



Installation and instruction manual



DUCATI energia

Thank you for choosing a **DUCATI energia** product.

Note for installers:

The company producing and selling bicycles provided with FreeDUCk Wheel must compulsorily supply the client with the use and maintenance product manual.

Incomplete or incorrect guidelines may lead to misuse and loss of guarantee.

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1

SAFETY INSTRUCTIONS



This Manual contains important information about the assembly and correct use of the FreeDuck2 e-wheel as well as its maintenance and safety.

The installer must read and understand the content of this Manual. To maintain e-wheel performance and use it safely for many kilometres, follow the instructions in this manual and carry out all the installation, maintenance and checking procedures described.

2

RULES FOR CORRECT USE

The FreeDuck2 e-wheel was designed to guarantee easy assembly and use with the least maintenance possible. There are some simple rules to follow to fit the bike safely.



- *Follow the installation, operating and maintenance instructions in this Manual. Incorrect assembly or failure to comply with maintenance instructions may lead to rapid deterioration of the original performance and serious harm to the rider and others on the road.*

- *The e-wheel is designed to be used on paved and dirt roads. Do not use on off-road or wading vehicles.*
- *Do not expose the wheel to inclement weather, high temperatures, salt air and acid or corrosive materials/fumes.*



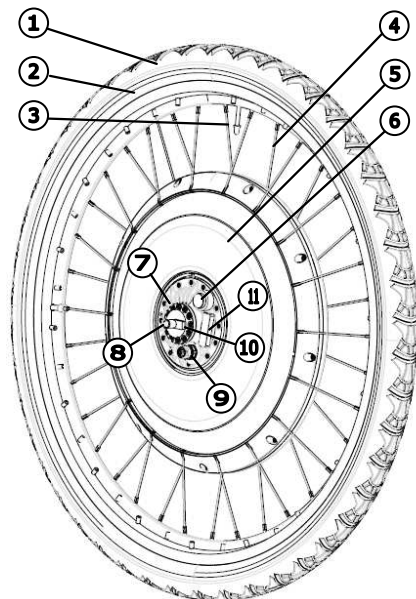
- *Do not modify or adjust in a different manner from that indicated in this Manual. Any intervention on internal parts by personnel not authorised by DUCATI Energia during the warranty period invalidates said warranty.*



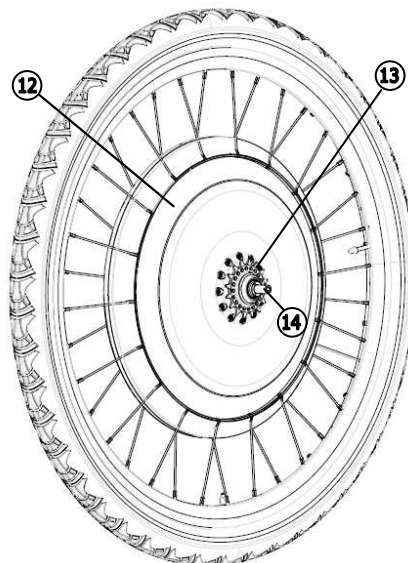
- *No adjustment or maintenance operations must be carried out inside the e-wheel or charger. Do not open or tamper with these components. Risk of short-circuit and electrocution. Any modifications will be considered as tampering and, in addition to releasing the Manufacturer from any responsibility, will invalidate warranty rights.*
- *During the installation and adjustment of the e-wheel must be turned off and unplugged from the charger.*
- *Do not use the charger if the cable is damaged, cut or showing signs of wear. Replace it immediately.*

3 E-WHEEL DESCRIPTION

3.1 Main components



LEFT SIDE



RIGHT SIDE

1. Tyre
2. Rim
3. Inflating valve
4. Spokes
5. Aluminium cover
6. On/Off button
7. Direction flange
8. Wheel axle
9. Charger connector
10. Rotation stopper
11. Bluetooth Antenna
12. Aluminium cover
13. Free wheel sprocket
14. Wheel axle



3.2 Technical features

The FreeDuck2 Wheel is an innovative bike propulsion system that integrates all the electrical and mechanical devices necessary for its operation and enables any traditional bicycle to be transformed into a pedal assist bike.

The wheel adapts to all bicycles with: standard IS2000 mount, 135 mm-wide fork (recommended value) and VBrake brakes.

The electric motor provides assistance proportionally to the force exerted on the pedals, which is detected thanks to a sophisticated combined torque/speed sensor. This way, the motor will provide more assistance when needed, for example with standing starts or riding uphill, guaranteeing a smooth and relaxing ride.

When in pedal-assist mode (see *Par. 7.1 on p.10*), motor performance is limited to a top speed of 25 km/h and 250W of power, as prescribed by Electrically assisted bike standards. It is still possible to reach a higher speed, but the power required to do so relies exclusively on the rider's muscle strength.

The e-wheel can be controlled through a smartphone app that communicates via Bluetooth. Consult the reference manual.

The bicycle on which the device is mounted can also be used as a traditional bike simply by keeping the device turned off.

3.3 Technical data

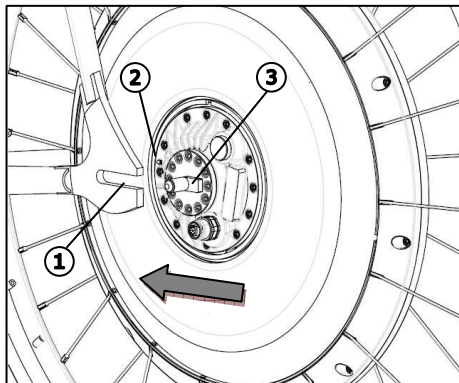
Rim size	26" or 700c	Battery type	Li-ion
Motor type	Brushless	Rated voltage	36 V
Motor continuous power	250 W	Battery capacity	11.8 Ah
Top speed in pedal-assist mode	25 Km/h	Energy management system	BMS with equaliser
Operating temperature	0°/50°C*	Total charging time	4.5 hours

Notes: * battery and motor performance deteriorate quickly when used outside this temperature range. As such, use in these conditions is not recommended. When the inside temperature of the e-wheel is below -20°C or above 60°C, system operation is inhibited.

The FreeDUCk2 Wheel can be used to create a pedal assist bicycle in compliance with UN EN 15194 and 168/2013/EC standards.

4 MOUNTING THE E-WHEEL ON THE FRAME

Mounting the e-wheel on the frame is quick and easy.

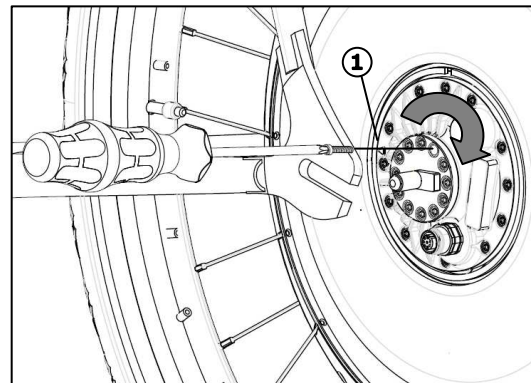


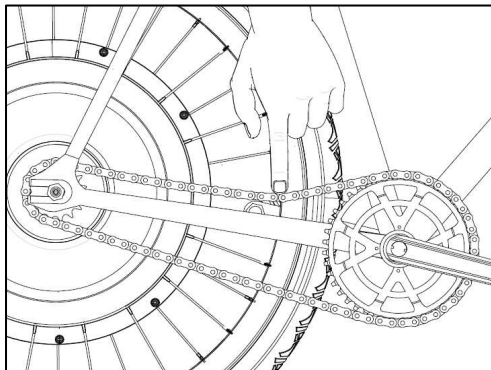
Place the e-wheel in the back fork slot (point 1) - the power button and the charger connector must be on the left and the direction arrow shown in point 2 must be facing forward.

Make sure that the rotation stopper (point 3) is perfectly inserted in the slot.

If you need to adjust the position of the stopper because of the way the fork is turned or to prevent the frame from being in the way of the e-wheel parts (e.g. button or connector), unscrew the 12 Torx M4 screws of the flange and turn the stopper as needed using a 10mm spanner. Once adjusted, block the screws with a 2.8 Nm tightening torque.

The direction arrow (point 1) must always face forwards, with a $\pm 15^\circ$ maximum tolerance.



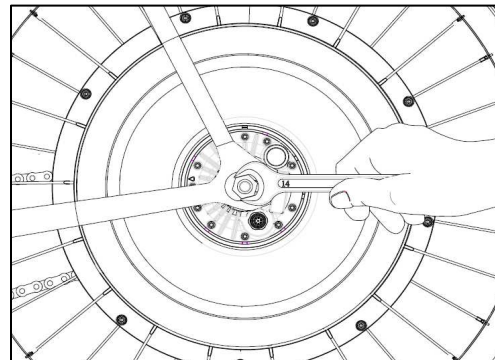


Screw on the two axle nuts and position the e-wheel parallel to the frame so that the chain has a 15-20 mm stroke at the centre.

Correct adjustment is necessary to prevent the bearings and transmission organs from premature wear.

Check the alignment of the wheel again (adjust if needed) and tighten the nuts to a 30Nm torque using a 14mm spanner.

Once assembled, lubricate the transmission with chain grease.



- Riding with a wheel that has not been properly installed is very dangerous. Use suitable tools in good condition for tightening. Respect the tightening torques indicated.

5 ADJUSTMENTS AND CHECKS BEFORE USE

Before turning the e-wheel on for the first time, carry out the following adjustments and checks.

5.1 Preliminary checks

- ◆ **Fully charge** the battery. Please refer to the instructions in Par.6.3 on p.8.
- ◆ Make sure the **tyre pressure** is 5.5 bars. Correct tyre pressure is essential on electric vehicles to guarantee maximum range for each charge and a long battery life.

6 BATTERY

6.1 General battery information

FreeDuck2 wheels are powered by a sophisticated Li-ion battery. This innovative technology guarantees great range, reliability and durability.

The complete battery - composed of different elements connected in series - has a rated voltage of 36 Volt.

The BMS (Battery Management System) is the electronic device that manages and protects the battery from undercharging, over voltage and overheating during charging and while in use.

In addition, the voltage of battery elements is levelled by an equalisation system that intervenes during the final charging phase. We, therefore, recommend charging the battery for an extra hour after it is fully charged (5.5 hours total) at least once every two weeks.

The battery, BMS and equaliser are all positioned inside the e-wheel and do not require manual maintenance.

The battery has no memory effect and can be charged at any time even if partially charged.

Battery performance refers to a temperature of 20°C. For each degree below this, there will be a 1% drop in performance. This means that if the temperature is 0°, a 20% reduction in range is to be expected.



- *Any operations or changes to the electrical devices of the e-wheel not expressly approved by DUCATI Energia shall invalidate the warranty.*



6.2 Correct battery management

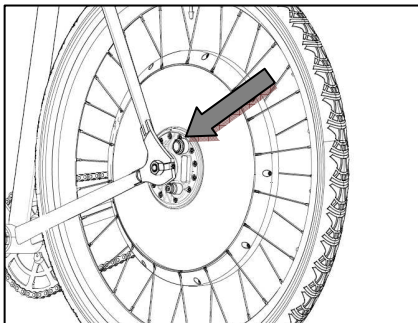
The new e-wheel is usually supplied with a 50% charge, so the battery **must be fully charged before using it for the first time**.

At the beginning, lithium batteries go through a "training" process, which affects future performance and durability. Do not fully discharge the battery during the first 4/5 cycles and do not put the vehicle on which it is mounted under too much strain.

To obtain maximum battery performance and maintain its features over time, please adhere to the following instructions:

- Fully discharging the battery must be an exceptional event, not the norm. Avoid further discharging the battery once the red light comes on (see Par. 6.3).
- The battery must not be left flat for long periods of time, charge it as soon as possible, in any case within 24 hours.
- If you plan on not using the e-wheel for a long time, store it away from the elements and extreme temperatures and fully charge the battery at least once a month.

6.3 Charging the battery



The battery level is indicated by the light around the power button. Each colour corresponds to a different level:

COLOUR	REMAINING CHARGE
GREEN	above 60%
YELLOW	between 30 and 60%
RED	between 15 and 30%
FLASHING RED	below 15%

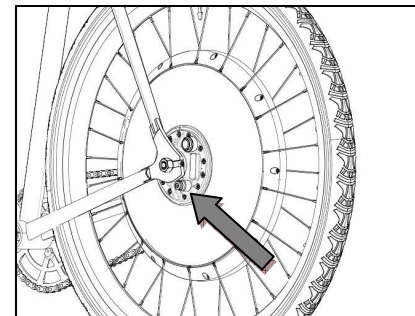
Note: If the light flashes red at high frequency, the battery switched into protection mode. Turn off the wheel, wait some time and then turn it back on.

During the first couple of uses, the light may flash red even after charging. This is due to the BMS self-learning phase, after which the correct level will be shown.

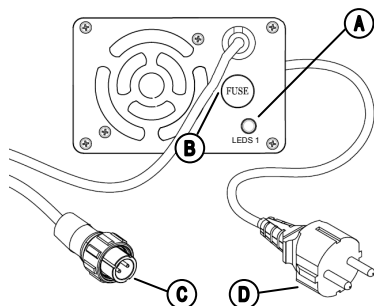
Charging the battery is very easy:

- Put the vehicle in a sheltered environment on a stable support.
- Turn the e-wheel off.
- Wait a few seconds, then connect the charger to the e-wheel.
- Connect the plug to a normal 220V socket.

While charging, the colour of the light on the e-wheel will indicate the level reached. Once charged, disconnect the charger first from the mains, and then from the e-wheel.



6.4 Charger



- A Status indicator light
- B Fuse
- C Charging connector
- D Plug

The charger is fitted with only one warning light ("A"), which glows green to indicate the presence of the power supply (220V) when the plug ("D") is plugged in.

The warning light turns red during the charging process, when even the connector ("C") is connected to the wheel. It turns back green at the end of charge.

If the warning light "A" does not come on after connecting the charger to the e-wheel, make sure the socket is indeed connected and working. If so, fuse "B" might be blown and need replacement.



If the fuse needs to be replaced, use one with the same amperage. Using the wrong amperage can lead to serious risks, including fire hazard.



The charger must be used sheltered from the elements and not exposed to direct sunlight.

Do not cover the charger when functioning, as doing so will impede cooling and cause damage.

If the internal temperature of the e-wheel is above 45°C (due to exposure to sunlight or intensive use), the battery cannot be charged until the temperature drops below this threshold.



- *Charging the battery with any device that is not the original charger supplied by DUCATI Energia, and connecting any unauthorised electrical devices to the e-wheel circuits or its charger can result in serious material and personal damage and cause a fire.*



- *Do not use the charger or the cables if they look damaged. The voltage inside the device is dangerous when in use.*

7 USING A BICYCLE WITH FREEDUCK2 WHEEL

The FreeDUCk2 wheel is designed for easy use. The bicycle on which it is mounted can be used both in pedal-assist mode or as a traditional bike by simply keeping the e-wheel turned off.

7.1 Pedal assist mode

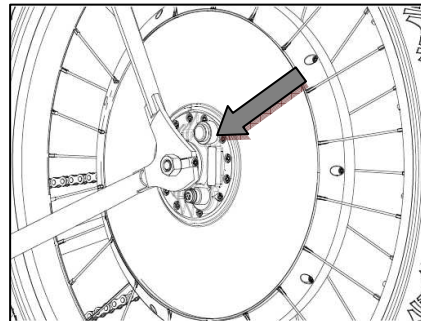
In this mode, the electric motor assists pedalling, so cycling is easy and relaxing.

The power supplied by the motor is proportional to the force exerted on the pedals (combined torque-speed sensor), so riding is smooth even when going uphill and starting and stopping continuously, as is the case in city traffic.

The motor supplies up to 250 W power and a speed of 25 km/h, as per the European standards concerning the operation of pedal assist bikes. In case of higher power demand (such as facing a very tough climb) or travelling at speeds above 25 km/h the engine stalls.

To activate pedal assist mode, keep the power button pressed for a few seconds. A light will flash and show the colour corresponding to the battery level (see Par. 6.3 p.8).

Once finished, remember to switch off the e-wheel by pressing the same button.





- *It is important to switch the e-wheel off when not using the vehicle to avoid consuming energy. In any case the e-wheel will turn off automatically after some hours of no pedalling.*
- *If the e-wheel is subjected to prolonged strain at high temperatures, the thermal protection may trip, inhibiting motor function if the internal temperature rises above 60°C. If the protection trips, turn off the bike and wait for the system to cool down.*

7.2 Unassisted pedalling

To use the bicycle in this mode, simply turn off the e-wheel.

Riding will be similar to a traditional bicycle. If you use the bike in this mode for a long time, make sure to charge the battery at least once every two weeks.

The battery undergoes a slow self-discharging process which could lead to a progressive deterioration and loss of capacity if left uncharged over a long period of time.

8 MAINTENANCE

Little maintenance is needed, but the simple rules described in this chapter must be followed carefully to avoid performance deterioration.

➤ Tyre

The correct pressure is 5.5 bar. Lower pressure can lead to a significant increase in energy consumption, thus reducing the range of the vehicle. Pressure set by the manufacturer must also be maintained in the front tyre.

➤ Battery

Prevent the battery from discharging completely and never leave it flat for long periods of time. Charge for a minimum of 5.5 hours at least once every two weeks to allow it to equalise.

9 STORAGE FOR LONG PERIODS

If you are storing the e-wheel for long periods of time, please refer to the following indications:

- Before storing, fully charge the battery and charge again at least once a month.
- Store it in a sheltered, cool and dry place.
- If mounted on a bicycle, store raised from the ground to avoid deforming the tyre.

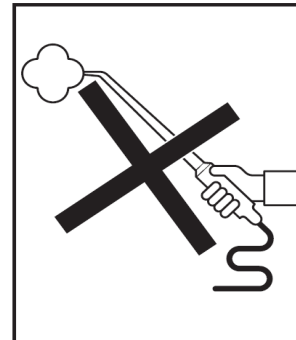


10

WASHING AND CLEANING

Periodical cleaning helps maintain the bicycle in a good and efficient state, enables correct maintenance and makes it easier to notice damage or breakage. To wash the bicycle correctly:

- Do not use high pressure or high temperature jets, but only water, mild detergent and soft, natural sponges.
- Do not use aggressive detergents, solvents or abrasive pastes that could severely damage varnished frame or chrome parts.
- After washing rinse the bicycle with cold, clean, low-pressure water and dry it thoroughly.
- Lubricate the transmission after every wash.
- To remove rubber brake residues on the rims, use a rag soaked with the specific gentle solvents sold in spare part and accessory stores.



- *Wet brakes extend braking distances. After washing the bicycle, ride slowly until the brakes are completely dry.*

11

WARRANTY CONDITIONS

Warranty conditions are described in the "Warranty Certificate" provided. The "Warranty Certificate" must be kept for the entire warranty period and, if servicing is requested, it must be given to the dealer. Following the installation and operating instructions in this Manual is an essential condition for the warranty to remain valid.

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TROUBLESHOOTING

Below is a short guide to solving the most common problems that may arise. It may help to better understand how the device works and to diagnose any faults. If the problem cannot be solved by following the solutions provided, contact the dealer for assistance.

PROBLEM	POSSIBLE CAUSE	SOLUTION
The e-wheel does not turn on.	The voltage is below the minimum.	Charge the battery for at least 5.5 hours.
	The thermal protection has tripped.	Wait for the temperature to drop back down within the acceptable range and turn it back on.
The light flashes red and the motor does not work.	The battery is completely flat.	Charge the battery.
Pedal assistance is weaker than usual.	Insufficient tyre pressure.	Restore the correct tyre pressure.
	The chain is too tight.	Adjust chain tension.
The charger does not charge and the LED is off.	Power is not reaching the plug.	Fix the plug.
	The fuse of the charger has blown.	Replace the fuse.
	The charger cable is damaged.	Replace the charger.
The charger is not working and the LED remains green.	The connector is not connected properly.	Check the connection of the charger to the e-wheel.

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