically recover after charging.
5. When not in use for long periods of time, charge the battery pack to 40% - 60% and store it in a relatively dry environment at 68° F to 77° F (20° C to 25° C). Charge the battery pack once a month to ensure that the battery pack is in the range of 40% - 60%. Charge the battery pack once a year to 100%, discharge it to less than 10%, and then maintain it regularly according to the above maintenance methods to avoid affecting the performance and life of the battery pack and causing permanent damage.
6. Do not wash the battery pack directly with a pressure washer when washing the motorcycle. High-pressure washing can cause water intrusion into the battery pack causing internal damage. If water intrusion is suspected, do not charge or operate the motorcycle. Doing so may cause safety accidents such as fire, combustion and explosion of the battery pack.

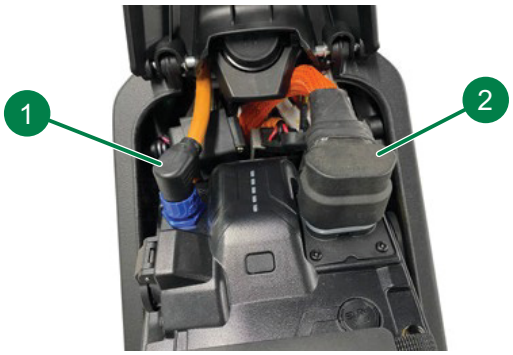
Battery

Removal

1. Turn off the motorcycle and remove the key.



2. Use the key to unlock the battery compartment by rotating the lock upward. Rotate the cover upward and out of the way.



3. Disconnect battery communications connector (1) by rotating the blue fitting counter-clockwise.
4. Unlatch and remove discharge connector (2).
5. Vertically lift the battery out of the compartment.

WARNING

Install the battery terminal cover on the battery while the battery is unplugged to avoid any accidental contact.

Installation

1. Installation is the reverse of the removal procedure with the exception of the battery connectors. Install discharge connector (2) first, then install the communications connector (1).

Charging

Charging Guidelines

Check and confirm the following before charging:

- Whether the electrical outlet being used is consistent with the input voltage/amperage range of the charger.
- Whether the socket load power of the AC power grid can meet the power requirements of the charger (above 840W is recommended)
- The battery management system prohibits charging when the internal temperature is high in order to preserve the life of the battery. The maximum allowable charging temperature inside the battery pack is 113° F (45 °C). If it exceeds this temperature, it will not be able to charge. After riding, the battery management system may delay charging if the battery temperature is too hot. Charging will resume when the battery cools to within range.

⚠ CAUTION

Do not use other methods to rapidly heat or cool the battery pack. The battery must be allowed to gradually warm and cool with the ambient temperature.

- The battery management system prohibits charging when the internal battery temperature is at or below 32° F (0° C). Charging will resume when the battery warms to within range. If the battery is too cold to charge, allow the battery to warm naturally without the aid of any heating device.
- Charge the battery pack only with a dedicated charger matched to the original motorcycle or specified by Zero. It is strictly forbidden to use other chargers or accessories to charge this motorcycle. Non-approved equipment may cause battery failure or damage, and can even cause fires.
- Charge the motorcycle in a dry, well-ventilated environment away from combustibles. Do not charge in the rain.
- Disconnect the charger before operating the motorcycle.

⚠ WARNING

If the battery is dropped or damaged during a collision, the housing can become damaged. If the housing is damaged a peculiar smell may be observed during charging and discharging. Excessive heat may also be observed if the housing is damaged. If either occur, stop charging and disconnect the power supply immediately. Do not use the motorcycle. Contact Zero Customer Support.

⚠ WARNING

If the battery pack begins smoking or catches fire, it is necessary to use a (Class D) fire extinguisher to extinguish the fire. It is also advised to contact the fire department.

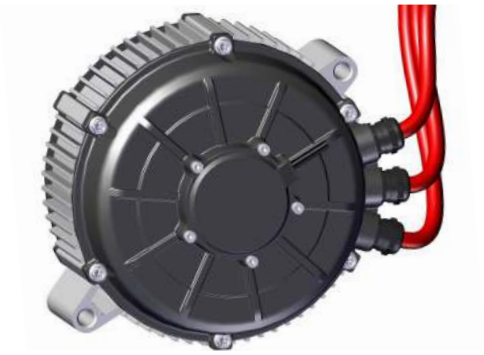
Charging

Note: The battery can be charged while installed in the motorcycle or while removed. To remove, see Battery, page 20-2.



1. Connect the charger output plug to the battery charging port socket.
2. Connect the charger input plug to the power supply.
3. Make sure the charging indicator on the battery indicates the battery is charging.
4. After the battery is fully charged (solid green light on charger), disconnect the charger from the electrical outlet, first. Then, unplug the charger from the battery charging port on the battery.

Motor

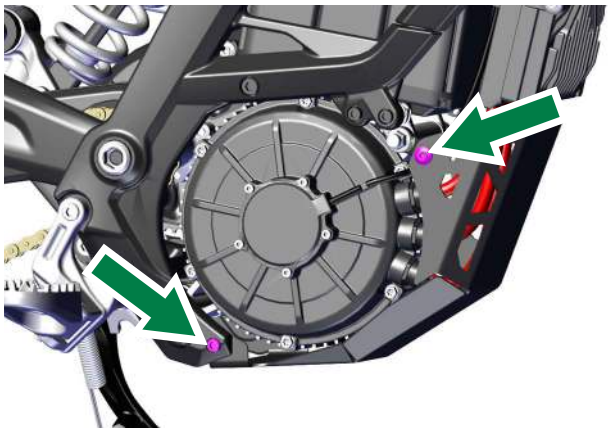


The motorcycle is equipped with a permanent magnet synchronous motor (PMSM) motor, which has the advantages of high efficiency and a stable output.

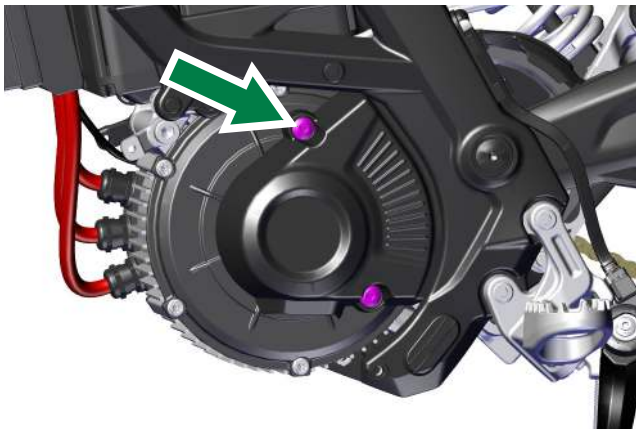
The main characteristics of the motor include a stable speed, energy consumption and a simple structure.

1. Water intake of the drive motor will cause insulation degradation. After the motor is disassembled and drained, it can be dried by blower or sun drying. Then the motor resistance and position sensor shall be tested and replaced if damaged.
2. Inadequate battery charging will result in short continuous driving range and lack of power Keep the battery fully charged.

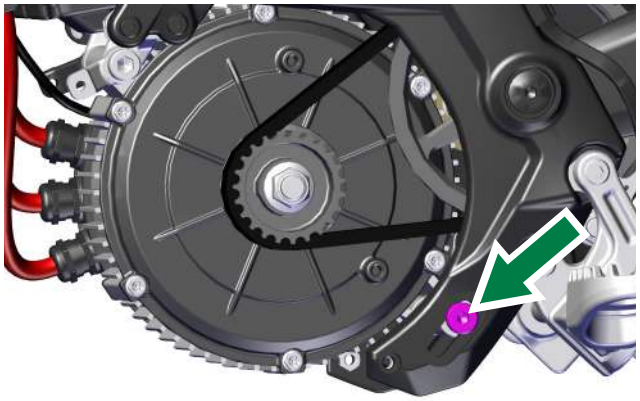
Removal



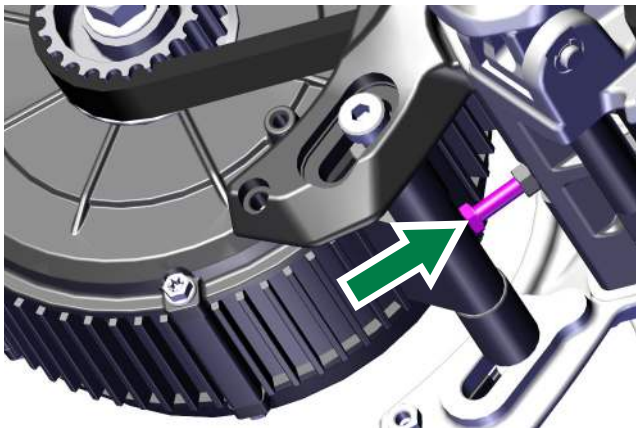
1. Remove the four bolts that secure the belly pan and remove the pan.
2. If replacing the motor, remove the sprocket. Refer to Motor Sprocket, page 30-3.



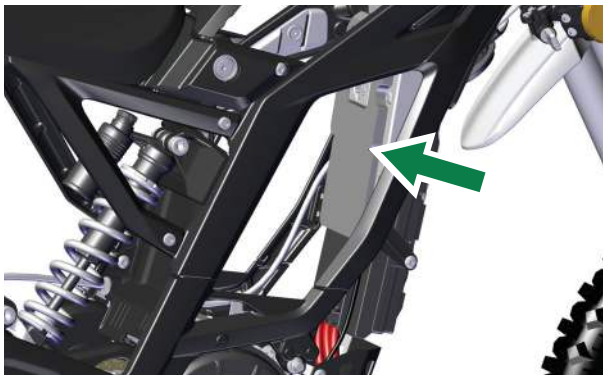
3. Remove the two screws securing the belt guard and remove the guard.



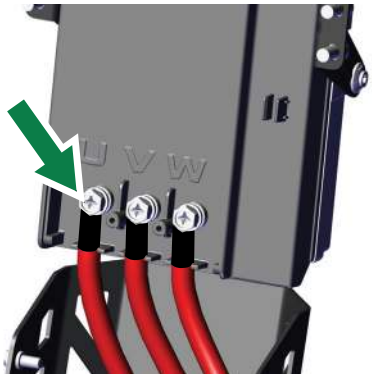
4. Loosen the lower mounting bolt.



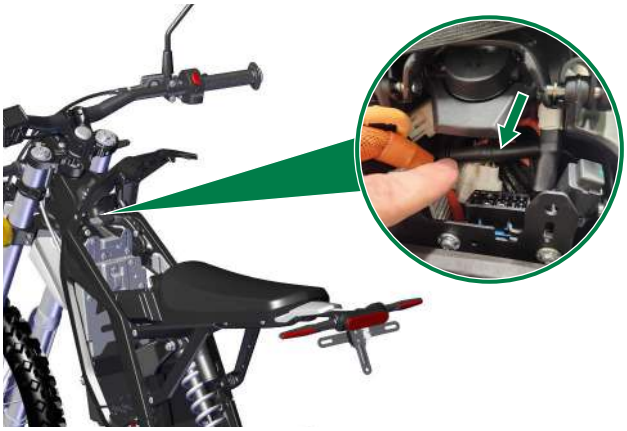
5. Slacken the belt using the tensioner. Remove the belt.
6. Remove the battery.



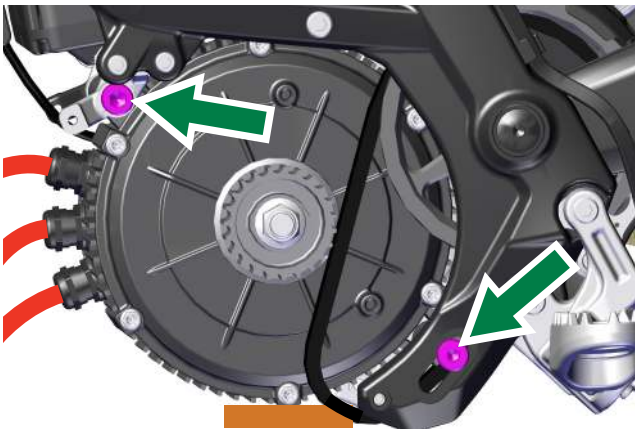
7. Remove the foam cushion from the back of the controller.



8. Disconnect the motor leads from the bottom of the controller.



9. Locate the encoder connector below the USB port on top of the bike and disconnect (pull apart).
10. Follow the cable down and free it from the clamp. Note the routing for installation.



11. Support the motor with a jack or other suitable support, then remove the lower and upper mounting hardware.
12. Remove the motor from the motorcycle.

Installation

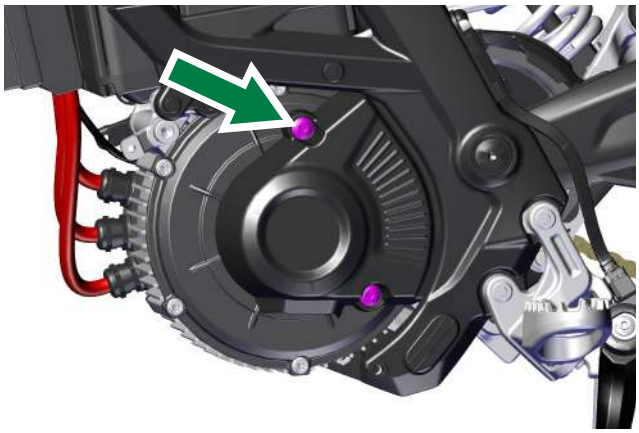
1. Clean the threads on the top mounting bolt and apply Loctite 243 to the threads.
2. Place the motor into position and install the top motor mount. Tighten to 37 ± 4 lb·ft (50 ± 5 Nm).
3. Loosely install the lower motor mount, then adjust the belt. Refer to Belt Adjustment, page 30-6.
4. Connect the phase leads.
5. Route the motor encoder cable back up to the connector as it was when removed. Connect the connector.
6. Install the battery, the lower plugs, the belt guard and the belly pan.
7. Calibrate the motor. Refer to Motor/Controller Calibration, page 30-10.
8. Test drive the motorcycle and make sure the drivetrain is functioning properly.

Motor Sprocket

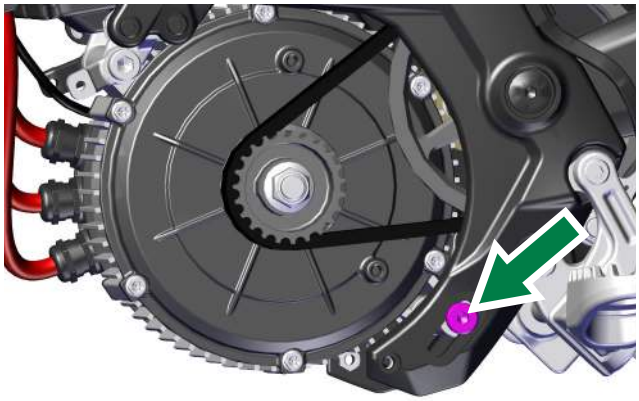
Required Tools

- Loctite 263 and 680
- Old drive belt (to hold sprocket)
- Gear puller (only if pulley is seized)

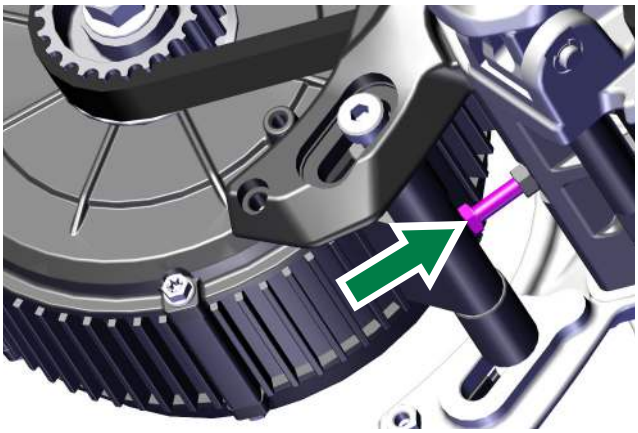
Removal



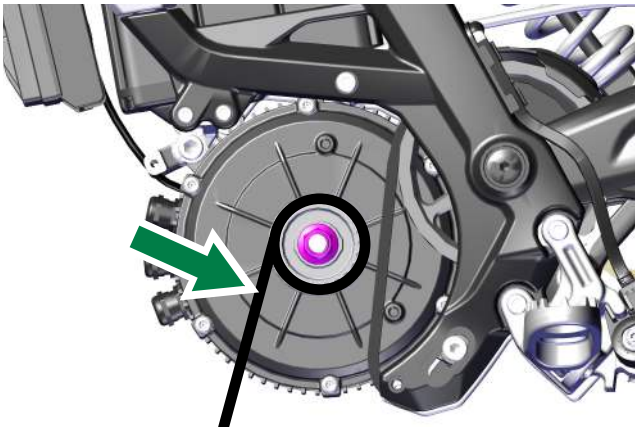
1. Remove the two screws securing the belt guard and remove the guard.



2. Loosen the lower mounting bolt.



3. Slacken the belt using the tensioner. Slip the belt off of the sprocket.



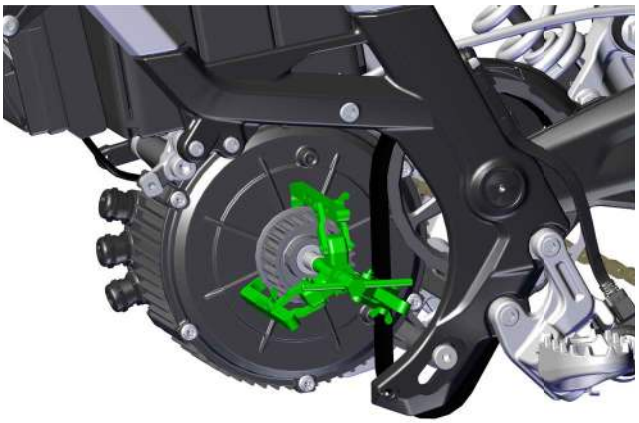
4. Use an old belt to hold the sprocket stationary. Remove the sprocket nut then remove the sprocket.

⚠ CAUTION

Do not use the belt that will be installed back onto the motorcycle. Damage to the belt can occur.

⚠ CAUTION

Do not use an impact wrench of other power tool to remove the sprocket screw. Using an impact can cause permanent damage to the encoder and/or the target magnet resulting in unsafe operation.



5. If the sprocket is seized on the shaft, use a gear puller to remove the sprocket.

⚠ CAUTION

Prying or hammering on motor shaft can cause permanent damage to the encoder and or target magnet within the motor.

Installation

1. Clean the motor shaft with alcohol using a cotton swab.
2. Inspect the shaft and splines for damage.



3. Apply Loctite 680 to the leading edge on the inside of the motor sprocket. Apply an even bead around the entire circumference.
4. Install the sprocket onto the motor shaft. The sprocket should slide easily onto the motor shaft.

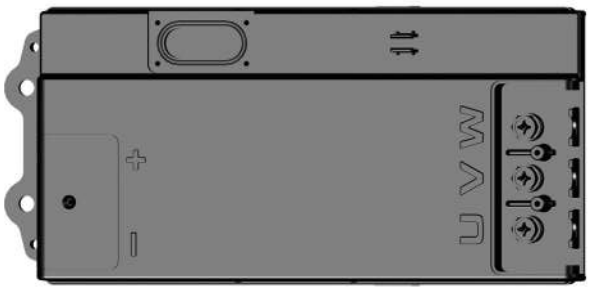
⚠ CAUTION

Do not hammer the sprocket onto the motor shaft. Doing so can cause permanent damage to the encoder and or target magnet within the motor.

Note: Clean any excess Loctite from the front of the sprocket.

5. Apply Loctite 263 to the threads of the motor shaft. Install the sprocket and tighten to 55 ± 4 lb·ft (75 ± 5 Nm).
6. Install the belt and tension as outlined in Belt Adjustment, page 30-6.

Controller



The motor controller is the core component in electric vehicles and is responsible for controlling electric energy conversion and regulation. Its primary functions are to control the operating speed and steering of the electric motor. Its working principle is as follows:

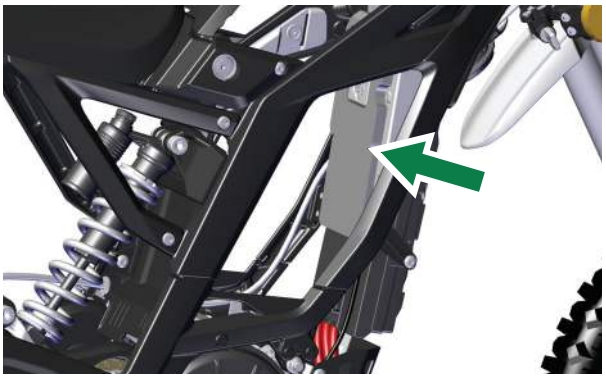
The controller serves as the control center of the electric vehicle system. It timely samples sensor signals through different components, processes these signals through programs, and issues operational instructions. It is highly efficient, providing smooth starts and rapid acceleration.

The main control board within the controller constitutes the main circuit of the electric vehicle, carrying a significant current and generating heat. Therefore, when parking the electric vehicle, avoid exposing it to direct sunlight or prolonged rain exposure to prevent controller malfunctions.

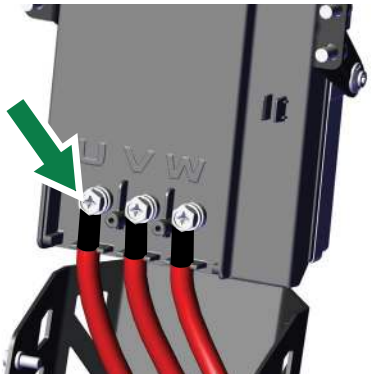
When operating the throttle, simply turn it lightly and release it gently. There is no need to rotate it forcefully.

Removal

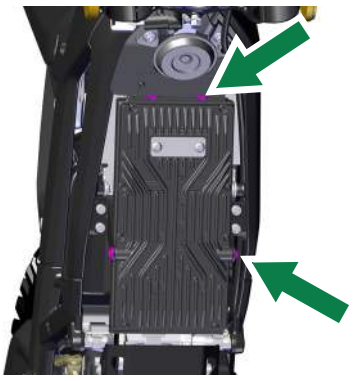
1. Remove the battery. Refer to Battery, page 20-2.



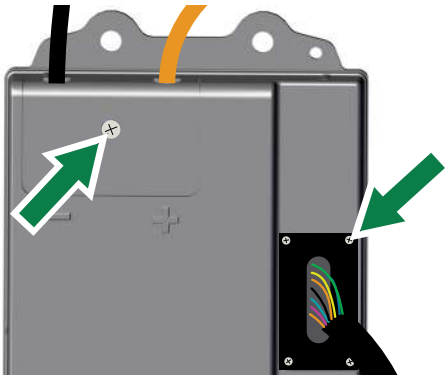
2. Remove the two foam cushions from the back of the controller.



3. Disconnect the motor leads from the bottom of the controller.



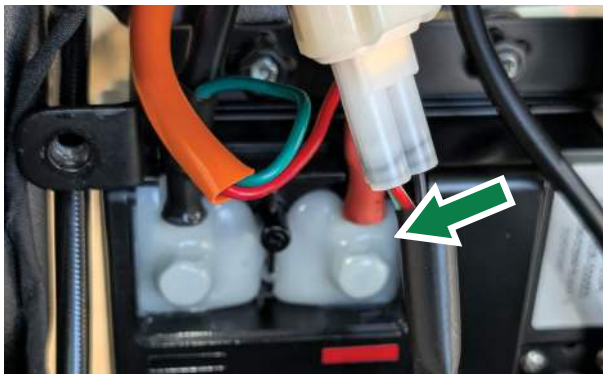
4. Remove the four bolts that secure the controller and lower the controller.



5. Remove the cover from the power connections and disconnect the power connections
6. Remove the controller connector.

Installation

1. Installation is the reverse of the removal procedure.



2. After installing and tightening the power leads to the controller, seal the two cavities using Dowsil 737 or Dowsil 732 sealant.

Belt Adjustment

Proper belt tension is essential for optimum operation of the drive system. Check the tension at the interval listed in the Owner's Manual.

Lack of belt tension can lead to "ratcheting". The teeth of the belt slide over the teeth of the rear sprocket. This causes an unpleasant sound and damages the carbon tensile cords. If ratcheting has occurred, replace the belt.

Too much tension can increase the wear of your drive system and the system can drag.

There are two different methods of checking tension on the belt. A tension tool can be used or if a tool is not available, an app can be installed on your phone to measure the frequency to determine proper tension. For the two methods, refer to the following:

Tension Tool: Drive Belt Tension Check - Gates Krikit Tension Gauge, page 30-6

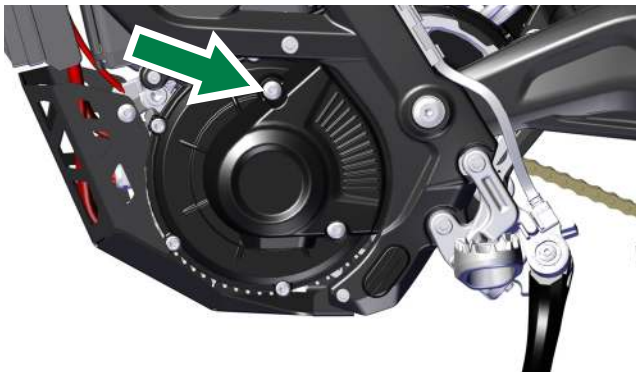
Phone App: Drive Belt Tension Check - Gates Carbon Drive Smartphone Application, page 30-7

Drive Belt Tension Check - Gates Krikit Tension Gauge

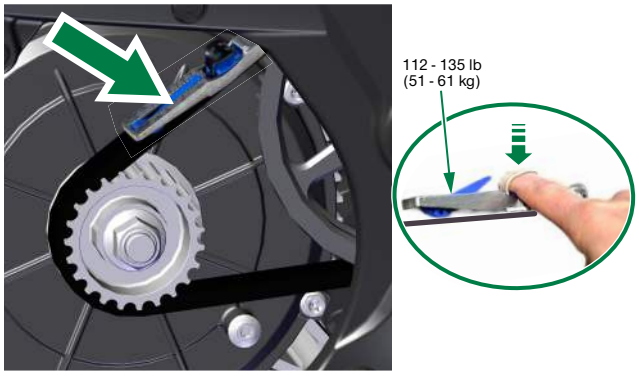


The drive belt tension can be checked by using the Gates® Krikit tension gauge. The gauge has a plastic measurement arm, located in a slot. Along this slot there is a measuring scale. The point of intersection of the measurement arm and the measuring scale shows the tension of the belt. There is a button (clicking pad) on the upper side of the gauge where you can secure your finger with a rubber band holder. A spring is located underneath this clicking pad. If a certain pressure is applied to the spring, it makes a clicking sound.

1. Remove the key from the key switch.
2. Raise the rear wheel using a rear paddock stand.



3. Remove the two screws that secure the belt cover to the motor. Remove the cover to access the belt.



4. Center the tension tool on the belt in between the pulleys. Slowly push the tool against the belt. Once you hear a click, observe the tension reading (the point at where the pivot arm crosses over the scale).
5. Record the tension.
6. Rotate the rear wheel one -quarter turn and repeat. Repeat until the belt has been checked at four points across one full wheel revolution.
7. Check that the highest reading is within the range values below.
   - 112 to 135 lb. (51 to 61 kg)
8. If the highest tension is not within the specified tension range, adjust the belt. Refer to Adjustment Procedure, page 30-8.

Drive Belt Tension Check - Gates Carbon Drive Smartphone Application

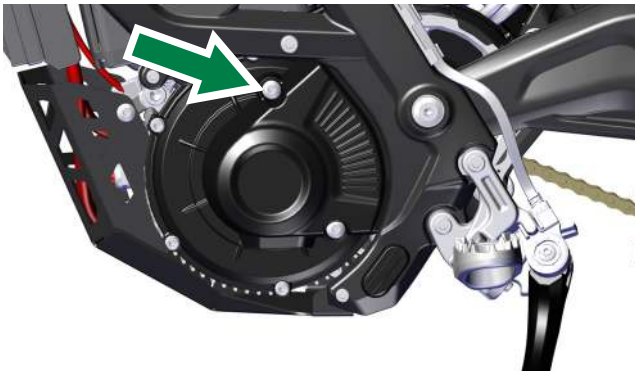
The drive belt tension can be checked by using the Gates® Carbon Drive™ Smartphone application, which measures belt tension frequency.

The application is available for free to download at both the Apple iTunes® store and Google Play® store. iTunes® is a registered trademark of Apple. Google Play® store is a registered trademark of Google.

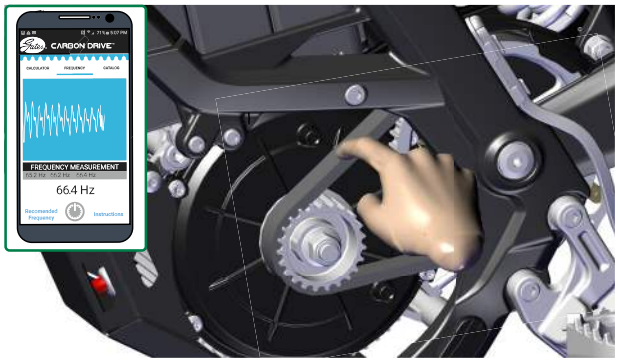
Note: The application works best in a quiet environment.

Note: The following application instructions may differ between phones.

1. Remove the key from the key switch.
2. Raise the rear wheel using a rear paddock stand.



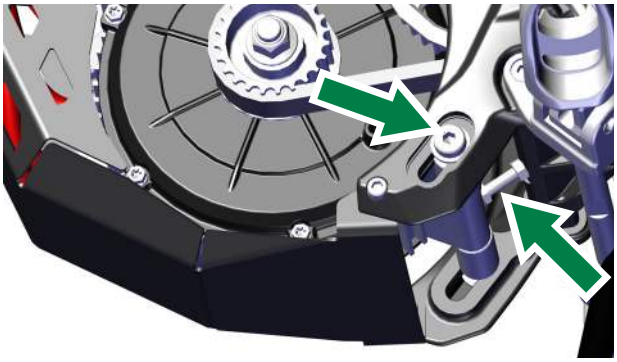
3. Remove the two screws that secure the belt cover to the motor. Remove the cover to access the belt.
4. Open the Gates Drive App and enable the microphone access, if prompted.



5. Hold the phone with its microphone facing the belt, roughly centered over the midpoint of the span, 1/2 - 3/4 in. (1-2 cm) from the belt. Do not touch the phone to the belt.

6. Use your finger to pluck the belt once, firmly and cleanly, like a guitar string, at the midpoint of the span.
7. Record the frequency (Hz) reported by the app.
8. Rotate the rear wheel one-quarter turn and repeat. Repeat until the belt has been checked at four points across one full wheel revolution.
9. Calculate the average. Compare the average to the recommended range values below.
   - 269 - 294 Hz
10. If the average is not within the specified tension range, adjust the belt. Refer to Adjustment Procedure, page 30-8.

Adjustment Procedure



1. To adjust the belt, remove the two plugs from each side of the motor mount and loosen the two bolts. Turn the adjuster directly at the rear of the motor mount to adjust tension. Tighten the motor mount bolts to 22 ± 1.5 lb·ft (30 ± 2 Nm).
2. Install the belt guard.
3. Test ride the motorcycle.
4. Recheck the belt for proper adjustment after the test ride and readjust, if necessary

Drive Chain

Cleaning The Drive Chain

WARNING

Always wear safety glasses when cleaning the chain to prevent eye injuries.

WARNING

Never place your hand or any other body part between the chain and sprockets. Work with the chain only in the middle between the two sprockets. Failure to do so could result in serious injury.

WARNING

Do not allow any of the drive chain cleaner to get on the brake rotors or brake pads. If the brake rotors or brake pads are contaminated with cleaner, it will impair the motorcycle's ability to stop. This could result in serious injury or death.

WARNING

Never have the motor spinning the wheel during cleaning. Turn the wheel only by hand. Failure to do so could result in serious injury or death.

Follow the manufacturer's instructions for the chain cleaner you

are using; below are the general guideline.

1. Remove the key from the key switch.
2. Set the motorcycle on a stand or lift so the rear wheel is free to spin. While turning the wheel by hand, spray the inside of the entire chain with kerosene and let it sit for a few minutes.
3. Using a brush, fill the bristles with spray from the chain cleaner. Begin gently scrubbing the chain on the top of your swingarm using the brush.

CAUTION

If soaking the chain, do no soak in kerosene for more than 10 minutes.

4. Do this for the entire length of the chain. Now do the same thing for the inside/bottom of the chain.
5. Using the brush, clean both sides of the rear sprocket. Let this soak for 5 minutes.
6. Using a water hose, rinse the entire chain. Then, using a clean rag, wipe any residual moisture from the chain.

Lubricating The Drive Chain

Lubricate the chain every 300 mi (500 km) of motorcycle travel. Lubricate the chain regardless of mileage after riding in rainy or dirty conditions.

⚠WARNING

Wear safety glasses when lubricating the chain to prevent eye injuries.

⚠WARNING

Never have the motor spinning the wheel. Turn the wheel only by hand. Failure to do so could result in serious personal injury.

⚠WARNING

Never place your hand between the chain and sprockets. Work with the chain only in the middle between the two sprockets. Failure to do so could result in serious personal injury.

⚠WARNING

Do not allow any of the lubricant to get on the brake rotors or brake pads. If the brake rotors or brake pads are contaminated with lubricant, it will impair the motorcycle's ability to stop. This could result in serious personal injury.

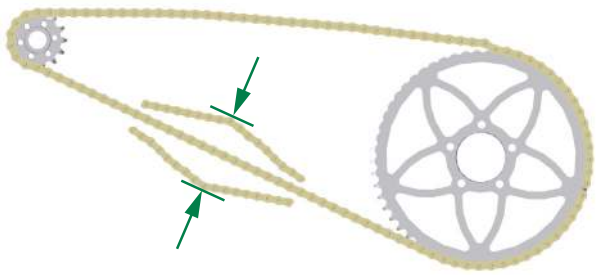
Use ISO grade 32 or 46 engine oil to lubricate the drive chain.

To lubricate the drive chain:

1. Clean the chain as specified. See Cleaning The Drive Chain, page 30-8.
2. Rotate the wheel backwards slowly and spray the inside of the chain on the inside of the links.
3. Rotate the wheel backwards slowly and spray the outside of the chain on the outside of the links.
4. Let the motorcycle stand for 30 minutes to allow the lubricant to penetrate the link rollers.

Inspecting the Drive Chain

When scratches, rust, wear, tight links in the chain, detachment of sealing rings, or abnormal noises during operation occur on the chain and gears, it indicates that the chain is damaged and has reached its usage limit. Replace the chain with a new one and simultaneously replace both the front and rear sprockets.



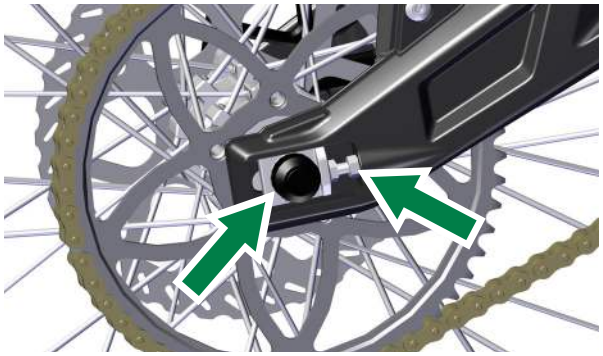
1. Check the cleanliness of the chain and sprocket.
2. Check the wear of the chain and sprocket, as well as the tightness and lubrication level of the chain.
3. Chain sag standard: the upper and lower swings of the chain are between 0.40 - 0.60 in. (10 - 15 mm).

Adjusting the Drive Chain

WARNING

If the chain is not properly adjusted, it can be thrown from the sprockets or break. Ensure the chain is properly adjusted to ensure optimal safety.

1. Remove key from the key switch.



2. Remove the cap and loosen the rear wheel axle nut. Adjust the left and right adjusting bolts to adjust the tension of the chain. When adjusting, keep the left and right chain adjusters in the same position as the mark on the swingarm.

Note: The open end of the clamping spring of the chain joint shall be opposite to the movement direction of the chain.

3. Once properly adjusted, tighten the axle nut to 55 ± 4 lb·ft (75 ± 5 Nm).
4. Test ride the motorcycle.
5. Recheck the chain for proper adjustment after the test ride and readjust, if necessary.

Motor/Controller Calibration

Perform this procedure after replacing the motor or controller. Enter the learning motor magnetic encoding sensor angle or use the dash to learn the angle.

1. If not already done, lower the kickstand.
2. Raise the rear wheel using a jackstand.
3. Turn off the key switch and ensure the kill switch is in the STOP position.
4. Twist the throttle to full on, apply the RH brake lever and hold.
5. Turn the key switch on and continue holding the throttle and brake lever for 5 seconds, then release.
6. Then, apply the throttle again (fully open) while applying the brake three times. After approximately 5 seconds, the wheel will begin to turn slowly.
7. After the motor/wheel stops rotating, release the throttle and turn off the key switch.
8. Key the motorcycle back on and check for normal motor operation.

General Troubleshooting

Poor steering behavior

- Steering bearing(s) is damaged
- Insufficient tire pressure
- Damaged tire
- Damaged wheel bearing(s)
- Steering adjusting nut too tight.

Drifting

- Uneven adjustment of left and right shock absorbers
- Bent front fork
- Bent front axle or incorrectly installed wheel
- Damaged wheel bearing

Front wheel vibration

- Deformed rim
- Worn/damaged wheel bearing
- Deformed or loose wheel spokes
- Loose front axle
- Damaged tire

Difficult turning

- Damaged wheel bearing and/or axle sleeve
- Insufficient tire pressure
- Brake malfunction

Suspension too soft

- Worn/weak front fork spring
- Low hydraulic oil level
- Wrong hydraulic oil used

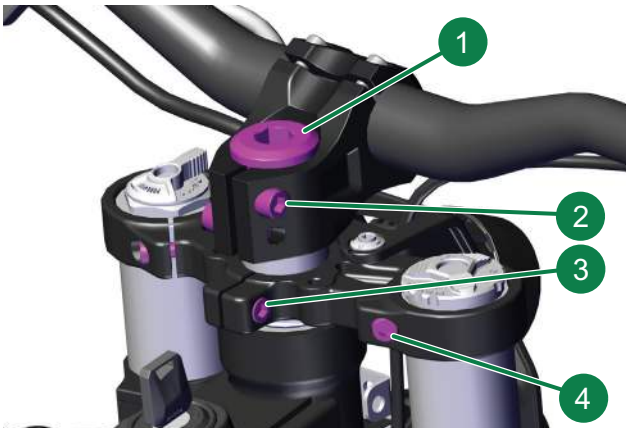
Suspension too hard

- Excessive hydraulic oil
- Wrong hydraulic oil used
- Bent front shock absorber tube
- Blocked front shock absorber

Steering Bearing Check

1. Secure the motorcycle in place and jack the front wheel off the ground.
2. Steer the front wheel from side to side several times. If the steering is smooth with no resistance, no adjustment is needed.
   If the there is resistance, proceed to the next section.

Adjustment



1. Loosen bolts (1), (2), (3) and (4).
2. Tighten steering column bolt (1) to 31 ± 2 lb-ft (42.5 ± 2.5 Nm). Then, loosen half a turn and re-tighten to 11 lb-ft (15 Nm).
3. Next, tighten bolts (2), (3), and (4) in sequential order.
   - (2): Torque to 9 ± 1 lb·ft (12.5 ± 1.5 Nm)
   - (3): Torque to 7 ± 1 lb·ft (9 ± 1 Nm)
   - (4): Torque to 8 ± 1 lb·ft (10.5 ± 1.5 Nm)

Note: Ensure the gap on the handlebar riser is centered on the lower triple clamp shaft. Adjust as necessary.

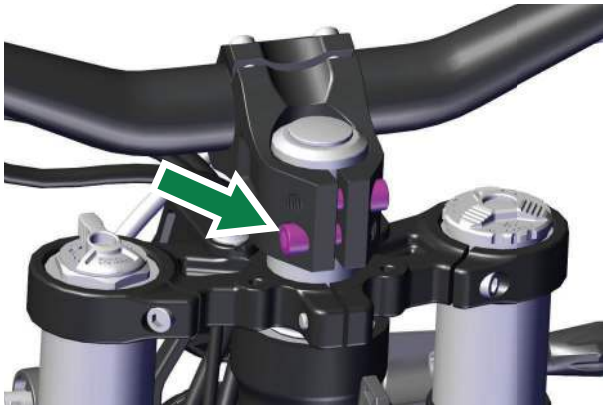
Steering Column

Removal

1. Remove the front suspension. Refer to Front Suspension - Removal, page 40-6 for instructions.



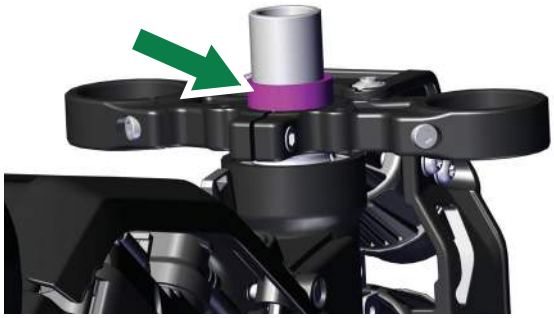
2. Remove the three bolts securing the front fender.



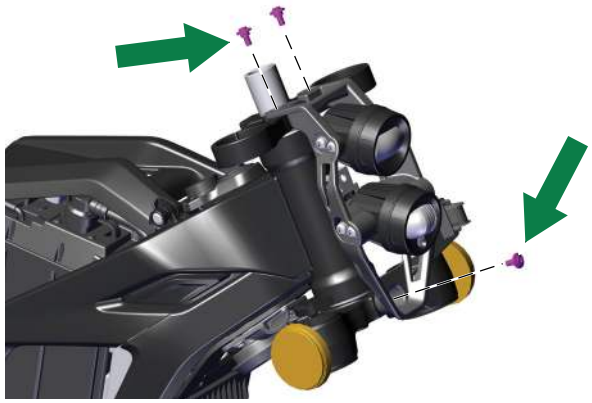
3. Loosen the pinch bolts. Torque: 9 ± 1 lb·ft (12.5 ± 1.5 Nm)



4. Remove the steering column lock bolt cover and bolt. Lift the handlebar off and set aside.



5. Remove the riser spacer from the shaft.



6. Remove the three screws that secure the headlight bracket and remove. Set the bracket out of the way.



7. Support the lower clamp while loosening the upper clamp pinch bolt. Remove the upper and lower clamps.



8. Remove the dust cover, alignment ring and bearing.



9. Remove the lower bearing, dust cover and gasket from the lower triple clamp.

Inspection

1. Inspect the bearings and associated components. Replace worn components.
2. If the bearings are being replaced, replace the inner races inside the head tube.

Installation

1. Installation is the reverse of the removal procedure.
2. Pack the bearings with lithium grease before installation.
3. Refer to Adjustment, page 40-1 to properly set the bearing preload on the steering column.

Front Suspension

Factory Supplied Front Suspension Settings

The following information will allow you to adjust the front suspension back to the factory settings.

Adjustment	Setting
Spring Rate	370 lb/in (6.6 kg/mm
Spring Preload	8 mm
Compression Setting	7 clicks out - counterclockwise
Rebound Setting	5 clicks out - counterclockwise

Adjustment Procedure

1. Check the appearance of the front forks for damage, cracks, and oil leakage. Repair/replace as necessary.
2. Measure and adjust the preload. Refer to Measuring Preload, page 40-3.
3. Adjust the fork rebound adjuster to the minimum damping. Refer to Rebound Adjustment, page 40-5.
4. Take a ride and increase the rebound damping until the fork stops wallowing. Target having the minimum amount of rebound damping, but enough that the fork feels like it's controlled, doesn't wallow or oscillate more than once after hitting a bump.

Measuring Preload

Obtaining the correct front suspension preload (sag) is critical for proper handling. The fork preload must be set to match the weight of the rider. A good approximation of your front air spring requirement can be found by measuring the front suspension's sag. This measurement quickly determines if your front spring is approximately correct for your weight. This adjustment is a recommended guideline; personal riding preference may vary from the specifications given.

To Check the Sag Value:

1. Support your motorcycle upright on a stand with the front wheel off the ground.



2. Measure vertically from the center of the front axle to the bottom of the upper tube.
3. Record this measurement (this is the measurement referred to as L1 or fully extended length).
4. Remove the motorcycle from the stand.



5. Wearing your normal riding apparel, sit on the motorcycle in a ready riding position.
6. Have an assistant hold the motorcycle upright while resting your feet on both footpegs.
7. Gently push down on the handlebars, then let the front end rise back up slowly on its own, without bouncing and without the rider ever changing position. Once the fork settles, measure the distance from the bottom of the upper fork tube to the center of the axle.
8. Record this measurement (this is the measurement referred to as **L2** or compressed stiction).
9. This time, gently lift up on the handlebars, then let the front end drop back down slowly on its own, without bouncing and without the rider ever changing position. Once the fork settles, measure the distance from the bottom of the upper fork tube to the center of the axle.
10. Record this measurement (this is the measurement referred to as **L3** or extended stiction).
11. Calculate the average loaded length **L4** = (**L2** + **L3**) /2
12. Calculate the fork sag. Fork sag = **L1** - **L4**

Example:

Measurements	Calculations
L1 = 150 mm	L4 = (90 + 85) / 2 = 87.5
L2 = 90 mm	Sag = 150 - 87.5 = 62.5
L3 = 85 mm	

In this example, the total sag is 2.46 in (62.5 mm). Refer to the box below for the correct sag.

Recommended total sag = 2.17 ± 0.20 in (55 ± 5 mm)

If the sag is below the minimum, then the fork is riding too high in it's stroke. First, decrease the preload. Refer to Preload Adjustment, page 40-4. If the preload is already at it's minimum limit, reduce air chamber pressure until the target sag is achieved. Refer to Air Chamber Adjustment, page 40-5.

If the sag is above the maximum, then the fork is riding too low in it's stroke. First, increase the fork air chamber pressure. If the pressure reaches it's 120 psi (827 kPa) maximum, increase the preload until the target sag is achieved.

Preload Adjustment



Obtaining the correct spring preload is critical for proper handling. The preload must be set to match the weight of the rider.

- Rotate in the **+** direction to increase the preload value. This raises the ride height (less sag).
- Rotate in the **-** direction to decrease the preload value. This lowers the ride height (more sag).

Rebound Adjustment



- Rotate in the **+** direction to increase damping. This slows down the rebound speed.
- Rotate in the **-** direction to decrease damping. This speeds up the rebound speed.

Air Chamber Adjustment



- Check and calibrate the pressure value every 3 months using a proper “shock pump¨.
- The air chamber pressure can be adjusted according to the riding condition.
- Do not exceed 120 psi (827 kPa) in the air chamber when the fork is fully extended. This could lead to shortening of the stroke and total length, loss of function, permanent fork damage and other consequences.
- Suggested pressure value: 110 ± 10 psi (758 ± 69 kPa)

Post-Ride Maintenance

1. Clean the surface of each fork immediately after each ride and promptly remove any sediment attached to the fork’s lower tubes and dust seals.

⚠ CAUTION

When cleaning, do not direct pressurized water or air upwards towards the lip of the fork dust seal (as shown in the figure below) Doing so can allow contaminants to enter the chamber causing jamming, wear and oil leakage.



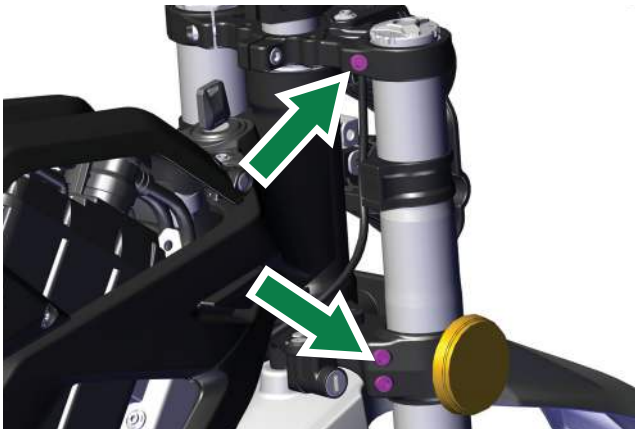
2. After cleaning, use a soft cotton cloth and neutral cleaning agent to clean the surface of the fork tube.

⚠ CAUTION

Do not use solvents that are easily soluble or corrosive to avoid damage to the dust seal.

Front Suspension - Removal

1. Remove the front wheel. Refer to Front Wheel, page 50-1.
2. Remove the brake caliper if removing the LH shock. Refer to Brake Caliper - Front, page 45-6 for instructions.



3. Loosen the upper and lower clamp bolts on the side to be removed. Support the suspension when loosening the bolts. Torque: 8 ± 1 lb·ft (10.5 ± 1.5 Nm).
4. Slide the suspension out from the upper and lower mounts.

Front Suspension - Installation

1. Installation is the reverse of the removal procedure.

Rear Shock Adjustment

Factory Supplied Rear Suspension Settings

The following information will allow you to adjust the rear suspension back to the factory settings.

Adjustment	Setting
Spring Rate	370 lb/in (6.6 kg/mm
Spring Preload	8 mm
Compression Setting	7 clicks out - counterclockwise
Rebound Setting	5 clicks out - counterclockwise

Adjustment Procedure

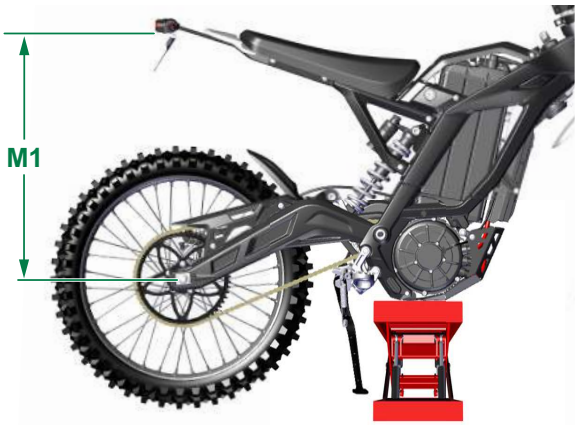
1. Check the appearance of the rear shock absorber for damage, cracks, or oil leakage. Repair/replace as necessary.
2. Measure and adjust the preload. Refer to Measuring Preload, page 40-7.
3. Set the compression and rebound dampers to their minimum limit. Refer to Compression Adjustment, page 40-8 and Rebound Adjustment, page 40-8.
4. Now go for a ride and increase the rebound damping until the shock stops wallowing. Target having the minimum amount of rebound damping, but enough that the shock feels like it's controlled, doesn't wallow or oscillate more than once after hitting a bump. If you want more bottoming resistance or more support in bumps, start increasing the compression damping. The shock will feel harsh if the rebound and/or compression damping is too high.

Measuring Preload

Obtaining the correct rear spring preload is critical for proper handling. The spring preload must be set to match the weight of the rider.

To Check the Sag Value:

1. Support your motorcycle on a stand with the rear wheel off the ground.



2. Measure vertically from the rear axle to the tail light. Mark this spot as it is used for other measurements.
3. Record this measurement (this is the measurement referred to as M1).
4. Remove the motorcycle from the stand.



5. Wearing your normal riding apparel, sit on the motorcycle.
6. Have an assistant hold the motorcycle up, your feet should be on both pegs.
7. Bounce the suspension a couple of times.
8. Have a second assistant take a measurement at the same locations.
9. Record this measurement (this is the measurement referred to as M2).
10. Subtract the second measurement (M2) from the first measurement (M1).

Example:

Measurement	Operation	Value
M1		23.62 in (600 mm)
M2	-	21.59 in (548.5 mm)
Sag	=	2.03 in (51.5 mm)

The total sag is 2.03 in (51.5 mm). Refer to the box below for the correct sag.

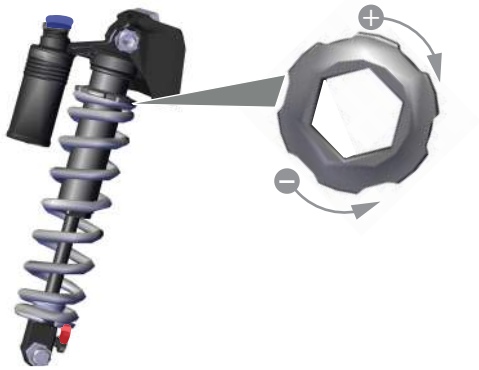
Recommended total sag = 2.32 in (59 mm)

If below the target sag, reduce the spring preload. If above the target sag, increase the spring preload. Refer to Preload Adjustment, page 40-7.

If more than 0.79 in (20 mm) preload is needed to achieve target sag, a different shock spring with a higher spring rate is required.

If less than 0.04 in (1 mm) preload is needed to achieve target sag, a different shock spring with a lower spring rate is required.

Preload Adjustment



Obtaining the correct rear spring preload (sag) is critical for proper handling. The preload must be set to match the weight of the rider.

- Rotate the preload ring in the **+** direction (clockwise) to increase preload. This raises the ride height (less sag).
- Rotate the preload ring in the **-** direction (counter-clockwise) to decrease preload. This lowers the ride height (more sag).

Compression Adjustment



Compression that is set too hard will pack-up (feel harsh over consecutive bumps), while compression that is set too soft causes the shock to bottom out harshly. If the shock is bottoming out, turn the adjuster one click at a time until the bottoming out stops.

- Rotate in the **+** direction to increase compression. This make the shock absorption harder.
- Rotate in the **-** direction to decrease compression. This make the shock absorption softer.

Rebound Adjustment



- Rotate in the **S** direction to increase damping. This slows down the rebound speed.
- Rotate in the **F** direction to decrease damping. This speeds up the rebound speed.

Post-Ride Maintenance

1. Clean the surface of the shock immediately after each ride and promptly remove any sediment attached to the surface of the shock tube.

⚠ CAUTION

When cleaning, do not direct pressurized water or air upwards towards the lip of the dust seal. Doing so can allow contaminants to enter the chamber causing jamming, wear and oil leakage.

2. After cleaning, use a soft cotton cloth and neutral cleaning agent to clean the surface of the fork tube.

⚠ CAUTION

Do not use solvents that are easily soluble or corrosive to avoid damage to the dust seal.

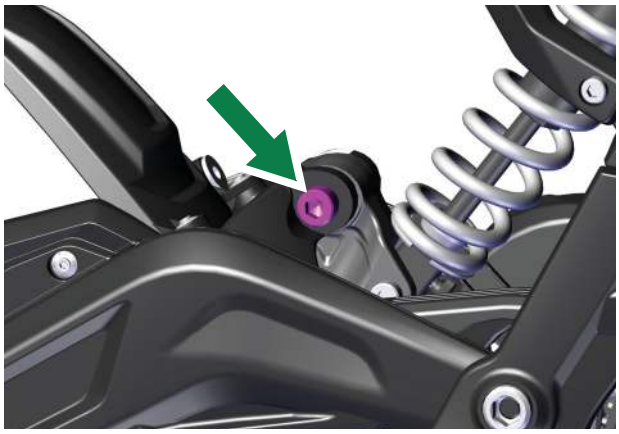
3. Apply a thin layer of multi-purpose grease on the surface of the suspension rod after cleaning to keep the shock lubricated.

Note: It is recommended to lower the tire pressure when using off-road tires on forest roads.

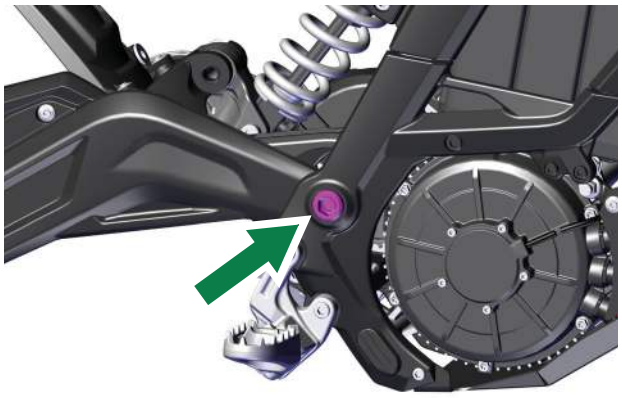
Swingarm

Removal

1. Remove the rear wheel. See Rear Wheel, page 50-2.



2. Remove the bolt securing the suspension linkage to the swingarm. Torque: 55 ± 4 lb·ft (75 ± 5 Nm)



3. Remove the bolt securing the swingarm to the frame. Remove the bolt and separate the swingarm from the frame. Torque: 55 ± 4 lb·ft (75 ± 5 Nm)

Installation

1. Installation is the reverse of the removal procedure.
2. Apply Loctite 243 to the linkage bolt before installation.

General Precautions

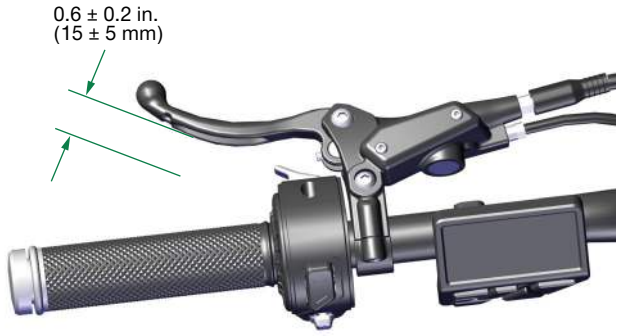
- Soiled brake discs and friction discs may reduce braking performance. Clean soiled brake components and recheck.
- Do not clean brake components with air or a dry brush. Doing so can result in inhalation of brake dust and cause respiratory discomfort.
- Brake fluid can seriously damage painted surfaces, rubber and plastic. Ensure any brake fluid will be properly contained when opening the brake system and/or filling the master cylinders.
- Do not allow contaminants (dirt, water, etc.) to enter the brake system when opened.
- Once the brake system is opened, air in the brake system must be bled.
- DOT4 brake fluid must be used. Do not mix different types of brake fluid.
- Before driving the motorcycle, check for proper operation of the brakes.

General Troubleshooting

SYMPTOM	POTENTIAL CAUSE	POTENTIAL SOLUTION
Poor braking performance.	There is air in the system.	Bleed the system.
	There is leakage in the system.	Inspect for leakage and repair.
	The brake fluid level is low.	Add brake fluid.
	The brake rotor is dirty.	Clean the dirty rotor.
	The piston seal in the master cylinder is faulty.	Replace the assembly.
	The piston in the master cylinder is stuck or worn.	Replace the assembly.
	The brake pads are worn.	Replace the pads.
	Poor surface mating of brake pads and rotor.	Inspect and replace faulty components.
	A brake line is restricted.	Check for restrictions and flush.
	The brake rotor is warped and deformed.	Replace the rotor.
Brake lever does not move freely.	The brake system is restricted.	Check for restrictions and flush.
	The piston of brake caliper is stuck or worn.	Replace the caliper.
	Poor surface mating of brake pads and rotor.	Inspect and replace faulty components.
	A brake line is restricted.	Check for restrictions and flush.
	The piston of main brake pump is stuck and worn.	Replace the assembly.
	The brake lever is bent or damaged.	Replace the brake lever assembly.
Poor braking performance.	Dirty rotor/pads.	Clean dirty parts and check operation.
	The wheels are not balanced.	Check wheel runout and tire balance.
	The brake rotor is warped and deformed.	Replace faulty parts.
	Poor surface mating of brake pads and rotor.	Inspect and replace faulty components.

Brake System Checks

Brake Lever Stroke



1. Check the free stroke of the front and rear brake levers. The free stroke of each brake lever is 0.6 ± 0.2 in. (15 ± 5 mm).
2. If the stroke is not within range, turn the adjusting nut to properly set.

Brake Fluid Inspection

⚠ WARNING

Only use new brake fluid from and airtight container. Fluid from open containers or fluid previously used in the system will have absorbed moisture, which will adversely affect performance and must not be used.

⚠ CAUTION

Brake fluid can damage plastic, as well as painted and coated surfaces. Handle with care and wipe up spills and wash the surfaces immediately.



1. Observe the brake fluid level from the sight glass on each brake lever assembly. Ensure the brake fluid is above the bottom 1/3 of the sight glass. Add fluid as necessary.
   Brake fluid specification: DOT 4.
2. Inspect the appearance of the fluid. If the fluid appears cloudy or infiltrated with dirt and impurities, replace the fluid. Refer to Brake Bleeding - Vacuum Method, page 45-4.

Brake Bleeding - Vacuum Method

Use this procedure to bleed air from the brake system for optimal braking performance.

In instances when the brake fluid in the brake cylinder has been exhausted, use this method for refilling. The process is the same for front and rear.

Tools Required:

- Vacuum bleeder with reservoir

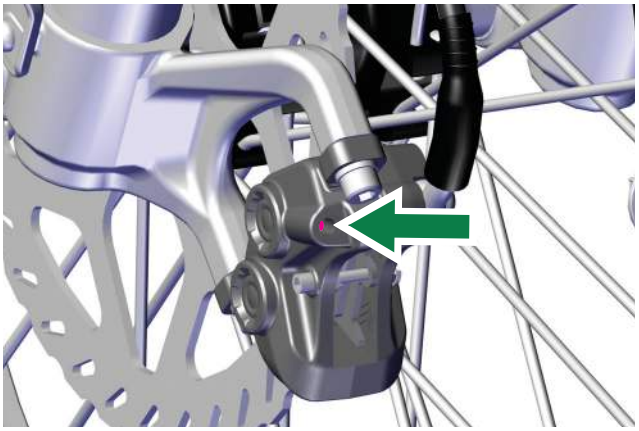
Bleeding

WARNING

Only use new brake fluid from and airtight container. Fluid from open containers or fluid previously used in the system will have absorbed moisture, which will adversely affect performance and must not be used.

CAUTION

Brake fluid can damage plastic, as well as painted and coated surfaces. Handle with care and wipe up spills and wash the surfaces immediately.



1. Loosen the bleeder screw then tighten finger tight. Install a vacuum pump onto the brake caliper bleeder screw.



2. Remove the brake reservoir cover and fill with brake fluid. Keep the reservoir full during this procedure.
3. Operate the brake lever until resistance is felt in order to remove air from the system.
4. Install the vacuum hose onto the bleeder screw. Loosen the screw and operate the vacuum pump to purge the system of air. Once a steady stream of fluid flows into the vacuum pump reservoir, close the bleeder screw and remove the hose. Tighten the screw to 6 ± 1 lb-ft (8 ± 1 Nm).
5. Install the brake reservoir cover and gasket. If damaged, replace the gasket with a new one.
6. When complete, check the entire system for leaks.

Brake Bedding

Note: Bedding new brake rotors and/or new pads is recommended to ensure proper brake performance and maximize brake life. Proper bedding improves brake pedal/lever feel and reduces or eliminates brake squeal. Bedding in the brakes is a process of depositing an even layer of pad material on the surface of the brake rotor.

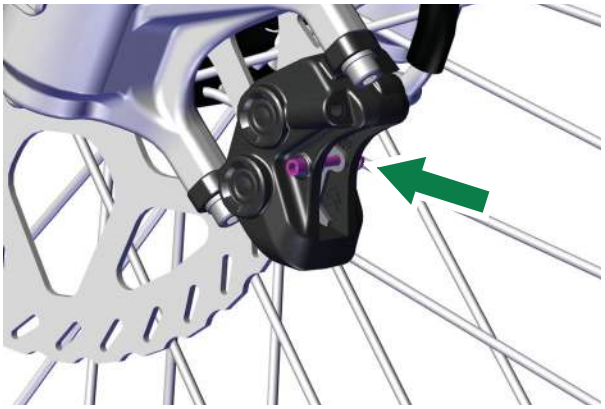
⚠ CAUTION

With new brake systems or just new pads, the first few braking applications will result in very little braking power. Perform the following steps to ensure proper braking friction.

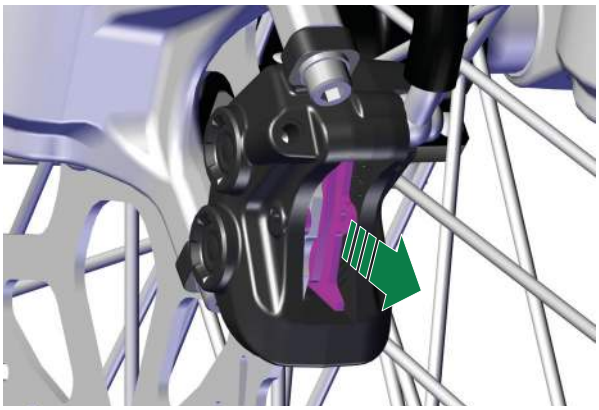
Process

1. Begin at top speed and gradually apply the brake to reduce speed to 10 mph (16 km/h). Avoid locking the tires and do not come to a complete stop to prevent pad material from adhering to the rotor which can cause vibration.
2. Accelerate back to top speed and repeat this process 15-20 times, ensuring you work on the front and rear brakes separately.
3. After completing 15-20 cycles for both the front and rear brakes, take a 10 mile (16 km) ride to allow the braking system to cool down.

Brake Pads - Front



1. Remove the clip that secures the brake pad pin onto the caliper.



2. Remove the bolt and the pads.

Installation

1. Installation is the reverse of the removal procedure.
2. When new pads and/or rotors are installed, bed the brakes to ensure optimal performance. Refer to Brake Bedding, page 45-5.

Brake Caliper - Front

⚠ CAUTION

Plug all open connections to prevent ingress of moisture and debris.

⚠ CAUTION

Brake fluid can damage plastic, as well as painted and coated surfaces. Handle with care and wipe up spills and wash the surfaces immediately.

⚠ CAUTION

Do not operate the front brake lever while the brake caliper is removed.

Note: Position a suitable container to contain fluid spillage.

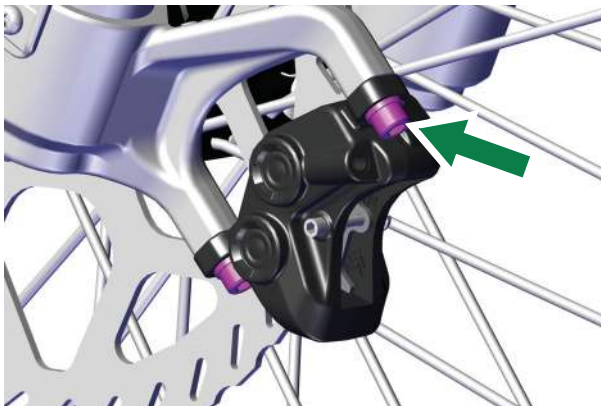
Note: Position absorbent material around affected area to absorb possible fluid spillage.

Note: Replace crush washers upon installation.



1. Remove the banjo bolt securing the brake hose to the front caliper.

Note: If removing the caliper for fork removal, skip this step. Hang the caliper out of the way using wire or a bungee cord after removing the bolts in the next step. Remove the clamp from the fork guard to provide more slack on the brake line.



2. Remove the two bolts and washers securing the caliper to the fork. Torque: 7 ± 1.5 lb·ft (10 ± 2 Nm)

Note: Apply Loctite 243 to the bolts before installation.

Installation

1. Installation is the reverse of the removal procedure.
2. If the brake line was removed, bleed the brake system. Refer to Brake Bleeding - Vacuum Method, page 45-4.

Brake Rotor - Front

1. Remove the front wheel. Refer to Front Wheel, page 50-1.



2. Remove the six screws securing the rotor to the front wheel. Torque: 7 ± 1.5 lb·ft (10 ± 2 Nm)

Note: Apply Loctite 243 to the screws before installation.

3. Remove the rotor.

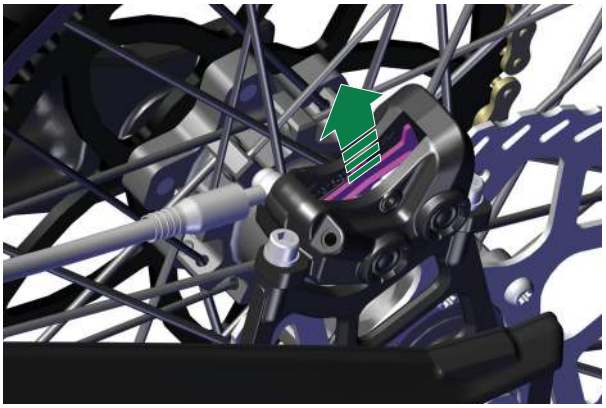
Installation

1. Installation is the reverse of the removal procedure.
2. When new pads and/or rotors are installed, bed the brakes to ensure optimal performance. Refer to Brake Bedding, page 45-5.

Brake Pads - Rear



1. Remove the clip that secures the brake pad pin onto the caliper.



2. Remove the bolt and the pads.

Installation

1. Installation is the reverse of the removal procedure.
2. When new pads and/or rotors are installed, bed the brakes to ensure optimal performance. Refer to Brake Bedding, page 45-5.

Brake Caliper - Rear

⚠ CAUTION

Plug all open connections to prevent ingress of moisture and debris.

⚠ CAUTION

Brake fluid can damage plastic, as well as painted and coated surfaces. Handle with care and wipe up spills and wash the surfaces immediately.

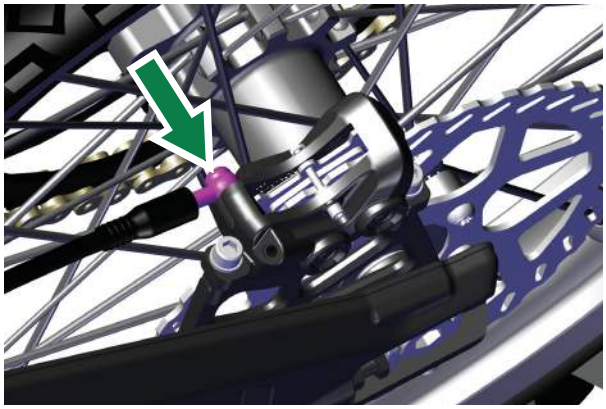
⚠ CAUTION

Do not operate the rear brake lever while the brake caliper is removed.

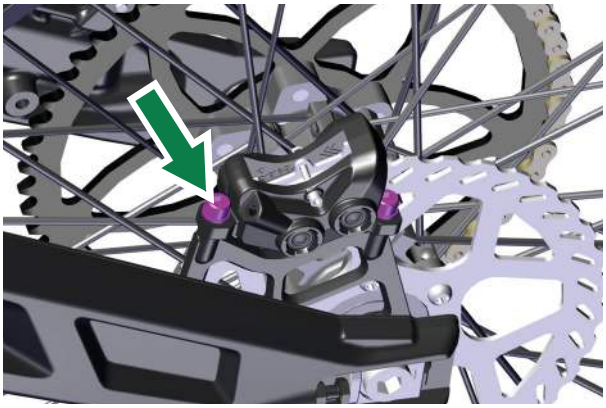
Note: Position a suitable container to contain fluid spillage.

Note: Position absorbent material around affected area to absorb possible fluid spillage.

Note: Replace crush washers upon installation.



1. Remove the banjo bolt securing the brake hose to the rear caliper.



2. Remove the two bolts and washers securing the caliper to the mounting bracket. Torque: 7 ± 1.5 lb·ft (10 ± 2 Nm)

Note: Apply Loctite 243 to the bolts before installation.

Installation

1. Installation is the reverse of the removal procedure.
2. Bleed the brake system. Refer to Brake Bleeding - Vacuum Method, page 45-4.

Brake Rotor - Rear

1. Remove the rear wheel. Refer Rear Wheel, page 50-2.



2. Remove the six screws securing the rotor to the front wheel. Torque: 7 ± 1.5 lb·ft (10 ± 2 Nm)

Note: Apply Loctite 243 to the bolts before installation.

3. Remove the rotor.

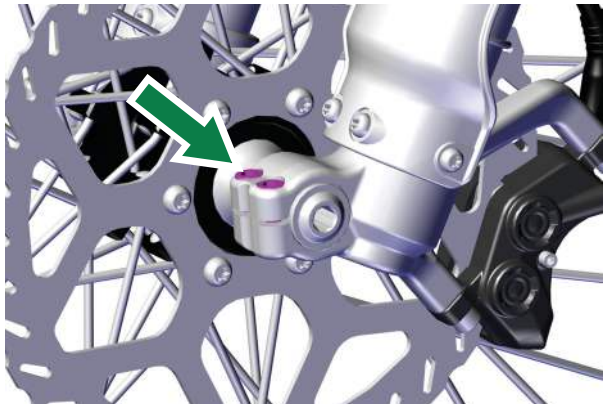
Installation

1. Installation is the reverse of the removal procedure.
2. When new pads and/or rotors are installed, bed the brakes to ensure optimal performance. Refer to Brake Bedding, page 45-5.

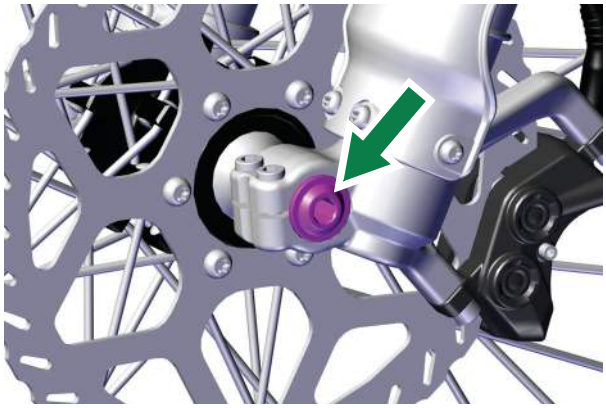
Front Wheel

Removal

1. Remove the key from the key switch.
2. Raise the front wheel off the ground using a jackstand or similar lifting device.



3. Loosen the pinch bolts on both sides of the front axle. Torque: 8 ± 1 lb·ft (10.5 ± 1.5 Nm)



4. Remove one of the axle shaft retaining bolts. Torque: 17 ± 2 lb·ft (22.5 ± 2.5 Nm)
5. Pull the axle shaft out of the wheel from the other side of the motorcycle.



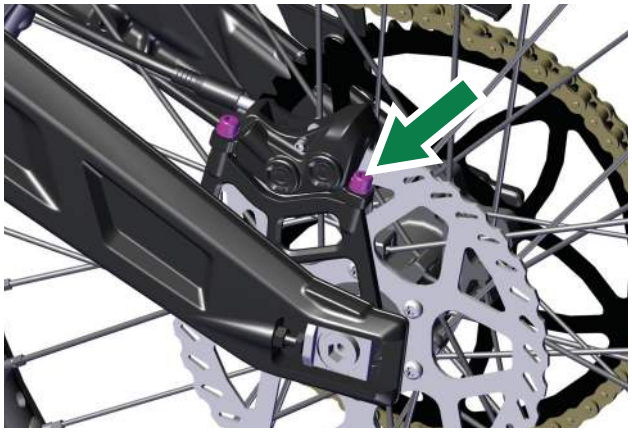
6. Pull on the wheel to dislodge the wheel spacers and remove the wheel.

Installation

1. Installation is the reverse of the removal procedure.
2. Apply lithium grease to the axle and wheel spacers before installation.

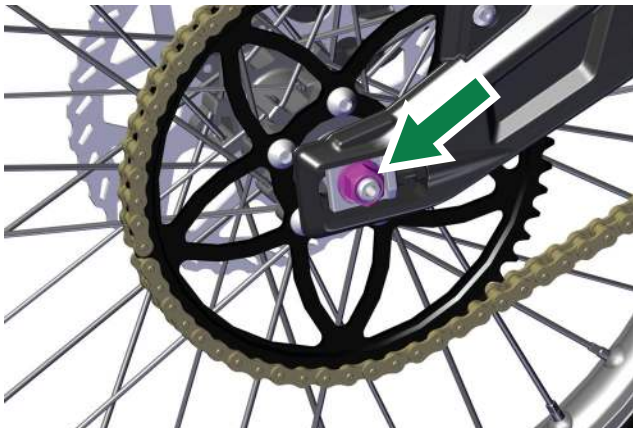
Rear Wheel

Removal

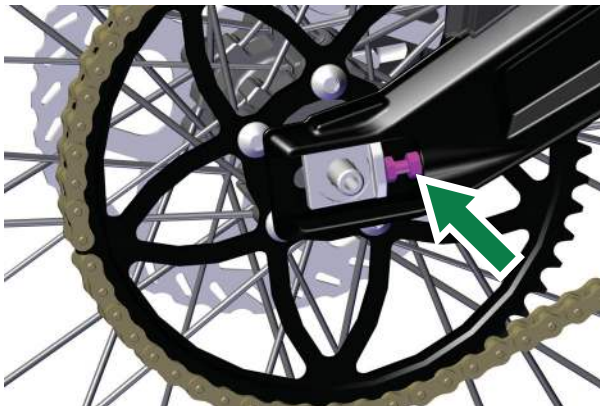


1. Remove the rear brake caliper mounting bolts and remove the caliper. Support the caliper with wire to prevent stress and twisting of the hose.

Note: Check the rear brake pads for wear and replace if necessary. See Brake Pads - Rear, page 45-7.



2. Remove the nut from the rear axle shaft. Torque: 55 ± 4 lb·ft (75 ± 5 Nm)



3. Use the axle adjusters to loosen tension on the drive chain. Slip the chain off of the rear sprocket.
4. Remove the rear axle shaft.



5. Pull the wheel out and remove the spacer and caliper bracket.

Installation

1. Installation is the reverse of the removal procedure.
2. Apply lithium grease to the axle before installation.
3. Adjust the chain tension. Refer to Adjusting the Drive Chain, page 30-10.

Wheel Spoke Guidelines

- If the spokes are broken, replace the adjacent group of spokes
- Use a spoke torque wrench to check torque
- Spoke torque: 29 ± 7 lb-in. (3.25 ± 0.75 Nm)
- Check that rim runout is 0.08 in. (2 mm) or less

Precautions for Circuit Inspection

1. Before disconnecting or connecting a connector, turn the key switch off to avoid damage to electrical components.
2. When checking a circuit, use a probe that can be inserted from the front and back of the connector and reliably contacted with the terminal.
3. Disconnect the power supply and relevant electrical components during the inspection of the circuit.
4. Ensure the battery is properly charged before doing voltage checks on circuits.
5. When there is a fault in the electrical system, it is generally diagnosed according to the following steps:
   a. Observe the fault performance to locate the faulty subsystem.
   b. Use the elimination method and the wiring diagram to minimize the fault range.
   c. Check the circuits of subsystems for open circuit, short circuit or wrong connection;
   d. Check the relevant components for failure or damage.
6. When investigating a circuit fault, check the place that is easy to dismantle first. Parameter detection method and part replacement method can be adopted, but when using part replacement method, make sure that there is no overload in the circuit to avoid damaging new parts.
7. Understand that most electrical failures are caused by wire connectors or wire failures.

System Principle and Structure

The electrical system is an essential guarantee that the motorcycle can operate normally, safely, reliably and efficiently. It covers a wide range of subjects, including motor, electrical, electronic technology, computer, electro-chemistry, acoustics, optical materials, etc. With the development of electronic technology in particular, the motorcycle electrical system will undergo significant changes. The electrical system is more advanced than traditional motorcycles in that it applies more advanced automotive electronics and is much more complex. It consists of the following subsystems.

- Power supply system
- Starting system
- Lighting signal system
- Information display system

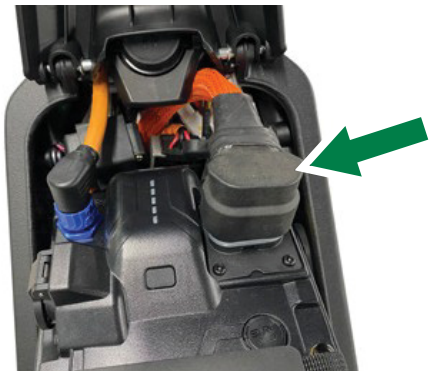
12 Volt System

SYMPTOM	POTENTIAL CAUSE	POTENTIAL SOLUTION
No power: with the key on, there is no display on the dash and other electrical functions cannot be performed.	The main fuse is blown	Replace the main fuse.
	Poor contact in main fuse circuit	Check the connection.
	Poor contact of the battery cables	Check the connections.
	Battery discharged	Charge or replace.
	Ignition switch failure	Replace.
	Poor connection between ignition switch outgoing line and main cable;	Check the connections.
	Open or short circuit in main harness.	Repair or replace.
Low battery voltage	Charger failure	Replace the charger.
	Batteries failing to store power	Replace the battery. See your Zero Dealer.
	Motorcycle inactive for too long	Charge with DC stabilized voltage charger.
	Motorcycle charging circuit fault	Check the charging circuit.
	Parasitic draw on battery current	Check and repair.
	Decaying battery capacity, battery does not store power, battery self discharge	Replace the battery.
	Poor connection between charger and main harness	Check the connections.
	Open or short circuit of main harness	Repair or replace.
Battery overcharge: The battery has a large deformation damage phenomenon.	Charger failure	Replace.

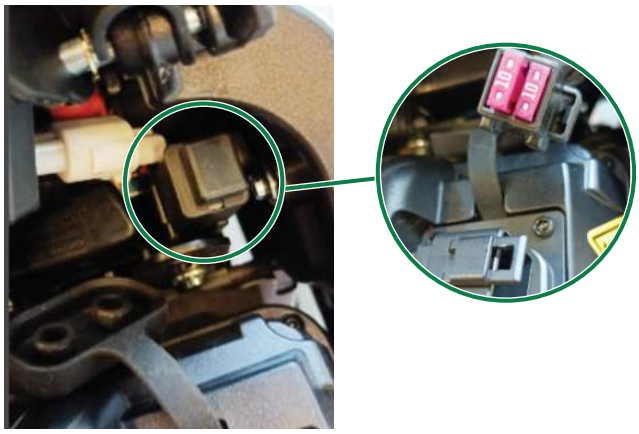
Fuse Center

The fuse center contains a 10 amp (red) fuse and a spare fuse. The 10 amp circuit supplies 12 V from the DC/DC converter to the various switches and controls. Refer to XB Wiring Schematic, page 80-1 for circuit information.

To access the fuse center:



1. Open the battery compartment and remove the discharge connector from the battery.



2. Pull out the fuse holder and disconnect the cover to access the fuses.

Wiring Harness

The main wiring harness consists of wires of various specifications, connector sheaths, terminals, conduit, tapes, fuse and other parts of various specifications through bifurcation, riveting, wrapping and assembly.

Through the connections of the wiring harness, the electrical and electronic equipment of the whole motorcycle can work as intended.

Basic Parameters

- The on-off status of all colored wires shall conform to the electrical wiring diagram.
- Riveting of each branch and terminal shall be firm and connected well.
- The conduit and tape must be tightly wrapped.
- All connectors and corresponding electrical and electronic equipment shall be reliably connected.

Failure Mode

- Terminals and connectors are not properly installed or connected.
- Short circuiting to ground or adjacent wires caused by damaged wire sheathing.
- Corrosion at the splice or other connection, causing an unreliable connection or an open circuit.
- Instantaneous failure and poor contact of wire head or wire (most instantaneous electrical failures are caused by this).
- Poor contact or blown fuse.
- Improper fastening of the wiring harness along the motorcycle causing wire vibration, wear, or poor contact.

Key Switch



When the ignition switch is turned on, a signal is sent to the DC converter to provide 12 V battery power to the motorcycle.

Switch Position	Wire Color	
	Red	Black
		
		

Do not attempt to repair the switch. If the key does not operate the lock cylinder properly, or the electrical switch is defective, replace the unit.

Lighting and Turn Signal System

The lighting and turn signal system is an important guarantee for the safe operation of motorcycles. The system includes the headlights, turn signals, and horn system.

Note: Turn signals, the tail light and the license plate light are only fitted on bikes sold in the EU.

Headlight System

When the motorcycle is operated at night, it needs the headlight to illuminate the road and notify the surrounding motorcycles and people of the existence of the motorcycle.

Tail Lights and Turn Signals

The tail light and license plate light help increase visibility of the motorcycle from the rear, particulary at night. When braking, the brake light illuminates to alert other vehicles that the vehicle is decelerating. When turning left or right, the left or right turn signals should be activated to notify surrounding vehicles and pedestrians.

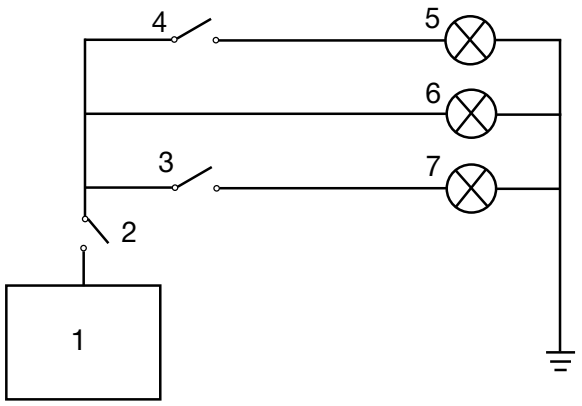
Horn System

If other vehicles or pedestrians are obstructing or may hinder the driving of the motorcycle, the horn can be used to alert others in the area. The operation of the horn is controlled by the horn button.

System Components

- Headlight
- Combined brake/tail light
- Horn
- Front brake switch
- Rear brake switch
- Left and right combination switches

Circuit Diagram



1. Battery
2. Key switch
3. Brake switch
4. Headlight switch
5. Headlight
6. Tail light
7. Brake light

Headlights

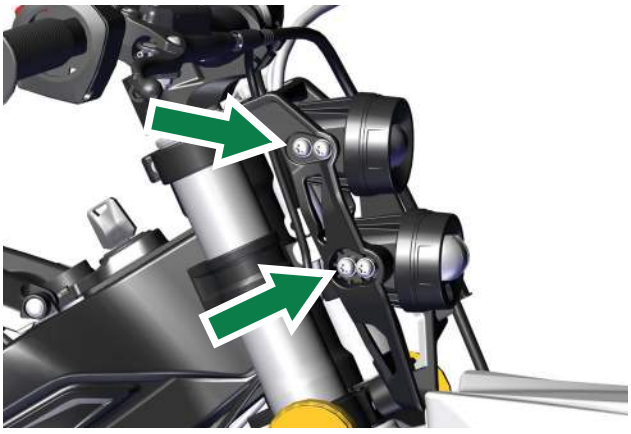
The motorcycle is equipped with a high beam headlight and a low beam headlight.

Headlight Troubleshooting

SYMPTOM	POTENTIAL CAUSE	POTENTIAL SOLUTION
One or both of the headlights do not light.	The corresponding fuse is not connected or has burnt out.	Connect the fuse or replace it.
	The corresponding switch is defective.	Repair or replace the switch.
	LED failure.	Replace the headlight.
	Poor connection.	Check all connections.
	The relevant wires in the main harness are open.	Repair or replace the main harness.
	No battery power/output.	Charge the battery.
	DC converter defective.	Replace the DC converter.
Headlight works intermittently.	Poor contact of the fuse, light contacts or circuit connections.	Check the circuit for loose connections.

Adjustment

Check the projection height of the headlights before driving. Both lights can be adjusted vertically.



1. Loosen the locking bolts and rotate the headlight upwards or downwards to adjust the headlight height.
2. Tighten the bolts to lock the position.

Brake/Tail Light

The combined rear brake/tail light integrates the functions of tail light and brake light. The lens of the tail light and brake light is red. The tail light/brake light bead is a double filament bead, the low power bead is used for the tail light, and the high power bead is used for the brake light.

Rear light specifications: LED 12 V 0.86W/12V 0.36W?

Tail Light Troubleshooting

SYMPTOM	POTENTIAL CAUSE	POTENTIAL SOLUTION
The brake/tail light doesn't work	The corresponding fuse is not connected or is blown.	Connect the fuse or replace it.
	LED failure.	Replace the LED.
	Poor connection.	Check all connections and repair.
	The relevant wires in the main harness are open.	Repair or replace the main harness.
	No battery power/output.	Charge the battery.
	DC converter defective.	Replace the DC converter.

Horn



When the horn switch is pressed, current passes through the horn coil. The magnetic field from the coil generates suction on the armature, which makes the bass diaphragm and the treble diaphragm move at the same time to create sound.

When the contact is opened, the current is interrupted, and the electromagnetic force disappears. The diaphragm returns by its own elastic force and the sound is stopped.

The contact clearance can be adjusted by the adjustment screw to change the vibration frequency of the diaphragm, so as to change the sound level.

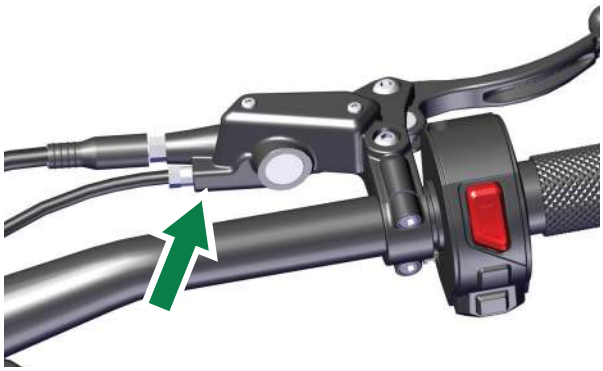
Adjustment

1. Loosen the lock nut and turn the screw clockwise or counter-clockwise to adjust the tone.
2. Sound the horn and readjust until the desired tone is achieved.

Horn Troubleshooting

SYMPTOM	POTENTIAL CAUSE	POTENTIAL SOLUTION
The horn is inoperable.	The corresponding fuse is not installed or is blown.	Install the fuse or replace it.
	Failure of the horn switch.	Repair or replace the left combination switch.
	The horn is defective.	Adjust or replace the horn.
	Poor connection.	Plug in again
	Open circuit in horn wiring.	Repair or replace the effected wiring.
	No battery power/output.	Charge the battery.
	The DC converter is inoperable.	Replace the DC converter.

Brake Switches



When the brake levers are operated during braking, and the travel of the brake levers exceeds 0.4 ± 0.2 in. (10 ± 5 mm) (from the center of the brake handle ball head), a magnet in the piston generates a magnetic field, causing the reeds in the magnetic reed switch to become magnetized and close, thereby completing the circuit.

When the switch is closed, the brake light illuminates. When the brake handle is released, the two reeds of the magnetic reed switch do not come into contact in the absence of an external magnetic field, breaking the circuit and causing the brake light to turn off.

A compression spring on the guide rod forces the contact point to separate from the conductive strip, breaking the circuit and extinguishing the brake light.

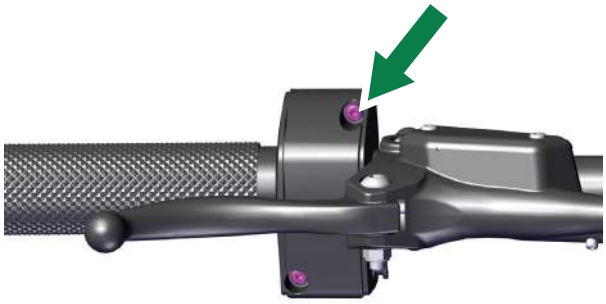
RH Combination Switch

Removal

1. Remove the RH combination switch harness from the front cable straps.
2. Access the switch connector and disconnect. The connectors are located forward of the battery under the key switch bezel.



3. Remove the bar end and bolt from the handlebar.



4. Loosen the two screws at the rear of the switch enough to slide the assembly off the handlebar.

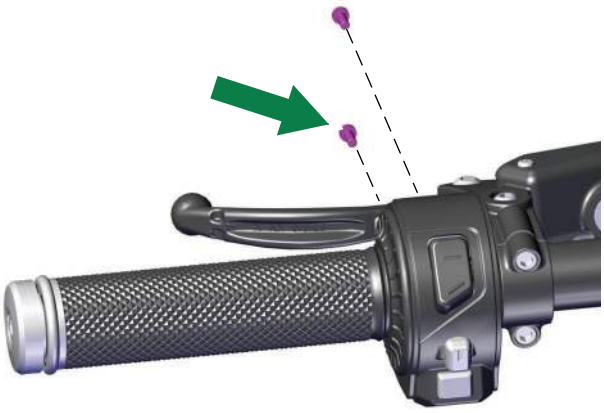
Installation

1. Installation is the reverse of the removal procedure.

LH Combination Switch

Removal

1. Remove the LH combination switch harness from the front cable straps.
2. Access the switch connector and disconnect. The connectors are located forward of the battery under the key switch bezel.



3. Remove the two screws and separate the switch halves. Remove the switch from the handlebar.

Installation

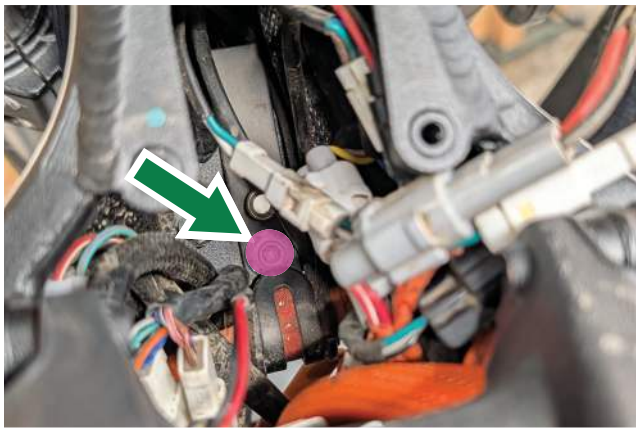
1. Installation is the reverse of the removal procedure.

Dash

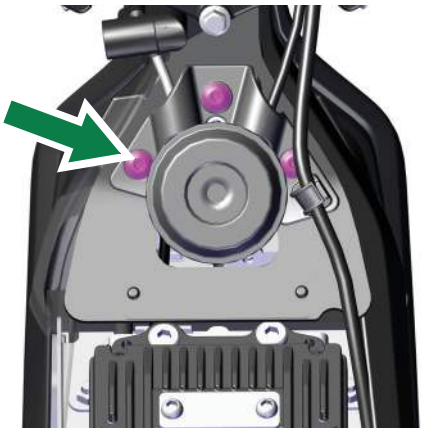
Removal



1. Remove the two screws (T25) that secure the key switch bracket to the frame. Set the bracket aside.



2. Remove the bolt (T25) that secures the main harness clip to the frame.



3. Remove the three screws (5 mm Allen) that secure the horn and front cover. Disconnect the brake line from the clip and set the cover aside.



4. Disconnect the two dash harness connectors.



5. Mark the location of the dash clamp by making a mark on the handelbars next to the clamp. Then, remove the screw (2.5 mm Allen) from the dash clamp and remove the dash from the motorcycle.

Installation

1. Installation is the reverse of the removal procedure.

⚠ CAUTION

Do not over-tighten the dash screw during installation.

Fault Codes

If a diagnostic code has been recorded, it can be retrieved from the dash panel. Refer to the following table for a list of fault codes.

CODE	DESCRIPTION	ACTION
b103	Cell differential pressure fault 1	Contact your local Zero dealer.
b110	Discharge monomer undervoltage fault 1	Charge the battery.
b114	BMS charging overcurrent fault 1	Reduce charging current.
b119	BMS discharge over temperature fault 1	Motorcycle limit level 1 power usage.
b120	BMS charging over temperature fault 1	Limit charging current.
b121	BMS discharge under temperature fault 1	Motorcycle limit level 1 power usage.
b122	BMS charging under temperature fault 1	Reduce charging current.
b130	BMS discharge overcurrent fault 1	Reduce output current.
b131	Battery insulation fault 1	Contact your local Zero dealer.
b140	Charging unit battery undervoltage fault level 1	Charge the battery.
b141	Uneven temperature fault 1	Contact your local Zero dealer.
b203	Cell differential pressure fault 2	Contact your local Zero dealer.
b210	Discharge monomer undervoltage fault 2	Charge the battery.
b214	BMS charging overcurrent fault 2	Reduce charging current.
b219	BMS discharge over temperature fault 2	Motorcycle limit level 2 power usage.
b220	BMS charging over temperature fault 2	Limit charging current.
b221	BMS discharge under temperature fault 2	Motorcycle limit level 2 power usage.
b222	BMS charging under temperature fault 2	Reduce charging current.
b230	BMS discharge overcurrent fault 2	Reduce output current.
b231	Battery insulation fault 2	Contact your local Zero dealer.
b240	Charging unit battery undervoltage fault level 2	Charge the battery.
b241	Uneven temperature fault 2	Contact your local Zero dealer.
b302	Cell failure	Contact your local Zero dealer.
b303	Cell differential pressure fault 3	Contact your local Zero dealer.
b307	BMS internal MOS failure or relay failure	Contact your local Zero dealer.
b309	Total discharge voltage overvoltage fault	Charge the battery.
b310	Discharge monomer undervoltage fault 3	Charge the battery.
b314	BMS charging overcurrent fault 3	Replace the charger.
b319	MBS discharge over temperature fault 3	Use after the battery temperature decreases.
b320	BMS charging over temperature fault 3	Charge the battery after the temperature decreases.
b321	BMS discharge under temperature fault 3	Use after the battery temperature decreases.
b322	BMS charging under temperature fault 3	Charge the battery after the temperature rises.
b330	BMS discharge overcurrent fault 3	Contact your local Zero dealer.
b331	Battery insulation fault 3	Contact your local Zero dealer.
b332	Battery short circuit failure	Contact your local Zero dealer.
b333	BMS internal communication failure	Contact your local Zero dealer.
b340	Charging monomer battery undervoltage fault level 3	Charge the battery.
b341	Uneven temperature fault 3	Contact your local Zero dealer.

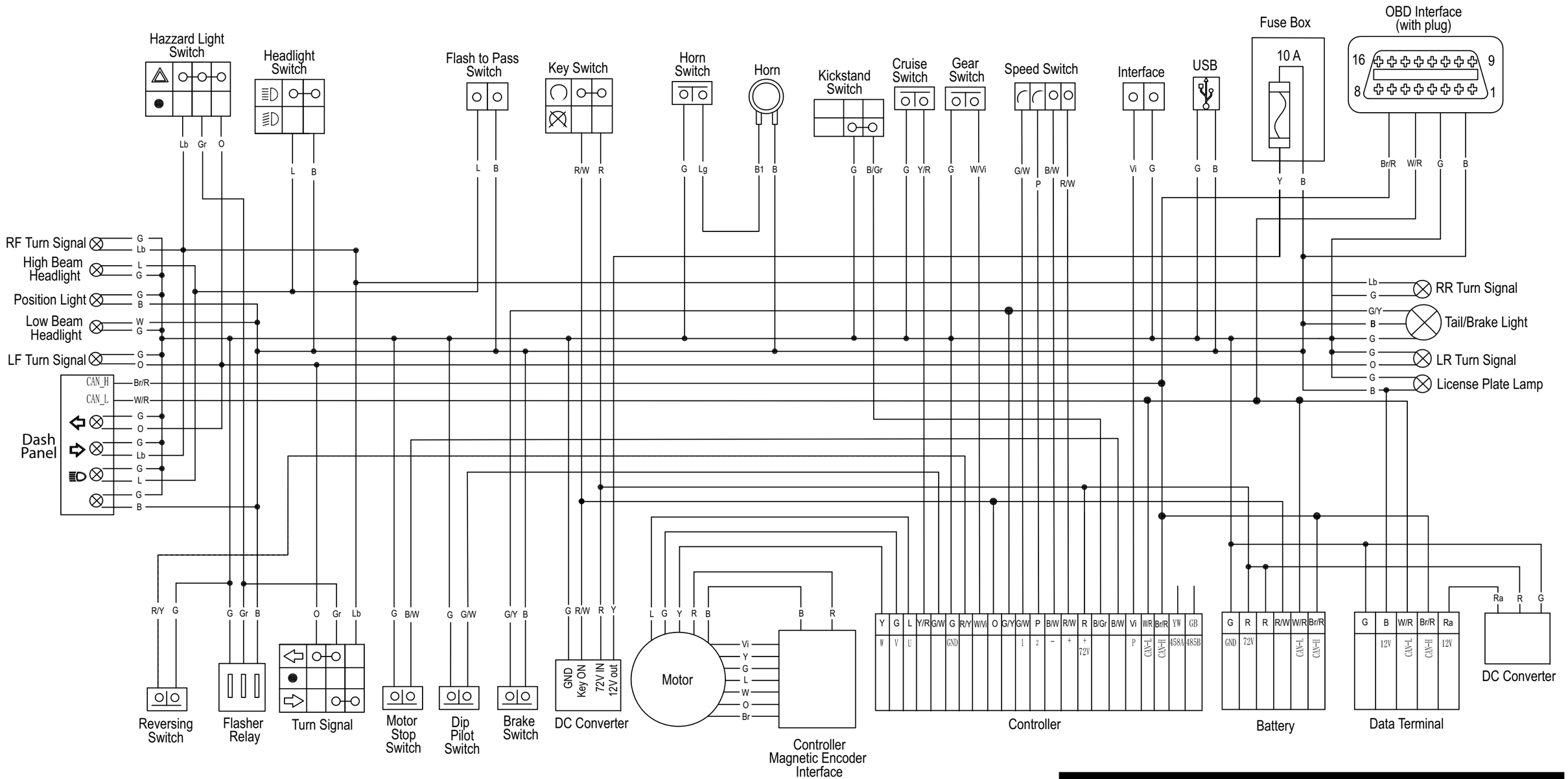
CODE	DESCRIPTION	ACTION
b342	Total charging voltage overvoltage fault	Check the input voltage.
b343	Total discharge voltage undervoltage fault	Check the battery.
b344	Total charging voltage undervoltage fault	Check the input voltage.
b345	Discharge monomer overvoltage fault	Check the battery.
b348	Communication failure	Contact your local Zero dealer.
C101	Charger fault 1	Contact your local Zero dealer.
C106	Temperature fault 1	Reduce charging current.
C107	Input overvoltage protection 1	Check input voltage.
C108	Input undervoltage protection 1	Check input voltage.
C109	Output overcurrent protection 1	Cycle the key off and on to reset.
C110	Output overvoltage protection 1	Cycle the key off and on to reset.
C111	Output undervoltage protection 1	Cycle the key off and on to reset.
C201	Charger fault 2	Contact your local Zero dealer.
C206	Temperature fault 2	Reduce charging current.
C207	Input overvoltage protection 2	Check input voltage.
C208	Input undervoltage protection 2	Check input voltage.
C209	Output overcurrent protection 2	Cycle the key off and on to reset.
C210	Output overvoltage protection 2	Cycle the key off and on to reset.
C211	Output undervoltage protection 2	Cycle the key off and on to reset.
C301	Charger fault 3	Contact your local Zero dealer.
C302	Hardware fault 3	Contact your local Zero dealer.
C303	Communication fault 3	Contact your local Zero dealer.
C304	Short circuit protection 3	Contact your local Zero dealer.
C305	Open circuit protection 3	Contact your local Zero dealer.
C306	Temperature fault 3	Charge after the temperature drops.
C307	Input overvoltage protection 3	Check input voltage.
C308	Input undervoltage protection 3	Check input voltage.
C309	Output overcurrent protection 3	Contact your local Zero dealer.
C310	Output overvoltage protection 3	Contact your local Zero dealer.
C311	Output undervoltage protection 3	Contact your local Zero dealer.
P111	Controller over temperature fault 1	Motorcycle limit level 1 power usage
P112	Electronic TCS malfunction	Contact your local Zero dealer.
P123	Motor controller system fault level 1	Check the controller power cord for looseness.
P124	Motor over temperature fault 1	Motorcycle limit level 1 power usage
P126	Battery imbalance warning prompt level 1	Contact your local Zero dealer.
P211	Controller over temperature fault 2	Motorcycle limit level 2 power usage
P223	Motor controller system fault level 2	Check the controller power cord for looseness.
P224	Motor over temperature fault 2	Motorcycle limit level 2 power usage
P225	Motor temperature sensor failure	Contact your local Zero dealer.
P226	Battery imbalance warning prompt level 2	Contact your local Zero dealer.
P301	Controller overvoltage failure	1. Replace the battery. 2. Replace the controller.
P302	Controller undervoltage failure	Charge the battery.
P303	Controller overcurrent protection failure	Cycle the key off and on to reset.
P304	Motor locked failure	Cycle the key off and on to reset.
P305	Motor position sensor failure	Contact your local Zero dealer.

CODE	DESCRIPTION	ACTION
P307	Controller phase loss failure	Contact your local Zero dealer.
P309	Braking state	Check the brake switch.
P310	Motor controller self-test failure	Contact your local Zero dealer.
P311	Controller over temperature fault 3	Allow the controller to cool.
P314	Acceleration handle failure	Check if the handle is damaged and if the wiring harness plug is loose
P320	Brake failure	Contact your local Zero dealer.
P321	Communication failure	Contact your local Zero dealer.
P322	Precharge fault	Contact your local Zero dealer.
P323	Motor controller system fault level 3	Contact your local Zero dealer.
P324	Motor over temperature fault 3	Allow the motor to cool.

General Troubleshooting

SYMPTOM	POTENTIAL CAUSE	POTENTIAL SOLUTION
No power with the key on.	Battery connector not fully inserted	Check and properly insert the battery connector.
	Battery low power protection	Charge the battery.
	Battery in low or high temperature protection	Wait for battery temperature to return to normal.
	Main fuse blown	Check the circuit and replace the fuse.
	Poor contact at key switch connector	Firmly insert the connector or replace the key switch.
	DC converter damaged or malfunction	Replace the DC converter.
	Battery malfunction	Replace the battery at a Zero Dealer.
Charger not charging	Battery temperature too low or too high	Charge the battery after the temperature returns to normal.
	Poor contact of charger connector	Re-insert and secure the charger connector.
	Charger malfunction	Replace the charger at a Zero Dealer.
	Battery malfunction	Replace the battery at a Zero Dealer.
Power mode ineffective or reduced power	Low battery charge	Charge the battery.
	Battery temperature too low or too high	Wait for the battery temperature to return to normal.
	Excessively high temperature of motor or controller	Wait until the temperature returns to normal.
	Damaged power mode switch	Replace the switch.
Power supply normal, battery gauge not displaying	Loose connection at battery gauge	Replace the battery at a Zero Dealer.
	Damaged battery gauge	Replace the battery at a Zero Dealer.
Power supply normal, motor not working after power-on	Kickstand switch protection on	Retract the kickstand.
	Brake power-off switch protection	Check the brake switches.
	Motorcycle tip-over switch active	After standing the motorcycle, turn the key off and then back on to reset the switch.
	Throttle not returned to neutral position	Check operation and replace if defective.
	Low battery power protection	Charge the battery.
	Motor overheating protection	Wait for the motor to cool down before use.
	Controller overheating protection	Wait for the controller to cool down before use.
	Damaged kickstand switch	Check kickstand switch connections; replace the kickstand switch.
	Damaged tip-over sensor	Check sensor connections; replace the tip-over sensor.
	Poor contact or damaged throttle	Check throttle connections; replace the throttle.
	Poor contact of controller connector	Inspect and secure the controller connector.
	Poor contact of motor sensor connector	Inspect and secure the motor sensor connector.
	Controller malfunction or motor sensor malfunction	Replace the motor at a Zero Dealer.

XB Wiring Schematic



B = Black	L = Blue	Br = Brown	Lg = Light green
W = White	G = Green	Gr = Gray	O = Orange
Y = Yellow	R = Red	Lb = Light blue	P = Pink
Vi = Violet			