binova flow®

OPERATING MANUAL

For the end customer

Please retain for later reference.

Document information

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This operating manual is a

Original operating manual	☐
Translation of the original operating manual	☒

Safekeeping

This operating manual and the accompanying documents are to be kept for safekeeping by the operator. It needs to be always available to ensure correct operation.

Copyright

Think new. binova flow®.

Dear e-biker,

binova flow® moves the e-bike market -- and now it moves you, too!

We are pleased that you have decided on an EPAC with a binova flow® drive unit. We hope that you have a lot of fun with our product and can enjoy our unique riding experience.

Attempting new things providing EPAC drives with a new level of attractiveness and an entirely new riding experience requires bravery, endurance and the highest level of precision.

As a company from Glashütte, Germany, we have confronted this challenge - and mastered it. And we are proud, that you will now experience binova flow® for yourself.

Come with us on our path into the future and become a part of the binova family!

With binova flow®, you will experience an entirely new riding feeling. Our unique, intelligent sensor package means that biking remains biking. At every time you will have the feeling of control as well as a quiet, dynamic riding feeling, while at the same time enjoying powerful support. During this process, our motor will not push its way into the foreground, but instead support you quietly and powerfully.

The drive is intuitive and simple to operate. The highly compact construction of the motor means that maintenance will be almost unnecessary!

Still, please take the time to read this operating manual carefully, and become acquainted with your EPAC before your first ride. Only then can we promise that you will maximize the joy of riding with our drive unit.

Further, please follow all instructions and warnings in this operating manual, to ensure your own safety. Disregarding them can lead to damage to the EPAC, as well as to personal injury.

In the event that you have further questions, please contact your bicycle dealer. Even after your purchase consultation and assembly, he or she remains your first contact partner for inspection and maintenance, modifications and repairs.

We wish you many electrifying rides with your new drive unit and thank you for your trust in us.

Your binova team!

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1 GENERAL

1.1 Manufacturer / Customer service

Address	binova GmbH Liebstädter Straße 2 D-01768 Glashütte / Schlottwitz
Telephone	(+49) 35053 - 3122 - 20
Fax	(+49) 35053 - 3122 - 10
E-Mail	kontakt@binova-technologies.de
Internet	www.binova-technologies.de

1.2 Identification data of the mid-drive unit

Name	binova flow®
Serial number	
Construction year	

1.3 Authorized dealer

Your drive unit was mounted by:

Image 1: Authorized dealer's stamp

1.4 Purpose of this document

This operating manual should familiarize you with the following points:

- **WHO** may use binova flow®?
- **WHERE** on your EPAC can you find binova flow® components?
- **HOW** you simply operate binova flow® with your EPAC?
- **WHICH** safety warnings you have to observe.
- **WITH WHAT** you can best clean binova flow® and your EPAC.
- **WHEN** binova flow® should require maintenance.
- **WHAT** you have to do to take your binova flow® out of service.
- **WHY** we request / it is important, to follow our guidelines and recommendations on disposal.
- Warranty and limitation of liability.
- Explanation of symbols.
- Safety tips.
- Fault detection and troubleshooting.
- Maintenance, decommissioning / storage and disposal.

Further, you will receive information on the remaining risks of the binova flow® mid-drive unit and methods and behaviors to avoid dangerous situations. These warnings can also apply to the mid-drive unit's surroundings.

You will find information on maintenance, repair, bicycle adjustments and other purchased parts in the relevant documents you have received from your authorized retailer.

1.5 Explanation of the symbols and tips

When the operation of the binova flow® drive system presents a danger, this operating manual will draw this to your attention. According to the level of the danger, the following formulations will be used. Other symbols may be used in reference to specific dangers.

Danger!

This symbol, with the text **danger**, means an immediate, threatening danger to the lives and health of people.

Disregard for this warning will lead to serious adverse health effects and life-threatening injuries.

Warning!

This symbol, with the text **warning**, means a possibly threatening danger to the life and health of people.

Disregard for this warning can lead to serious adverse health effects and life-threatening injuries.

Careful!

This symbol, with the text **careful**, means a situation which may be dangerous.

Disregard for this warning can lead to injury or material damages.

Information!

With this symbol you receive usage tips for the proper handling of the mid-drive unit. These help you to make the most of the functions of the mid-drive unit and to avoid disruptions.

1.6 Target group

The operating manual is to be read by each person tasked with any of the following operations on or with the mid-drive unit system, e.g.

- **Operation and usage**, including fault detection and troubleshooting tasks assigned to the operator,
- **Maintenance**, also with reference to the mounting instructions for the installer.

Information!

binova flow® may only be operated by people who have been authorized and instructed in proper use.

The operating individuals may only operate the drive system and clean it to the extent described in this operating manual. All other activities, such as, e.g., fault detection or troubleshooting, which are not described in this operating manual are not the task of the operating individuals. Components may not be removed or opened. Should safety components of the binova flow® be damaged or removed, you will lose your warranty claims.

1.7 Warranty, limitation of liability

Information!

binova GmbH points out that the content of this operating manual is not part of an earlier or existing agreement, promise, or legal relationship, nor should it amend any of these.

All obligations of binova GmbH and the supplier are the result of the purchase contract, which also contains the complete and solely applicable warranty conditions. These contractual warranty provisions are neither extended nor limited by this operating manual.

The information in this operating manual has been carefully checked. All indications and tips for operation and maintenance have been made under the consideration of our experience and to date, to the best of our ability. In the event of errors or omissions, binova GmbH is liable within the framework of the warranty provisions entered into with the purchase agreement.

binova GmbH and the supplier assume no liability for damages or disruptions which result from a failure to comply with this operating manual, incorrect repairs and / or improper use of the drive system.

In the event of any questions, please consult your certified dealer or binova GmbH. That way you can avoid any major damage which could possibly result.

During repairs, insist on the use of original replacement parts offered by binova GmbH.

We are happy to help you!

1.8 Repairs

Repairs may only be made by instructed and trained specialist shops.

The user may perform maintenance and repair work only to the extent that these have been described in this operating manual. In that process, the instructions in this operating manual are to be observed in all points.

1.9 Obligation of safekeeping

Information!

This operating manual is to be retained by the user for safekeeping. It should always be available to ensure correct usage of the drive system.

1.10 Scope of the operating manual

Information!

The operating manual for the mid-drive unit is complemented by the documents which accompany it.

For reasons of clarity, the operating manual cannot contain all detailed information for all possible variants and especially cannot take each conceivable case of installation, operation or maintenance into consideration. For those reasons, the operating manual only contains the information which is necessary for the user during operation of the mid-drive unit as intended.

In this regard, should ambiguities arise, particularly in the absence of product-specific detailed information, the necessary clarification has to be sought from binova GmbH. In these cases, please always specify the type, serial number and article number of the drive unit in question.

1.11 binova flow®

In the following, the essential components of the binova flow® mid-drive unit system will be introduced. This operating manual describes the binova flow® mid-drive unit system. You can find information on the bicycle and all other components in the operating manuals of the relevant manufacturers.

The mid-drive unit serves as a drive unit for electro-motorically supported bicycles (EPAC: electric power assisted cycles).

Image 2: Position of the components on an EPAC with downtube battery:
1 speed sensor, 2 motor; 3 cranks and bottom bracket; 4 downtube battery; 5 display incl. handlebar remote control

Image 3: Position of the components on an EPAC with rack battery:
1 motor; 2 cranks and bottom bracket; 3 rack battery; 4 display incl. handlebar remote control (speed sensor obscured by frame)

Kommentiert [TC1]: Hier stand unterrohrakku, aber das ist sicherlich ein Versehen.

1.12 Scope of delivery

The motor is sold to the end customer in a mounted condition only by a specialist dealer certified by binova GmbH.

You will receive all relevant safety and service related documents within the scope of delivery of your EPAC.

1.12.1 Motor incl. controller

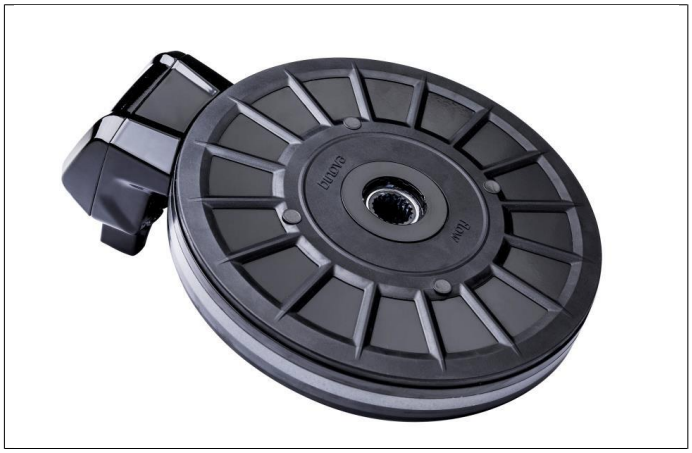


Image 4: Motor incl. controller

binova flow® is the first gearboxless mid-drive unit, quiet, robust and ingeniously simple in construction. The controller is responsible for controlling the motor and processing the commands from the rider, as well as display and sensor data. The freewheels integrated in the motor ensure a quick decoupling of the motor without any friction losses. Due to the use of the freewheels, however, it is not possible to use backpedal brakes.

The motor is installed directly on the binova bottom bracket. The torque is supported by the connection of the controller box to the frame on the seat tube of the EPAC.

1.12.2 Bottom bracket

Image 5: Bottom bracket

The binova flow® bottom bracket is equipped with sensors to precisely measure the pedal torque, as well as the crank speed and direction. These signals are processed by the motor controller, and the motor performance is correspondingly adjusted. The bottom bracket has been designed for frames with a 68 mm wide bottom bracket shell and standard BSA threads.

1.12.3 Crank set

Image 6: left and right cranks

The binova flow® cranks are equipped with a special multi-tooth profile to mount them on the bottom bracket. The cranks are made from cold forged aluminum.

1.12.4 Display and handlebar remote control

Image 7: Display, display holder and handlebar remote control

The display and the handlebar remote control serve as the user interface between the binova flow® mid-drive unit system and the rider.

1.12.5 Frame mount

Image 8: Frame mount

left: frame clamp; right: spherical calotte

The motor's torque support is provided by a frame clamp and an elastic spherical calotte, which is placed around the seat tube of the EPAC. The spherical calotte is available for varying tube diameters.

1.12.6 Battery

The **standard package** for the motor system includes a downtube battery with a nominal voltage of 36 V and a capacity of 11.6 Ah. Other options include a downtube battery with a capacity of 16 Ah or a rack battery with 36 V and 12.8 Ah. The motor system does not necessarily have to be ordered in the standard package, but can also be ordered with the

desired battery variant, for an adjusted price.

Later modifications from downtube battery to rack battery are not possible.

The battery is delivered with the following accessories:

Downtube battery:

Anchor bar with mounting material and 2 keys

Rack battery:

Luggage rack with battery well and 3 keys

Warning!

Batteries which should power the motor system have to be approved for this purpose by binova GmbH.

Replacement batteries are optionally available.

Image 9: Delivery scope of the downtube battery
2 keys not shown

1.12.7 Rack battery

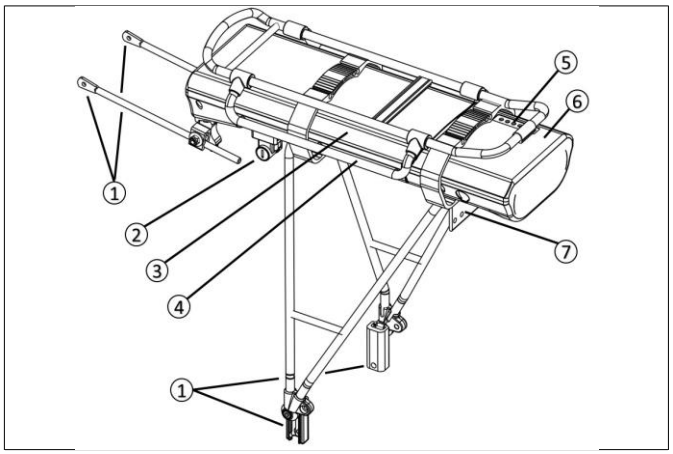


Image 10: Delivery scope of the rack battery

1 frame mounting; 2 lock; 3 well; 4 mounting rails for bike luggage (optional accessory);
5 capacity display; 6 battery; 7 possible mount for reflector or rear light; keys not shown;

Usage of the rack battery requires a special luggage rack with a well in which the battery can be mounted. The luggage rack is included in the delivery scope of the rack battery.

Warning!

Batteries which should power the motor system have to be approved for this purpose by binova GmbH.

1.12.8 Battery charger

binova flow® is delivered with a 2.35 Ah battery charger.

Warning!

Battery chargers which should charge batteries for the motor system have to be approved for this purpose by binova GmbH.

Other battery chargers are optionally available.

1.13 Optional accessories

A complete overview of the optionally available accessories can be found at www.binova-technologies.de . Examples include:

1.13.1 Shift sensor

Image 11: Shift sensor with speed sensor

For EPACs with hub gear systems, binova recommends using the optionally available shift sensor. When using a shift sensor, the motor's performance is briefly reduced while shifting, the shifting process is improved, and wear on the shifting mechanism is reduced. The shift sensor can be retrofitted by your certified specialist dealer.

1.13.2 Bicycle luggage mounting rails

A set of two mounting rails is available to mount bicycle luggage on the luggage rack of the rack battery.

2 SAFETY INSTRUCTIONS

Information!

- The binova flow® drive system may be mounted and operated exclusively by instructed and authorized individuals.
- The drive system is exclusively intended to serve as a supporting drive motor on an EPAC in accordance with EN 15194.
- The operation of the drive system as an EPAC may only be performed by individuals instructed on its use.
- The drive system was subjected to extensive safety tests. The construction and design of the mid-drive unit reflect the state of the art and the established safety regulations. All required safety and protective measures have been taken.
- Should you have questions, please contact your specialist dealer or binova GmbH.

2.1 Conduct in the event of an emergency or danger

- Bring the EPAC to a stop.
- Turn off the binova flow® drive system on the display, in order to stop the drive system.
- Disconnect the power supply of the drive system and remove the battery.

2.2 Obligations of the user

All individuals, who own or operate an EPAC equipped with the binova flow® drive system accept the following obligations before their first ride

- following the basic rules of road traffic and of accident avoidance,
- observing the information in the safety capital and the warnings in this operating manual. To this extent, the corresponding sections have to be read, or instruction has to be provided on their content.

2.3 Operator selection and authorized activities

- Operation of the binova flow® drive system is only permitted to responsible individuals who possess the necessary physical condition. Observe the minimum age requirement.
- Only allow individuals who have received appropriate instruction to operate your EPAC.

Installation(OEM)	Maintenance (dealer)	Operation (owner, operator)	Individuals
–	–	X	Minimum age 15 years old. Rider must be able to ride a bike and confidently mount and dismount the bicycle. Must have the physical and mental fitness required to operate an EPAC. Following traffic laws
X	X	X	Specialist bicycle mechanic *
Legend: X ... allowed – ... not allowed * training from binova GmbH or EPAC manufacturer is required			

Table 1: Operator selection and activities allowed – overview
OEM –Original Equipment Manufacturer

2.4 Approved operation

The binova flow® drive may only be used to power an EPAC. The defining characteristics of an EPAC are:

- The electric motor may only provide support up to 25 km/h and
- Electrical support may not be provided unless the operator pedals the bicycle.

Any other or further usage of the drive system is considered **not approved** and is a misuse of the drive system. The manufacturer is not liable for any damages resulting from such use. The risks entailed in unapproved usages of the drive system are carried by the operator or executor of the unapproved usage.
The operating safety of the drive system is only ensured during approved operation.
In the event that the drive system is used in an unapproved manner, dangers may arise.
The permissible total weight prescribed by the manufacturer may not be exceeded.

The drive system may be used on the following roads and paths:

	Specification	binova flow® operation
Roads and paths	Asphalt, sand, gravel or similar substrate, e.g. forestry roads, dirt roads	
• public		X
• no public		–
Fortified trails	Visibly fortified and maintained with few or no roots, stones, branches; simple terrain with light or middle incline	X
Unfortified trails	With roots, sleepers, steps, jumps, and so on.	–
Jumps		–
Roller training equipment		–
Water	Deep puddles, streams etc.	–
Sport park	Specially designated areas and equipment for free riding, downhill, dirt and BMX	–
Downhill	Descents at high to very high speeds on specially designated slopes.	–
Free-Riding	Artistic and athletic usage, fast descents in open areas.	–
Legend: X ... allowed – ... not allowed		

Table 2: Surface selection

2.5 Symbols and nameplates on the system components

Please observe all the warning labels and connection markings directly affixed to the mid-drive unit and components.
Keep these in a completely legible condition.

Symbol	Explanation
	Opening the mid-drive unit and / or control unit is forbidden
	Cleaning with a water jet or high pressure cleaner is forbidden
	Read the operating manual
	Thermal danger

Table 3: Overview of symbols

2.5.1 Nameplates

The following components are equipped with nameplates. In the event that service is required, please name the appropriate serial number(s).

- Motor (inner rotor disc, image 12)
- Display (underside)
- Display holder (underside)
- Downtube battery (underside)
- Rack battery (underside)
- Bottom bracket (Removal only allowed by certified service personnel)

Image 12: Motor nameplate

2.6 Safety regulations and protective equipment

2.6.1 Basic safety rules

The safety rules for the operation of an EPAC with binova flow® can be found in chapter 4, page 30 and following.

Before checking electronic parts you have to disconnect the power supply to the battery by removing the battery and protect the mid-drive unit from accidental starts.

- Have the electrical equipment of the binova flow® drive system checked regularly. Loose connections, damaged cables, broken or very dirty connectors have to be replaced at once.

2.6.2 Dangers from electromagnetic fields

The electromagnetic behavior of the mid-drive unit can be compromised by alterations or modifications of any kind.

- For that reason, make no alterations or modifications of the electric / electronic components without the written permission of binova GmbH.
- The binova flow® motor system complies with all legal requirements for electro-magnetic compatibility according to EN 15194.
- Due to the electromagnetic radiation emanating from the mid-drive unit and its controller, impacts may be felt in the surrounding environment!

2.6.3 Operation/ repair

- Only individuals who have been instructed in the operation of the drive are permitted to operate it.
- No components of the drive may be opened.
- The operator may not perform any repairs on or the mounting of the drive system.

2.7 Hazards when using the binova flow®

2.7.1 Areas of danger

The following areas of danger apply to **all** individuals:

- The rotation of components such as the chain ring and cranks can cause injuries. Please maintain sufficient distance and ensure that no objects or articles of clothing are allowed to enter their field of motion.
- When the cables, connectors or other components are damaged, the EPAC may not be operated and the damaged components are to be immediately replaced with original parts.

- During intensive operation, heating of the inner and outer sides of the motor may occur. The inner and outer motor areas should not be touched immediately after operation.
- In the event of questions or uncertainty, please contact your specialist dealer.

2.7.2 Sources of danger

The following sources of danger can occur with the binova flow® drive system:

- electrical voltage and electric current
- mechanical movements when the motor is rotating
- Mechanical movements when stabilization is insufficient (accidents, falls)

These sources of danger can result in the endangerment of people's health.

2.7.3 Remaining risks

The remaining risks are those risks which cannot be neutralized with construction measures. They are always present and can cause injuries which, in serious cases, can even cause death.

Danger!

High speed

Please bear in mind, that high speeds are more easily achieved with an EPAC than with a conventional bicycle. Ensure that the riding speed is always appropriate and adjust the speed in response to dangerous situations which may arise and to the surface on which the EPAC is being ridden.

Danger!

Missing protective measures or non-functional protective measures may cost lives.

- Only operate the mid-drive unit with properly functioning protective measures!
- Stop the mid-drive unit immediately, should you notice a defective or non-functioning protective measure.
- As the operator, you are responsible that the motor is never operated in a damaged condition! Please contact your specialist dealer immediately if you notice damage or irregularities or if the seal stickers on the motor and casing are damaged.

Danger!

Danger of crushing by powered parts or parts moving against each other.

- During operation, not more than one person may be in the area of the drive system/ EPAC. Remove other individuals from the area of danger before beginning operation.
- Only authorized individuals who have received instruction in the operation of the mid-drive unit may operate it.

Danger to life!

Electric shock from contact with components carrying electrical current.

- As operator, never work on components which carry electrical current.
- Always have such work done by your specialist dealer.

Danger!

The danger of injury exists during configuration, maintenance, repair and service work, as well as during troubleshooting.

These tasks have to be carried out by the specialist dealer with the motor turned off and the drive system completely devoid of current.

Also during cleaning, the drive system should be turned off and the battery removed.

2.8 Safety measures

2.8.1 Safety measures on the drive system

The following safety measures exist to protect individuals during operation:

- There is a seal stick on the controller housing (image 13). Opening the controller housing and/or damaging the seal sticker will result in the loss of all warranty rights.
- Opening or manipulation the components of the drive system is prohibited.
- Watch out for damage to the components, as otherwise dirt and moisture can make their way unimpeded into the drive system. Do not ride with damaged components and have them replaced immediately by your specialist dealer. Especially in the case of damage to the battery case, there is the risk of fires, electrical shock, and explosions.

- The connection of the motor cable to the battery rail of the downtube battery (batter cable adapter) may not be removed or loosened.

These protective measures and components have to be examined for completeness and lack of damage before operating the mid-drive unit.

Image 13: Seal sticker on controller housing

3 Composition

3.1 Overview

Image 14: Overview of the positioning of binova flow® on the bicycle

Pos.	Component
1	Motor, with controller and battery cable
2	Bottom bracket with sensor package
3	Spherical calotte with frame clamp
4	Cranks (with bolts)
5	Power magnet
6	Speed sensor with cable, optionally with shift sensor
7	Remote / Handlebar remote control
8	Display
9	Battery with mounting

Table 4: Overview of the positioning of binova flow® on the bicycle

3.2 Selection of chain ring, chain and gear ratio

The chain ring and the chain are not included in the scope of delivery of the motor system.

It is only permitted to mount a single chain ring on the chain ring adapter of the motor.

binova GmbH recommends the use of a chain ring with a size between 34 and 42 teeth, depending on the transmission components selected and the field of application of the EPAC. The mounting dimensions of the chain ring can be found in the following diagram:

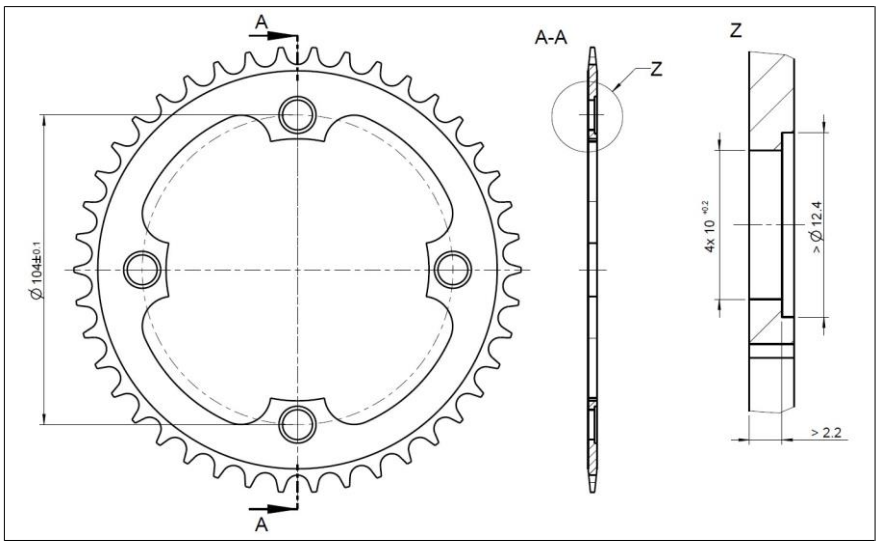


Image 15: Mounting dimensions of the chain ring

The chain ring and sprocket for the hub gear should be selected so that a minimum overall gear ratio of 1:1 is possible.

The transmission components used have to be approved for use on an EPAC by their individual manufacturers.

Replacement of the chain ring has to be performed by your specialist dealer.

3.3 Installation in a different EPAC

binova flow® can be installed on diverse bicycles. Should you want to install the motor on another bicycle, please have the bicycle and all interfacing components checked by your certified specialist dealer and have him perform the installation. Various adapter kids are available as accessories, for different tube and handlebar diameters.

4 OPERATION OF YOUR EPAC WITH BINOVA FLOW®

You have received your EPAC from your dealer and, at the same time, received the following documents:

- Evaluation of your bicycle and special safety instructions.
- An appointment for the next maintenance appointment.

Danger!

During transportation, setup and putting into operation observe the indications of remaining risks in chapter 3.9.3.

4.1 Initial operation

Information!

The initial operation of the mid-drive unit on the EPAC will be performed by the EPAC manufacturer or a certified dealer.

4.2 Checks before use

Danger!

Each time before you use your EPAC, check it for damage either to the EPAC itself or to parts of the binova flow® drive system. Soiling, damage or loosened cables could lead to impairment of the system and to the functioning of the bicycle and thus ultimately to accidents!

Checks before each use

- Before each ride, check that mounting elements, battery, drive, display, bottom bracket and cranks are mounted tightly and securely.
- Check all components of the EPAC for obvious damage. When damage exists, you may not use the EPAC.
- Check that all cables are undamaged and that no moving parts, such as the cranks or chainring, can come into contact with them.
- Check that the mid-drive unit is free of play and runs smoothly.
- Have malfunctions which reduce operating safety repaired by your specialist dealer immediately.
- Have work on the electrical supply system performed exclusively by specialist electricians.
- Is the battery properly emplaced and solidly locked in place?
- Remove soiling which could impair braking power or other functions.

- Are all screw connections tightly mounted?
- Check the drive, chain and braking system for wear and functionality.
- Check the chain -- or belt drive -- is there disruptive foreign matter or soiling? Is the chain properly tightened?
- Can the drive be turned on and off via the display? Are there error messages on the display?
- Prevent unauthorized individuals from accessing the drive system/EPAC.

In addition, please note the other necessary checks from the other operating manuals of your bicycle/EPAC.

Clear any disruptions or soiling from the bicycle. Have malfunctions which inhibit safety, immediately rectified by your specialist dealer.

Danger!

Have loose connections and damaged cables repaired by your specialist dealer immediately!

Danger!

NEVER open the binova flow® drive system yourself!

If the motor unit is improperly opened, there is a danger of electrical shocks and crushing injuries! Working on the motor and controller leads to the loss of the warranty.

The drive unit requires little maintenance and may only be opened by employees of binova GmbH with approved devices. **Unauthorized opening of the drive unit - also if performed by your dealer - renders the warranty null.**

Warning!

Do not make any changes to your EPAC system, and do not install any additional products which are intended to increase the performance of your EPAC system.

4.3 Usage of the battery and charger

Before initial operation, the battery has to be fully charged. In the best case, your dealer has already done this and you take possession of the EPAC in a fully charged state.

The battery can be charged either directly on the EPAC or separated from the EPAC. The battery is firmly locked to the bike by means of a lock.

4.3.1 Handling the downtube battery

Removal

Before removing the battery, turn the binova flow® off (see 4.9 page 39). In order to remove the battery from the bicycle, you have to first open the locking mechanism by turning the key clockwise (image 16, 1). Afterwards, slide the battery out of its holder (2). To do this, you need to simultaneously turn the key and slide the battery out of its holder.

It is recommended to remove the battery by standing in front of the EPAC and, turning the key with the middle finger of your left hand (3), and to pull the battery by its grip with three fingers of each hand. In this manner, both thumbs can be used to push against the battery rail.

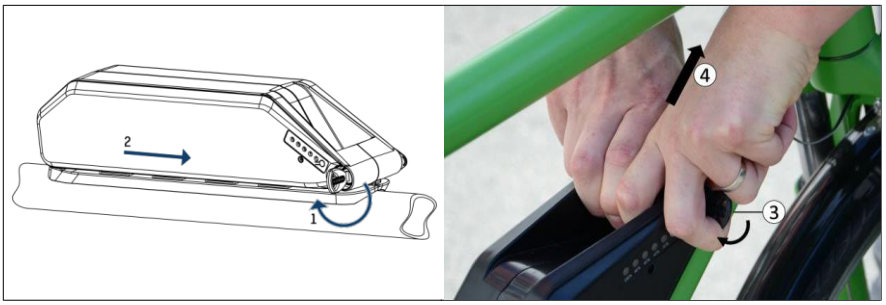


Image 16: Removal of the battery

Mounting

When the battery is mounted on the bicycle, the battery locks itself in place (as theft protection) as soon as the battery slides completely onto the battery rail (the key is not required for locking).

Information!

When mounting the downtube battery, please ensure that it is seated properly in the guide. Press the battery, if necessary, slightly downward and then slide the battery back until it locks in place.

Charging

To charge, open the closure cap (3) to access the charging socket (4) and connect the charger plug (5) of the charger there. Note the charging instructions on page 34.

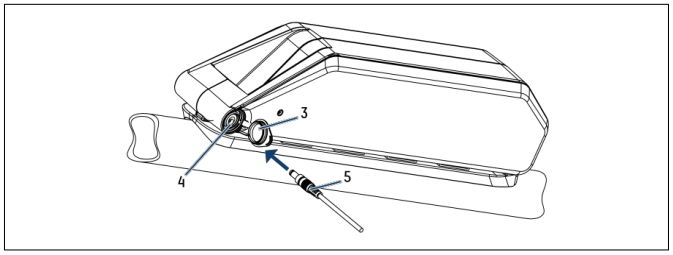


Image 17: Charging the downtube battery

4.3.2 Handling the rack battery

Removal

Before removing the battery, turn the binova flow® off (see 4.9 page 39). To remove the rack battery, turn the key counter-clockwise in the lock (image 18, 1). Then pull the battery backwards out of the well (2).

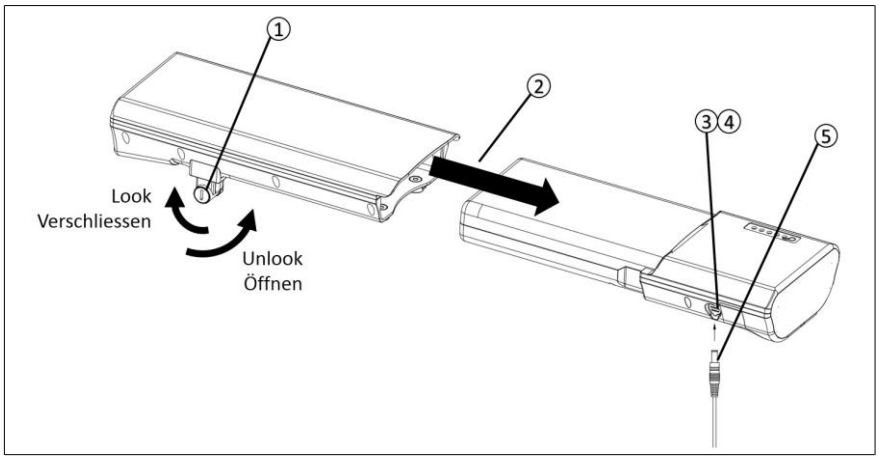


Image 18: Removal and charging of the rack battery

Mounting

After mounting the battery in the well, the battery has to be locked in place (turn the key clockwise), as otherwise there is a risk that the battery may fall out or be stolen.

Charging

To charge, open the closure cap (3) to access the charging socket (4) and connect the charger plug (5) of the charger there. Note the charging instructions on page 34.

4.3.3 Charging the battery

After you have connected the charger with the battery, connect the charger's power cable to a power outlet. While the battery is charging, the indicator glows red; as soon as the battery is fully charged, the indicator glows green. On the battery itself, the progress of the charging will be indicated by a blinking LED on the capacity indicator.

Charging temperature:	0 °C to 45 °C	
Charging time:	approx. 7 hours	(full charge)
Storage:	5 °C to 25 °C	(recommendation)
Storage:	-20 °C to 45 °C	(limit)

Table 5: charging progress

It is recommended to charge the battery after each ride. Before longer periods of non-use (e.g., before a winter break from riding) the battery should be fully charged. During non-use, please remove the battery from the EPAC and recharge the battery every 12 weeks, at the latest, to avoid damage to the battery. The battery should only be stored in a dry area.

Please note:

Avoid direct sunlight and too high temperatures.

Protect the battery from open flames.

CE symbol (Conformity Europe), the battery is manufactured in accordance with all named European norms.

The cells contain lithium.

The battery may not be disposed of with household waste. Return the battery to a collection point for batteries.

- Only use a charger approved for use with this battery.
- Avoid short circuits.
- During charging, only put the battery on fireproof, heat-resistant surfaces. No combustible or flammable materials may be located near the battery.
- Never leave the battery unattended during charging.
- Batteries are not toys. Keep them away from children!
- The original cables and plugs may not be cut or altered.

Careful!

Inappropriate treatment of the battery leads to risks such as explosion, overheating, or fire. Failure to follow the instructions for use will cause premature wear or other defects. These instructions are to be carefully kept, so that they may be passed to the next owner of the battery, in the event of transfer.

After a successful charge, remove the power cable of the charger from the power outlet and remove the charging plug from the charging socket of the battery. Close the charging access with the closure cap again, to avoid water penetration and corrosion.

4.3.4 Capacity indicator

The capacity can be checked on the battery via a capacity indicator. To do this, the button on the capacity indicator needs to be briefly pressed. Afterwards, the state of charge will be indicated for a short time with LEDs. In operation, the battery capacity can be read from the indicator on the display.

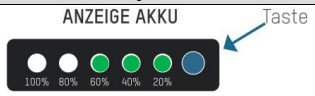
	Battery indicator	Display indicator
		
> 90 %	LED 20 % to LED 100 % on	All bars on
71 - 90 %	LED 20 % to LED 80 % on	4 bars on
51 - 70 %	LED 20 % to LED 60 % on	3 bars on
31 - 50 %	LED 20 % and LED 40 % on	2 bars on
11 - 30 %	LED 20 % on	Lowest bar blinks
< 10 %	LED 20 % blinks	No bar on

Table 6: Capacity indicators on the battery and display

If the battery is charged and properly mounted in the holder, the drive system is ready for operation.

Danger!

A DROPPED BATTERY ALWAYS HAS TO BE REPLACED!

The shock of the fall can cause damage in the battery which is not externally visible and can, in the worst case, cause short circuits and serious fires.

Do not expose your battery to extreme cold or direct sunshine and extreme heat. To the extent possible, store and charge your battery at room temperature.

4.4 Turning on

To turn on the binova flow® system, press the top button 1 of the display for at least 0.5 seconds (Image 19: Turning on binova flow®). After approximately 10 seconds, the system is ready for operation. The display then shows the remaining range and the capacity indicator is active in the battery symbol.

After the insertion of the battery, the binova flow® system turns itself on and the EPAC is ready for operation.

Image 19: Turning on binova flow®

4.5 Riding

After turning it on, the EPAC is ready for operation. Test your EPAC on a quiet street and make yourself acquainted with the new ride characteristics.

The drive system supports you depending on the pedaling power that you apply and the ride profile that you have selected. The motor no longer provides support at speeds over 25 km/h, in accordance with the law. The system achieves optimum efficiency at a cadence of about 80 to 90 rpm. Naturally, you will also be powerfully and harmoniously supported at higher or lower cadences.

Information!

When pedaling backwards or pedaling without motor support, the motor's freewheels may be audible. This is a property of the system and does not indicate a defect.

Danger!

High speed and usage conditions

Please bear in mind, that high speeds are more easily achieved with an EPAC than with a conventional bicycle. Ensure that the riding speed is always appropriate and adjust the speed in response to dangerous situations which may arise and to the surface on which the EPAC is being ridden.

Please note that other participants in traffic may not be able to properly estimate your speed.

Dismount from your bicycle on slippery surfaces, or reduce your speed and level of support.

An EPAC is heavier than a conventional bicycle. Please consider the changes in riding and braking behavior.

It is a property of the system that the binova flow® pedals are further from the center of the bike. Note the slight reduction in the possible tilt angle in curves and consider your pedal selection to avoid contact with the ground.

The drive system is designed for operation with the normal degree of road dirt. Usage, by which the system is partially or entirely submerged, is not allowed.

4.5.1 Range

The potential range is dependent on many different factors and can vary depending on the conditions of use and selected battery capacity from approx. 20 up to 200 km. The range is dependent on, among other things:

- The selection of the level of support
- Terrain profile
- Speed
- Pedaling frequency
- Environmental temperature
- Wind speed
- Selected riding profile (see 4.13.2, page 47)
- Total weight

4.6 Selecting the level of support

The binova flow® system has 5 levels of support:

- Not displayed Riding without motor support
- *ECO* Eco mode
- *NORMAL* Normal support level
- *HIGH* High support level
- *POWER* Maximum support level

The level of support can be selected using the upper (for raising the support level) and lower (for reducing the support level) buttons on the handle bar remote control (image 20).

The level of support selected impacts the range of the EPAC.

Image 20: The selection of the support level

4.7 Starting and pushing assistance

The starting and pushing assistance can be activated by pressing the middle button of the handle bar remote control (image 21), up to a speed of 6 km/h. For this, the button has to be pressed for longer than 2 seconds. The word "SCOOP" will be displayed in the lowest line of the display.

Warning!

The support level of the pushing assistance is dependent on the level of support. For that reason, the EPAC can accelerate very powerfully. Use the pushing assistance with the support levels "ECO" or "NORMAL" and only raise the level of support on steep slopes.

Image 21: Activating the starting and pushing assistance

4.8 Speed mode

Pressing this button for longer than 2 seconds while riding at a speed between 6 and 25 km/h, will temporarily activate the highest level of support in order to more easily master short, steep climbs or to better accelerate (Image 22). This mode is available for a maximum of 5 minutes. The word "SPEED" will be displayed in the lowest line of the display.

Image 22: Activating speed mode

4.9 Turning off

To turn off the binova flow® system, press the upper button 1 of the display, for at least 2 seconds (image 23). The system always has to be turned off before the battery is removed.

The binova flow® system turns itself off after 5 minutes of immobility in which neither the cranks nor the rear wheel are moved. Turning on the system is described in 4.4, page 36.

For anticipated periods of immobility of the EPAC which extend more than 38 hours, you should remove the battery.

Image 23: Turning off binova flow®

4.10 Emergency operation

In the event that the display is lost, you can activate the binova flow® system as follows:

- Remove the battery and place it in the holder again, or
- Briefly press the button to display the level of charge on the battery once (< 5 seconds).

The system is then ready for operation in the support level "Normal". The handlebar remote control has no function and the level of support cannot be changed.

4.11 Display

In the following, the functions of the buttons and content of the information presented on the display are summarized.

The display is equipped with background lighting. This is activated by a light sensor and is additionally active for 5 seconds after a button was pressed.

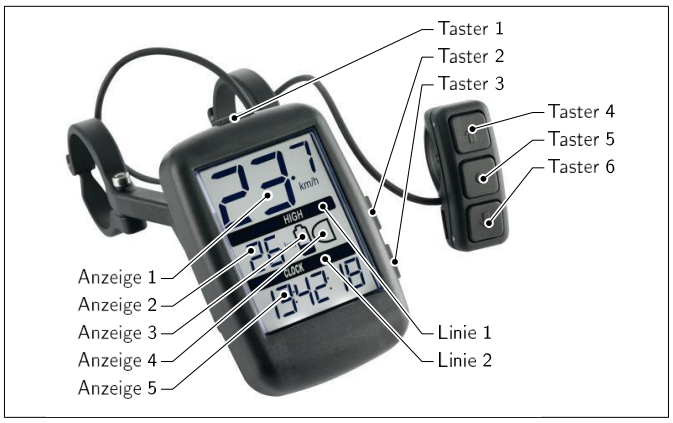


Image 24: Display and handlebar remote control

4.11.1 Function of buttons

Button 1 Power the system on and off

If the display/system is turned on, pressing button 1 (for longer than 2 seconds) will turn the system off. The display then turns itself off and there is a quiet sound from the motor.

The system has to always be turned off before the battery can be removed.

If the display/system is turned off, pressing button 1 for longer than 0.5 seconds will turn the system on.

Button 2

This button is deactivated.

Button 3 Change modes

The function displayed in line 2 will be changed and the value of the data in display 5 will be displayed. The following display values are available:

- *TIME*: Riding time
- *DATE*: Date
- *CLOCK*: Time of day
- *AVG*: Average speed of the ride being recorded under TIME
- *W*: Average of the rider's pedaling powered as measured in Watts
- *TRIP*: Distance ridden during the trip recorded under TIME
- *ODO*: Total kilometers ridden
- *TIME*; AVG and TRIP are coupled together

If button 3 is pressed for a long time (2 seconds) while in *TIME*, *AVG* or *TRIP*, the values in *TIME*, *AVG* and *TRIP* will be reset.

If button 3 is pressed for longer than 2 seconds while in *CLOCK* or *DATE* mode, these values can be set. The first block will begin to blink. With the remote control (buttons 4 and 6) the value can be increased or decreased. If buttons 4 or 6 are pressed for longer than 2 seconds, the value will continue to be automatically increased or decreased as long as the button continues to be pressed. After setting the correct value, confirm it by pressing button 5. Then the next value begins to blink and the value can be set as previously described.

Button 4 Increase the level of support

The selected level of support will be displayed in line 1. The following levels of support are available:

- Nothing displayed: No support
- *ECO*
- *NORMAL*
- *HIGH*
- *POWER*

The actual support provided depends on the level of support selected and the riding profile.

Button 5 Changing modes, starting and pushing assistance button

Button 3 has three functions, depending on how long it is pressed and the speed of riding.

Change of mode

When briefly pressed (less than 2 seconds) or at a speed above 25 km/h, the function is identical to that of button 3 and the information in the lowest line of the display will be changed.

Starting and pushing assistance
The starting and pushing assistance can be activated by pressing this button (for longer than 2 second), up to a speed of 6 km/h.

Warning!

The support level of the pushing assistance is dependent on the level of support. For that reason, the EPAC can accelerate very powerfully. Use the pushing assistance with the support levels "ECO" or "NORMAL" and only raise the level of support on steep slopes.

The word "SCOOP" will be displayed in display field 5. This function is available for a maximum period of 5 minutes.

Speed

Pressing this button for longer than 2 seconds while riding at a speed between 6 and 25 km/h activates the highest level of support. The word "SPEED" will be displayed in the lowest line of the display in display field 5.

Button 6 Reduce the level of support

See button 4

Display field 1 Speed

The speed measured at the rear wheel is displayed in km/h or mph. The unit can be changed and is displayed to the right of the speed.

Display field 2 Remaining range

An estimation of the distance which can be covered at the current level of support is displayed in kilometers or miles. The unit is displayed next to the value. The remaining range is calculated from data available from the battery.

Due to the many different factors which can influence the remaining range, variations between the actual range remaining and the range displayed are possible.

Display field 3 Battery charge level

The relative capacity of the energy remaining in the battery is displayed. See page 35.

Display field 4

This display field is deactivated

Display field 5 Multi-function field

For the display, see button 3.

In the event of an error in the system "Er" will be displayed in this line, with the corresponding error number. For the meaning of the individual error numbers, see page 48.

4.11.2 USB port

The display holder has a USB port. This can be used for system updates or to charge USB devices. The USB devices connected for charging have to support DCP (Dedicated Charging Port) or CDP (Charging Downstream Port) and be turned on. The maximum charging power is 1 A by 5 V.

Before use, the cap on the USB port has to be opened to the left (image 25).

After use, the port has to be closed again with the rubber cap.

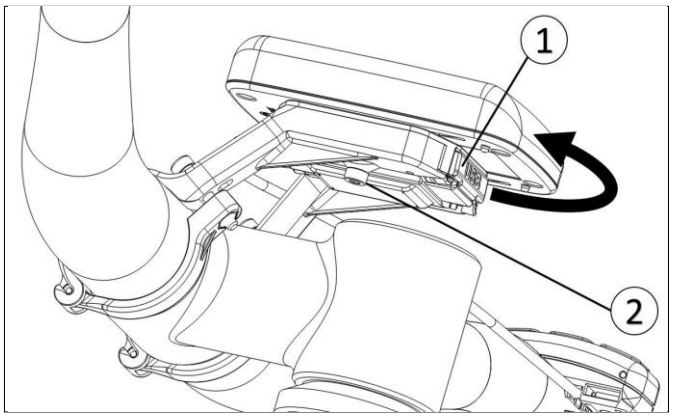


Image 25: Details of the display
1 USB port cap; 2 Screw for theft protection

4.11.3 Theft protection, display removal

Remove the display from the holder when not in use (image 26) or affix the display with the screw provided for that purpose (image 25). Please note that affixing the display with the screw does not provide complete protection from theft.

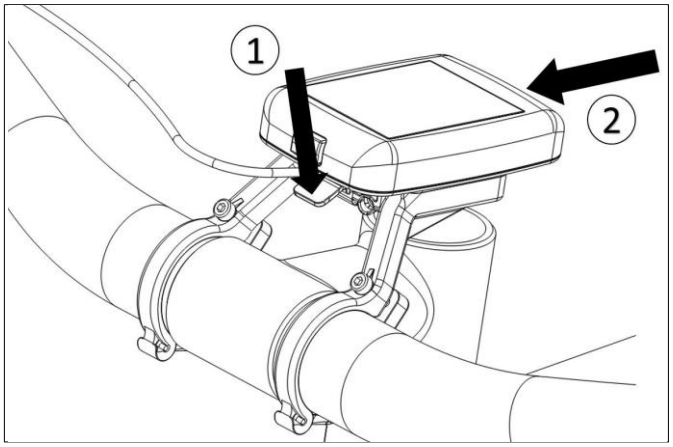


Image 26: Removal of the display
Press the lever (1) and simultaneously remove the display from the holder (2)

4.11.4 Changing between km/h and mph

Image 27: Changing between km/h and mph

While turning on the system, press button 3 and then simultaneously press button 1.

The displayed values in the display can be changed between km/h and mph or miles. Saved display values will be correspondingly converted. To change the units, first turn the system off. Then, press button 3 and then simultaneously press button 1 until the display shows values. The changed values will be shown in display.

4.12 Cleaning and care

- A lack of cleaning and maintenance can lead to dangerous riding situations, falls and accidents. Maintain your EPAC in accordance with the following instructions.
- Park your EPAC safely and securely.
- Turn your EPAC off via the display.
- Remove the battery and display and store these in a suitable location (protected from direct sunlight, water, and the risk of falling).
- Only use products which are expressly suitable for bicycles and ensure that these products do not adversely affect paint, rubber, plastic, metal parts, etc. Cleaning, lubricating and preservative agents are chemical products and can potentially damage an EPAC.

For wet cleaning, **never** use a steam cleaner, high-pressure cleaners or a hard water jet! These can cause damage to bearings and to the electronics.

- Clean the battery and display exclusively with a damp cloth.

Careful!

Danger of short circuits and damage to components

- The battery and display should **never** be immersed, sprayed, or held under flowing water.
- Soiling and unsuitable cleaning agents may cause damage to the plastic surfaces and the cover glass.
- Before mounting the battery and display, ensure that all electrical contacts and components, as well as the battery rails and display holder are clean and entirely dry.

4.13 Maintenance

Have the EPAC maintained once a year or every 10,000 km (whichever occurs sooner) by your specialist dealer and have the binova flow® motor system checked.

- **Maintenance and troubleshooting may only be performed by trained personnel from a specialist dealer certified by binova GmbH.**
- Have all prescribed adjustments, maintenance, inspection and cleaning work done at the required intervals.
- Secure the mid-drive unit against unintentional starting.
- Under no circumstances should maintenance and adjustment work be performed by an individual person without another person nearby, who could provide support and assistance.

Danger of injury!

Unintentional starting of the motor can be caused by maloperation of the display buttons or work on the chain and gears!

The mid-drive unit should be put in a state free of electrical charge by turning off the system and removing the battery before any maintenance or cleaning work is performed on the EPAC.

- After the maintenance is completed, check loosened screws and plug connections for tightness.
- Check the protective devices for integrity and function after the completion of maintenance work.

4.13.1 Service tool

Your certified specialist dealer has a service tool for reading and adjusting important system information.

4.13.2 Riding profile

The characteristics of the binova flow® drive can be adjusted by various riding profile. Your specialist dealer can change this with the service tool.

At the moment, the following riding profiles are available:

Riding profile	Description
Standard	The standard profile has a balanced riding profile and corresponds to the factory default at delivery.
Tour	This riding profile is recommended for longer rides, in which a higher range is achieved by reducing the level of support. This is also suitable for EPAC beginners and older individuals.
Mountain	The mountain riding profile offers very powerful and rapid support. It is suitable for practiced EPAC riders. The potential range is reduced.
Recumbent bike	Adapted to the requirements of recumbent bikes.
Cargo bike	Adapted to the requirements of cargo bikes and bicycle couriers.

Table 7: Riding profiles

4.14 Transporting the EPAC

You can transport your EPAC equipped with binova flow® in your vehicle or on commercially available bike carriers. However, please check the permissible loads (weights) of your bicycle carrier and ground support, as well as the support load of the trailer hitch or the roof of the car, as applicable. Also note the changes in the car's driving behavior, as well as the recommended maximum speeds for trips with loaded carriers and reduce speed when driving in the rain. Due to the possibility of high water pressures occurring during a drive in the rain, binova GmbH recommends protecting the drive system with a suitable cover during transport on a car.

Remove the battery and the display before transporting the EPAC.

During transportation in a car, the permissible temperature range for storage of the battery may not be exceeded.

4.15 Storage, decommissioning

This section covers the storage and decommissioning of the binova flow® drive system when it is not in use for a longer period.

4.15.1 Storage

For storage of up to 3 months, no special measure have to be taken. Please remove the battery in any case and store it as described in section 4.3, page 31 and following.

If the EPAC has been operated, clean all parts and charge the battery. The process for doing this is described in section 4.3 page 31 and following.

5 TROUBLESHOOTING

5.1 Possible errors

See table 8

Error	Possible cause	Correction measures
System does not turn on. Motor does not function.	Battery completely empty.	Charge battery.
	Display cable loose or damaged.	Connect the display cable, or have the dealer replace it.
	Battery not operational.	Reset the battery by charging it briefly.
	Water between display and display holder.	Remove the display and dry the contacts.
	Plugs loosened from the motor controller.	Have plugs and connections checked at the dealer.
	Cables damaged, torn off?	Have plugs and connections checked at the dealer and replaced as needed.
No indicator on the display.	Battery properly installed?	Please check.
	Battery not operational.	Reset the battery by charging it briefly.
	System turned off?	Turn system on.
	Plugs connected properly?	Please check.
Error codes on the display.		See table 9, page 50.
Reduced output power.	Motor very warm. First stage of temperature shutdown.	Motor power is reduced automatically corresponding to motor temperature. If power is not sufficient, allow the motor to cool down.
Chain jumps	Chain and / or chainring worn.	Have the chain and / or chainring replaced by the dealer.
	Transmission misaligned?	Correct (or have corrected) the alignment.
Power transmission to the rear wheel is not possible.	Has the chain fallen off?	Turn the system off and remove the battery. Either set the chain on the chainring yourself or have the dealer do it. Be careful that the cable to the bottom bracket is not damaged.
Battery cannot be charged.	Cell temperature of the battery outside of the loading range. Battery heats during use.	Adjust the ambient temperature of the battery and wait for the battery temperature to adjust.
	Battery is fully charged.	Remove the battery from the charger.
Motor can only be turned by hand with great force.	Bearings in motor damaged.	Only turn the motor by hand with the battery removed. Contact your dealer.
Grinding noise.	Motor tensioned.	Have the dealer check the adjustment of the frame connection.
When none of these apply.	Other error.	Please contact your dealer.

Table 8: Overview of errors

Error code	Cause	Corrective measure
ER0001	Configuration error. No wheel size set.	Restart the system. If the problem persists, contact an authorized specialist dealer.
ER0003	Calibration failed.	Contact an authorized dealer. At system start, the motor can automatically calibrate.
ER0004	Motor does not detect a speed signal.	Connect the speed sensor cable to the controller, check the cable for damage, or realign the magnet.
ER0005	Bottom bracket values are outside the limits.	Connect the bottom bracket cable with the controller or check the cable for damage. (Dealer)
ER0006	Calibration failed.	Contact an authorized dealer. At system start the motor can automatically calibrate.
ER0008	Temperature error.	The drive system is outside the acceptable temperature range. 2nd stage of temperature shutdown. Turn off the system and let the motor cool down.
ER0009	Erroneous battery voltage.	Check that the battery is inserted correctly and check the Rosenberger cable for damage. (Dealer)
ER0010	Internal error.	Restart the system. If the problem persists, contact an authorized specialist dealer.
ER0012	Internal sensor error.	Restart the system. If the problem persists, contact an authorized specialist dealer.
ER0013	Internal sensor error.	Restart the system. If the problem persists, contact and authorized specialist dealer.
ER0014	Internal sensor error.	Restart the system. If the problem persists, contact an authorized specialist dealer.
ER0015	Internal sensor error.	Have an authorized specialist dealer check the contacts and connections.
ER0016	Internal sensor error.	Have an authorized specialist dealer check the contacts and connections.
ER0017	Internal sensor error.	Have an authorized specialist dealer check the contacts and connections.
ER0018	Internal sensor error.	Restart the system. If the problem persists, contact an authorized specialist dealer.
ER0019	Internal error.	Turn the system off, remove the battery and replace the battery. Restart the system. If the problem persists, contact an authorized dealer.
ER0021	Internal memory error.	Restart the system. If the problem persists, contact an authorized specialist dealer.
ER0022	Internal memory error.	Restart the system. If the problem persists, contact an authorized specialist dealer.

Table 9: Error codes

6 DISASSEMBLY AND DISPOSAL

Information!

The disassembly may only be performed by a certified specialist bicycle mechanic!

If the mid-drive unit is to be disassembled and installed on a different EPAC, this may only be performed by a certified specialist bicycle mechanic.

Careful!

The battery and electronic components may cause environmental dangers.

The battery and electronic components have to be collected and disposed of safely.

7 TECHNICAL DATA

Characteristic	Value
Continuous rated power	250 W
Voltage	36 V
Maximum torque	65 Nm
Range, depending on battery capacity, speed, level of support, gradients and wind	20 ... 200 km
Pushing assistance	Up to 6 km/h
Motor support	Up to 25 km/h
System weight incl. display, bottom bracket, cranks, inner bearing, and battery **	approx. 11 kg

Table 10: Technical data

*** Depending on installation, e.g. on the type of battery*

Temperatures	Minimum	Maximum
Storage, transport of all components except battery	-10 °C	+50 °C
Storage, battery	+5 °C	+20 °C
Mounting (mid-drive unit)	+5 °C	+40 °C
Operation	-5 °C	+40 °C
Battery charging	+5 °C	+30 °C

Table 11: Operating temperatures

Humidity	Minimum	Maximum
Storage, transportation, mounting	0% rh	80% rh
Operation	0% rh	80% rh

Table 12: Storage

7.1 Replacement parts, wear parts

The binova flow® motor and the controller are designed to be low-wear.

Have your EPAC and the drive system maintained regularly.

During repairs, insist on the usage of spare parts offered by binova GmbH.

7.2 Handover protocol KP13-FB.03.03

From the form KP13-FB.01 out of the binova standard "General evaluation of the customer bicycle and components in which binova flow® should be installed" that your dealer has specifically filled out for your bike, the following safety precautions can be derived for you as the end customer.

The bicycle you have selected is probably **not** approved for use as an EPAC by its manufacturer. Different, larger forces will now act upon the frame and its components, for which they were not originally designed. With the binova standard and the knowledge of our specialist dealers, binova tries to name the resulting risks and to agree upon measures with you to minimize these risks and make them assessable for you.

Please confirm with your signature that you have a received a copy of this form and that all the existing, potential risks have been pointed out to you, and that you have arranged a first maintenance date to check the overall condition of the bicycle again.

Please record specific measures in writing and confirm these with your signature, as well.

This procedure ensures your safety!

Special measures agreed upon:

-
-
-
-
-
-
-
-
-

Dealer's stamp and signature

Location, Date

Customer's signature

7.3 Return material

Your opinion is important to us!!

COMPANY	
NAME	
STREET	
POSTAL CODE / CITY	
TELEPHONE / FAX	
PRODUCT NAME	

We are interested in continuously improving the quality of our work and would appreciate it if you would give us your opinion. To do this, please use the prefabricated form to fax or send as a letter.

You may send it to us carriage forward. That means write "fee paid by addressee" on the letter.

☐	**Suggestions**	☐	**Wishes**
☐	Uncertainties	☐	Safety instructions
☐	Opinions	☐	Suggestions for improvement
☐	Errors		
☐	Other:		

Nr.	**Description**	**Page**

General evaluation		**General comment**
☐	Very good	
☐	Good	
☐	Acceptable	
☐	Poor	
☐	Defective	
☐	…	

8 KEYWORD INDEX