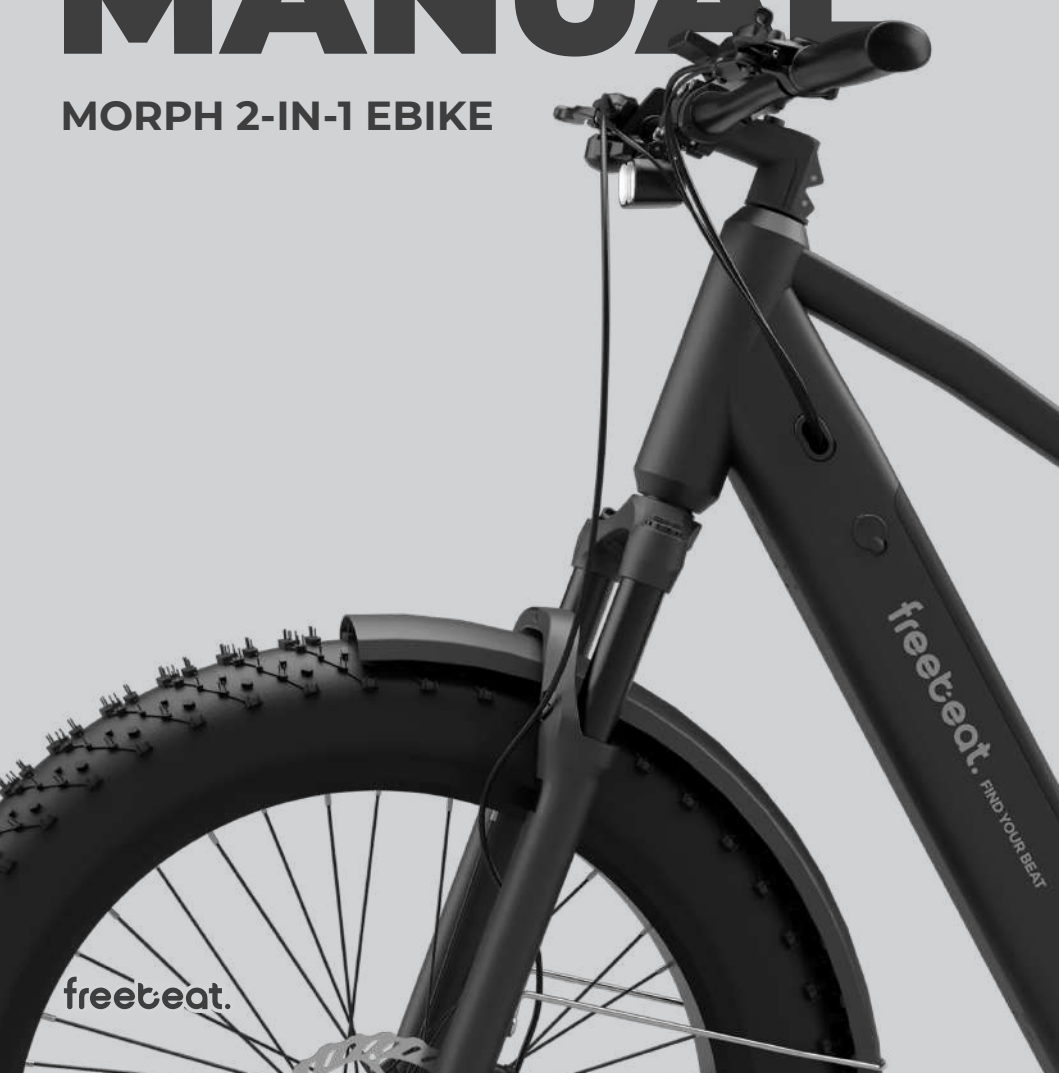
OWNER'S MANUAL

MORPH 2-IN-1 EBIKE



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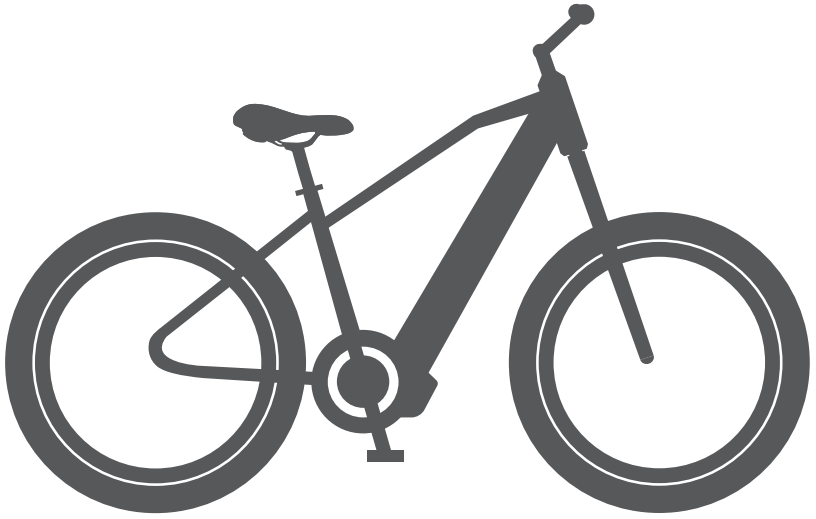

BICYCLE OWNER'S MANUAL

IMPORTANT

This manual contains essential safety, performance, and service information. Please read it carefully before taking your first ride on your new bicycle, and keep it for future reference.

Additional safety, performance, and service information specific to components such as suspension or pedals on your bicycle, as well as accessories like helmets or lights, may also be available. Ensure that your dealer has provided you with all the manufacturer's information included with your bicycle or accessories. In case of any conflict between the instructions in this manual and the information provided by a component manufacturer, always follow the component manufacturer's instructions.

If you have any questions or do not understand something, take responsibility for your safety and consult with your dealer or the bicycle manufacturer.

Please note that this manual is not intended to be a comprehensive guide for use, service, repair, or maintenance. For service, repairs, or maintenance, please contact your dealer. They may also be able to refer you to classes, clinics, or books on bicycle use, service, repair, or maintenance.

INTRODUCTION

Congratulations! Thank you for purchasing a freebeat bike! You now have the ultimate urban bike in your hands.

Instead of going through the entire manual, we understand that you're probably eager to start riding. We have condensed the content to only include the most important information so that you can hit the road and embrace your city as soon as possible.

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GENERALWARNING

Like any sport, bicycling involves the risk of injury and damage. By choosing to ride a bicycle, you accept the responsibility for that risk. It is important to be aware of and follow the rules of safe and responsible riding, as well as proper use and maintenance of your bicycle. Proper use and maintenance will reduce the risk of injury.

This Manual contains various "Warnings" and "Cautions" regarding the consequences of failing to maintain or inspect your bicycle, as well as failing to follow safe cycling practices.

The combination of the safety alert symbol and the word "WARNING" indicates a potentially hazardous situation that, if not avoided, could result in serious injury or death.

The combination of the safety alert symbol and the word "CAUTION" indicates a potentially hazardous situation that, if not avoided, may result in minor or moderate injury, or serves as an alert against unsafe practices.

The word "CAUTION" used without the safety alert symbol indicates a situation that, if not avoided, could result in serious damage to the bicycle or the voiding of your warranty.

Many of the warnings and cautions mention the possibility of losing control and falling, as any fall can result in serious injury or even death. We do not always repeat the warning of possible injury or death. Since it is impossible to anticipate every situation or condition that may occur while riding, this manual does not guarantee the safe use of the bicycle under all conditions. There are risks associated with the use of any bicycle that cannot be predicted or avoided, and it is solely the responsibility of the rider to manage these risks.

A SPECIAL NOTE FOR PARENTS

As a parent or guardian, it is your responsibility to ensure the activities and safety of your minor child. This includes making sure that their bicycle is properly fitted, in good repair, and safe to operate. It is important that both you and your child learn and understand how to safely operate the bicycle, as well as obey local motor vehicle, bicycle, and traffic laws. Additionally, it is crucial to follow common sense rules for safe and responsible cycling. Before allowing your child to ride the bicycle, you should read this manual and review its warnings, as well as the bicycle's functions and operating procedures with your child.

WARNING

Always ensure that your child wears an approved bicycle helmet when riding. However, it is also important to make sure your child understands that a helmet is only for bicycling and should be removed when not riding. A helmet should not be worn while playing in play areas, on playground equipment, or while climbing trees. Failure to follow this warning could result in serious injury or death.

Make sure that your child's bicycle is correctly sized so that when the saddle is adjusted properly, both feet can touch the ground. If your child's new bike does not fit, ask your dealer to exchange it before riding.

FIRST

NOTE

We highly recommend that you read this manual in its entirety before your first ride. At the very least, ensure that you understand each point mentioned in this section. If you have any questions or concerns, refer to the specified sections for further clarification. Please note that not all bicycles may have all the features described in this manual. You can ask your dealer to show you the specific features of your bicycle.

A. SAFETY FIRST

- Always wear an approved helmet when riding your bike, and make sure to follow the instructions provided by the helmet manufacturer for proper fitting, usage, and care.
- Do you have all the necessary safety equipment required and recommended for riding your bike? It is your responsibility to familiarize yourself with the laws and regulations of the areas where you ride and ensure that you comply with all applicable laws.
- Do you know how to properly secure your front and rear wheels? Riding with improperly secured wheels can cause the wheel to wobble or disengage from the bicycle, resulting in serious injury or even death.
- Does your bike have suspension? Suspension can greatly affect the performance of a bicycle. It is crucial to follow the instructions provided by the suspension manufacturer for proper adjustment and maintenance.

B. MECHANICALSAFETY CHECK

Before every ride, it is important to routinely check the condition of your bicycle.

NUTS, BOLTS SCREWS, AND OTHER FASTENERS:

Manufacturers utilize a wide range of fastener sizes, shapes, and materials, making it crucial to apply the correct tightening force or torque. Unfortunately, there is no one-size-fits-all approach to tightening these fasteners. To ensure proper tightening, it is imperative to refer to the torque specifications provided by the specific bicycle or component manufacturer. It is highly recommended to use a calibrated torque wrench to achieve accurate torque values. If you choose to undertake maintenance on your own, be sure to use a torque wrench and follow the tightening torque specifications meticulously. However, for peace of mind and to guarantee utmost safety, it is strongly advised to have a professional bicycle mechanic inspect the fasteners you have worked on as soon as possible.

WARNING

Applying the correct tightening force to fasteners, such as nuts, bolts, and screws, is of the utmost importance. Inadequate force may result in loose fasteners, compromising the integrity of the bicycle. Conversely, excessive force can lead to thread damage, stretching, deformation, or breakage. Either scenario can result in component failure, potentially causing loss of control and accidents.

- Make sure nothing is loose before your ride, lift the front wheel a few inches off the ground and let it bounce. Pay close attention to any unusual sounds, sensations, or visual indications of looseness. Conduct a meticulous inspection of the entire bicycle, checking for any loose parts or accessories. If you are uncertain about any aspect of the inspection, it is highly recommended to seek assistance from an experienced individual with knowledge of bike maintenance. Your safety should always be the top priority.

TIRES AND WHEELS:

Ensure that the tires are properly inflated (refer to the Quick Start Guide for instructions). To check the tire pressure, place one hand on the saddle and the other on the intersection of the handlebars and stem. Bounce your weight on the bike while observing the tire deflection. Compare the deflection with how it should look when the tires are correctly inflated and adjust as necessary.

Are the tires in good condition? Spin each wheel slowly and inspect the tread and sidewall for any cuts or damage. It is important to replace damaged tires before riding the bike.

Are the wheels true? Spin each wheel and check for brake clearance and any side-to-side wobble. If a wheel wobbles slightly, rubs against, or hits the brake pads, it is recommended to take the bike to a qualified bike shop for wheel truing. Truing wheels require special tools and experience, so it is not advisable to attempt it unless you have the necessary knowledge, experience, and tools.

WARNING

Ensure that the wheel rims are clean and undamaged. Check the cleanliness and inspect for any damage at the tire bead. If you have rim brakes, also inspect the braking surface. Ensure that no rim wear indicator markings are visible at any point on the wheel rim.

NOTE

Bicycle wheel rims are subject to wear. Some rims have a rim wear indicator that becomes visible as the braking surface wears down. If a rim wear indicator is visible on the side of the wheel rim, it indicates that the rim has reached its maximum usable life. Riding a wheel that is at the end of its usable life can result in wheel failure, leading to loss of control and potential accidents.

BRAKES:

Check the brakes for proper operation. Squeeze the brake levers and ensure that the brake quick-release mechanisms are engaged. Verify that all control cables are seated and securely engaged. If you have rim brakes, confirm that the brake pads make solid contact with the wheel rims and fully engage within an inch of brake lever movement. You should be able to apply full braking force without the levers touching the handlebar. If adjustments are needed, do not ride the bike until the brakes are properly adjusted by a professional bicycle mechanic.

- Ensure that the front and rear wheels are securely fastened in the wheel retention system.
- If your seat post has an over-center cam action fastener for easy height adjustment, check that it is properly adjusted and locked in position.
- Confirm that the saddle and handlebar stem are parallel to the bike's center line and tightened sufficiently to prevent twisting or misalignment.
- Check that the handlebar grips are securely attached and in good condition. Ensure that the handlebar ends and extensions are properly plugged. If you have bar end extensions, make sure they are tightly clamped to prevent any twisting.

WARNING

It is crucial to replace any handlebar grips, end plugs, or extensions that are loose or damaged. These components can expose the ends of the handlebars, posing a risk of injury and potentially leading to loss of control and falls. Additionally, handlebars or extensions that are not properly plugged can cause cuts and serious injuries, even in minor accidents. Therefore, it is important to ensure that all handlebar components are securely in place to maintain rider safety.

SAFETY

A. THE BASICS

WARNING

The area where you ride may have specific safety requirements. It is your responsibility to familiarize yourself with the local laws and regulations and comply with them. This includes ensuring that you and your bike are properly equipped as per the law.

Here are some guidelines to follow:

1. Always wear a helmet that meets the latest certification standards and is suitable for the type of riding you do. Follow the manufacturer's instructions for fitting, using, and maintaining your helmet. Head injuries are often severe in bicycle accidents and can be prevented by wearing a proper helmet.
2. Before riding a bike, always perform a thorough bike check to make sure everything is in proper working order.
3. Be fully acquainted with the controls of your bicycle, including the brakes, pedals, and shifting mechanisms.
4. Take caution to keep body parts and other objects away from the sharp teeth of the chainrings, the moving chain, the rotating pedals and cranks, and the spinning wheels of your bike.
5. Wear appropriate shoes that securely stay on your feet and provide grip on the pedals. Ensure that shoelaces cannot get tangled in moving parts, and never ride barefoot or in sandals.
6. Wear bright, visible clothing that is not too loose, as loose clothing can become entangled in your bike or snagged by objects along the road or trail.

Protective eyewear is essential to shield your eyes from airborne dirt, dust, and bugs. Choose tinted lenses for bright sunny conditions and clear lenses for other times when visibility is not an issue.

7. Avoid jumping on your bike. While jumping can be thrilling, it places significant and unpredictable stress on both the bicycle and its components. Riders who insist on jumping their bikes not only risk serious damage to their bicycles but also put themselves in harm's way.
8. Always ride at a speed that is appropriate for the present conditions. Remember that higher speeds increase the risk of accidents and potential injuries. It is crucial to prioritize safety over speed.

B. RIDING SAFETY

1. Adhere to all rules of the road and comply with local traffic laws.
2. Remember that you are sharing the road or path with other motorists, pedestrians, and cyclists. Respect their rights and prioritize safety.
3. Ride defensively and assume that others may not see you. Always be prepared to react to potential hazards.
4. Stay alert and be ready to avoid various obstacles such as slowing or turning vehicles, opening car doors, pedestrians stepping out, potholes, grates, railroad tracks, construction, debris, and other potential obstructions.
5. Ride in designated bike lanes or paths, or as close to the edge of the road as possible, in the direction of traffic flow according to local laws.
6. Stop at stop signs and traffic lights, and look both ways at street intersections. Yield if necessary, even if you have the right of way.
7. Use approved hand signals for turning and stopping.
8. Avoid riding with headphones as they can mask important traffic sounds and emergency vehicle sirens, distracting you from your surroundings and posing a risk of entanglement in moving bicycle parts.
9. Do not carry a passenger unless it is a small child wearing an approved helmet and secured in a correctly mounted child carrier or trailer. Ensure that the bicycle is suitable for carrying passengers and does not exceed the maximum weight limit.

10. The minimum age for riding should be 16 years or older, with proper protective gear.

WARNING

Child carriers and racks can affect the handling of a bicycle, altering the weight distribution and balance. Use them cautiously to prevent loss of control and serious injury or death.

11. It is recommended to transport children using a towed trailer instead of a child carrier mounted to the frame. Keep in mind that towing a trailer affects stopping distances, turning radius, and bicycle handling.
12. Children should always wear a helmet while in a child carrier or trailer. Refer to local laws regarding bicycle helmet usage.
13. Do not carry anything that obstructs your vision or control of the bicycle, or that can become entangled in moving parts.
14. Never hitch a ride by holding onto another vehicle.
15. Avoid performing stunts, wheelies, or jumps unless you have the necessary skills and are willing to accept the risks involved.
16. Do not weave through traffic or make sudden moves that may surprise others on the road.
17. Observe and yield the right of way when necessary.
18. Never ride a bicycle under the influence of alcohol or drugs.
19. If possible, avoid riding in bad weather, during low visibility conditions at dawn, dusk, or in the dark, or when excessively tired. These conditions increase the risk of accidents.

C. OFF ROAD SAFETY

We recommend that children do not ride on rough terrain or in the rain unless accompanied by an adult.

1. Off-road biking requires careful attention and specific skills due to variable conditions and hazards. Start slowly on easier terrain to develop skills and gradually progress to higher speeds or more challenging terrain. If your bike has suspension, be aware that increased speed also increases the risk of losing control and falling. Familiarize yourself with safe bike handling before attempting more difficult situations.
2. Always wear appropriate safety gear for the type of riding you plan to do.
3. Avoid riding alone in remote areas. Even when riding with others, ensure that someone knows your intended route and expected return time.
4. Carry identification in case of an accident and bring money, food, a drink, and a mobile phone for emergencies.
5. Yield the right of way to pedestrians and animals. Ride in a manner that doesn't frighten or endanger them and give them enough space to make unexpected moves without putting your safety at risk.
6. Be prepared in case something goes wrong while riding off-road, as help may not be readily available.
7. Respect off-road regulations and obey local laws. Be mindful of private property and remember that you may be sharing the trail with hikers, equestrians, and other cyclists. Stay on designated trails and avoid contributing to erosion by riding in mud or unnecessarily sliding.
8. Preserve the ecosystem by avoiding cutting your own trail or taking shortcuts through vegetation or streams. Minimize your impact on the environment and leave everything as you found it. Remove any waste or belongings you brought in with you.

D. WETWEATHER RIDING

In wet conditions, the effectiveness of your brakes, as well as the brakes of other vehicles on the road, is significantly reduced, and your tires have less grip. This makes it more difficult to control your speed and increases the risk of losing control. To ensure that you can slow down and stop safely in wet conditions, ride at a slower pace and apply your brakes earlier and more gradually than you would in normal, dry conditions.

E. NIGHT RIDING

Riding a bicycle at night is much more dangerous than riding during the day. A bicyclist is very difficult for motorists and pedestrians to see.

Therefore, children should never ride at dawn, at dusk, or at night. Adults who choose to accept the greatly increased risk of riding at dawn, at dusk, or at night need to take extra care both riding and choosing proper equipment which helps reduce that risk.

WARNING

Using reflectors alone is not sufficient to ensure safety when riding at dawn, dusk, at night, or in poor visibility conditions. It is crucial to have an appropriate bicycle lighting system in addition to reflectors. Riding without proper lighting and reflectors in these conditions is extremely dangerous and can lead to severe injuries or even death.

Bicycle reflectors are specifically designed to reflect car lights and street lights, increasing your visibility and helping others recognize you as a moving cyclist.

Furthermore, the mounting brackets of front and rear reflectors often serve as safety catches for brake straddle cables. These brackets prevent the straddle cable from getting caught in the tire tread if it jumps out of its yoke or breaks. This additional safety feature contributes to a safer riding experience.

NOTE

It is recommended to avoid riding at night if possible. Only ride at night if it is necessary.

WARNING

It is important to keep the front and rear reflectors, as well as the reflector brackets, on your bicycle. These components are essential for the bicycle's safety system.

Removing the reflectors reduces your visibility to other road users, increasing the risk of being struck by vehicles, which can result in severe injury or even death. Additionally, the reflector brackets serve as a protective measure in case of brake straddle cable failure. They prevent the cable from getting caught in the tire, which could cause the wheel to stop suddenly and lead to loss of control and a fall.

If you choose to ride in conditions of poor visibility, it is strongly recommended that you comply with all local laws regarding night riding and take the following precautions:

- Purchase and install head and tail lights powered by batteries or a generator that meets regulatory requirements and provides adequate visibility.
- Wear light-colored, reflective clothing and accessories, such as a reflective vest, arm and leg bands, helmet stripes, and flashing lights attached to your body or bicycle. Any reflective device or light source that moves will help draw the attention of approaching motorists, pedestrians, and other traffic.
- Ensure that your clothing or anything you carry on the bicycle does not obstruct a reflector or light.
- Make sure your bicycle is equipped with properly positioned and securely mounted reflectors.

While riding at dawn, dusk, or at night:

- Ride at a slower pace.
- Avoid dark areas and areas with heavy or fast-moving traffic.
- Steer clear of road hazards.
- If possible, stick to familiar routes.

If riding in traffic:

- Be predictable in your movements so that drivers can see you and anticipate your actions.
- Stay alert and ride defensively, expecting the unexpected.

If you plan to ride in traffic frequently, consider asking your dealer about traffic safety classes or finding a good book on bicycle traffic safety.

F. EXTREME, STUNT, OR COMPETITION RIDING

Engaging in extreme, aggressive riding poses a high risk of injury or death, regardless of what it is called - Aggro, Hucking, Freeride, North Shore, Downhill, Jumping, Stunt Riding, Racing, or anything else. It is important to note that not all bicycles are designed for these types of riding styles, and even those that are may not be suitable for all aggressive riding styles. It is recommended to consult with your dealer or the bicycle's manufacturer to ensure the suitability of your bike before participating in extreme riding.

When riding downhill, it is crucial to understand that you can reach speeds comparable to motorcycles, exposing yourself to similar hazards and risks. It is highly recommended to have your bicycle and equipment thoroughly inspected by a qualified mechanic to ensure they are in perfect condition.

Before riding, it is advisable to consult with experienced riders, local site personnel, and race officials for advice on conditions and equipment. Wearing appropriate safety gear, such as an approved full-face helmet, full-finger gloves, and body armor, is essential. Ultimately, it is your responsibility to have the proper equipment and be familiar with the course conditions.

WARNING

While catalogs, advertisements, and articles often portray bicyclists engaging in extreme riding, it is important to recognize the inherent dangers of this activity. Engaging in extreme riding significantly increases the risk of injury or even death, and can also worsen the severity of any injuries sustained. It is crucial to remember that the actions depicted are performed by professionals with years of training and experience. It is important to know your own limits and always wear appropriate safety gear, such as a helmet. Even with state-of-the-art protective equipment, there is still a high chance of serious injury or death when participating in activities such as jumping, stunt riding, or downhill riding at high speeds or in competition.

Bicycles and their parts have limitations in terms of strength and integrity, and extreme riding can exceed these limitations. We strongly advise against this type of riding due to the inherent dangers and risks involved. However, if you choose to take the risk, we recommend the following precautions:

- Take lessons from a competent instructor before attempting extreme riding.
- Start with basic exercises and gradually develop your skills before trying more difficult or dangerous riding techniques.
- Only perform stunts, jumps, races, or downhill riding in designated areas.
- Wear a full-face helmet, safety pads, and other appropriate safety gear.
- Understand that the stresses imposed on your bike during this type of activity may cause parts to break or become damaged, potentially voiding the warranty.
- If any part of your bike breaks or bends, take it to your dealer for repairs, and do not ride it in its damaged state.
- If you engage in high-speed downhill riding, stunt riding, or competition, be aware of the limits of your skills and experience. Ultimately, avoiding injury is your responsibility.

G. CHANGING COMPONENTS OR ADDING ACCESSORIES

There are various components and accessories available to improve the comfort, performance, and appearance of your bicycle. However, if you decide to change components or add accessories, you do it at your own risk. The manufacturer of the bicycle may not have tested that specific component or accessory for compatibility, reliability, or safety on your bicycle. Before installing any component or accessory, such as a different size tire, make sure to check with your dealer to ensure compatibility with your bicycle. Also, be sure to read, understand, and follow the instructions that come with the products you purchase for your bicycle.

WARNING

Failure to properly install, operate, and maintain any component or accessory can lead to severe injury or even death.

Replacing bike components with anything other than genuine replacement parts may jeopardize the safety of your bicycle and potentially void the warranty. For instance, when replacing the brake and steerer tube, it is crucial to ensure that the replacement parts are specifically designed for your bike.

FCC CAUTION

Any Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

—Reorient or relocate the receiving antenna.

—Increase the separation between the equipment and receiver.

—Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

—Consult the dealer or an experienced radio/TV technician for help.

FCC RF Radiation Exposure Statement:

1. This Transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.
2. This equipment complies with RF radiation exposure limits set forth for an uncontrolled environment.
3. This equipment should be installed and operated with minimum distance 20cm between the radiator& your body.

FIT

Having the correct fit is crucial for the safety, performance, and comfort of bicycling. Adjusting your bicycle to fit your body and riding conditions requires experience, skill, and special tools. It is recommended to have your dealer make these adjustments or, if you have the necessary experience, skill, and tools, have your dealer check your work before riding.

WARNING

It is important to note that failure to properly install, operate, and maintain any component or accessory can result in serious injury or even death. Therefore, it is crucial to ensure compatibility and proper installation of any component or accessory.

Using replacement parts other than genuine ones may compromise the safety of your bicycle and could void the warranty. For instance, when replacing forks, they must have the same rake and steerer tube inner diameter as the ones originally fitted with the bicycle.

A. STANDOVER HEIGHT

1. DIAMOND FRAME BICYCLES:

The standover height is an important factor in bike fit. It is the measurement of the distance from the ground to the top of the bicycle's frame at the point where your crotch is when straddling the bike. To determine the correct standover height, straddle the bike while wearing the shoes you'll be riding in and bounce on your heels. If your crotch touches the frame, the bike is too big for you. It is not advisable to ride the bike around the block in this case.

For riding on paved surfaces exclusively and no off-road riding, a minimum standover height clearance of two inches (5cm) is recommended. For riding on unpaved surfaces, a minimum clearance of three inches (7.5cm) is suggested. For off-road riding, a clearance of four inches (10cm) or more is preferable.

2. STEP-THROUGH FRAME BICYCLES:

Standover height does not apply to bicycles with step-through frames. Instead, the limiting dimension is determined by the range of saddle height. You should be able to adjust your saddle position without exceeding the limits set by the height of the top of the seat tube and the "Minimum Insertion" or "Maximum Extension" mark on the seat post.

B. SADDLE POSITION

Correct saddle adjustment is an important factor in getting the most performance and comfort from your bicycle. If the saddle position is not comfortable for you, see your dealer.

The saddle can be adjusted in two directions:

1. UP AND DOWN ADJUSTMENT TO CHECK OR CORRECT SADDLE HEIGHT:

To adjust your saddle height, follow these steps:

1. Sit on the saddle.
2. Place one heel on a pedal.
3. Rotate the crank until the pedal with your heel on it is in the down position and the crank arm is parallel to the seat tube.
4. If your leg is not completely straight, your saddle height needs to be adjusted. If your hips rock to reach the pedal, the saddle is too high. If your leg is bent at the knee with your heel on the pedal, the saddle is too low.
5. If you choose to make your own saddle height adjustment, follow these steps:
   a. Loosen the seat post clamp.
   b. Raise or lower the seat post in the seat tube.
   c. Make sure the saddle is straight and tighten the seat post clamp to the recommended torque.

6. If your frame has a sight hole on the seat tube, the seat post must be visible through the sight hole and must not project from the frame beyond the minimum/maximum mark. Use the sight hole in conjunction with the min/max mark on the seat post. If the seat post is at the min/max mark but not visible through the sight hole, it needs to be lowered until it can be seen.
7. Do not cut the seat post short if it doesn't meet the requirements mentioned above.
8. If your seat post is at the minimum/maximum mark and/or not visible through the sight hole, and the saddle is not high enough, you need to replace the seat post with a longer one.
9. For bikes with an interrupted seat tube, ensure that the seat post is far enough into the frame so that you can touch it through the bottom of the interrupted seat tube with the tip of your finger without inserting your finger beyond its first knuckle.

⚠ **WARNING**

If the seat post is not inserted correctly into the seat tube as explained in section B.1, it may break, causing you to lose control and fall. Therefore, ensure proper insertion.

To achieve an optimal riding position, the saddle can be adjusted forward or backward. We recommend asking your dealer to set the saddle in your optimal position and demonstrate how to make adjustments. If you choose to make the adjustment yourself, ensure that the clamp mechanism is securely fastened to the straight part of the saddle rails and not touching the curved part. Use the recommended torque specific to your bike model.

2. SADDLE ANGLE ADJUSTMENT:

Most riders prefer a horizontal saddle, but some may prefer a slight upward or downward angle. Your dealer can assist with adjusting the saddle angle, or you can do it yourself if your seat post has a single bolt saddle clamp. In that case, make sure to loosen the bolt enough to disengage any serrations before changing the angle. Then, fully re-engage the serrations before tightening the bolt to the recommended torque specific to your bike model.

WARNING

Always check for worn serrations on the clamp surfaces when making saddle angle adjustments with a single-bolt saddle clamp. Worn serrations can cause the saddle to move, leading to loss of control and potential injury. Additionally, ensure that all fasteners are tightened to the correct torque. Over-tightened bolts can stretch and deform while loose bolts can lead to fatigue and potential failure, both of which can result in loss of control and falling.

If your bike has a suspension seat post, be aware that it may require periodic maintenance or servicing. Consult your dealer for recommended service intervals specific to your suspension seat post.

WARNING

Small adjustments to the saddle position can significantly impact performance and comfort. Make one adjustment at a time to find your best saddle position.

After any saddle adjustment, make sure the saddle adjusting mechanism is properly seated and tightened before riding. A loose saddle clamp or seat post clamp can cause damage to the seat post and compromise stability. A correctly tightened saddle adjusting mechanism should prevent any saddle movement in any direction. Periodically check to ensure that it is properly tightened.

WARNING

It has been reported that using a saddle that is incorrectly adjusted or does not properly support your perineal area can lead to potential injuries to nerves, blood vessels, and even impotence. If you experience pain, numbness, or any discomfort while riding, it is important to listen to your body and stop riding.

Your saddle plays a crucial role in providing comfort and support during your rides. If you experience any issues with your current saddle, it is recommended to consult with a professional bike mechanic or specialist to find a saddle that suits your needs and provides proper support for your perineal area.

Remember, your comfort and safety should always be a priority while riding. If you have any concerns or experience discomfort, take the necessary steps to address the issue and ensure a comfortable riding experience.

C. HANDLEBAR HEIGHT AND ANGLE

Your bike may be equipped with either a "threadless" stem or a "quill" stem. If you're unsure about the type of stem on your bike, it's best to consult your dealer for clarification.

If your bike has a "threadless" stem, your dealer may be able to adjust the handlebar height by moving height adjustment spacers. Alternatively, you may need a stem of a different length or rise to achieve the desired handlebar height. It is important to consult your dealer for assistance in making these adjustments as it requires specialized knowledge.

WARNING

Changing the stem or stem height on certain bicycles can impact the tension of the front brake cable. This can result in either the front brake becoming locked or excessive slack in the cable, rendering the front brake ineffective. If the front brake pads move closer to or further away from the wheel rim when adjusting the stem or stem height, it is crucial to properly adjust the brakes before riding the bicycle. Additionally, your dealer has the ability to alter the angle of the handlebar or bar end extensions.

Changing the stem or stem height on certain bicycles can impact the tension of the front brake cable. This can result in the front brake becoming locked or creating excess cable slack, rendering the front brake inoperable. If the front brake pads move closer or farther away from the wheel rim when adjusting the stem or stem height, it is crucial to have the brakes correctly adjusted by a professional before riding the bicycle.

Your dealer can also assist in adjusting the angle of the handlebar or bar end extensions to suit your preferences.

WARNING

Always ensure that fasteners are tightened to the correct torque. Over-tightened bolts can stretch and deform, while loose bolts can move and cause fatigue. Either scenario can lead to the sudden failure of the bolt, resulting in loss of control and potential falls.

WARNING

Insufficiently tightened stem clamp bolts, handlebar clamp bolts, or bar end extension clamping bolts can compromise steering action, potentially leading to loss of control and falls. To check if these bolts are properly tightened, place the front wheel of the bicycle between your legs and attempt to twist the handlebar/stem assembly. If any movement is detected, the bolts are not sufficiently tightened and should be adjusted.

WARNING

When using aero extensions, it is important to note that you will have less control over the bicycle and a diminished ability to steer. Additionally, you will need to reset your hands to operate the brakes, which means your response time to braking will be longer. Exercise caution and ensure you are comfortable and experienced with using aero extensions before riding.

D. CONTROL POSITION ADJUSTMENTS

To adjust the angle of the brake and shift control levers and their position on the handlebars, it is recommended to consult a professional bike mechanic. They have the expertise to make the necessary adjustments for you. However, if you decide to make these adjustments yourself, make sure to retighten the clamp fasteners to the recommended torque. Refer to the specific model's instructions or consult freebeat for the appropriate torque specifications.

E. BRAKE REACH

If you have small hands or struggle to squeeze the brake levers on your bike, it may be possible to adjust the reach of the brake levers. Your dealer can assist you in making this adjustment or recommend shorter reach brake levers if necessary.

However, it is important to note that when using shorter reach brake levers, it becomes even more crucial to have properly adjusted brakes. This ensures that you can apply full braking power within the available brake lever travel. Insufficient brake lever travel may result in loss of control, which can lead to serious injury or even death. Therefore, it is vital to prioritize correctly adjusted brakes when using shorter reach brake levers.

MECHANICAL & ELECTRICAL PARTS

NOTE

It's important to your safety, performance, and enjoyment to understand how things work on your bicycle. We urge you to ask your dealer how to do the things described in this section before you attempt them yourself, and that you have your dealer check your modifications before you ride the bike. If you have even the slightest doubt as to whether you understand something in this section of the manual, talk to your dealer.

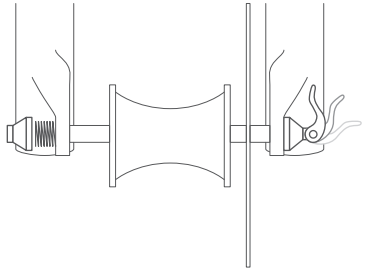
MECHANICAL PARTS

A. WHEELS

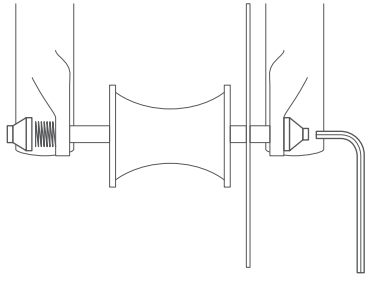
Bicycle wheels are designed to be easily removable for the purpose of transportation and tire repair. In most cases, the wheel axles are inserted into slots known as "dropouts" on the fork and frame. However, some suspension mountain bikes utilize a different system called a "through axle" for mounting the wheels. If you own a mountain bike with through axle front or rear wheels, it is essential to obtain the manufacturer's instructions from your dealer and strictly follow them when installing or removing a through axle wheel. If you are unfamiliar with what a through axle is, do not hesitate to ask your dealer for clarification. There are three common methods for securing wheels in place:

There are several types of wheel securing methods that may be used on your bicycle:

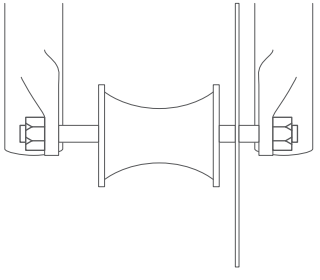
1. A hollow axle with a shaft, known as a "skewer," running through it. This skewer has an adjustable tension nut on one end and an over-center cam on the other.



2. A hollow axle with a shaft skewer running through it. This skewer has a nut on one end and a fitting for a hex key or a lock lever on the other.



3. Hex nuts or hex key bolts that are threaded onto or into the hub axle.



It is of utmost importance that you have a clear understanding of the type of wheel securing method employed on your bicycle. It is essential to know how to securely fasten the wheels and apply the appropriate clamping force to ensure their safety. It is highly recommended to consult your dealer for proper guidance on the correct procedure for wheel removal and installation, as well as to obtain any relevant manufacturer's instructions that may be available.

WARNING

Riding with an improperly secured wheel can lead to wobbling or the wheel falling off the bicycle, resulting in serious injury or death. Therefore, it is crucial to:

1. Seek assistance from your dealer to ensure you know how to safely install and remove your wheels.
2. Understand and correctly follow the proper technique for securing your wheel in place.
3. Before each ride, check that the wheel is securely clamped in the dropouts.
4. Ensure that the clamping action properly engages the surfaces of the dropouts.

1. FRONT WHEEL SECONDARY RETENTION DEVICES:

Most bicycles utilize a secondary wheel retention device on the front fork to reduce the risk of the wheel disengaging if it is incorrectly secured. These devices can be categorized as:

a. Clip-on type: This is a part that the manufacturer attaches to the front wheel hub or front fork.

b. The integral type of front fork dropouts are formed by molding, casting, or machining them into the outer face.

WARNING

o not remove or disable the secondary retention device. As the name implies, it serves as a backup in case the wheel is not secured correctly. Removing or disabling the secondary retention device may also void the warranty. However, secondary retention devices should not substitute for correctly securing your wheel. Failure to properly secure the wheel can result in loss of control and serious injury or death.

2. WHEELS WITH CAM ACTION SYSTEMS:

There are two types of wheel retention mechanisms that utilize a cam action system: the traditional over-center cam and the cam-and-cup system. Both of these systems employ an over-center cam action to securely clamp the bike's wheels in place. It is possible that your bicycle is equipped with a cam-and-cup system for the front wheel and a cam action system for the rear wheel. To ensure proper understanding and operation of these systems, it is advisable to consult the manufacturer's instructions provided by your dealer.

A. ADJUSTING THE TRADITIONAL CAM ACTION MECHANISM:

Ensure that the skewer is located against one dropout and that the lever is pulling evenly over the skewer against the other dropout. The clamping force is controlled by the tension adjusting nut. Turning the nut clockwise while preventing the cam lever from rotating increases clamping force, while turning it counterclockwise reduces clamping force. Even a small adjustment, less than half a turn of the tension adjusting nut, can make a significant difference in safely clamping the wheel.

WARNING

The full force of the cam action is necessary to securely clamp the wheel. Simply holding the nut with one hand and turning the lever like a wing nut with the other hand will not provide a safe clamp for a cam action wheel in the dropouts.

B. ADJUSTING THE CAM-AND-CUP MECHANISM:

WARNING

The cam-and-cup system on your front wheel should have been correctly adjusted by your dealer for your specific bicycle. It is recommended to have your dealer check this adjustment every six months. Do not use a cam-and-cup front wheel on any other bicycle than the one for which it was adjusted by your dealer.

3. REMOBING AND INSTALLING WHEELS

A. REMOVING A DISK BRAKE OR RIM BRAKE FRONT WHEEL:

1. For bikes with rim brakes, disengage the brake's quick-release mechanism to create more space between the tire and brake pads.
2. If your bike has a cam action front wheel retention system, move the cam lever from the locked or closed position to the open position. If your bike has a through bolt or bolt-on front wheel retention, loosen the fastener using an appropriate tool.
3. If your front fork has a clip-on type secondary retention device, disengage it. If your front fork has an integral secondary retention device, and a traditional cam action system, loosen the tension adjusting nut to allow for wheel removal. If your front wheel uses a cam-and-cup system, squeeze the cup and cam together while removing the wheel.
4. In some cases, you may need to tap the top of the wheel with your hand to release it from the front fork.

B. INSTALLING A DISK BRAKE OR RIM BRAKE FRONT WHEEL:

1. If your bike is equipped with a front disk brake, be cautious not to damage the disk, caliper, or brake pads when inserting the disk into the caliper. Only activate the brake lever when the disk is correctly inserted in the caliper.
2. For bikes with a cam action front wheel retention system, move the cam lever away from the wheel, into the open position. If your bike has a through bolt
3. If you have a traditional cam action mechanism, position the cam lever in the closed position, parallel to the fork blade and curved toward the wheel. Apply enough clamping force by wrapping your fingers around the fork blade for leverage, ensuring the lever leaves a clear imprint in your hand.
4. With a through bolt or bolt-on system, tighten the fasteners according to the recommended torque specifications for your specific bike model.
5. If using a traditional cam action system and the lever cannot be pushed all the way to a position parallel to the fork blade, return the lever to the open position. Then, turn the tension adjusting nut counterclockwise by one-quarter turn and attempt to tighten the lever again.

WARNING

Significant force is required to properly secure the wheel with a cam action retention device. If you find that you can easily close the cam lever without gripping the frame for additional leverage, it indicates that the tension is insufficient. To rectify this issue, follow these steps: open the lever, turn the tension adjusting nut clockwise by a quarter turn, and then try closing the lever again.

For bikes with a derailleur gear system, shift to the highest gear. For bikes with an internal gear rear hub, refer to the manufacturer's instructions before removing the rear wheel.

If your bike has rim brakes, disengage the brake's quick release mechanism to create more clearance between the wheel rim and the brake pads.

C. INSTALLING A DISK BRAKE OR RIM BRAKE REAR WHEEL:

(1) For bikes with a multi-speed system and derailleur gear, shift to the highest gear, which is the smallest and outermost rear sprocket. If you have a bike with an internal gear rear hub, it is advisable to consult your dealer or refer to the hub manufacturer's instructions before proceeding with the removal of the rear wheel. For single-speed bikes with rim or disk brakes, you can skip to step (4) below.

(2) If your bike is equipped with rim brakes, disengage the brake's quick release mechanism to create more space between the wheel rim and the brake pads.

(3) On bikes with a derailleur gear system, use your right hand to pull the derailleur body back.

(4) For bikes with a cam action retention system, move the quick release lever into the open position. If your bike has a through bolt or bolt-on mechanism, use the appropriate tool to loosen the fastener(s). Push the wheel forward until there is enough slack in the chain to be able to remove it from the rear sprocket.

(5) Lift the rear wheel a few inches off the ground and remove it from the rear dropouts.

D. INSTALLING A DISK BRAKE OR RIM BRAKE REAR WHEEL:

WARNING

When re-inserting the rear wheel with a disk brake, take care not to damage the disk, caliper, or brake pads. Only activate the disk brake's control lever when the disk is correctly inserted in the caliper.

(1) For bikes with a cam action retention system, move the cam lever to the open position, which should be on the opposite side of the wheel from the derailleur and rear wheel sprockets.

(2) On a derailleur bike, ensure the rear derailleur is in its outermost high gear position. Then, pull the derailleur body back with your right hand and place the chain on top of the smallest rear wheel sprocket.

(3) For single-speed bikes, remove the chain from the front sprocket, allowing enough slack in the chain. Put the chain on the rear wheel sprocket.

(4) Insert the wheel into the frame dropouts and push it all the way in.

(5) For single-speed or internal gear hub bikes, replace the chain on the chainring and pull the wheel back in the dropouts for straight alignment and about 6mm (1/4 inches) of up-and-down play in the chain.

(6) With a cam action system, move the cam lever upwards and swing it into the closed position. The lever should now be parallel to the seat stay or chain stay and curved towards the wheel. Apply enough clamping force by wrapping your fingers around the fork blade for leverage, ensuring the lever leaves a clear imprint in your hand.

(7) With a through bolt or bolt-on system, tighten the fasteners according to the recommended torque specifications for your specific bike model.

(8) If you disengaged the brake quick release mechanism, re-engage it to restore correct brake pad-to-rim clearance.

(9) Spin the wheel to ensure it is centered in the frame and clears the brake pads. Squeeze the brake lever and check that the brakes are operating correctly.

B. SEAT POST CLAMP

Some bikes come with a cam action seat post binder, which functions similarly to a traditional wheel cam action mechanism. The binder consists of a long bolt with a cam on one end and a center cam on the other end to securely clamp the seat post in place.

WARNING

Riding with an improperly tightened seat post can cause it to slip or move, resulting in loss of control and potential falls. To prevent this, please follow these steps:

1. Seek assistance from your dealer to ensure you know how to correctly clamp your seat post.
2. Understand and apply the correct technique for clamping the seat post.
3. Before riding, always check that the seat post is securely clamped.

Adjusting the seat post cam action mechanism: The cam action works by squeezing the seat collar around the seat post to hold it securely. The amount of clamping force can be controlled by adjusting the tension adjusting nut. Turning the nut clockwise, while keeping the cam lever from rotating, increases clamping force, while turning it counterclockwise reduces clamping force. A small adjustment of the tension adjusting nut can make a significant difference in achieving a safe and secure clamping force.

WARNING

The full force of the cam action is necessary to securely clamp the seat post. Holding the nut with one hand and turning the lever like a wingnut with the other hand until everything is tightened as much as possible will not ensure a safe clamping force.

If you can fully close the cam lever without wrapping your fingers around the seat post or a frame tube for leverage, and the lever does not leave a clear imprint in your hand, the tension is insufficient. In this case, open the lever, turn the tension adjusting nut clockwise a quarter turn, and try again.

C. BRAKES

There are three main types of bicycle brakes: rim brakes, which work by squeezing the wheel rim between two brake pads; disc brakes, which work by squeezing a hub-mounted disc between two brake pads; and internal hub brakes. All three types can be operated using handlebar-mounted levers. In certain bicycle models, the internal hub brake is operated by pedaling backward.

WARNING

1. Riding with improperly adjusted brakes, worn brake pads, or wheels that show rim wear marks is dangerous and can result in serious injury or death.
2. Applying brakes too hard or too suddenly can cause wheel lockup, leading to a loss of control and potential falls. Applying excessive force to the front brake may cause the rider to go over the handlebars, resulting in serious injury or death.
3. Some bicycle brakes, such as disc brakes and linear-pull brakes, are highly powerful. Take extra care to familiarize yourself with these brakes and exercise caution when using them.
4. Some bicycle brakes are equipped with a brake force modulator, a small cylindrical device through which the brake control cable runs. It is designed to provide a more progressive application of braking force, gradually increasing force until full force is achieved. If your bike has a brake force modulator, take extra care to understand its performance characteristics.
5. Disc brakes can become extremely hot with extended use. Avoid touching a disc brake until it has had sufficient time to cool down.
6. Refer to the brake manufacturer's instructions for the operation and care of your brakes, as well as guidelines on when brake pads should be replaced. If you don't have the manufacturer's instructions, consult your dealer or contact the brake manufacturer.
7. When replacing worn or damaged parts, only use manufacturer-approved genuine replacement parts.

1. BRAKE CONTROLS AND FEATURES

It is crucial for your safety that you learn and remember which brake lever controls which brake on your bike. Traditionally, the right brake lever controls the rear brake and the left brake lever controls the front brake. However, to ensure that your bike's brakes are set up this way, squeeze each brake lever individually and observe which brake, front or rear, engages. Repeat this process with the other brake lever.

Ensure that your hands can comfortably reach and squeeze the brake levers. If your hands are too small to operate the levers comfortably, consult your dealer before riding the bike. The lever reach may be adjustable, or you may need a different brake lever design.

Most rim brakes have a quick-release mechanism that allows the brake pads to clear the tire when a wheel is removed or reinstalled. When the brake quick-release is in the open position, the brakes are inoperative. Ask your dealer to explain how the brake quick-release works on your bike and check each time to ensure that both brakes work correctly before you ride.

2. HOW BRAKES WORK

To ensure maximum friction and effective braking, it is important to keep the wheel rims and brake pads, or the disc rotor and caliper, clean and free from dirt, lubricants, waxes, or polishes.

When you apply the brakes, the bike starts to slow down, but your body naturally wants to continue at the speed it was going. This results in a transfer of weight to the front wheel. Under heavy braking, this weight transfer could cause the bike to pitch forward, potentially causing you to be thrown over the handlebars.

A wheel with more weight on it can handle greater brake pressure before locking up, while a wheel with less weight will lock up with less brake pressure. Therefore, as you apply the brakes and your weight shifts forward, it is important to shift your body towards the rear of the bike to transfer weight back to the rear wheel. At the same time, you need to decrease rear braking force and increase front braking force. This becomes even more crucial during descents, as descents shift weight further forward.

Two key factors in effective speed control and safe stopping are controlling wheel lockup and weight transfer. Weight transfer is especially important if your bike has a front suspension fork, as it affects the bike's stability during braking. Practice braking and weight transfer techniques in a controlled environment without any hazards or distractions.

However, everything changes when you ride on loose surfaces or in wet weather. It takes longer to stop on loose surfaces or in wet conditions. The tires have reduced traction, which means less cornering and braking ability, and they can easily lock up with less brake force. Moisture or dirt on the brake pads also reduces their ability to grip. To maintain control on loose or wet surfaces, it's important to ride more slowly.

D. SHIFTING GEARS

Shifting gears on a multi-speed bicycle requires understanding your bike's drivetrain and gear mechanisms. This can include a rear cassette or a three-wheel sprocket cluster, a front derailleur, shifters, and one, two, or three front sprockets called chainrings.

A. SHIFTINGOEARS

There are various types and styles of shifting controls, such as levers, twist grips, triggers, combination shift/brake controls, and push buttons. The terminology of shifting can be confusing. An upshift refers to shifting to a higher or faster gear, while a downshift refers to shifting to a lower or easier gear. It's important to note that what happens at the front derailleur is opposite to what happens at the rear derailleur.

Whether upshifting or downshifting, the bike's derailleur system requires the drive chain to be moving forward and under tension. Never move the shifter while pedaling backward or immediately after moving the chain in the opposite direction. This could cause the chain to jam and potentially damage the bike.

E. PEDALS

Toe overlap is a common issue on small-framed bicycles, where the rider's toe can touch the front wheel when turning the handlebars. To avoid this, it is important to keep the inside pedal up and the outside pedal down during sharp turns. This technique also prevents the inside pedal from striking the ground.

WARNING

To prevent potential loss of control and falls, it is crucial to determine if toe overlap exists based on frame size, crankarm length, pedal design, and shoes. Replacing crankarms or tires can reduce toe overlap clearance. Regardless of overlap, keeping the inside pedal up and the outside pedal down during sharp turns is essential.

WARNING

1. It is important to note that some pedals, particularly high-performance ones, have rough and potentially sharp surfaces for increased grip. Riders should not ride barefoot and should wear shoes with thick soles for safety.
2. To prevent potential loss of control and falls, it is crucial to determine if toe overlap exists based on frame size, crankarm length, pedal design, and shoes. Replacing crankarms or tires can reduce toe overlap clearance. Regardless of overlap, keeping the inside pedal up and the outside pedal down during sharp turns is essential.
3. Toe clips and straps can help keep feet correctly positioned and engaged with the pedals. They provide maximum pedaling power by positioning the ball of the foot over the pedal spindle. Cycling shoes designed for toe clips work best with this setup.

WARNING

Proper technique and practice are required to get in and out of pedals with toe clips and straps. Concentration is necessary to avoid distractions and potential loss of control. It is advisable to keep the straps loose and not tighten them until confident in the technique. Tightening toe straps should be avoided when riding in traffic.

Clipless pedals, also known as step-in pedals, securely position the feet for optimal pedaling efficiency. They require compatible shoes with cleats that engage with the pedal's spring-loaded fixture. Engaging and disengaging the foot should be practiced until it becomes instinctive. The tension on clipless pedals should be set to prevent unintended foot release.

It is crucial to use shoes specifically made to fit clipless pedals, as inadequate engagement can lead to safety issues. Practice engaging and disengaging clipless pedals in a hazard-free area, following the manufacturer's setup and service instructions.

WARNING

If your bicycle has a suspension system, it is important to read and follow the suspension manufacturer's setup and service instructions. Failure to maintain and properly adjust the suspension system can result in malfunction and loss of control.

F. SUSPENSION

Please make sure to read and follow the suspension manufacturer's setup and service instructions if your bicycle is equipped with a suspension system. Failure to maintain and properly adjust the suspension system can lead to malfunction and loss of control, resulting in falls.

WARNING

Having suspension on your bike can increase your speed, but it also increases the risk of injury. When braking, the front of a suspended bike may dip, potentially causing you to lose control and fall. It is important to have experience with this system and learn to handle your suspension safely.

WARNING

Changing suspension adjustments can affect the handling and braking characteristics of your bicycle. Only make suspension adjustments if you are thoroughly familiar with the manufacturer's instructions and recommendations. After making any adjustments, carefully test ride the bike in a hazard-free area to check for changes in handling and braking.

Suspension enhances control and comfort by allowing the wheels to better follow the terrain. This increased capability may allow you to ride faster, but it is important not to overestimate your own abilities as a rider. Increasing your skill with the bike will take time and practice. Proceed with caution until you have fully learned to handle the capabilities of your bike.

WARNING

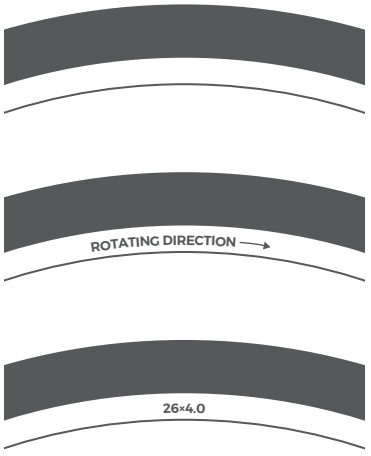
Not all bicycles can be safely retrofitted with certain types of suspension systems. Before attempting to retrofit a bicycle with suspension, check with the bike's manufacturer to ensure compatibility with the bike's design. Failing to do so can result in catastrophic frame failure.

G. TIRES AND TUBES

1. TIRES

Bicycle tires come in a variety of designs and specifications, ranging from general purpose to specialized tires for specific weather or terrain conditions. If you feel that a different tire may better suit your riding needs, your dealer can assist you in selecting the most appropriate design.

The size, pressure rating, and recommended use (if applicable) are marked on the side of the tire. The most important information for you will be the tire pressure. Most bicycle tires have pressure rating ranges based on the tire size, but some tires may have different pressure ranges based on their intended use.



WARNING

It is crucial to follow the recommended tire pressure and not exceed the maximum pressure indicated on the side of the tire. Exceeding the maximum pressure can damage the tire and pose a risk to both the rider and bystanders. The best and safest way to inflate a bicycle tire to the correct pressure is to use a high-quality bicycle pump with a built-in pressure gauge.

WARNING

Using gas station air hoses or other air compressors not designed for bicycle tires can be unsafe. These devices can rapidly increase the pressure in the tire, potentially causing damage or failure.

To determine the appropriate tire pressure for your weight and riding conditions, consult your dealer or a knowledgeable professional. They can recommend the ideal pressure range based on your bike's specifications and the type of riding you will be doing. Additionally, it is advisable to use a high-quality dial gauge instead of relying on potentially inaccurate tire pressure gauges to ensure precise measurement.

Regularly checking your tire pressure is essential for maintaining optimal performance and safety. Some tires may require inflation before each ride, while others may need attention less frequently. By making it a habit to check your tire pressure before every ride, you can ensure that you are riding with the correct pressure and reduce the risk of punctures or other tire-related issues.

Certain high-performance tires have a unidirectional tread pattern, designed to work more effectively in one direction than the other. To ensure proper performance, check the sidewall markings for an arrow indicating the correct rotation direction. Mounting these tires to rotate in the proper direction will maximize their benefits.

2. TIRE VALVES

There are two primary types of bicycle tube valves: the Schrader valve and the Presta valve. It is important to use a bicycle pump that has the appropriate fitting for the valve stems on your bicycle.

The Schrader valve is similar to the valve on a car tire. To inflate a Schrader valve tube, remove the valve cap and clamp the pump onto the valve stem. To let air out of a Schrader valve, press down on the valve stem with an appropriate tool, such as the end of a key.

The Presta valve has a narrower diameter and is commonly found on bicycle tires. To inflate a Presta valve tube, remove the valve cap, unscrew the locknut counterclockwise, and push down on the valve stem to expose the valve head and ensure a tight seal. To let air out, simply loosen the locknut and press on the valve stem.

To prevent air leakage, it is recommended to use a Presta valve cap (available at most bike shops), which screws onto the valve stem after inflation. This cap fits into the Schrader pump attachment and provides a secure seal.

Remember to always handle the valve stems carefully to avoid any damage or bending.

WARNING

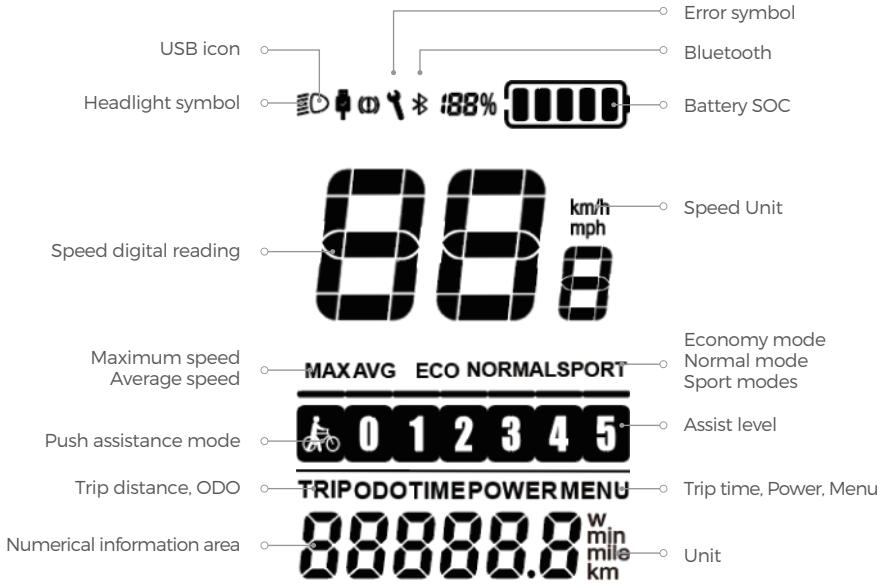
It is strongly advised that you carry a spare inner tube whenever you ride your bike. Patching a tube should be considered an emergency repair. If the patch is not applied correctly or if multiple patches are used, there is a risk of tube failure. This can result in a loss of control and potentially cause a fall. It is recommended to replace a patched tube as soon as possible to ensure your safety.

H. ELECTRICAL SYSTEM

A. BATTERY

Ensure the battery is fully charged and operating properly The battery must be locked onto the frame battery mount properly before usage. Ensure the battery charger is unplugged from the battery pack and put away before use.

B. DISPLAY FEATURES



The image shows the varous features andintormation displayed on the Display.

The content includes:

- Intelligent battery level display
- Motor power indication
- Assist level adjustment and indication
- Speed display (including real-time speed, maximum speed, average speed)
- Mileage display (including single trip mileage and total mileage)
- Assist pushing control and display
- Riding time display
- Backlight control and display
- Error code display
- USB connection indication
- Multiple parameter settings (such as wheel diameter, speed limit, startup password setting, indoor/outdoor mode setting, etc.)
- Default parameter restore function

Button Definitions

The screen is equipped with buttons: power on/off, i button, plus button, headlight button, and minus/assist button. In the following explanations, the power on/off button will be referred to as "ON/OFF", the i button as "i", the plus button as "+", and the minus/assist button as "-"

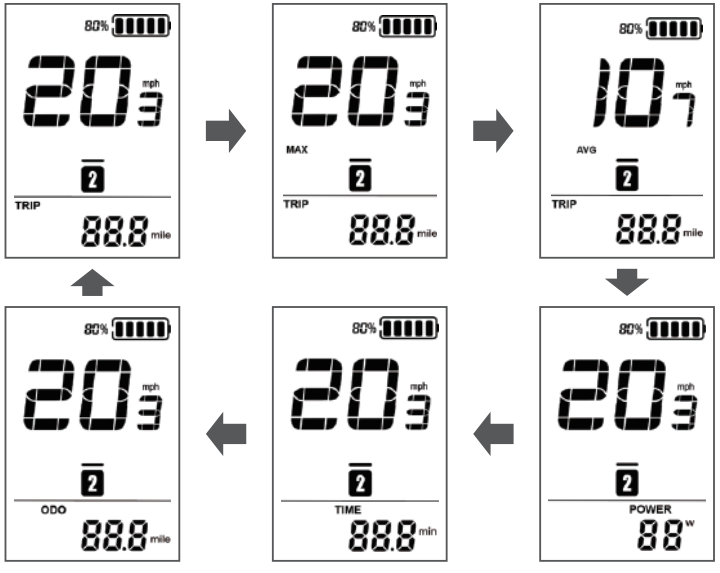
Power On/Off

Long-press the "ON/OFF" button to turn on the instrument and provide power to the controller. In the power-on state, long-pressing the "ON/OFF" button will shut off the power to the electric bicycle. In the power-off state, the instrument no longer uses battery power, and the instrument's standby current is less than 5uA.

- If the electric bicycle is not used for more than 5 minutes, the instrument will automatically power off.

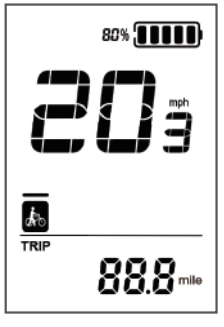
Display Interface

After powering on, the instrument will default to displaying real-time speed and total mileage (in miles). Pressing the "i" button briefly will display information such as **single trip mileage (TRIP, in miles), maximum speed (MAX, in mph), average speed (AVG, in mph), total mileage (ODO, in miles), riding time (TIME, in minutes),** and **power (POWER, in watts).**



Move Assist Mode

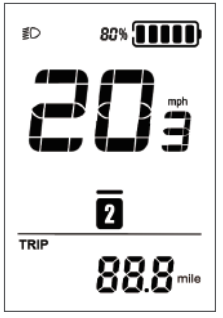
Hold down the "-" button for 2 seconds, and the electric bicycle enters the assist pushing mode. The electric bicycle will travel at a constant speed of 6 kilometers per hour. The screen will display "". Release the "-" button to immediately stop power output and return to the state before assist pushing.



- The assist pushing function can only be used when the user is pushing the electric bicycle. Please do not use it while riding.

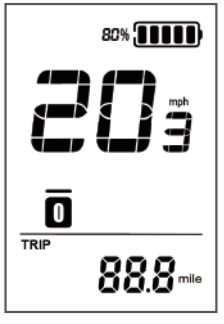
Backlight On/Off

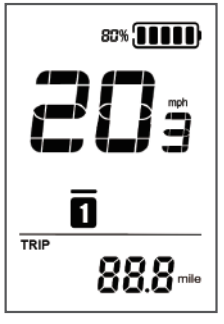
Press the light button for 1 second to turn on the instrument backlight and notify the controller to turn on the headlight. Press the light button again for 1 second to turn off the LCD backlight and notify the controller to turn off the headlight.

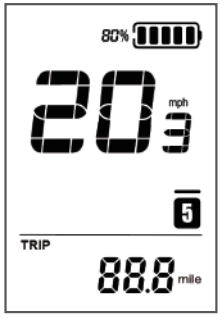


Pedal Assist Mode Selection

Press the "+" or "-" button briefly to switch between different assist modes on the electric bicycle. This will change the motor's power output. The instrument defaults to a power output range of 0 to 5 levels, with 0 being no power output, 1 being the lowest power level, and 5 being the highest power level. When the highest level (5) is reached, pressing the "+" button again will still display 5 on the screen, with a blinking indication that it is the maximum level. When the assist level is reduced to 0, pressing the "-" button again will still display 0 on the screen.

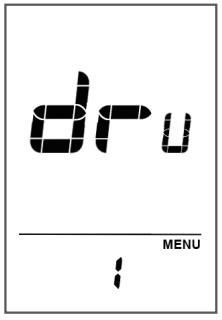


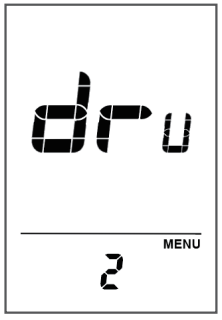




Indoor/Outdoor Mode Setting

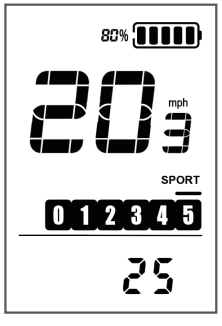
DRU represents the indoor/outdoor mode setting. Press the "i" button briefly to enter the indoor/outdoor mode setting state. Use the "+" or "-" button to switch between indoor and outdoor modes, with 1 representing outdoor mode and 2 representing indoor mode. The default mode is outdoor mode. Press and hold the "i" button to save and exit to the main interface.





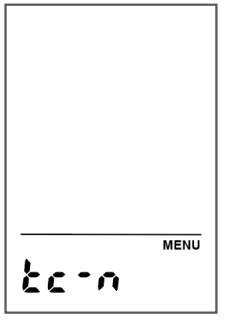
Resistance Setting

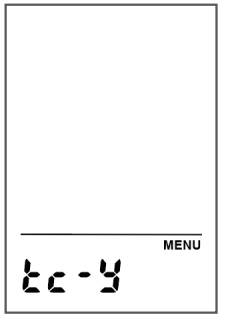
When the instrument is switched to indoor mode, you can set the resistance value on the indoor mode main interface. Use the "+" or "-" button to set the resistance value on the instrument. The resistance value can be set within the range of "0-100 (displayed in increments of 5)". The default resistance value is 25. When the resistance value is reduced to 0, pressing the "-" button again will still display 0 on the screen.



Single Trip Mileage Reset

TC represents resetting the single trip mileage. Use the "+" or "-" button to select "Y/N", where Y indicates resetting the single trip mileage and N indicates not resetting the single trip mileage. Press the "i" button briefly to confirm, and press and hold the "i" button to confirm and exit the regular setting state.





BATTERY BAR

The battery bar indicators show the amount of battery remaining in the battery package.

5Bar:80%-100%- 4Bar:60%-79%- 3Bar:40%-59%

-2Bar:20%-39% -1Bar:10%-19% -0Bar:0%-9%

TRIP DISTANCE (MILES/KM)

The trip distance feature keeps track of the distance traveled by the bike until the rider resets it.

ERROR CODE SIGN

The error code sign will appear when the control system detects an electronic malfunction at any given moment.

PAS LEVEL

The assist level indicator displays the current level of pedal assist selected by the rider.

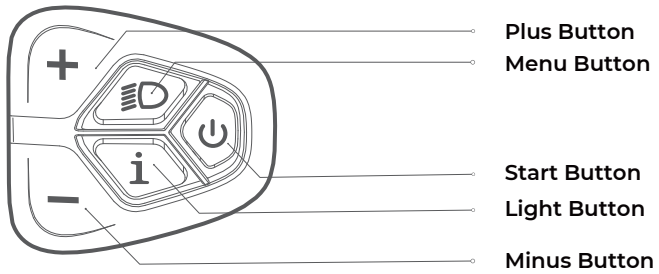
WALK MODE

The walk mode indicator shows the status of the walk mode operation.

FRONT LIGHT

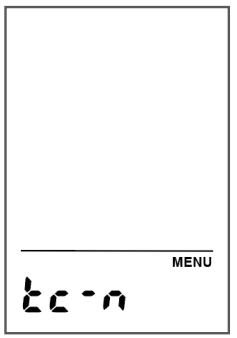
The headlight indicator displays the operation status of the front light mode

I. INDOOR/OUTDOOR MODE SWITCH



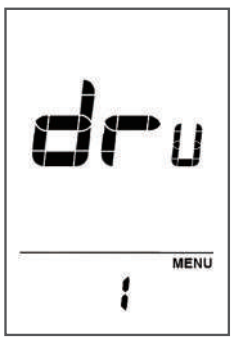
Step 1

Press and hold the '+' and '-' buttons simultaneously for 2 seconds. This will take you to the desired interface.



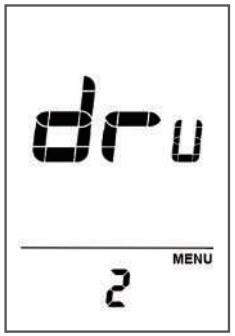
Step 2

Press and hold the '+' and '-' buttons again, then press the 'i' button to switch to the DRV mode.



Step 3

After entering DRV mode, press the '+' button to change it to 2. (To switch to outdoor mode, follow the same method and switch it to DRV1.)

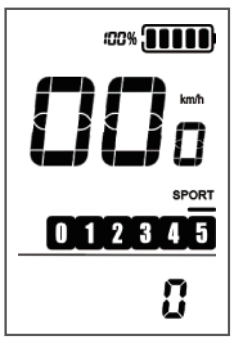


Step 4

Finally, long-press the 'i' button to return to the main interface. (When all gears are illuminated, it indicates the indoor mode.)

Step 5

After entering the indoor mode, short-press the 'i' button to access the resistance level. At this point, you can adjust the resistance level by using the handlebar '+' and '-' buttons.



UNBOXING ASSEMBLY INSTRUCTIONS

A. UNBOXING

1. Position the package with the arrows on the side facing upward.
2. Raise up the top cover to unpack the package.
3. Verify that all items are present in the accessory box.

B. FRONT WHEEL ASSEMBLY

1. Remove the nuts & washers from the front wheel axle
2. Attach the front wheel axle to the front fork.
3. Slide the front wheel washers onto the front wheel axle, and tightly fasten the axle nuts to secure the front wheel.

C. DISC BRAKE CALIBRATION

1. Bend down near the wheel to inspect for any squealing sounds coming from the brake disc and pads.
2. Loosen up the screw so the brake hub can move freely.
3. Adjust the clearance between the brake pad and disc, and ensure that there is enough clearance between them.
4. Inspect the wheel again to identify the source of the squeaking sound and check if the issue is resolved.

D. HANDLEBAR ASSEMBLY

1. Ensure the stem is straightened up at a 90-degree angle.
2. Install the handlebar onto the stem.
3. Align and center the handlebar with the perfect angle facing you.
4. Fully tighten the screws on the side and top of handlebar.

E. SEAT ADJUSTMENT

1. Use the M3 Allen key to loosen the screws holding the display.
2. Install the bracket onto the handlebar and securely tighten the screws using the M3 Allen key.
3. Connect the blue and green female connectors to their corresponding male connectors.

F. PEDAL ASSEMBLY

1. Remove the sticker from the RIGHT crankset.
2. Install the RIGHT pedal onto the RIGHT crankset, following the provided illustration. Rotate the pedal in a clockwise direction.
3. Use a wrench to securely tighten the RIGHT pedal.
4. Remove the sticker from the LEFT crankset.
5. Install the LEFT pedal onto the LEFT crankset, following the provided illustration. Rotate the pedal in a counterclockwise direction.
6. Use a wrench to securely tighten the LEFT pedal.

G. FRONT LIGHT ASSEMBLY

1. Connect the wire of the front light.
2. Unscrew the front light M4 screws off the front light stands.
3. Install the front light onto the front light stands.

H. BATTERY INSTALLATION

1. Insert the battery key into the keyhole.
2. Rotate the battery key in a counter-clockwise direction to switch it to the "UNLOCK" mode, as shown in the provided illustration.
3. Gently pull the top part of the battery out of the down tube.
4. Remove the battery from the down tube.

*If you wish to install the battery, firmly press it against the down tube and turn the battery key clockwise to the "LOCK" mode after you hear a "click sound" when the battery is properly inserted into the tube.

I. BATTERY CHARGING

1. Open the rubber cover on the charging socket.
   a. Place the charger on a flat and secure surface. Connect the output plug from the charger to the charging port located on the side of the battery section.
2. Insert the input plug into a power outlet. Charging will begin, and you will see the LED charge status light on the charger turn red.
3. When the charging is complete and the charging indicator light turns green, begin by unplugging the charger from the wall outlet. Next, remove the charger's output plug from the bike's charging port.

J. INDOOR WORKING STATION

Front

1. Align the screw holes located at the lower end of the bike rack's main body with the corresponding holes on the bottom tube of the bike frame. Insert the screws into the aligned holes.
2. Screw in the hex socket countersunk screw and use a tool to tighten it securely.
3. Install and tighten the four corners of the product following the sequence described above.

Rear

1. Take out the training unit body, main frame crossbar, and parts package from the box.
2. Align the holes on the main frame crossbar with the corresponding holes on the training unit body. Insert the carriage bolt, place a flat washer, and tighten the cap nut.
3. Use an open-end wrench to securely tighten the cap nut. Make sure the nut is tightened before using the training unit.

K. START YOUR BIKE

1. Remove the protective sticker from the display.
2. Press and hold the start button located on the left-hand side to initiate the bike's startup process.

Pioase checkthe"Quick Start Cuide that endosod wth yourpackage for detailed and picturg nstusction.

OPERATION INSTRUCTION

A. BRAKE OPERATION

The e-bike is equipped with front and rear disc brakes, which are responsible for slowing down or stopping the bicycle. It is important to note that when riding in low-traction conditions, it is recommended to apply the rear brake before using the front brake.

- The front brake, controlled by the lever on the left-hand side of the handlebar, provides the majority of the e-bike's stopping power.
- When slowing down on slippery surfaces, it is advised to use the rear brake first before engaging the front brake. Additionally, ensure that all installed items are properly torqued, tightened, and connected.
- Each brake lever is equipped with a signal wire that automatically turns off the motor when either brake is being used. This feature helps prevent unnecessary wear on the electric motor and battery (for NA Version).

B. GEAR OPERATION

The e-bike is equipped with a multi-speed gear system. Use lower gears when starting from a stop or traversing steep hills and higher gears when riding at higher speeds. The gear shifter, located on the right side of the handlebar, can be rotated to select the desired gear. It is worth noting that the gear shifting system and the pedal assist control system are completely independent and do not affect each other's performance.

C. POWER ON/OFF OPERATION

POWER ON

To power on the bike, securely install the battery pack and press the power button. Then, push and hold the power button on the left-hand side control module interface for 3 seconds. The LCD display will illuminate, indicating that the bike is powered up.

POWER OFF

To power off the bike, push and hold the power button for 3 seconds when the bike is on. The LCD display will power down, and the bike will shut off.

AUTOMATIC SHUTOFF

The electronic system also has an automatic shutdown feature that activates after a set period of time. This duration can be adjusted in the setup menu.

D. PEDAL ASSIST CONTROL(PAS) OPERATION

PEDAL ASSIST CONTROL(PAS) ON/OFF

1. To turn on the Pas controller, press and hold the Power Button for 5 seconds. Make sure to have both feet off the pedals and the bike still, as the sensor will calibrate upon turning on. The LCD display panel will turn on and show the battery's charge level and selected pedal assist level.
2. To turn off the controller, press and hold the power button. The LCD display panel will turn off, and no power assist will be provided to the rider.

PEDAL ASSIST CONTROL ADJUSTMENT

1. Upon turning on the bike, press the "PLUS" button to increase the assist level. Continue pressing until PAS 3: SPORT mode is reached.
2. To decrease the assist level, press the "MINUS" button once. Keep pressing to decrease the assist level one level at a time until PAS 0: No Pedal Assist is reached. The default assist setting is level 0, which will be displayed whenever the e-bike is powered off and back on.

Additional Information:

- When the battery pack level drops to 2 bars, it is recommended to recharge the battery pack soon and select a lower pedal assist level.
- When the battery pack level reaches 1 bar, it is advisable to stop using the throttle and recharge the battery pack.

NOTE

Temporary voltage drops may occur when using the throttle and/or pedal assist. It is normal for the voltage to decrease when riding uphill, regardless of the charge state. Additionally, if the battery pack is exposed to cold temperatures, the voltage may be lower. To accurately determine the battery pack's charge state, release the throttle.

E. THROTTLE OPERATION

1. Turn on the Pedal Assist Control system (PAS).
2. Set the PAS to the desired setting. If you select "off," the pedal assist control system will be unavailable.
3. Press the PLUS BUTTON/MINUS BUTTON to control the bike's speed.

F. FRONT LIGHT OPERATION

FRONT LIGHT ON:

Push and hold the "LIGHT" button for 2 seconds. The front light will illuminate, and the front light status icon will appear on the screen.

FRONT LIGHT OFF:

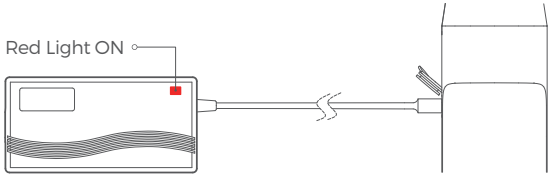
When the front light is on, push and hold the "assist up" button for 2 seconds to turn off the front light. The front light status icon will disappear from the screen.

G. BATTERY CHAROINO OPERATION

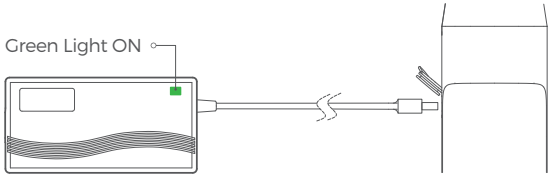
CHARGER SAFETYINFORMATION

1. Keep the charger in a safe place out of reach of children.
2. Before each use, fully charge the battery to prolong its lifespan and reduce the risk of over-discharging.
3. Only use the chargers originally supplied with your Velotric Bike or a charger purchased directly from Velotric Bikes for your specific bike's serial number, as approved by Velotric Bikes.
4. The charger is designed to work with standard home AC power outlets of 100/240V 50/60 Hz. Do not attempt to adjust the voltage input; the charger automatically detects and adjusts for incoming voltage.
5. Avoid contact between the charger and liquids, dirt/debris, or metal objects. Battery Charging: Ensure the battery is fully charged and functioning properly. The battery pack must be securely locked onto the frame battery mount before usage. Make sure to disconnect and store away the battery charger before riding.

CHARGING



FULLY CHARGED



WARNING

When using this product, it is essential to follow basic precautions, including the following:

a. Read all the instructions before using the product.

b. Always supervise children closely when the product is being used to reduce the risk of injury.

c. Do not insert fingers or hands into the product.

d. Do not use the product if the flexible power cord or output cable is frayed, has broken insulation, or shows any signs of damage.

e. This equipment is designed for use at temperatures between -10˚C (14˚F) and 40˚C (104˚F). The battery should only be charged when the ambient temperature is between 0˚C (32˚F) and 25˚C (77˚F). Do not charge the battery if the ambient temperature is outside this range.

f. Use only the freebeat recommended charger for charging the bike.

SAVE THESE INSTRUCTIONS/CONSERVE CES INSTRUCTIONS.

MOVING & STORAGE INSTRUCTION

WARNING

Please ensure that you follow the instructions provided by freebeat for storing your bike and battery. Failure to follow proper battery storage procedures may result in a non-functional battery, and replacement will not be covered under warranty.

If the battery is physically damaged, not functioning normally, or has been dropped or involved in a crash, with or without visible signs of damage, please discontinue use and charging and contact freebeat immediately.

While charging, do not cover the charger. Place the charger on a hard, flat surface in an open space, with the indicator light facing upward. Do not use the charger upside down, as it can hinder cooling and reduce charging efficiency.

Do not attempt to open the battery housing, as it will void the warranty and may cause damage to the battery or result in serious injury or death.

For bike storage temperature, it is recommended to store your bike in a dry, climate-controlled indoor location between 14˚F (-10˚C) and 40˚F (10˚C).

The bike is not intended for use at temperatures below -10˚C (14˚F) or above 40˚C (104˚F). The battery can be transported by sea, air, and automobile, but it should be packed in a carton during transportation.

LONG-TERM BATTERY STORAGE

if you plan to store your freebeat Bike for more than two weeks at a time, follow the instructions below to maintain the health and longevity of your battery:

1. Charge or discharge the battery to approximately 75% before storage.
2. Remove the battery from the bike frame during long-term storage.
3. Store the battery in a dry, climate-controlled indoor location between 50˚F (10˚C) and 77˚F (25˚C).
4. Check the battery every month and use the Velotric Bikes charger to recharge it to approximately 75% if needed.

Prolonged exposure to UV rays, rain, and other elements may damage the enclosure materials. It is recommended to store your bike indoors when not in use to protect it from these factors.

USER MAINTENANCE INSTRUCTIONS

WARNING

Technological advancements have made bicycles and their components more complex, and the pace of innovation is increasing. This manual may not provide all the necessary information for proper repair and maintenance of your bicycle. To minimize the risks of accidents and potential injuries, it is crucial that any repair or maintenance not specifically described in this manual be performed by your dealer. Additionally, individual maintenance requirements can vary based on factors such as riding style and geographic location. Consult your dealer to determine your specific maintenance needs.

WARNING

Many bicycle service and repair tasks require specialized knowledge and tools. Do not attempt any adjustments or services on your bicycle until you have learned from your dealer how to properly carry them out. We strongly recommend that significant mechanical repairs be done by a qualified bicycle mechanic. Improper adjustment or service can result in damage to the bicycle or accidents that may cause serious injury or even death.

SERVICE

If you are interested in learning how to perform major service and repair work on your bike:

1. Ask your dealer for copies of the manufacturer's installation and service instructions for the components on your bike, or contact the component manufacturers directly.
2. Ask your dealer to recommend a book on bicycle repair.
3. Inquire with your dealer about the availability of bicycle repair courses in your area.

We recommend that you ask your dealer to check your work and the quality of your maintenance before riding the bike for the first time. This will ensure that everything is done correctly, and if any adjustments or corrections are needed, it can save you time and the need for a mechanic. Please note that there may be a modest charge for this service.

We also recommend consulting your dealer for guidance on purchasing appropriate spare parts, such as inner tubes or light bulbs, once you have acquired the skills to replace these parts when necessary.

BICYCLE CARE

Before performing any bike maintenance or cleaning, remove the battery from the bike.

Please note that the bike is not approved for steam cleaning or high-pressure water hose cleaning. Clean the bike using a moist rag.

Regular maintenance is recommended to be carried out once a year or every 800 miles, whichever comes first.

Do not attempt to open or tamper with any part of the electrical system of the bike. There is a risk of injury and permanent damage to the bike. Always use Velotric genuine spare parts, if needed. When disassembling and reassembling the wheels, tighten the front wheel with 30Nm of torque and the rear wheel with 40Nm. Brake pads and tires are consumable parts that should be replaced in a timely manner. Use size 26-inch tires.

Different materials and components may react to wear and fatigue differently.

If a component has exceeded its design life, it may suddenly fail, potentially causing injuries to the rider.

Any cracks or changes in color in highly stressed areas indicate that the component has reached the end of its life and should be replaced.

APPENDIX A

INTENDED USE OF YOUR BICYCLE

WARNING

Understanding Your Bicycle:

It is essential to understand the purpose and appropriate use of your bicycle. Riding the wrong type of bicycle or using it incorrectly can be dangerous.

Different types of bicycles serve different purposes, and your retailer can assist you in choosing the right bicycle for your needs. They can also help you understand the limitations of each type. There are various categories, including mountain, road, racing, hybrid, touring, cyclocross, and tandem bicycles.

It's worth noting that some bicycles may combine features from different categories. For instance, there are road racing bikes with triple cranks. While they offer the low gearing of a touring bike and the quick handling of a racing bike, they may not be suitable for carrying heavy loads on a tour. In such cases, a dedicated touring bike would be more appropriate.

Even within each category, one can optimize a bicycle for specific purposes. It is advisable to visit a bicycle shop and seek guidance from experts in the area that interests you. Additionally, conducting your research can be beneficial. Small choices, such as selecting the right tires, can greatly impact the performance of a bicycle for a particular purpose.

In the following pages, we provide general outlines of the intended uses for various types of bicycles. However, please note that industry usage conditions are subject to change and evolve. To ensure your bicycle aligns with your specific use case, consult your dealer.

IMPORTANT:

All adult freebeat bicycles are designed and tested for a maximum combined rider/cargo/bike weight of 100kg.

APPENDIX B

THE LIFESPAN OF YOUR BIKE AND ITS COMPONENTS

1.NOTHING LASTS FOREVER, INCLUDING YOUR EBIKE.

When the useful life of your bike or its components is over, continued use can be hazardous.

Every bicycle and its component parts have a finite, limited useful life. Factors such as construction, materials, maintenance, care, and type of use can affect the lifespan of the frame and components. Certain activities like competitive events, trick riding, jumping, aggressive riding, riding on severe terrain, riding in severe climates, riding with heavy loads, commercial activities, and non-standard use can significantly shorten their lifespan and may result in unpredictable failures.

Periodically checking your bicycle and its components for indicators of stress and potential failure is crucial. Look for cracks, deformation, corrosion, paint peeling, dents, or any other signs that may indicate problems or inappropriate use. These safety checks are essential to prevent accidents, injuries, and premature product failure.

2. PERSPECTIVE

Today's high-performance bicycles require frequent and careful inspection and service. While this manual provides some guidelines on maintenance and inspection, it is essential to seek professional care and attention from your dealer. They can provide expertise and ensure the safety of your bike.

WARNING

It is important to inspect your bike before every ride using the Mechanical Safety Check outlined in Section 1. C of this manual. Additionally, periodic detailed inspections are necessary, and the frequency depends on your usage. As the rider/owner, you have control and knowledge of how often and how intensely you use your bike and where you ride it. Your dealer can not track your use, so it is your responsibility to bring your bike to them periodically for inspection and service. Your dealer can recommend the appropriate frequency based on your usage.

A. UNDERSTANDING METALS:

Steel has long been the traditional choice for building bicycle frames due to its favorable characteristics. However, in high-performance bicycles, aluminum and titanium have largely replaced steel. This shift is driven by the desire of cycling enthusiasts for lighter bicycles.

When considering the use of different metals for bicycles, it is important to understand that their suitability cannot be simplified into a single statement. The application of the metal, including the design, testing, and manufacturing process, along with the specific characteristics of the metal, are more significant considerations than the material itself.

Metals vary widely in their resistance to corrosion. Steel, for example, requires protection from rust, which can corrode it. On the other hand, aluminum and titanium quickly develop a protective oxide layer that prevents further corrosion. While both aluminum and titanium are highly resistant to corrosion, aluminum may still be susceptible to galvanic corrosion when in contact with other metals.

Metals exhibit different levels of ductility, which refers to their ability to bend, buckle, and stretch before breaking. Among common bicycle frame materials, steel is the most ductile, followed by titanium and then aluminum.

Metals also vary in density, which is a measure of weight per unit of material. Steel has a density of 7.8 grams/cm3, titanium has a density of 4.5 grams/cm3, and aluminum has a density of 2.75 grams/cm3. In contrast, carbon fiber composite materials have a much lower density of 1.45 grams/cm3.

One important aspect to consider when using metals in bicycles is

fatigue. Over time, metals can develop cracks due to repeated loading, which can eventually lead to failure. Understanding the basics of metal fatigue and the contributing factors is crucial.

Fatigue damage occurs on a microscopic level, with cracks forming in highly stressed areas. As the load is repeatedly applied, these cracks grow. Eventually, they become visible and large enough to weaken the part, making it unable to carry the load it previously could. This can result in a sudden and complete failure of the part.

While it is possible to design a part with an almost infinite fatigue life, achieving this requires a significant amount of material and weight. Any structure that needs to be lightweight and strong will inherently have a finite fatigue life. Therefore, trade-offs must be made to prioritize desired lightweight performance while also ensuring regular inspections of the structure for potential issues.

In summary, the choice of metal for a bicycle frame involves various complex factors, and crashworthiness cannot be determined solely based on the material. Factors such as impact force and specific loading conditions can result in bending, buckling, or even separation of parts. Regular inspections and maintenance are essential to ensure the longevity and safety of your bike.

What to look for

ONCE CRACKS BEGIN, THEY CAN EXPAND RAPIDLY: Consider cracks as pathways to failure. Any crack, regardless of size, has the potential to be dangerous and will only become more so over time.	**SIMPLE RULE 1** If you discover a crack, replace the affected part.
ONCE CRACKS BEGIN, THEY CAN EXPAND RAPIDLY: Cracks tend to grow faster in corrosive environments. Visualize corrosion as further weakening and extending the crack.	**SIMPLE RULE 2** Maintain a clean bike, regularly lubricate it, protect it from salt, and promptly remove any salt buildup.
SIGNIFICANT SCRATCHES, GOUGES, DENTS, OR SCORING CREATE VULNERABLE POINTS FOR CRACKS: Imagine a surface that has undergone damage as a focal point for stress. Engineers often refer to such areas as stress risers, where stress is intensified. You may have observed how scoring glass can lead to it breaking along the scored line.	**SIMPLE RULE 3:** Avoid scratching, gouging, or scoring any surface. If you unintentionally cause damage, closely monitor that area or replace the part if necessary.

In most cases, a fatigue crack is not a defect but rather an indication that the part has worn out and reached the end of its useful life. This is similar to when car tires wear down and the tread bars touch the road, signaling the need for replacement. When a metal part shows a fatigue crack, it is a clear sign that it is worn out and needs to be replaced.

Fatigue is not a perfectly predictable science, but there are some general factors that can help determine how often your bicycle should be inspected. If you have a riding style that puts more stress on the bike, such as hard and harsh riding, frequent hits, crashes, jumps, or higher body weight, you will need to inspect your bike more frequently. Additionally, riding in corrosive environments with wet or salt air, winter road salt, or accumulated sweat, as well as riding in areas with abrasive mud, dirt, sand, or soil, can also shorten the product life and require more frequent inspections.

On the other hand, factors that can lengthen the product life and reduce the need for frequent inspections include a smooth and fluid riding style, avoiding hits, crashes, jumps, and other impacts to the bike, lower mileage, lower body weight, being a less aggressive rider, riding in non-corrosive environments with dry and salt-free air, and maintaining a clean riding environment.

It is important to consider these factors and regularly inspect your bike to ensure its longevity and safety.

⚠ **WARNING**

Riding a bicycle or component with any crack, bulge, or dent, even a small one, can lead to complete failure and pose a serious risk of injury or death.

B. INSPECTION OF COMPOSITE FRAME, FORK, AND COMPONENTS CRACKS:

Inspect for cracks, broken or splintered areas. Any crack, regardless of size, is considered serious. Do not ride any bicycle or component that has a crack.

Delamination: A delamination is a severe form of damage in composites, where the layers of fabric are no longer bonded together. Do not ride any bicycle or component that shows any signs of delamination. Here are some clues to identify delamination:

1. Cloudy or white area: Delaminated areas will appear different from undamaged areas, often looking opaque and cloudy compared to the glossy and deep appearance of undamaged areas.
2. Bulging or deformed shape: Delamination can cause changes in the surface shape, resulting in bumps, bulges, soft spots, or uneven surfaces.
3. Difference in sound when tapping: Tap the surface of an undamaged composite, and you will hear a consistent, hard, and sharp sound. Tap a delaminated area, and the sound will be duller and less sharp.

Unusual Noises:

Both cracks and delamination can cause creaking noises while riding. Treat any unusual noise as a serious warning signal. A well-maintained bicycle should be quiet and free of creaks and squeaks. Investigate and fix the source of any noise before riding, as it may indicate a crack, delamination, or another issue that needs to be addressed.

Always prioritize safety and ensure that your bicycle and its components are in good condition before riding.

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