

Operating Manual for VELOGICAL-VELOPSPEEDER

Version Ec5 / Cologne, November 2019 from Controller-Software 190209 (Released 09.02.2019)

We congratulate you on the purchase of this innovative bicycle drive. To ensure your long-lasting pleasure from this drive system, please read and observe this manual before use and always proceed precisely as instructed.



Please be sure to heed the warnings, particularly those concerning the battery and charging procedure.

1) Shift lever / twist-grip switch on handlebars

Lever up/Pos.1: Cable extended/untensioned, motors folded up: Drive “off”

Lever in centre/Pos.2: Cable retracted/tensioned, motors folded down: Drive “on”

Lever down/Pos.3: Drive “on” with increased contact pressure

2) Operation

Only switch the drive on using the lever when there are no obstructions in your path. When you are getting used to the drive, always switch it off before you stop or when you are approaching an obstacle such as junctions, red traffic lights or confusing traffic situations.

When you are thoroughly familiar with the drive, you can also leave it permanently switched on.

When not in use, the drive should always be switched off. However, while you are travelling, you can switch it on and off as often as you wish.

Pos. 3 should only be used when you have the impression that the drive is slipping, such as when riding in the rain.

3) Starting up

Connect the battery. With the bicycle stationary, if you now switch the drive from “off” to “on”, 1 to 4 beeps will sound to roughly indicate the charge level of the battery. The drive unit is now ready to use.

1 beep= 0 -25% / 2 beeps=25-50% / 3 beeps=50-75% / 4 beeps= 75-100%

No beeps sound when you switch on the drive during the ride.

(Tip: Approx. 30 minutes after ending your journey, the controller enters energy-saving sleep mode and does not emit any more beeps. Rapid rotation of the motors ends the sleep mode. If you wish, you can program the controller to give a finer indication of charge, for example with 6 or 8 beeps.)

4) Pedal sensor

It works together with the switch contact, i.e. the drive will only start when it is switched on, both motors are rotated forwards and the crank is activated. Particularly when riding uphill, always choose the lowest gear so that you achieve the necessary cadence of 45 rpm instantly and without effort.

(Tip: There are normally 2 magnets on the chainwheel and the controller is programmed to only switch on after the second magnetic impulse, provided the interval between impulses is less than 0.7 seconds.)

5) Low-voltage cut-off

The end of the range is indicated by a reduction in the drive output.

(Tip: As a test, you can also stop and count the beeps – the motors must be stationary for this purpose.)

The motor controller is set so that the battery is treated with care and is never entirely discharged. Thanks to this remaining reserve in the battery, it is still possible to produce light for a number of hours.

The controller has a free, somewhat thicker/tied red and black cable pair (marked: 24V DC) that can be used to connect an e-bike lighting system. Not until this discharge threshold is attained will the light be switched off to avoid total discharge.

(Tip: The two adjacent thin red cables which are connected together must not be separated!)

If no additional load is connected to this controller output, the battery can remain connected even at the end of the ride as the controller switches to sleep mode after 30 minutes and then consumes practically no further electricity. Exception: when the drive is not used for several weeks.

(Tip: If the headlight does not have a separate off switch, the battery should be unplugged at the end of the ride in order to

switch off the headlight and thus conserve battery capacity. The same applies to loads connected to the controller via the USB charging ports.)

6) Use in hot weather and on long climbs

During operation, the controller continuously calculates the motor temperature and lowers the riding current as soon as certain motor temperature values are exceeded. As a result, the motors are reliably protected against overheating, and, at the same time, power consumption is limited. Due to the reduced riding current, the propulsive force may even gradually decrease on lengthy climbs. A short break of a few minutes may be enough to reactivate the original output. During this process, it is essential to keep the battery connected.

On the other hand, a sudden and complete interruption of the drive indicates that the maximum permissible battery temperature has been attained. In this case: open the battery compartment or bag or remove the battery entirely in order to improve the air supply. In a case such as this, a cooling period of at least 15 minutes will be necessary.

If the battery is replaced, it will only be possible to start up again with full performance capacity if the motors have cooled down to approximately ambient temperature before the reserve battery is connected.

7) Charging

FIRST connect the battery with the charger and THEN plug in the mains unit. Shortly afterwards, the green LED will switch to red and the charging process will begin. The charging current is 3 A or 1 A for the compact travel charger.

- Battery type A: capacity 5.2 Ah, charging time approx. 2 hours @ 3 A, 6 hours @ 1 A
- Battery type B: capacity 8.7 Ah, charging time approx. 3 hours @ 3 A, 9 hours @ 1 A
- Battery type C: capacity 14.5 Ah, charging time approx. 5 hours @ 3 A, 15 hours @ 1 A

The charging time decreases for batteries that are only partially discharged. The battery is fully charged when the red light-emitting diode changes to green. The charging process then stops automatically. Disconnect the battery from the charger and remove the mains plug.

– Avoid storing the batteries at high temperatures.

– Before any maintenance work is carried out on the e-bike, the battery must be unplugged and the bicycle jacked up on supports.

The batteries from VELOGICAL engineering GmbH are largely maintenance-free. You are merely recommended to clean the surfaces of the plugs from time without using any cleaning agent.

The charging device has an input voltage range of **100 to 240 V AC** and can be operated on all European and most global electricity mains, provided the range is observed.

8) Handling the battery

The drive will only produce its optimum performance and range when the battery is fully charged. It is therefore always best to set off with a fully charged battery.

A second charging device may make sense for commuters so that they can also start their return journey with a fully charged battery.

As the battery output decreases with falling temperature, you should not take the battery outside on cold winter days until immediately before you set off.

Even when not in use, batteries undergo a constant aging process. If you intend to stop using the bike for any lengthy period of time (e.g. winter breaks), avoid fully charging the battery (4 beeps) or leaving it with too little charge (1 beep), instead adjust it to an approximately half-charged level (2 or 3 beeps). If you also store it in a cold, dry room, this will slow down the aging process.

9) Removing and mounting the rear wheel

If the tyre is fully deflated, removing and mounting the rear wheel is particularly easy. You move the level on the handlebars upwards/Pos. 1: cable extended/un tensioned, motors folded up: drive "off". You then press the tyre together with your hand so that it fits between the motors.

Alternatively, the outer cotter pin of the cable fastening on the motor base can be pulled out with a pair of pliers so that the motors can fold out much further.

When inserting the rear wheel, please make sure that the free ends of the brass tubes are not bent. Make sure that the rear wheel resumes its original position relative to the frame, otherwise the correct lateral adjustment of the motors will be lost. Check the angular position of the two motors for symmetry when they are folded onto the rim!

(Tip: You can insert wheels with derailleur gears correctly and reproducibly by pressing the axle into the dropouts while you tighten the quick-release levers. In the case of hub gears, you first have to tighten the nut on the chain side and only then should you tighten the second nut on the left).

10) Maintenance, care

The drive is almost maintenance-free. Nevertheless, you should still check the following points occasionally.

Lateral runout of the rim – it should never be greater than 0.5 mm, otherwise the rim might touch the friction ring of the motors when the drive is switched off. Even minimal contact on each revolution of the wheel may lead to irregular flattening of the friction ring in the long term, which would cause uneven running and generate noise.

B) Adjustment of the cables: with the motors folded up, the distance between rim and friction ring should be at least 2 mm. When folded into the drive position, there must be at least sufficient tension on the cables for both motors to rotate when the bike is pushed forward.

C) When oiling the chain, make sure that no lubricant comes into contact with the rims. Worn material from the brake pads should be removed from time to time with a damp tissue.

D) The blue friction rings on the motors are subject to minimal wear, with the diameter decreasing by 0.1 to 0.2 mm per 1000 km. Consequently, it will be necessary to replace the friction rings after 5,000 to 10,000 km. Changing the friction rings involves removing the cotter pin of the cable lock so that the motors can be folded up further. After you have removed the red motor cap, you can pull off the old friction rings. Heat the new friction rings in boiling water for approx. 1 minute and fit them onto the motor while still hot. Reverse the above steps for reassembly.



E) **WARNING! Visual inspection: there must be no damage such as cracks or bare wires on live cables, plug connectors or the battery. Protect your bike against vandalism. Make sure that no cable comes into contact with rotating parts.**



F) **WARNING! Outside interference** – Only service partners should be allowed to access the inside of the motors or interfere with the wiring and the electrical control unit.

Any interference with the battery is prohibited!

Any unauthorized attempts to open the motors, change the cable connections or use third-party batteries will immediately cancel the guarantee and any responsibility on the part of the manufacturer.

If any unusual noises are generated, switch off the drive straight away.



11) WARNINGS! Safety regulations for disposal

Like all modern bicycle drive systems, the VELOSPEEDER is also equipped with lithium-ion high-performance battery cells. Lithium is a highly reactive combustible material, and you should therefore exercise special care and caution when handling these batteries.

– **Only use the device supplied by VELOGICAL engineering GmbH to charge the battery. An excessively high charging voltage may permanently damage the battery and set it on fire. For reasons of safety, you should never charge or store the battery near combustible objects, but in a place where there is no fire risk and on a non-combustible surface. Keep the battery away from children, avoid impacts and any other kind of mechanical load and damage.**

– **Batteries that have been dropped or subjected to exceptional impacts or stresses or that exhibit visible damage must be taken out of service immediately** as they may present a hazard. Do not attempt to repair damaged batteries. On no account should you try to open batteries and their peripherals. Take appropriate precautions and dispose of batteries properly. Damaged batteries must be covered with sand and stored outside in a fireproof metal container in a dry place under cover. Never transport a defective battery in road traffic yourself. Damaged batteries must under no circumstances be handed over to a forwarding agent of parcel service. Contact a local disposal service.

– **Information obligation pursuant to the German Batteries Act and the Electrical and Electronic Equipment Act (ElektroG):**

Motors, electronic control unit and the battery must not be disposed of in household waste at the end of their lifespan. All mechanical parts (motor mounts) can be disposed of in the recycling bin. All electrical parts and all electromechanical parts must be disposed of as electronic scrap. The battery is hazardous waste and must be disposed of accordingly.

– As a consumer, you are legally obliged to dispose of it at your own expense via locally available take-back and recovery systems or via VELOGICAL GmbH (Jan-Wellem-Str.23, 51065 Köln, Germany).



12) Important notes! General safety information

Basic principles

- **Customers are personally responsible for observing a general duty of care in the maintenance of their bicycles.**
- **All components of the Velospeeder must only be used in the configuration supplied on a bicycle suited for the purpose.**
- **Any improper use of VELOSPEEDER components for another purpose is legally prohibited and may be subject to prosecution.**

Connections and adjustments of motor components

All screw settings on the installed VELOSPEEDER drive system have been adjusted. Do not alter the screw settings, Bowden cable settings, cables and connecting parts between motor components yourself without any reason, particularly not at the switching bridge and the switching lever / twist-grip switch. If you think that any components on the VELOSPEEDER need to be readjusted, please contact VELOGICAL Service first.

Controller Settings

A Bluetooth module is contained in the Sinus controller which can be used to establish a connection with Windows-based computers. You can use this to adapt customer-specific settings independently.

- Make sure that the Bluetooth module on your computer is switched on.
- Turn your bicycle so that no solid objects (e.g. battery) obstruct the transmission path between controller and computer. Set the bicycle up close to the computer.
- Double click on the application file “vs_customer_tool.zip”. A black window opens up.

Insert the battery plug and switch on the drive on the handlebars. Immediately after the beeps have sounded, the controller is ready to receive signals.

- Shortly afterwards, the message “Found” will appear. “Velogical kTwin” The connection has been established but the access is blocked (no access). If, instead of this, the error message “No Bluetooth adapter found” or “no connect” appears, then the Bluetooth device has not been recognized in the computer. (Check range!)

- Entering your 4-digit customer pin (on your bicycle pass) with the command “pin=xxxx” and pressing the enter key will give you access to the customer area, in which you can alter the following parameters:

startcurrent=xx for rapid acceleration, the starting current is generally selected to be higher than the riding current “setcurrent”. Those who prefer a more gentle start can set startcurrent=0.

startdelay=x is the transition time between startcurrent and setcurrent, which is limited to a maximum of 10s.

setcurrent=xx is the riding current in amperes, which is set for the propulsion or thrust of the drive. A higher value of the riding current – particularly when used to the full on slopes or against a headwind – decreases the range.

setspeed=xx is the maximum speed in km/h, which is limited to 25 km/h for pedelecs not subject to registration. If required, it is of course possible to set lower values as well.

batvolume=5 is the factory setting volume for the beeps, which can be set from 1 to 10.

batbeeps=4 is the factory setting for the charge status signal. If, for example, batbeeps=10, the charging status will be indicated in 10% steps.

pedalcount=2 means that the drive does not start up until the second passage of a magnet, in order to prevent an unintended startup by small movements of the crank.

pedaltimeout=0.7s is the factory setting for the time lag in seconds after the last magnet passes before the motor stops. If 2 magnets have been attached to the chainwheel, the minimum rotational speed on the crank is $60/(2 \times 0.7) = 42.8$ rpm in order to keep the drive running constantly. If the time lag is reduced, you are recommended to attach additional magnets (e.g. 4 magnets, 0.35 s)

gasmin=-4.8 und gasmax=4.8 have been set in the factory so that even if a potentiometer for the riding current is subsequently installed, a reduction in motor current down to 50% will still be possible. Those who want a reduction down to 33%, can set gasmin=2.4.

Use lower case for any input (check that the caps lock key is not activated if you cannot enter a value). It is important to remember that the minus sign is important for gasmin, to use full-stops as decimal separators (not commas), to confirm the inputs with the Enter key and to save all inputs with the command “save” and a final Enter.

The command “config” + Enter key enables you to check all of your inputs.

13) Degree of support for current control

With an additional potentiometer, you can reduce the riding current (setcurrent) at any time during the ride. You will lose propulsive force but gain additional range. To add a potentiometer to the current control, remove the red and green cable pair connected/tied together on the controller. Connect the red controller cable to the red potentiometer cable, the green controller cable to the

brown potentiometer cable and connect the black controller cable already connected with the micro switch to the black potentiometer cable (join 3x black cables together).

14) Transport

- **When end customers are transporting e-bikes on the roof or rear carrier of a car, they should always remove the battery and set the handlebar switch to Position 2.**
- When e-bikes are being transported for commercial purposes, the battery fitted to the e-bike should be secured and protected against loss, damage or short-circuit. The safety provisions for the transport of hazardous goods apply to the commercial transport of e-bike batteries when removed.

15) Wheel & rim

The use of an aluminium rim with a perpendicularly positioned flank is a precondition for the proper functioning of the VELOSPEEDER.

A correctly mounted VELOSPEEDER drive causes no noticeable wear on an aluminium rim flank.

– On fully anodized aluminium rims for disc brakes, a visible coloured mark will form on the surface of the friction ring over the course of time. Although the friction ring will not create a groove in the rim, the anodized layer will be abraded.

– Carbon rims with carbon brake flanks have a poorer level of heat dissipation and wet adhesion (exception: carbon rims with aluminium brake flanks).

– It is generally not advisable to use steel rims.

– **Only mount the e-bike drive on wheels that have correctly fitted spokes or that are sufficiently stiff, which have an appropriate spoke tension and are symmetrically aligned within the frame.**

– **Rims for use with rim brakes should be inspected for the degree of wear before mounting the VELOSPEEDER. The VELOSPEEDER must not be fitted to or operated on rims that have reached their limit of wear.**

16) Tyres

Use sturdy tyres from a brand-name manufacturer for a pedelec or e-bike (e.g. Schwalbe, Continental, Vittoria, Kenda). Do not use folding tyres on what are called hookless rims. When the rim warms up, folding tyres on hookless rims may burst unexpectedly, which is something that calls for preventive care particularly on downhill runs. Bear this in mind! Never ride so fast that you are unable to retain control of the bike if any tyre problems should suddenly occur. Always ride with properly inflated tyres. Observe the air pressure recommended by the manufacturers. Replace tyres immediately as soon as they exhibit any cracks and become porous. **Do not ride with worn or damaged tyres because this not only poses a risk for you but also for other road users.** Choose tyres with sufficient puncture protection whenever possible.

17) Brakes

It is very important for the brakes to function perfectly. Check that your brakes function correctly before every ride. **Do not ride if the brake system is not correctly adjusted or is defective or if you observe any irregularities or if you are uncertain as to whether the brakes are functioning correctly.** Choose brake shoes for a pedelec or e-bike with a constant material quality, which deliver a good braking performance without damaging the rims, even when wet, and which leave as few greasy residues on the brake flank of the rim as possible. Brake blocks and brake shoes of well-known brands (e.g. Shimano, Magura, Koolstop, Campagnolo) are generally readily available throughout the world and exhibit a constant product quality. Avoid using the most basic brake shoes that lead to a heavy, greasy deposit on the rims in the wet. Do not skimp on the quality when selecting the brake shoes for a motorized bicycle. White-label brake shoes that are labelled as a house brand for common component manufacturers may vary in quality. It is hardly realistic to test all these private brands, which means that we at VELOGICAL are not able to give any recommendations either for or against such products. You should therefore be sure to use optimal blocks for your brakes.

18) Riding style and safety

Before every ride, check your bike for the correct and firm positioning of important components such as handlebars, saddle, wheels, brakes as well as the connecting parts and screws.

Always adopt an appropriate riding style and pay attention to factors such as weather, route characteristics, road surface, traffic density.

Adopt a circumspect riding style, particularly in the wet, in the dark, in poor visibility, on uneven or damaged road surfaces and on cobbled streets. In urban areas, in particular, there are many

situations in which consideration for the traffic conditions dictate that a bicycle motor should not be switched on.

When selecting the type of bicycle, choose one that suits you in terms of the geometry, ergonomics and frame size and seek expert advice before making a purchase. VELOGICAL is not responsible for any damage to health resulting from the use of ergonomically unsuitable bicycles.

It is quite possible that you will ride longer distances than you are used to on a bicycle fitted with an electric motor. If required, take the charging device with you so that you can recharge the battery when on the move. When planning your route, you should also take into account the personal reserves of strength that you may need in order to complete the return journey without support from the motor.

When riding, be sure to wear appropriate clothing that is also visible for other road users. Use an LED lighting system on your bike. Switch on the light when riding in the dark. During the day, too, riding with lights increases your passive safety.

19) Energy use

Particularly on uphill sections, you should apply sufficient force on the pedals to prevent the speed – and hence the power output of the e-drive – from falling too sharply (below 8 km/h). Select a sufficiently low gear when riding uphill, particularly when setting off, so that you can generate a sufficient output with a higher cadence.

20) Range

- In order to achieve the optimum range from the battery type you are using, please wear closely fitting clothing and adopt an aerodynamic seating position.
- Make sure that your tyres have the optimum air pressure!
- Before setting off, check your brakes to make sure that they are not rubbing on the rims unintentionally.
- Additional factors: overall weight of the bicycle, fitness of the rider, wind conditions.

21) Range of application

- Limit of overall weight for solo bicycles: 120 kg (rider, bicycle including load carried).
- The VELOSPEEDER provides support for riding uphill, but does not “lift” cyclists up any slopes that they would not be able to negotiate without a motor.
- The VELOSPEEDER is not designed for extreme slopes.
- The VELOSPEEDER is designed for use on asphalt or surfaced roads but not, however, for off-road riding.

And now, it just remains for the VELOGICAL Team to wish you lots of fun and some wonderful tours!

VELOGICAL engineering GmbH

Managing Directors: Dipl. Ing. Peter Frieden & Dipl. Des. A. Ogando

Jan-Wellem-Str. 23 D-51065 Köln-Mülheim

T+49 (0)221 7201107 team@velogical.eu