Please read carefully the relevant sections of this instruction manual before proceeding to convert your bike.
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We Have Videos!

Please check out our website www.pandaebikes.com

Where you will find How-To videos for all our kits!
**Brief Introduction**

To convert a bicycle is a rewarding project, but caution is advised. Customers converting their own bike are responsible for the safe operation and installation of the kit.

Please read this user manual carefully before starting the conversion. We cannot be held responsible for any injury, damage or other consequences arising from the use of this product.

**User Precautions**

We want you to have a fun ride, but also safe one, so please read following information thoroughly. Even if you are an experienced rider, please take the opportunity to familiarise yourself with your conversion kit before you take your first trip.

- Read all of the enclosed installation and operating instructions and follow the instructions, prior to riding your new bike for the first time.

- The e-bike kit has lots of electric parts. Do not dismantle these parts and seek advice before attempting to make any alterations.

- All electrical components are fully waterproof but nevertheless should not be submerged fully in liquid.

- The acceptable range of storage temperature for lithium ion batteries is between -20 and +60 °C.

- Batteries should be charged immediately after every use and never stored for long periods of time without top-up charging. If you have to store your battery for a long period of time, please remember to charge it once at least every two months. Otherwise the battery will fully discharge and will not be useable again.

- Spoke Tension should be checked after 100km and adjusted where necessary. If you don’t maintain the spoke tension you may have spokes come loose. Panda eBikes accepts no responsibility for wheels returned due to lack
of spoke tension maintenance.

● Be sure to fully inflate tyres before riding.
● Make sure the brakes are operating properly before riding.
● Always wear a helmet when riding an electric bicycle for your own safety.
● Adhere to all valid traffic regulations.
● Keep in mind that other road users may underestimate the speed of an electric bicycle.
● Always ride your electric bicycle with both hands on the handlebars.

Battery and electrical safety

Assembling an eBike kit is very safe. So no need to worry about blowing anything up whilst connecting the controller! The only thing to be careful of is how you connect the battery. Just make sure you connect red to red, black to black, and turn the battery off before making the connections.

Instructions overview

The detailed instructions below are designed for both customers of complete kits (which include everything required to convert your bike) as well as customers who have bought just one specific component separately as a spare part or replacement.

If you are a complete kit customer, please refer to the “Instructions for complete kit customers” sections. If you are using a specific component on its own then please read the “Instructions for specific component users “. 


Introduction

When you open the carton you will find the following components.

<table>
<thead>
<tr>
<th>Hand-Built motor wheel</th>
<th>- see page **</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Motor Wheel Diagram" /></td>
<td></td>
</tr>
</tbody>
</table>

Batteries

<table>
<thead>
<tr>
<th>Bottle Battery</th>
<th>Rear pack</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Bottle Battery Diagram" /></td>
<td><img src="image" alt="Rear Pack Diagram" /></td>
</tr>
</tbody>
</table>
Chargers

Controllers and Accessories

Controllers

Standard controllers

New style integrated battery controllers
Cut-off Brakes

Pedal Assist sensors

Thumb Throttles

Half-twist Throttles

LED Display

LCD Display
1. One cable system
Complete Kit Installation Guide

Tools

You will need the following standard bike tools:

<table>
<thead>
<tr>
<th>1: Allen Keys</th>
<th>4: Pedal crank remover tool (standard PAS only)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2: Spanner</td>
<td>5: Spoke tightening tool</td>
</tr>
<tr>
<td>3: Pliers</td>
<td>6: Tyre removal tools</td>
</tr>
</tbody>
</table>

You may wish to

Step 1 Make sure your bike is suitable for conversion:

Our e-bike kit is universal and can be used to convert most conversional bicycles, however there are criteria which must be met first:

**Dropdown width:**

There must be enough space for the motor to fit between the forks. Our motors are designed to be compatible with standard bicycle dimensions.

Front wheel motors require at least 98mm gap in the front forks (the standard is 100mm).

Rear wheel motors require at least 133mm gap in the rear dropouts (the standard is 135mm).
Front forks:

For regular bicycles, the dropout of front folk require 100mm (more or less).

Rear Dropouts:

For regular bicycles, the dropout of rear folk require 135mm (more or less).
FAQ: Are your motors compatible with Bromptons?

No- Bromptons have 80mm width forks so our kits are not compatible.

Motor Axle size

The motor axle is 10mm wide. If the gap in your forks or dropouts for the motor axle is less than 10mm you may need to file it down. If it is much larger than 10mm then be cautious as the motor could come loose. The use of a torque arm is advised.

Step 2 Transfer your tire & tube & install the motor wheel:

You will need to transfer your existing tire and tube or a new tire and tube to the hand-built motor wheel.

Front motor wheel (disk or v-brake)

1. Take out the original bicycle wheel and release the caliper;
2. Dismantle the original disc and install it on the motor wheel (**tightly screw in a diagonal direction and do not tighten too much or you may damage the thread**)

3. Fit the spacers close to motor

★ the number of spacers depends on your bicycle
4. Fit the spacers on the axle and insert the motor wheel;

5. Tighten all screws
6. Adjust caliper to suitable location and tighten the screws

**Rear disc/V brake motor**

1. Take out the original rear bicycle wheel from the bike;

2. Install the brake disc and freewheel on the motor (when tightening the screws on the disc, tighten them diagonally)
3. Install the motor wheel and tighten it.

Step 3: Install display
1. Release the screws on the back of the display and fit it on the handle bar.
2. Adjust the display location and tighten the screws to fit to the handle bar.
Step 4 Install the brake levers, throttle & handle bars

1. Take out the original brake levers and grips (left & right);

2. Insert the brake lines to new electric brake levers;
3. Fit the electric brake levers onto the bike and tighten the screws (left & right)
4. Fit the throttle (generally right side) and the new grips (left & right; you need to warm the grips if they are hard to fit)

Step 5 Install PAS (pedal assist sensor)

A. Normal PAS (you need to use specific bicycle tools to take out the crank set and axis, the normal PAS is installed inside the crank set)

1. Undo the crank set and arm;
2. Take out the arm of the other side and its axle;

3. Fit the mental sensor on the axle, and fit back onto the bicycle, fit disc plate (please notice the direction of mental sensor and disc plate must be congruent with these images. The sensor must be close to disc plate, 1-3mm)
4. Fit the crank set and arm, tighten the sensor cable on the bicycle.

B. Easy-fit PAS, installed on the left side of the bicycle, crank arm removal not required.
1. Fit the disc on the crank axle:

2. Apply the adhesive sensor to the frame, please note that it should close to disc, or PAS will not work.

Step 6 Install battery and controller

**Bottle Battery**
1. Remove the bottle cage on the bicycle;

![Image showing tool No 2.4 mm]

2. Insert the bracket of tub battery, tighten the screws (may look different to photo);

![Image showing tool No 2.4 mm]

3: Fit the tube battery, lock it, turn off the battery switch (please refer to assembly batteries chapter)

4: Connect all electronic lines with controller (see the detailed controller section later in this manual for info on controller connections).

**Seat post battery**

1. Dismantle the controller box
Please take care not to lose these screws, they are a specialised kind and costly to replace.

2. Apply the rubber around the opening hole of controller box, insert the saddle seat stem, adjust the box location and tighten the screws;

1. Connect all electronic cables with controller (see the detailed controller section later in this manual for info on controller connections).

3. Put the controller into the box, reassemble the box;
4. Insert the seat post battery.

Rear pack battery

2. Take out the existing rear pack, please go to No 2 if this does not exist;

3. Check the rear battery is complete,
4. Fit the rear rack onto the bicycle, adjust and tighten the screws;

5. Insert the battery into the pack, lock the battery;

6. Connect all electronics with the controller (see the detailed controller section later in this manual for info on controller connections).
7. Put the controller into the box, assemble the box.

Step 7  Make final adjustments & Enjoy

Make sure the brakes are adjusted, the wheel is secure, screws are tightened, and that everything is functioning as expected. You can do this by twisting the throttle to test the hub motor with the motor wheel lifted off the ground. If anything is not working properly please recheck all of the step of assembly and contact the distributors for help.

Now you are ready to have fun riding, be careful and take it slow until you get the feel of your e-bike.
Charging

To charge your battery, first ensure the battery and charger are turned off. Connect the charger to the battery, then turn the charger on at the mains. Two red lights will show when charging, a green light will indicate when fully charged.

**Our batteries are protected by battery management systems as well as safety circuitry within the charger to avoid over-charging. However you should never leave a battery on charge for a long period of time as it will become damaged and may lead to over-heating and fire. Never leave a charging battery unattended.**

Battery Care

All of our conversion kits come with lithium-ion batteries, which allow over 800 charge cycles before your range starts to decrease appreciably (i.e. below 80% of its original value). However, with the right love and care, your battery can last even longer, perhaps by up to 50%. All you have to do is follow our three golden rules of good battery care.

1: Charge fully...

A battery life is measured by the number of charge and discharge cycles it can survive rather than, say, the total time for which it has been used. So it therefore makes sense to maximise the usefulness of each of those cycles by charging your battery all the way to full whenever you charge it.

2: ...but avoid charging once full!

We’ve just explained that it makes sense to charge your battery fully to get the most out of its limited number of charge and discharge cycles. However, if you leave your battery charging once full, it will discharge a little, then charge back to full, then discharge a little, then charge again... and so on through countless little charge and discharge cycles. So avoid damaging your battery by avoiding these unnecessary cycles once it’s fully charged.

3: Avoid “Deep Discharge”

Though it’s good practice to charge your battery fully, the opposite, discharging it completely, sadly isn’t. Continuing to use your battery until it is almost (or completely) empty, referred to as “deep discharge”, is in fact one of the most common ways to damage your battery. Although batteries have clever internal management systems designed to avoid a really deep discharge, it’s still best to avoid draining the battery too low. Instead, when the battery gets down to around 10-20% charge (one bar left on the display) then it’s time to ease off the throttle and charge up the battery.

Summary

In summary, the best way to use your battery is to:
1. Charge it to 100%
2. Remove it from charging promptly once full
3. Use it until the charge reaches 10-20%, then repeat!

Load/Unload the batteries

1. Please turn the keys left/right to lock or unlock the batteries

2. The keys have two functions: to lock the battery and turn on power.
Instructions for complete-kit customers

If you have bought a complete “Basic” conversion kit then the connections on your controller will match exactly with all of the accessories that come with the kit. Please refer to the picture above in order to identify which connection goes with which accessory (e.g. where to plug in the throttle).

FAQ: Do I need to connect something to every connection?

You must connect up the battery, motor lines, motor hall, display and either throttle or PAS. The kit will work with either throttle or PAS connected, or both. It is highly recommended you connect the brakes for safety reasons but the kit will function fine if you don’t.
**Instructions for specific component customers**

The brushless 3 phase motor controllers we supply will work with most 3-phase motors on the market. You should ensure the controller is suitable for your battery and motor:

1) Ensure the voltage and power are the same. If you have a 36V 250W motor you should use a 36V 250W controller.

2) Identify whether your motor has hall sensors or not, and therefore whether you should have a “hall-effect” or “no-hall” controller.

<table>
<thead>
<tr>
<th>Hall Effect Motors have 3 thick wires and 5 small wires</th>
<th>No-hall or “sensorless” motors have just 3 thick wires</th>
</tr>
</thead>
<tbody>
<tr>
<td>Example of a motor cable coming out of a hall sensor motor:</td>
<td>Example of wires coming out of a “no-hall” sensorless motor.</td>
</tr>
<tr>
<td>The 3 thick wires are the motor line or motor phase wires. This is where the power goes into the motor to drive it.</td>
<td>These 3 thick wires are the motor line or motor phase wires, this is where the power goes into the motor to drive it.</td>
</tr>
<tr>
<td>The 5 small wires are sensor wires that are used to tell the controller what position the motor is in, to keep it spinning.</td>
<td>There are no hall sensor wires, and so a “sensorless” controller is required to drive the motor.</td>
</tr>
</tbody>
</table>

*For this type of motor you should use a hall-sensor controller. It is important you connect up all the wires.*
Colour Coding of Motor Wires

Our controllers have blue/yellow/green colour coding on the motor phase wires and the hall sensor wires. If you are using it with a motor purchased elsewhere, the colours may not match up and so you should try a number of different combinations of how to connect the wires, e.g. try connecting blue-green, green-yellow and yellow-blue....

Accessory Connections – compatibility with other products.

If you are trying to use one of our controllers with accessories from elsewhere, then you will probably be able to get it to work as most connections are standardised in the eBike industry, however this is not guaranteed. Please refer to the wiring diagrams below.

Hall Sensors

The red and black wires are the power rails for the hall sensors. The green, blue and yellow wires are the hall sensors corresponding to each of the 3 motor phases (blue,green,blue).

*The hall sensors should always be connected in the same way as the motor phases.*
**LED Display connections**

It is highly recommended you use our compatible “880” LED display with our controllers. Other LED displays e.g. the “770”, may not work as they have a different control sequence.

See connection diagram below: Red and black are the power rail. The Blue “Lock” wire is where the “on” signal is sent to turn on the controller when you press the “on” button. Note it is possible to short Red-Blue and use the controller without the LED. However this will invalidate the warranty on the product and you will not have the added features of using the LED display (e.g. viewing the battery level and changing PAS setting) which are carried by the TX and RX signals. Details on the signal sequencing is not available.

**Brake Connections**

The cutoff brakes simply have 2 wires. When the brakes are pulled they change from being open circuit to short-circuit and this instructs the controller to shut off power.
**Throttle**

The throttle has 3 wires. Red and black are the 5V power rails and blue/white is the signal. When twisted the signal varies between 0V and 5V.

**Pedal Assist Sensor (PAS)**

The pedal assist sensor is similar to the throttle. Red and black are the 5V power rails and blue/white is the signal. When the PAS is activated the signal wire rises to 5V.

*Alternative colourings:*

Sometimes the PAS wires are coloured differently so as not to be confused with the throttle.

Red -> Brown (power rail)

Black -> Black (negative)

Blue -> Yellow (signal).
Instructions for complete-kit customers

If you have bought a complete “Upgraded” conversion kit then the connections on your controller will match exactly with all of the accessories that come with the kit. The battery, PAS and motor will plug into their respective cables. The rest of the accessories will plug into the end of the waterproof “one-cable” system which then plugs into the controller.

FAQ: Do I need to connect something to every connection?

You must connect up the battery, motor lines, motor hall, display and either throttle or PAS. The kit will work with either throttle or PAS connected, or both. It is highly recommended you connect the brakes for safety reasons but the kit will function fine if you don’t.

Instructions for specific component users

The wiring diagrams of upgraded controllers is the same as for the basic controllers except that the interconnectors are different. Please ensure you have checked whether your kit will be compatible with our waterproof interconnectors.
Technical Support FAQ

Accessories:

**Pedal Assist Sensors**

*Easy-fit PAS*

Our easy-fit pedal assist sensors (PAS) are designed to go on the left hand side of the bike. If you fit it on the right hand side you may find that it only works when you pedal backwards! If the PAS only activates when pedalling backwards, try swapping round the magnet disc and/or putting on the other side of the bike.

*Standard PAS*

We can also provide standard metal ring pedal assist sensors, but these require you to remove and replace the pedals which can be quite fiddly and requires a special tool.

*Square taper / cotter type crank*

Our pedal assist sensors are designed to work with most bicycles, and are quite flexible in that the magnet disc can be fixed to most pedal cranks. However they are primarily designed for square taper cranks. Old style cotter cranks may have compatibility issues.

**Throttles**

*Half Twist Throttles*

These work like motorbike throttles, you slide them onto your handlebars and fix tight. Then you can twist the full throttle between 0 and 180 degrees (hence “half twist”) They do take up a lot of space on the handlebars so they are not ideal if you have twisty grip gear shifters.

*Thumb Twist Throttle*

These take up less space than the half twist throttles. They are just a small plastic ring that fits over the handle bars with a lever you push with your thumb to activate.

**LED Displays**

*Is my LED 790 display compatible?*

Please note, the 790 display which looks similar is not compatible with Kunteng controllers as it is from King Meter. The 790 and 880 are not cross-compatible (also the 790 has just 4 wires instead of 5 wires).

The LED display carries a signal that can limit the motor speed. By default our LED display are not limited but we can supply 15mph speed limited ones on request.

*What are the 5 display wires for?*

Please see the attached wiring diagram for the LED 880 display
Can I use a controller without the display?

The key function of the display is to activate the controller by connecting the red (power) and blue (TX) wires. You can replicate this by shorting the red and blue wires if you don’t want to use the display.

**LCD Displays**

If you are having issues with the LCD display please first visit our FAQ web page for links to the control manuals:


**Brake Levers**

The brake levers we supply work simply by switching between open circuit and short circuit. Open circuit means brakes are inactive, and when pulled, a short circuit is connected which instructs the motor to shut off.

This way, you don’t **have** to connect the brake levers, the controller will work with them unconnected by default.

If you are using them with another controller then please check whether it requires an “always on” signal because this could mean that the controller doesn’t work with them unplugged, and that it will only drive when you pull them.

**Motors & Controllers**

**Can I use a no-hall controller with a hall sensor motor?**

Yes you can, just don’t plug in the hall sensors anywhere and it’ll work just as if they weren’t there.

**My motor doesn’t seem to have the same wiring colourings**

The standard colours for three phase motor wires are blue, green, yellow.

Our motors and controllers follow the same colour combinations, so if you connect blue-blue, green-green, yellow-yellow then it will work fine. However other manufactures don’t always have the same convention as us so you may find to get the motor to work you need to swap the wire connections around e.g. blue-green / green-yellow / yellow-blue

If you think your controller isn’t working, please follow these steps before getting in touch with us:

**My controller / motor / kit isn’t working**

If you can’t get your kit to work, please follow the following steps to work out what the problem is:

1) Check whether the display turns on

Hopefully you are using one of our compatible displays with the controller. If not that is probably why it’s not working and you should purchase one.

If the display turns on, then this is a good start and means that the controller probably is in working condition but that something else is wrong.
If the display isn’t turning on, then check that the battery is correctly connected (test the voltage at the controller input) and that the display wires are connected properly.

2) Check motor connections

A common problem is that the motor connections haven’t been pushed in fully. Please check that they are fully connected.

3) Test in the 6 km/h mode.

To see if the controller is activating correctly, activate the 6 km/h mode by holding the button for 5 seconds on the LED display or going to the relevant setting on the LCD display.

You should see the motor activate and turn. If not, check for voltages coming out of the motor phase wires.

Visit our FAQ page on the website to download manuals.

4) Check acceleration signals

So far so good. If all that is working then the problem is with the activation signal to the controller coming from the throttle or the pedal assist sensor

If you are using one of our throttles or PAS then this should work OK, please check the wires are connected OK, turn the throttle or activate the PAS (the red light should blink) and hopefully you’ll get some joy. Please try both the throttle and PAS.

If that doesn’t work then you can request a replacement throttle/PAS from us.

If you are using a throttle/PAS from another supplier, then this is probably the issue. Check the wiring diagrams on our product pages and ensure that the wires are connected OK.

On the throttle, you should have red = +ve power, black = -ve power, and then the third wire is the signal (usually blue or white coloured) so ensure you have connected red-red, black-black and blue/white-blue/white.

Similarly on the PAS, usually you have the same colour coding as for the throttle above, or: brown = +ve, black = -ve and yellow = signal

My motor won’t fit

Our motor wheels are designed for compatibility with most bikes, with 100mm dropout width on the front and 135mm dropout width on the back. The axle thickness is 10mm – if you have particularly narrow fork dropouts then you may need to file them slightly to get them to take the motor axle.

Do I need to connect everything?

You must connect up the battery, motor lines, motor hall, display and either throttle or PAS. The kit will work with either throttle or PAS connected, or both. It is highly recommended you connect the brakes for safety reasons but the kit will function fine if you don’t.
Batteries

My battery is fully charged, but I’m getting no power

If you have fully charged your battery, but are getting no power out to the motor, then either you have forgotten to turn the battery on, there is a loose connection somewhere, or there is a genuine fault:

1) Check the battery is turned on

Some of our batteries come with on/off battery switches, and some are activated by turning a key. Make sure that you have actually turned on and activated the battery as this is a common reason for thinking that the battery is dead.

2) Check the voltage at the immediate battery output

Start by checking the voltage immediately coming out of the battery (be careful and measure between the red/black outputs of the battery). If there is a strong voltage then the battery is fine. Continue to test the voltage at each stage along the wiring down to the controller. If you lose voltage, then there is a loose connection that you should investigate and fix or request new wiring from us.

If there is a strong voltage reaching the controller inputs, then there may be a fault with the controller. See the controller FAQ section.

3) If all else fails, contact us!

If there really is no or low voltage directly at the battery, then please get in touch with us for more technical assistance.

My battery won’t charge

If you are having issues when trying to charge your battery, e.g. the charging lights are doing funny things, or just not turning on. Or if it says it is already fully charged when you know it’s not, then please disconnect the charger and contact us straight away for support.

My display always shows low battery

The LED and LCD displays we sell estimate the battery charge state based on voltage, which drops as it runs out of charge. The relationship between charge and voltage is different for different battery types and so if you’re using a different style of battery you might get funny readings.

Our LED and LCD displays are designed for the most common type of battery – lithium ion.

For instance, a 36V lithium-ion battery starts at 42V when fully charged and drops to around 32V when discharged. So the display looks at the voltage and guesses how much charge is left.

Lithium-polymer (LiPo) and Lead Acid batteries are also common but they have different voltage discharge relationships and so you will get strange battery level readings if you use one of our displays with one of those battery types.
My battery level goes up and down

As mentioned in the previous FAQ, the display estimate battery charge comes from the voltage. If you draw lots of current from a battery in a short space of time it will hurt the voltage which will drop quite suddenly, if you then leave the battery a while and let it recover the voltage will go back up again, hence your display will show the charge going down and then up again.

Can I use my battery with a different voltage controller?

You should avoid ever using your battery with a controller or motor that has a different voltage. Either you will get a very poor performance and over-strain the battery if you use it on a motor/controller with a higher voltage, or if you use it on a motor/controller with a lower voltage you risk blowing up the controller or burning out the motor.
**Maintenance**

We recommend to have the spoke tension of the motor wheel and the torque of all screws checked by a qualified dealer after the first 50km. Then they should be checked regularly every 100 km.

In order to ensure extended use of the propulsion system, all plug-in contacts of the system should be checked every two to three months and cleaned with a soft and dry brush, if necessary. It must be ensured that no dirt or humidity penetrates the battery docking station when the battery is removed.

**Cleaning**

**CAUTION:** Never use a high pressure washer or a garden hose to clean the propulsion system. The force of a water jet could damage the electrical components of the propulsion system.

We recommend a soft sponge or a soft brush to clean the bicycle. Use a moist rag to clean the battery docking station. Always use very little water, and keep water away from the electrical contacts. Check the plug-in connections for moisture after cleaning and let these dry, if necessary, before using the bicycle.
About Panda eBikes

At Panda Bikes we specialise in electric bike conversion kits and accessories. As well as offering fantastic products, we also go above and beyond to make sure every customer gets the very best from their purchase. That’s why our technical advice and customer service is second to none and why, whether you’re an absolute beginner or a seasoned pro, we’re always on hand to help with your latest electric bike project. But don’t take our word for it. Check out our testimonials and find out for yourself why we have a whopping 100% positive feedback!

Returns
You may return any product within 14 days of purchase. If more than 14 days have elapsed since the date of purchase then we sadly cannot offer either a refund or an exchange.
To view our returns policy and submit a returns notification please visit: www.pandaebikes.com/contact/returns

Returns Address:
VDEPOT
CO Panda Bikes
Honingham Thorpe Business Park,
Norwich Road, Colton,
Norwich NR9 5BZ
Sandbach
CW11 3HP

Warranty
Our items come with a 1 year manufacturers warranty.
If you are struggling to get your item to work correctly, please first contact our technical support team (support@pandabikes.co.uk) who will either help you get it up and running or identify any potential fault with the item. Note that you have 30 days upon receipt of the item to inform us of any problem if you are to be eligible for a refund or replacement.
If your item is identified as faulty or you find that it is otherwise damaged upon receipt, please provide us with full details of the fault or damage (sales@pandabikes.co.uk). Please include as many details as possible, e.g. descriptions, pictures and any electrical readings, as indicated by the technical support team. Return the item to us as described above.
Upon receipt of your returned item, we will inspect the product and, if it is indeed faulty or damaged, offer you a refund or replacement at no charge (including shipping). If, however, our inspection shows that the item is in fact in good working order, all shipping costs additional to the initial shipment will be charged to you or deducted from a refund.
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Technical support via email: sales@pandaebikes.com

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