

**SPORT-ON**  
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**USER MANUAL**  
**HANDCYCLE ASSEMBLY AND MAINTENANCE**

**XCR**  
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# 1. GENERAL INFORMATION

This manual contains information on how to assemble the XCR handcycle after delivery to the dealer's or user's residence. It contains guidelines for adjusting and maintaining individual components during operation. An important part of this document are the safety rules of using the handcycle.

Since the handcycle is a complex design, this manual does not fully cover its maintenance and servicing. If repair, service, or maintenance are necessary, please contact the dealer or the handcycle manufacturer to obtain the necessary information or arrange a visit to an authorized service center.

There may be differences between the information contained in this manual and the information contained in the manufacturer's instructions on the maintenance of specific parts of the handcycle (e.g., hubs). In that case, follow the manufacturer's instructions.

If you receive the handcycle from a distributor, the distributor is obliged to deliver the handcycle assembled and properly working. Before the first ride, read the chapters "4. SAFETY" and "5. RIDING THE HANDCYCLE ON PUBLIC ROADS" of this manual.

If the handcycle was ordered directly by the user, it should be assembled in accordance with chapter "7. HANDCYCLE ASSEMBLY AFTER DELIVERY". After assembly, the user is obliged to follow the rules specified in the remaining chapters of this manual.

# 2. INTENDED USE

The basic condition for ensuring the long life and failure-free use of the handcycle is to use it as intended. XCR was designed for bike paths and hardened trails, like gravel forest roads and dirt roads. The main idea behind the project was to enable cycling over greater distances using the power of the user's own muscles, which, due to the user's physical limitations, was not possible until now. XCR is not a handcycle for every use. This model should not be used for riding in off-road and extreme conditions such as freeride, downhill, jumping, etc. Failure to comply with any of the above may lead to premature wear of the handcycle and damage to its components. Using the equipment in a manner inconsistent with its intended purpose indicates that the user intentionally places himself in danger, incurring the risk of serious health consequences. The manufacturer and the dealer are not responsible for any malfunctions, damage to the handcycle, or health issues resulting from improper use of the equipment. Any malfunctions and damage resulting from improper use of the equipment will not be included in the warranty.

### **3. USER WEIGHT AND TOTAL HANDCYCLE WEIGHT**

The XCR handcycle was designed for users whose weight does not exceed 90 kg. The total weight of the handcycle with the user and paraphernalia should not exceed 120 kg.

### **4. SAFETY**

After assembling the handcycle, before a test ride, check if all mechanisms work as intended. A detailed description of these inspections can be found in chapter “8. *MAINTENANCE*” of the manual. Inspection of the braking system and the components responsible for shifting gears is mandatory. The handling of a three-wheeled handcycle is completely different from a typical two-wheeled design. Driving, shifting, and braking are done with two limbs, not four. For safety reasons, you should make sure that your first ride takes place in a less frequented location, which will provide adequate space to maneuver freely and become familiar with riding a three-wheeled handcycle. Since it is important to protect the user’s body, a certified helmet, gloves, and protective glasses are recommended, even during the test ride. To prevent items of clothing from getting caught in the handcycle’s drive, the user should avoid wearing loose clothing. To protect knees and elbows against possible injury caused by a fall, using dedicated pads is recommended. Shoes are equally important. The user should choose high shoes that will protect the ankles against bruising if they fall. Shoes should be laced securely to fit the foot well.

Securing the handcycle to prevent theft is also advisable. The user should write down the serial number of the frame and register the handcycle with the appropriate offices (police, municipal guard). The frame serial number must also be added to the warranty card. The card with a dealer’s stamp is proof of handcycle ownership. Do not leave your handcycle unlocked and unattended.

### **5. RIDING THE HANDCYCLE ON PUBLIC ROADS**

The XCR handcycle is intended for recreational purposes, and its basic version cannot be used on public roads or if visibility is poor. To enable riding on public roads and in poor visibility, the device must be equipped with lighting that is compliant with the regulations in force in the country where the handcycle will be used.

## **6. SPARE PARTS**

The handcycle is built with original parts from recognized manufacturers to ensure an appropriate level of safety and functionality. The friction materials of brakes, tires, tubes, and steering column bearings are critical equipment for safety reasons; therefore, they must be maintained in accordance with the guidelines specified in chapter “8. *MAINTENANCE*”. If it is necessary to replace any of the components listed above, substitutes of equivalent quality should be used. Please contact the dealer or handcycle manufacturer for information on spare parts and accessories.

## **7. HANDCYCLE ASSEMBLY AFTER DELIVERY**

This chapter describes the contents of the package, the tools needed to assemble the handcycle parts, and how to perform all assembly steps. It contains the necessary illustrations.

### **7.1. Package contents**

After unpacking the package and organizing the components, the person assembling the handcycle should have the following parts:

1. Handcycle fork, consisting of:
  - assembled electric motor (optional) with a complete drivetrain system, i.e., front wheel, chain, chain tensioner;
  - mounted display (optional) with a function switch for operating the electric motor;
  - brake system with completed bleeding for the front wheel and rear wheels;
  - adjusted shifting gear system;
  - crank arms with axels, attached brake levers, and a gear shifter;
  - steering limiter attached with a dedicated screw.
2. Drive cranks;
3. Footrests with harnesses;
4. Main frame with the seat and backrest attached, additionally bearing races mounted in the head and a headset;
5. Seat backrest supports and a battery base;
6. Rear wheels with axles;
7. Battery (only if the handcycle is delivered to the recipient by road transport).

The contents of the package are shown in Figure 1.

## 7.2. Tools necessary for assembly

The following tools are needed to assemble the XCR components:

1. 1 x 10 mm combination spanner;
2. 1 x 15 mm combination spanner;
3. 1 x 16 mm combination spanner;
4. 1 x 19 mm combination spanner;
5. 1 x HX8 Allen key;
6. 1 x HX6 Allen key;
7. 1 x HX5 Allen key;
8. 1 x HX4 Allen key;
9. 1 x electrical cable cutter.

The set of tools necessary for assembling the handcycle is shown in Figure 2.



Fig. 1. Components of the XCR handcycle included in the package.



Fig. 2. The set of tools necessary for assembling the handcycle

### 7.3. Assembling the components

#### 7.3.1. Front fork assembly

To ensure comfort during handcycle assembly, it is best to place the main frame at hip height so that it is accessible from all sides. You can, for example, place it on a tool chest or on a table of appropriate dimensions (a square table 450x450mm with a solid base will be adequate). Additionally, the frame should be properly attached to the chest or table so that it does not move during assembly. The head of the frame must be completely outside the outline of the cabinet or table so that it does not hinder the fork assembly. Before starting work, secure the main frame from paint damage using, for example, several layers of stretch film, soft textiles, etc., and leave only the area on which the assembly will be performed at this moment exposed.

Since the fork is supplied fully assembled, it is very heavy, making it a difficult component to work on. Two people are, therefore, required to connect the fork to the main frame.

The front fork assembly should begin by preparing the headset for attachment. The set should be removed from the fork head. The parts should be arranged on the table, dividing them into the lower set (marked in Figure 3 with a red arrow) and the upper set (marked in Figure 3 with a green arrow) in the same order as they were in the frame. Then, after loosening the bolts in the fork arches with the HX5 Allen key, slide out the steerer tube (marked with a red arrow in Figure 4) towards the upper arch (marked with a green arrow in Figure 4) and remove the steering limiter (marked with a blue arrow in Figure 4) by unscrewing its screws with the HX6 Allen key.



Fig. 3. Frame head with a headset.

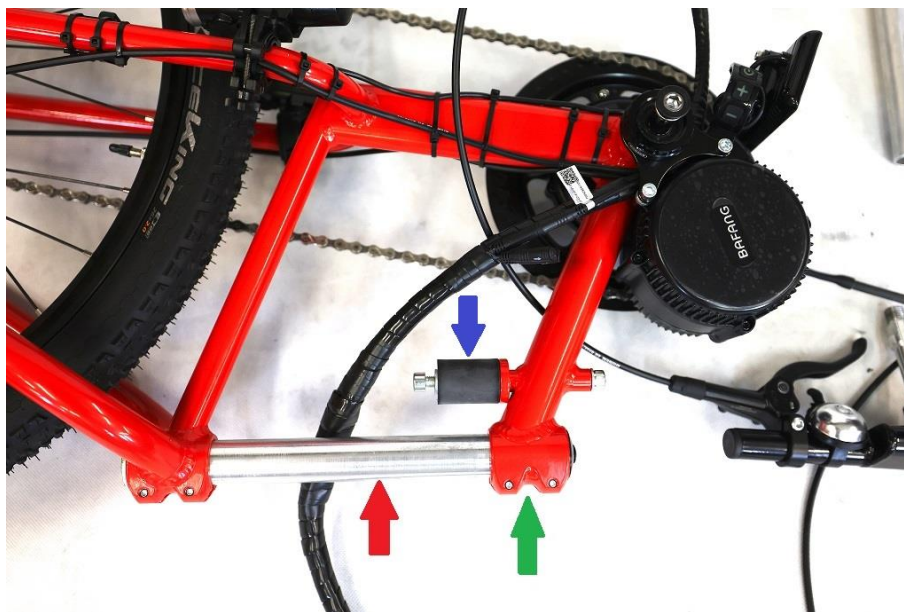


Fig. 4. Steering tube marked with a red arrow, and the upper fork arch marked with a green arrow.

Place a greased bearing in the upper race mounted in the frame head (the bearing is delivered ready for assembly). The bearing should be placed with the rollers towards the race. Covered the whole bearing with the upper race.

Before assembly, it is a good idea to lubricate the steerer tube with technical Vaseline or another non-aggressive lubricant for rubber elements. The top cap should be removed from the steerer tube along with the screw that secures it (HX5 Allen key). This screw has a plug that is easy to lose, so when assembling the handcycle, put it in a safe place. Initially, the tube should be placed so that its lower edge is approx. 15 mm below the lower edge of the upper arch. The upper washer (the element of the upper headset that was first removed from the frame head) should be inserted onto the protruding section of the tube. A rubber ring with a conical end should be pushed under the washer. The conical end must be directed towards the bearing mounted in the upper race of the head. Make sure that the lower edge of the steerer tube



protrudes below the lower edge of the rubber cone ring. The prepared fork should be placed against the frame head with the help of another person and, using a rubber hammer, carefully and delicately drive the steerer tube into the head, stopping when the tube reaches the edge of the lower bearing race embedded in the head. This is the most difficult part of fork assembly, which requires patience and a technical approach. It may seem difficult for someone who is doing this for the first time, but remember that the handcycle was fully assembled before shipping, so it can be done. One person holds the fork in place, while the other person inserts the bearing into the lower race in the head through the gap between the lower arch and the head, arranging it with the rollers towards the upper arch. Then, insert the washer, the lower outer bearing race, and the spacer, and carefully hammer in the steerer tube, constantly verifying the placement of the lower headset parts. The steerer tube should be in place when it extends about 3mm below the lower edge of the lower fork arch. The final effect can be seen in Figure 5.



Fig. 5. Fork attached to the main frame.

The next step is to eliminate the slack in the headset. It is necessary for a second person to constantly hold the fork in the straight-ahead direction until the steering limiter is installed. This will ensure the slack will be eliminated with the required precision, and the fork without the steering limiter will fall rapidly to the left or right side, which may result in damage to the paintwork.

To eliminate the slack in the headset, first, tighten the screws in the lower arch with an HX5 Allen key to a torque of 10 - 12 Nm, and then reinstall the cap previously removed to insert the steerer tube, as shown in Figure 6. To eliminate the slack in the headset, gradually tighten the screw securing the cap with an HX5 Allen key. This operation should be performed

in stages, i.e., until the first resistance is felt, the screw should be tightened by  $\frac{1}{2}$  turn, and the slack in the headset should be checked by moving the fork up and down alternately. When the slack begins to decrease, the screw tightening should be reduced to  $\frac{1}{4}$  turn.



Fig. 6. Steering tube cap mounting screw.

When the slack is already negligible, the screw tightening should be reduced to  $\frac{1}{8}$  turn until it is eliminated. Then tighten the screws of the upper arch with an HX5 Allen key (see Figure 7) to a torque of 10 - 12 Nm and install the cap screw cover.



Fig. 7. Tightening the upper arch screws.

The last step is to install the steering limiter (see Figure 8), which will allow the fork to maintain a straight-ahead direction. The steering limiter will also provide better steering precision.



Fig. 8. Steering limiter assembly

Tighten the upper and lower screws of the steering limiter using an HX6 Allen key with a tightening torque of 20 Nm.

### 7.3.2. Assembling drive cranks and crank grips

The next step in assembling the handcycle is to install the drive cranks. The cranks are marked with the letters L and R, as each should be on the correct side of the drive (marking visible in Figure 9).



Fig. 9. Crank assembly side marking; the photo shows the left crank.

The sides of the handcycle should be located from the driver's position. The crank marked L should be mounted on the left side; the crank marked R should be mounted on the right side. The cranks should be mounted concurrently. To attach the cranks, use an HX8 Allen key and tighten them to a torque of 38 – 42 Nm (Figure 10).



Fig. 10. Crank assembly

Once the cranks are in place, their grips need to be added, which will allow the cranks to be turned. The grips, just like the cranks, have markings indicating the assembly side. The grip marked “L” on the axle should be attached to the left crank (Figure 11), and the grip marked R on the axle should be attached to the right crank (Figure 12). An important detail is that the



Fig. 11. Left grip axis marking



Fig. 12. Right grip axis marking

right grip has a right-hand thread, and the left grip has a left-hand thread. For assembly, use a 15mm open-ended wrench and tighten the grips to a torque of 25Nm. Make sure that the threads

on the grip axles are greased. This will prevent the threads from seizing after attaching them to the cranks.

Figure 13 shows the final result of assembling the crank handles.



Fig. 13. Mounted right crank grip, left grip has a left-hand thread.

### 7.3.3. Footrest assembly

The final step for the front of the handcycle is to mount the footrest. To do this, loosen the footrest clamps marked in Figure 14 with an HX4 Allen key. Then, lubricate the footrest tubes that slide into the fork tubes with, for example, technical Vaseline to make assembly easier.



Fig. 14. Rear suspension wishbone assembly

Insert the footrest so that it does not rub against the wheel, setting it at a distance of approx. 20 mm from the tire. In the next step, tighten the screws in the clamps with the HX4 Allen key, tightening torque of 6 - 8 Nm. Figure 15 shows the footrest after inserting it and closing the clamps.

The last step of assembling the footrest is to interlace the footrest harness. The interlaced elements should be moved through the buckles based on those made during production. The location of the footrest harness straps interlaced after delivery is shown in Figure 16.



Fig. 15. Footrest pushed in and locked with clamps.



Fig. 16. Location of the footrest harness elements interlaced after delivery.

The front of the handcycle is now complete. Now it is time to handle the rear, starting with the assembly of the seat backrest supports along with the battery base.

#### 7.3.4. Installing the backrest supports

You will need an HX5 Allen key and a 10 mm combination spanner to mount the supports. The support location is shown in Figure 17. The torque for the support screws is 10 –

12 Nm. The length of the support can be adjusted by loosening the clamp mounted in the place where the support tubes meet, using an HX4 Allen key. It is best to do this after the handcycle is fully assembled, after the user has taken the riding position, to find the optimal backrest inclination for the person who will be using the handcycle. After setting the correct backrest position, the clamp should be tightened to a torque of 6 - 8 Nm.



Fig. 17. Installing the backrest support with the battery base.

The last step, once the handcycle is on a tool cabinet or table, is to mount the rear wheels.

#### **7.3.5. Rear wheels assembly**

The rear wheels of the handcycle are delivered with mounting axles attached to the spokes. Both axles are right-handed. However, the selection of wheels depending on the side of assembly is important. This is easy to recognize by finding the rotation direction marking on the tire or brake disc. We selected the wheel so that the arrow on the tire or disc after mounting points in the direction of the front of the handcycle. Before attaching the wheel, check whether the threads in the wheel axles are greased, which will protect them from seizing. The wheel should be attached with a 19 mm spanner and a tightening torque of 40 Nm. The method of assembly is shown in Figure 18.



Fig. 18. Rear wheel assembly.

### 7.3.6. Installing the rear brake calipers

Since the rear brake calipers are already attached to the brake levers and the entire system is bled, the handcycle must be removed from the assembly stand and placed on its wheels to mount them. This is necessary because the wiring bundle visible in Figure 19, in which the brake cables are interlaced together with the electric cable connecting the electric drive to the battery base, is routed under the handcycle seat.



Fig. 19. Wiring bundle with T-piece and rear caliper brake lines

The wiring bundle and clamp should be led under the handcycle in the location shown in Figure 20.





Fig. 20. Routing the wiring bundle with brake and electric cables

The cables should be routed along the left side of the frame head and then along the center tube of the frame, which is located under the seat. The bundle should be left loose until the rear clamps are mounted.

The brake calipers must be prepared for installation by removing the spacers from between the brake pads. The spacers are secured against falling out with cable ties, which must be cut to make removing them possible (Figure 21).



Fig. 21. Removing the spacers from between the brake pads.

Both calipers were dismantled for transport, along with the adapters, to avoid having to readjust their position relative to the brake disc after the handcycle is delivered to the distributor or the user. The caliper, ready for assembly, should be gently pushed onto the brake disc so that it fits between the pads. Then, the adapters should be screwed to the mounting brackets using the screws screwed into them for transport. The mounting screws should be tightened with an HX5 Allen key with a torque of 10-12Nm. The assembly method is shown in Figure 22.



Fig. 22. Rear brake caliper assembly.

### 7.3.7. Connecting the wiring to the battery base, arranging the wiring bundle, installing the flag

In the last stage of assembling the handcycle, connect the electrical system to the battery base, arrange the wiring bundle under the seat, and mount the flag. Connecting the battery base is a simple task. The yellow plug coming out of the base should be plugged into the system's yellow socket. The socket and the plug only fit together in one arrangement, so there is no risk of reversing the polarity of the connector. The connection is visible in Figure 23.



Fig. 23. Connecting the electrical system to the battery base.

Excess electrical wire should be hidden in the backrest upholstery by unfastening the Velcro connecting the halves of the backrest, placing the wire behind one of them, and fastening the Velcro again.

The section of the wiring that runs along the central tube under the seat should be attached to this tube with several cable ties. It is recommended that the front wheel be turned as far to

the right as possible during this task. The section of the wiring that comes out from under the seat in the area of the frame head should be attached using a cable tie in the place marked in Figure 24 without pulling the tie completely out.



Fig. 24. The wiring attachment point when it comes out from under the seat.

The flag is mounted by screwing its grip to the rear axle of the frame, as shown in Figure 25.



Fig. 25. Flag assembly

This should be done using an HX4 Allen key, tightening the mounting screws to a torque of 6 - 8 Nm.

The flag is the culmination of the work leading to the final effect, which is the complete XCR handcycle visible in Figure 26. Make sure to read section “8. *MAINTENANCE*” before the test ride.



Fig. 26. The final result - the complete XCR handcycle

## **8. MAINTENANCE**

### **8.1. Inspecting screws and bolts**

After assembling the handcycle, but before the first test ride, check all screws and bolts. For safety reasons, during the first period of using the handcycle, the inspections should be performed before each ride. This is because the parts are breaking in and aligning, which may result in some screws or bolts loosening. Over time, the frequency of the inspections may be reduced, but they should still be performed from time to time.

### **8.2. Inspecting brakes**

The brake system is the most important system of the handcycle, so the user should check it before each ride. The key elements of this system are brake discs and pads. The basic parameter that should be checked particularly often is the thickness of the brake discs. The thickness of the discs should be measured at least every 200 km. If the disc thickness drops to 1.5 mm, the disc should be replaced immediately. When replacing a brake disc, the new disc should always be installed with a set of new brake pads. Use a caliper tool to measure the thickness of the disc. The measurement method is shown in Figure 27.



Fig. 27. Method of measuring the brake disc thickness (illustrative photo)

Brake pads should be replaced when the brake lining thickness drops to 0.5 mm. Do not allow the brake pad lining to be completely worn off. Contact between a pad and a disc with completely worn-off lining will result in the need to replace the entire set, i.e., the pads and the brake disc. The pads are mounted in the brake caliper with a spreader, which maintains the appropriate distance between the pads and the brake disc. When the thickness of the pad lining is reduced to 0.5÷0.6 mm, the spreader will begin to touch the disc, which will result in a characteristic crackling sound during braking. This is a clear signal to replace the pads. You can visually assess the condition of the pad linings. When you notice significant wear, the pads should be dismantled, and the lining thickness should be measured using a caliper tool. If the thickness is 0.5 mm or less, the pads should be replaced. The measurement method of pad thickness is demonstrated in Figure 28. Each time the pads are replaced, we recommend replacing the fluid in the hydraulic system and bleeding air from it.



Fig. 28. Method of measuring the brake pad lining thickness

Under no circumstances should any abnormality in the operation of the braking system be ignored. Disturbing sounds coming from the area of the friction elements of the system during braking indicate their excessive wear. In this case, the system components should be immediately inspected and, if necessary, replaced. Deep sinking of the brake handles and a decrease in braking effectiveness may indicate air in the hydraulic system. In this case, the handcycle should be immediately delivered to a service center. Please note that on an XCR handcycle, the operation of the rear axle brake lever and front wheel brake lever is slightly different. The front brake works harder than the rear brake due to differences in the design and the capacity of hydraulic systems.

### **8.3. Adjusting the gear shift system**

The most commonly used planetary hub in the XCR handcycle is the 8 or 11-speed Alfine by Shimano. If the gear change becomes imprecise and the hub starts to pop characteristically, the setting of the calibration marks on the hub should be checked. In the case of an 8-speed hub, select gear no. 5, and in the case of an 11-speed hub, select gear no. 6 and check that the calibration marks on the selector mounted on the hub axle match. These are the two yellow lines. One is on the fixed element of the selector, and the other is on the rotating element. If they do not match, this should be corrected using the knob on the gear selection lever. Usually,  $\frac{1}{4}$  or  $\frac{1}{2}$  turn is enough. After correcting, it is best to go through the entire range of gears up and down, and then again select gear no. 5 for an 8-speed hub, and for an 11-speed hub, select gear no. 6, and then check the position of the calibration marks again. This operation should be repeated until the marks match as precisely as possible. If this does not help, the handcycle should be scheduled for maintenance in a service center.

After the first 500 km, in the case of an 11-speed hub, the oil should be replaced. This procedure should be repeated regularly every 3,000 km. You can easily buy a dedicated kit for this task on the market, consisting of the appropriate tools and oil, with detailed instructions. If the user does not feel confident to perform this procedure on their own, the handcycle should be scheduled for a visit to a service center.

#### **8.4. Chain maintenance and chain elongation**

The chain in the handcycle drive stretches during use, and this phenomenon should be monitored to maintain the good condition of drive components. Chain elongation is checked by a special tool, for example, the one shown in Figure 29. A chain elongation of 0.75% qualifies it for immediate replacement, while if the chain elongation reaches or exceeds 1%, the chain and all its chainrings must be replaced. Replacing the chain on time will significantly reduce the frequency of chainring replacement.



Fig. 29. Tool for measuring chain elongation.

The life of the drive is greatly increased by periodic cleaning and maintenance with dedicated tools and substances, which are widely available on the market. The chain and chainrings should be roughly cleaned and then lubricated with dedicated oil every 50-70 km, while the drive should be thoroughly cleaned and lubricated every 200 km. If the handcycle was used in difficult conditions, on surfaces that cause the drive to become dirty quickly, cleaning should be performed immediately after the ride.

#### **8.5. Inspecting tires**

The basic parameter controlled by the handcycle user is the wheel air pressure. The permissible pressure range at which the tire can operate is indicated by the tire manufacturer on its side profile (Figure 30).



Fig. 30. Tire marked with the permissible pressure.

Tire pressure should be higher when riding on hard surfaces (asphalt, concrete, etc.). When driving on looser surfaces (forest roads, trails, sand), tire pressure should be lowered. It is not possible to provide exact values of the pressure parameter here for every surface on which the handcycle will be used. It is strictly dependent on the weight, preferences, and experience of the user.

Tires should also be checked for mechanical damage. The obvious case is lack of air, which suggests a puncture in the inner tube and the need to repair it. Another issue is damage in the form of tread defects or visible tire deformations. These defects indicate tire surface damage, and the only way to repair them is to replace the tires with new ones. It is not necessary to remove the wheels from the handcycle for repairs or during rear wheel tire replacement. The front wheel, however, must be removed to repair or replace the tire. To make the task easier, the chain connecting the hub with the electric motor gear can be unfastened by opening the clasp.

### **8.6. Checking for slack in the fork steering system**

At the initial stage of using the handcycle, the headset slack should be checked as often as possible, every 30-40 km. It is best to do this with two people. The handcycle should be set so that the front wheel is a few centimeters above the ground. The easiest way to do this is to place a suitable-sized object under the frame in the place shown in Figure 31 (e.g., a toolbox). This object must be high enough to lift the front wheel off the ground.





Fig. 31. Place an object here to check the headset slack.

It is a good idea to remove the steering limiter to check the slack in the headstock bearings (HX6 Allen key). To do this, one person should control the position of the fork as if it were riding straight ahead. Then, the second person, after removing the steering limiter, presses the frame towards the ground with both hands, stabilizing it, and the person controlling the fork position moves it alternately up and down in short movements, trying to feel the slightest slack in the headset. If any, it should be eliminated by following the description starting under Figure 5 in section “7.3.1. Front fork assembly”.

## 8.7. Electric assist maintenance

The customer will receive the handcycle with or without a battery depending on the conditions set out in point 7.1. in chapter 7. If the handcycle is delivered without a battery, the customer is obliged to purchase a battery dedicated to the motor installed on the handcycle.

The basic battery maintenance performed by the user is charging, depending on energy consumption during driving. Please note that the battery charge level naturally decreases when the handcycle is not in use. The battery should not be excessively discharged; therefore, it is recommended to perform preventive charging once a month when the handcycle is parked, which will protect the battery against a decrease in its capacity and severe damage. The number of charging cycles also influences the battery capacity. The more times the battery is charged, the smaller its capacity will be. This is a completely normal phenomenon that should be considered because as the mileage of the handcycle increases, the range of electric assist will decrease.

Only a dedicated charger should be used to charge the battery. It is a good idea to remove the battery from the handcycle when charging and charge it in a closed, well-ventilated, dry room that is inaccessible to children and pets. Do not approach the battery with an open flame.

Apart from charging, the battery is maintenance-free. It is forbidden to disassemble it and attempt to modify it in any way. The same applies to the charger.

A crucial factor affecting battery performance is the ambient temperature. The battery rapidly loses its efficiency at temperatures below 5°C, and elevated temperatures on hot days negatively affect its operation. This phenomenon is directly felt by a noticeable decrease in the range of electric assist.

Apart from the influence of the ambient temperature, the battery heats up during operation, which is a direct result of using the device. Under no circumstances should the battery heat up to a point where it cannot be touched with a bare hand. This phenomenon indicates damage to the battery cells.

For safety reasons, the battery must not be stored in closed rooms with limited ventilation on hot days, as it may spontaneously combust.

When washing the handcycle, remove the battery and make sure that the drive and all electrical connections remain dry. Since the handcycle has electric assist, it should not be cleaned with high-pressure washers.

## **8.8. Periodic inspection of the handcycle**

To detect irregularities in individual handcycle components as early as possible, before each ride, you should check:

- the correct operation of the braking system;
- the centering of the wheels;
- tire pressure;

After driving 500 km or every month, the following should be checked:

- spoke tension;
- chain elongation;
- tire wear;
- thickness of brake pad and brake disc linings;
- frame for mechanical damage.

After 3,000 km or every 6 months, the handcycle should be checked by an authorized service center.

## **8.9. Cleaning the handcycle**

To keep your handcycle in good technical condition, you need to take care of both its mechanical and aesthetic aspects. There are many cleaning agents and tools from various

manufacturers available on the market, dedicated to cleaning handcycles. The choice of cleaning agents for individual elements is left to the user. Most of these substances require rinsing after use, and in the case of the XCR handcycle, one rule must be strictly followed. The use of any high-pressure washers is completely prohibited for rinsing and other stages of cleaning. Wetting the vehicle before thorough cleaning and rinsing should be done with running water, e.g., from a garden hose, the flow of which can be regulated using an appropriate tip.

The handcycle should not be sprayed with copious amounts of water. Another way to wet and rinse off dirt is to use a plant sprayer. This is a particularly good solution that allows for effective rinsing of the cleaning agents and, at the same time, does not cause too much water to be sprayed onto the handcycle.


## 8.10. Tightening torques for threaded connections

Tab. 1. List of tightening torque values for individual threaded connections

Tightening torque values for threaded connections		
Part name	Connection	Value [Nm]
Fork arches	M6 screw	10 - 12
	Ahead-type steering - M6 central screw	10 - 12
Fork footrest clamps	M5 screw	6 - 8
Drive cranks	M8 screw	38 - 42
Drive crank handles	Aluminum axle with M10 thread	25
Brake levers, gear shift levers	Brake lever clamp M5screw	6 - 8
	Alfine gear shift lever clamp M5 screw	6 - 8
Brake discs	Disc to hub connecting screws	6
Rear wheel	M20 aluminum wheel axles	40
Front wheel	Alfine hub axle M10 nuts	40
Brake calipers	Screws connecting the clamp adapter to the brackets in the frame and fork	10 - 12
	Screws connecting the clamp to the adapter	10 - 12
Battery base	M5 screw	6 - 8
Backrest support clamp	M5 screw	6
Backrest supports	M6 screw	10 - 12
Flag grip	M5 screw	6 - 8

If the manufacturer's tightening torque values are specified on the parts and they differ from those given in the table above, use those provided by the part manufacturer.

## 9. WARRANTY CARD

<b>Warranty Card</b>	
 <b>XCR</b> WWW.SPORT-ON.COM	
<b>Dealer</b>	
Stamp and signature of the Dealer	
Handcycle Model	
Manufacturing Year	
Date of Sale	
Frame Serial Number	
<b>Customer</b>	
Name	
Residence Address	
Telephone, E-mail	

## 10. WARRANTY TERMS AND CONDITIONS

The handcycle is covered by a 2-year warranty, counted from the date of delivery to the end customer.

If the handcycle was purchased from a distributor, after riding the first 100 km or after the first 30 days of use, it should be returned to the place of purchase for warranty inspection (paid inspection). This will help to remove any defects resulting from parts breaking in and improve the adjustment of components that require it. Failure to perform this inspection may result in defects that the warranty will not cover.

If the end user assembled the handcycle, the inspection should be carried out in accordance with the guidelines contained in chapter “8. *MAINTENANCE*”.

### **Warranty terms and conditions:**

1. The manufacturer guarantees delivery to the distributor or end user of a handcycle that has been assembled and tested before shipment.
2. The manufacturer guarantees the delivery of the equipment without any paint or mechanical damage to individual parts of the handcycle, excluding damage occurring during transport.
3. To submit the handcycle for warranty repair, the equipment should be washed, and any additional equipment installed by the user should be removed. A completed warranty card and proof of purchase must be provided with the handcycle.
4. Warranty for individual components, such as drive parts, brake system parts, etc., are subject to the warranty conditions of the manufacturer of the individual part.
5. The warranty remains valid only if the vehicle is used as intended, i.e., for the purposes described in *Section 2* of the manual.

### **The warranty does not apply if:**

1. Damage to the paint or any component occurred during the assembly of the handcycle by the distributor or end user.
2. The failure or damage to the handcycle occurred due to the use of the product outside of its intended purpose, unprofessional repairs, storage of the handcycle without protection against unfavorable weather conditions, or due to an accident.
3. The defect covered by the warranty was reported after the warranty period expired.
4. The product was not properly maintained and used without adhering to the manual.
5. When submitting the handcycle for warranty repair, a properly completed warranty card and proof of purchase have not been provided.

6. The defect resulted from normal wear and tear of parts.
7. Modifications to the structure that constitute independent interference by the owner have been found (replacement of handcycle components resulting in a change of frame geometry, wheel track, or change in loads on individual parts).
8. The fault has not been reported immediately after it occurred.
9. Unprofessional repairs have caused damage or caused threads to break off.
10. The paint was damaged during repairs or while using the handcycle, e.g., a chip caused by a stone thrown from under the tire.
11. Damage (dents, bends) to the frame and wishbones occurred as a result of hitting an obstacle.

## **11. SUMMARY**

The user manual contains all the information needed to assemble the handcycle after its delivery to the customer. It is especially important to follow point 4 of this manual before your first ride. To reduce the wear and tear of parts, to use the handcycle properly, to ensure your safety, and to maximize the period of failure-free riding, you must strictly follow the instructions contained in section “8. *MAINTENANCE*”. For spare parts, technical support, and warranty service, please contact the distributor or handcycle manufacturer.

## **12. CONTACT**

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