



USER MANUAL
HANDCYCLE ASSEMBLY AND MAINTENANCE



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1. GENERAL INFORMATION

This manual contains information on how to assemble the Explorer, Explorer Ultimate, and FAT Explorer handcycle after delivery at the dealer's or at the 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., shock absorbers). 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 chapter "*4. SAFETY*" 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 OF THE HANDCYCLE

The basic condition for ensuring the long life and failure-free use of the handcycle is to use it as intended. Explorer was designed for medium-difficulty terrain. The main idea behind this project was to enable access to places that were previously inaccessible due to the user's physical limitations. This handcycle allows the user to ride on mountain trails and the beach. However, it has limitations. This model cannot be used for riding in 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. WEIGHT OF THE USER AND TOTAL HANDCYCLE WEIGHT

The Explorer handcycle was designed for users whose weight does not exceed 80 kg. The total weight of the handcycle with the user and paraphernalia should not exceed 150 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 the manual in chapter “8. *MAINTENANCE*”. 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 your 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 unsecured and unattended. The handcycle can be used by children and people who are not the primary user only under supervision and after receiving training in the safe use of the handcycle and riding it in difficult terrain.

5. RIDING THE HANDCYCLE ON PUBLIC ROADS

The Explorer 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 main frame with assembled front suspension; steering system; brake system with completed bleeding; adjusted shifting gear system; electric motor with cranks and pedals or a Schlumpf bottom bracket axle with cranks and pedals (depending on the order); chain connecting the motor or bottom bracket chainring with the intermediate gear; rear suspension shock absorber attached; and footrests attached to the frame;
2. Wishbone with axle, mounting bolts, and intermediate gear;
3. Chain connecting the intermediate gear with the rear wheel hub (chain length chosen to fit a Rohloff hub);
4. Rear wheel with hub, axle, washers, and nuts necessary for assembly;
5. Seat with support;
6. Battery base;
7. Front wheel axles with screws;
8. Front wheels;
9. Front wheel brake discs;
10. 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 Explorer components:

1. 1 x 13 mm combination spanner;
2. 1 x 15 mm combination spanner;
3. 1 x TX25 torx spanner;
4. 2 x HX6 Allen key;
5. 2 x HX5 Allen key;
6. 1 x HX4 Allen key;
7. 1 x electrical cable cutter.

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



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



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

7.3. Assembling the components

7.3.1. Attaching the front wheel brake discs

The brake disc should be attached with screws that can be found in the package in the corresponding holes of the front wheel hub. Unscrew the screws from the hub. Adjust the disc so the holes in the disc and the hub are overlapping. The inscriptions and the arrow showing the direction of rotation on the disc should be visible (face up) during the assembly of the right wheel disc. The inscriptions on the left wheel disc should not be visible during assembly (face down). The spokes on wheels have attached a piece of tape with the inscription “L” for the left wheel and “R” for the right wheel. Using a TX25 torx spanner, connect the disc to the hub by tightening the screws with a torque of 6 Nm. The method of assembling the components is shown in Fig. 3.

7.3.2. Threading the front chain

Since the intermediate gear had to be disassembled for transport, the chain connecting the engine chainring and the gear was attached with zip ties to the cables to avoid movement during transport. In critical points, the frame is protected against damage that could be caused by the chain. To assemble the chain in its operating position, cut the zip ties with an electrical wire cutter. Remove the cardboard frame protectors as well. The next step is to remove the axle from the rear wishbone, along with the intermediate gear, washers, and the spacer bush. The screws securing the axle in the wishbone are lightly tightened for transport, but unscrewing them may require the use of tools such as two HX6 Allen keys. This is because of the dry assembly glue placed on the threads. The axle with washers, intermediate gear, and spacer bush should be mounted on the frame in the order shown in Figure 4.



Fig. 3. Attaching the brake disc to the wheel hub

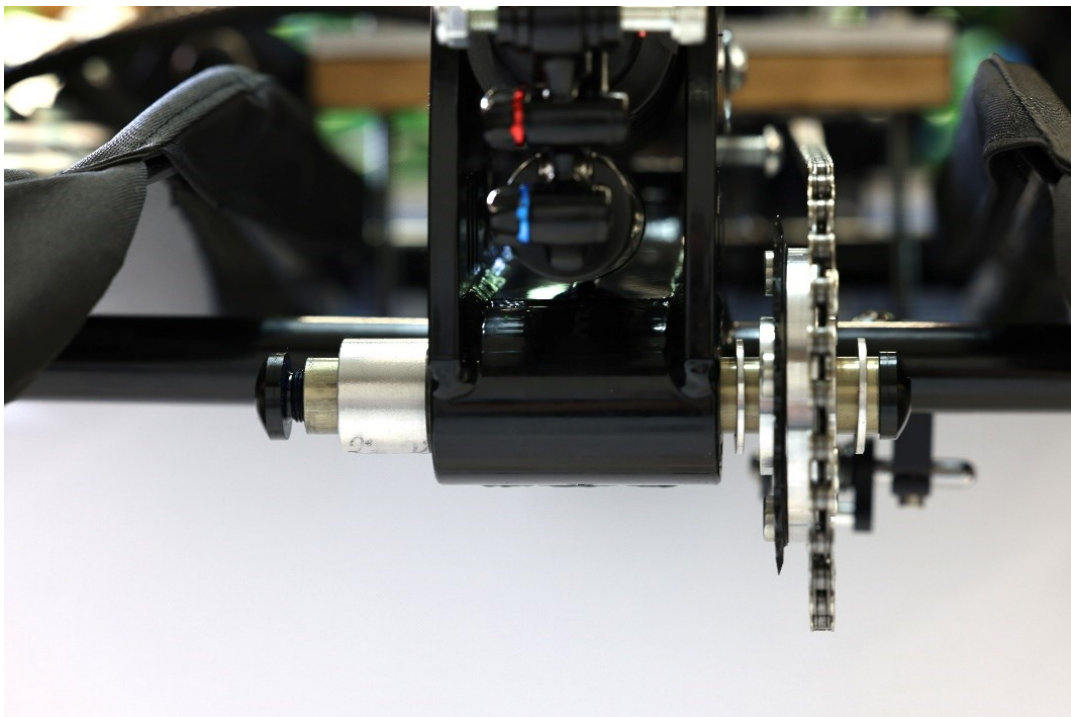


Fig. 4. Order of assembly of the rear wishbone axle, intermediate gear, washers, and spacer bush

The front chain should be threaded onto the outer chainring of the intermediate gear, as shown in Figure 4. Take special care to ensure that the larger chainring of the gear is mounted

on the outer side. The threading of the front chain should be combined with the assembly of the rear wishbone, as described in point 7.3.3.

7.3.3. Attaching the rear suspension wishbone

The mounting holes for the wishbone's rotation axle are very precise. Start mounting the wishbone by inserting the axle into the hole on the right. The axle should have a screw on the right side. Next, add the washer, intermediate gear, and another washer, which should be placed between the gear and the bearing embedded in the handcycle frame (the order of assembly is shown in Figure 4). The whole set should then be placed at its mounting site, and the wishbone axle should be inserted into the bearings embedded in the frame. Stop inserting the axle when it aligns with the outer surface of the bearing on the left side. Place a spacer bush in the space between the wishbone and the bearing, and then insert the axle until the screw attached to it on the right side rests against the wishbone. Then tighten the screw on the left side and tighten the whole thing with a torque of 40-50 Nm. The method of assembling the wishbone is shown in Figure 5.

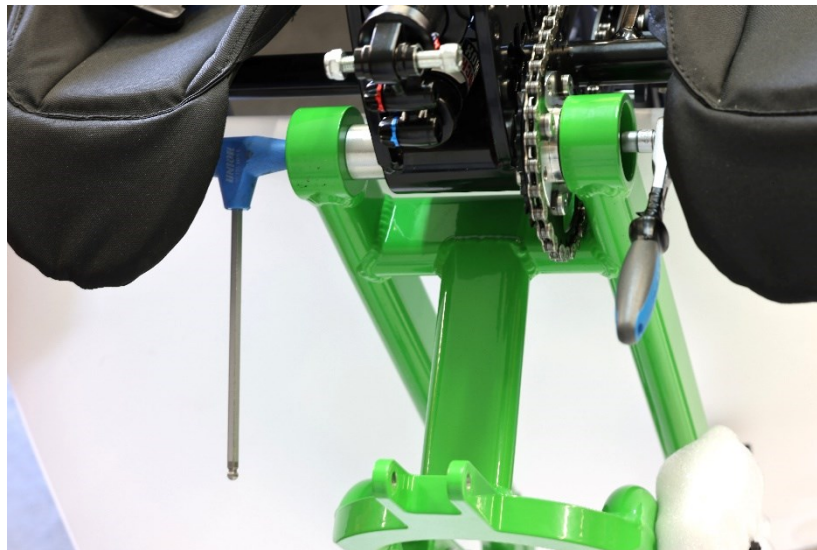


Fig. 5. Assembling the rear suspension wishbone

7.3.4. Connecting the rear suspension shock absorber with the wishbone

The rear suspension shock absorber is bolted to the mounting points on the main frame with the appropriate tightening torque for assembling the handcycle at the factory. After assembling the wishbone, screw it to the shock absorber axis with a 13mm open-ended spanner and an HX6 Allen key. The tightening torque for this connection is 20-25 Nm. The threaded connection is shown in Figure 6.



Fig. 6. Threaded connection of the rear suspension shock absorber axis with mounting points in the wishbone

7.3.5. Attaching the rear wheel

The next stage of assembling the handcycle is mounting the rear wheel. To make this operation easier, you should place a stable support about 40 cm high under the rear suspension wishbone axle. The wheel should be pushed into the wishbone hooks until it stops (Figure 7). Finally, tighten the wheel mounting bolts with a 15 mm combination spanner. The tightening torque of the bolts is 40 Nm.



Fig. 7. Attaching the rear wheel to the wishbone hooks

7.3.6. Attaching the seat

Mount the seat after attaching the rear wheel. The Explorer handcycle is designed to allow the seat to be mounted in 9 different positions. It is an individual matter for the user which seat position will be the optimal one. Assemble the seat using four M8 ball head screws, screwed into the seat bracket sockets with an HX6 Allen key, as shown in Figure 8.

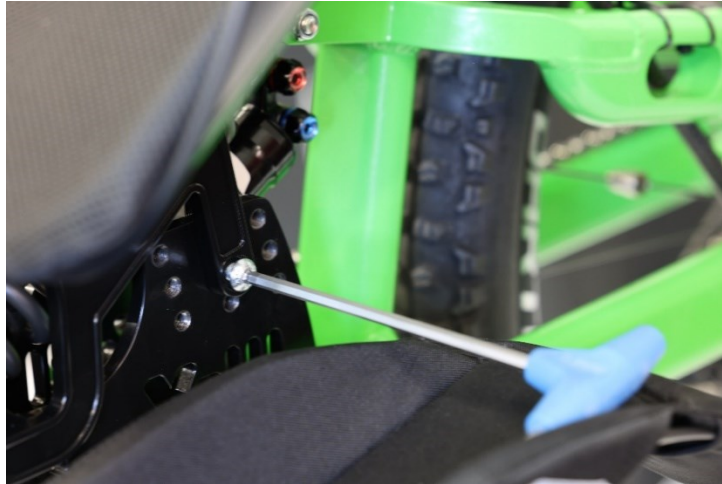


Fig. 8. Mounting the seat – tightening the rear bracket mounting screw

The seat is assembled similarly on both sides of the handcycle frame. The screws should be tightened to a torque of 25 Nm. The rear brake caliper cable, speed sensor cable and gear shift cables should be placed on the inside of the seat brackets.

7.3.7. Attaching the rear wheel brake caliper

The brake caliper and the adapter were removed for transport together. This increases the likelihood of not having to adjust the position of the brake caliper relative to the disc after mounting. Mounting the brake caliper begins by removing the spacers from between the brake pads. These are the yellow elements visible in Figure 9. The color and shape of the spacers may vary depending on the brake caliper manufacturer.

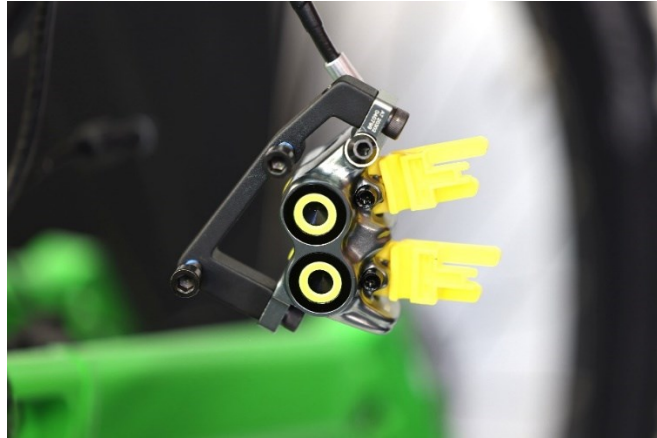


Fig. 9. Removing brake pad spacers

Afterward, mount the clamp as shown in Figure 10 and tighten it with an HX5 Allen key, with a tightening torque of 8 Nm.



Fig. 10. Attaching the rear brake caliper

Figure 11 shows a properly installed brake caliper. To check if it is in the correct position relative to the disc, spin the wheel and listen to the rhythmic sound of friction. If this occurs, you should visually assess which brake pad is rubbing against the disc. Then, correct the position of the brake caliper in relation to the disc by loosening the screws connecting the brake caliper with the adapter and moving it slightly so that the distance between the pad rubbing the brake disc and the disc increases, and then tighten the screws again with a torque of 8 Nm. This requires patience and may need to be repeated several times to achieve the desired effect.



Fig. 11. Rear brake caliper after mounting

7.3.8. Connecting the speed sensor

After the rear brake caliper, the next element to be assembled is the speed sensor. The connection cable is interlaced with the rear brake hydraulic cable. Finding the right plug should not be a problem. The cable plug fits into the sensor socket only in one position, so do not use force when connecting them. When the plug partially enters the sensor socket, use the nut built on it to complete the connection and tighten it until you feel the first resistance in the socket, using only the strength of your fingers. The correct plug is shown in Figure 12, while Figure 13 shows the connected speed sensor.



Fig. 12. Speed sensor plug



Fig. 13. Properly connected speed sensor

7.3.9. Connecting the gear selector mechanism

This manual contains the gear selector connection method for the Rohloff 500/14 hub. To position the selector correctly, you should ask a second person to help you hold the gear selection lever in position 14. Use a size 8 open-ended spanner to set the mechanism on the hub to the extreme left position, and after removing the spanner, place the selector carefully. These elements should be gently adjusted together, bringing the surface of the selector and the hub mechanism into contact. Lastly, tighten the screws of the selector with a flat screwdriver to a torque of 3 Nm. Then, check whether the full range of gears is available by turning the lever to position 1 and then back to 14. If you can easily select each gear, then the mechanism is properly assembled. Figure 14 shows the selector mechanism before connecting it to the hub. The correct positioning of the selector mechanism in relation to the hub and wishbone after installation is shown in Figure 15.



Fig. 14. Gear selector before connecting to the hub mechanism



Fig. 15. Location of the selector in relation to the hub and wishbone after completing the connection

7.3.10. Placing gear shift, speed sensor, and rear brake cables

To avoid tangling the speed sensor, rear brake, and gear shift cables in the wheel or tangling in the user's body during riding, use electrical cable ties to attach the cables to the frame, as shown in Figures 13 and 15. The bundle with speed sensor and brake should be attached to the upper wishbone, while the gear shift cable should be attached to the lower wishbone. Any excess ties remaining after tightening should be cut off.

7.3.11. Threading the rear chain

After properly fixing and connecting the cables at the rear of the handcycle, the next step is to thread and fasten the rear chain. The manufacturer selected the chain length, and the pin, so they should not need adjusting. It should be threaded along the internal chainring of the intermediate gear (Figure 16) and then through the rear hub chainring (Figure 17).

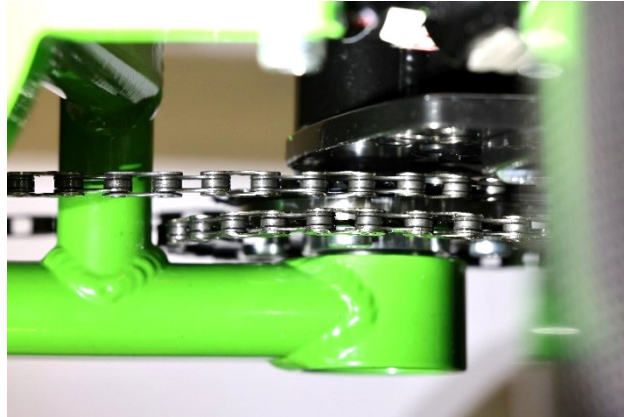


Fig. 16. Threading the rear chain (the inner chainring is smaller)



Fig. 17. Threading the rear chain through the hub chainring

Next, thread the chain through the rear tensioner, as shown in Figure 18.



Fig. 18. Threading the chain through the tensioner

Finally, the end links of the chain (Figure 19) should be connected with a clasp, as seen in Figure 20. Use a clasp opening tool to help.



Fig. 19. Fastening the rear chain connecting the intermediate gear with the rear hub

After placing the pins of the clasp in their sockets, stretch the chain on both sides until the pins enter their nominal position. You should hear a characteristic click. The properly attached, closed clasp can be seen in Figure 20.

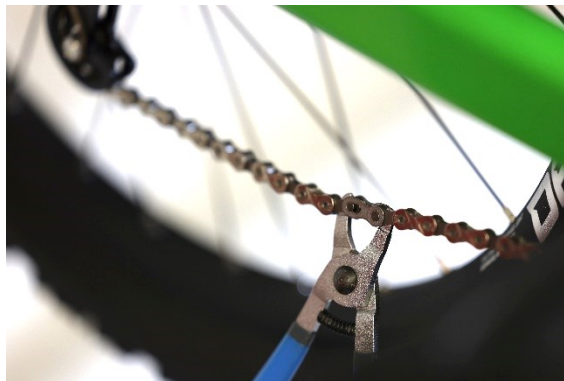


Fig. 20. Chain clasp after fastening

7.3.12. Attaching the front brake calipers

The front brake calipers are mounted similarly to the rear brake calipers. They were also prepared for transport in the same way - the brake caliper was removed together with the adapter to eliminate the need to adjust its position in relation to the brake disc during assembly. Mount the brake caliper by attaching it to the steering knuckle using the provided mounting screws and then removing the spacers between the brake pads. The screws are tightened using an HX5 Allen key. The tightening torque is 8 Nm. The brake caliper should be mounted on the outer side of the steering knuckle, on both the left and right sides. The front brake caliper is shown in Figure 21.



Fig. 21. Mounting the front brake caliper

7.3.13. Attaching the front wheels

The front wheels are mounted using thru-axles and two screws per wheel. To properly assemble the wheel, you need two HX6 Allen keys. The wheels should be tightened with a torque of 40 Nm. During assembly, pay special attention to the moment when the brake disc is inserted between the pads of the brake caliper. Be careful while completing this step, and keep the wheel stable to protect the disc from bending. The method of assembling the wheels is shown in Figure 22. The assembly method is the same for the left and right wheels.



Fig. 22. Front wheel assembly

7.3.14. Adjusting the chest support

The handcycle was equipped with a double steering system. The goal was to allow the user to steer the handcycle while powering it with the cranks. Normally, changing the driving

direction is done via the handlebars, but when the hands are busy turning the cranks, the driving direction is set via the chest support. The user tilts the support cushion with their torso to steer the handcycle in the desired direction. The support can be set in 6 different positions. During the first ride, the user should select the optimal position for themselves. The position of the support is locked with the double-sided handle shown in Figure 23 by tightening the screws using a HX4 Allen key. The tightening torque of the screws is 8 Nm. During assembly of a handcycle, it is best to place the support in the position closest to the handlebar to enable the next step, which is assembling the battery base.



Fig. 23. Adjusting the chest support position (the locking screw is marked on the picture)

7.3.15. Attaching the battery base

The battery base is mounted to the frame with two screws and an HX4 Allen key. The screws needed to attach the base are threaded lightly into the frame. Before assembly, unscrew them and connect the electric cable of the battery base as shown in Figure 24. Wrap the connected cable under the base and position it so that it touches the front cord guide. Then, tighten it with a max torque of 5 Nm, as shown in Figure 25.

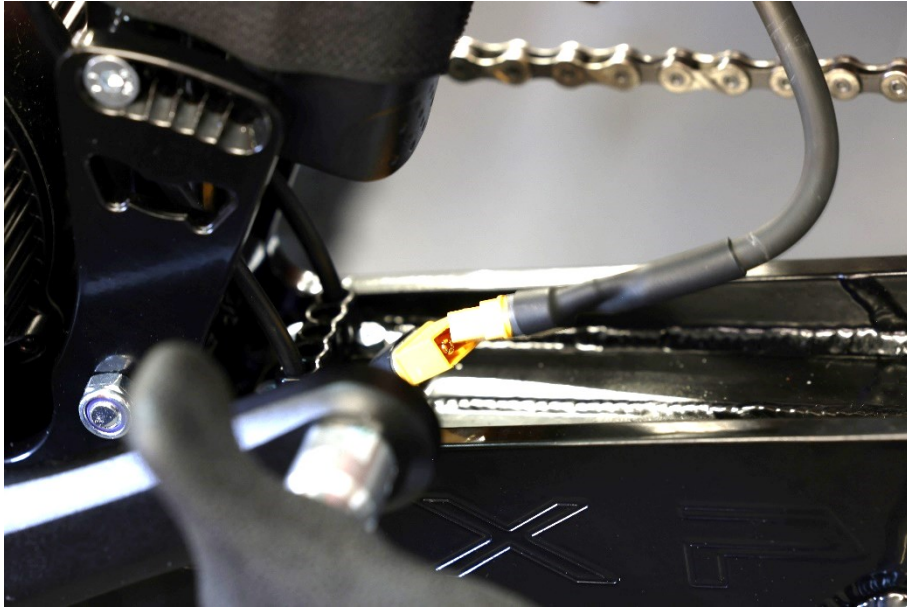


Fig. 24. Connecting the electric cable of the battery base



Fig. 25. Attached base with the cable placed underneath

7.3.16. Mounting the battery

After installing the base, place the battery so that the protrusions of its housing would fit into the appropriate protrusions in the base. Then, using only your hands, press the battery so that any gaps between its housing and the base are eliminated. The battery should be secured against sliding out by turning the key to the “closed” position. Figure 26 shows the final result – the Explorer ready for its first ride.



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

8. MAINTENANCE

8.1. Inspecting screws and bolts

After assembling the handcycle, but before the first test ride, check all screws and bolts, except the screw in the upper cover of the steering column bearing, as seen in Figure 27.



Fig. 27. Steering column tightening screw

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 28.



Fig. 28. Method of measuring the brake disc thickness

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 29. Each time the pads are replaced, we recommend replacing the fluid in the hydraulic system and bleeding air from it.



Fig. 29. 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 Explorer handcycle, the operation of the front axle brake lever and rear wheel brake lever is slightly different. The rear brake works harder than the front brake due to differences in the design and the capacity of hydraulic systems.

8.3. Adjusting the gear shift system

The Rohloff hub, which is used in Explorer, is controlled with two cables, and in its case, the problem of misalignment is extremely rare. If it does occur, the hub should be adjusted by an authorized handcycle service center. Please remember that the manufacturer of Rohloff hubs recommended periodic oil changes. This task should be performed by an authorized service center. The replacement interval for Rohloff hubs is 5000 km.

8.4. Chain maintenance and chain elongation

The chains in the handcycle drive stretch 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 30. 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. 30. 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, muddy terrain or other surfaces that cause the drive to quickly become dirty, 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 31).



Fig. 31. 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 front wheel tire replacement. The rear wheel, however, must be removed to repair or replace the tire. To make the task easier, the brake caliper can be disassembled by detaching it with the adapter (HX5 key) and unfastening the chain connecting the hub with the intermediate gear by opening the clasp (chapter 7.3.11).

8.6. Checking for slack in the steering system

Due to the high level of complexity of the steering system in the Explorer handcycle, frequent inspection of its components is required. The system should be checked for loose ball joints used in its construction, slack in the steering column bearings, and threaded connections. Two people are required to check for slack in the steering column ball joints. One person should hold the handlebars tightly in the straight-ahead position, and the other person should grab the wheel with both hands at the extreme points of its horizontal axis and move it, trying to turn it alternately left and right. These movements should be short and quick. If there is slack, the wheel will cover a certain small distance before its movement begins to be transferred to the handlebar. If you feel any looseness, one person should make quick and short turns of the steering wheel in both directions. The second person should block the movement of one of the wheels with one hand and, with the other hand, touch the outer and then inner joint of one of the steering handles to feel which of them is loose. The joints are shown in Figure 32. The task should be performed separately for each front wheel.

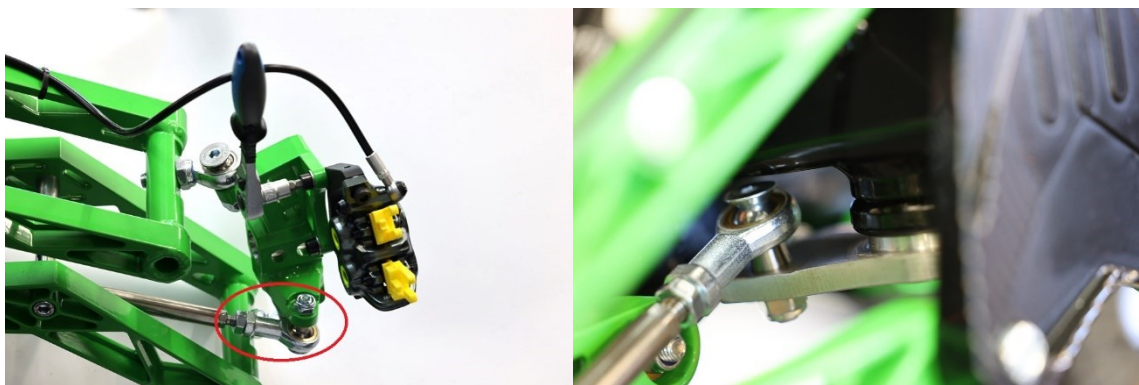


Fig. 32. Steering handle joints: external on the left, internal on the right

Slack may also occur at the threaded connection between the ball joint and the handle mounting socket in the steering column. It may also appear in the threaded connection between the ball joint and the handle mounting socket in the steering knuckle. In both cases, this slack

should be removed by tightening the screws using a 13 mm open-ended spanner and an HX5 Allen key with a torque of 20-25 Nm. If the diagnosis shows that a ball joint is worn, then it must be replaced. Since after replacing the ball joints of the steering handles, it is necessary to adjust the wheel alignment of the front axle, this repair should be performed at a service center.

One person is enough to check for slack in the steering column bearings. The steering column bearing system is directly transferred from traditional two-wheeled handcycle designs. It is the most popular Ahead-type control system.

To inspect for any slack in this system, press the front axle brake handle as far as it will go, and then, while holding it, move the handlebar alternately forward and back. If something is loose, you will hear characteristic knocking noises, and you will feel it through your hands. This slack can be eliminated by loosening the screws on the stem clamp. The screws are shown in Figure 33.



Fig. 33. Stem clamp screws

Next, tighten the screw in the top cover of the stem, shown in Figure 34, by turning it $\frac{1}{4}$ turn.



Fig. 34. Top stem cover screw

The next step is to re-tighten the screws in the stem clamp with a torque of 6-8 Nm. After completing the steps described above, check for slack in the steering column again. If it still exists, the entire procedure must be repeated, but you must tighten the screw in the cover by $\frac{1}{8}$ turn. Repeat the procedure until you cannot feel any more slack in the steering column.

8.7. Inspecting, maintaining, and adjusting the handcycle suspension

8.7.1. Front suspension

The front suspension of the Explorer handcycle consists of many elements and its operation depends strictly on the efficiency of each of them. Wishbones should be checked first, specifically their connections to the frame and steering knuckle. Wishbones are connected to the frame via slide bearings. The self-lubricating sliding bushes with a Teflon coating of the bearings are prone to wear. When the bushes are 100% functional, the only movement the wishbone makes at this connection point is rotation. The wear of the bushes will result in lateral movements of the wishbone relative to the axis of symmetry of the frame. This slack should be diagnosed by two people. For a more accurate assessment, detach the shock absorber from the upper mounting point. Then, one person should grab the front wheel at the extreme points on the vertical axis and move it, pushing the upper point away and pulling the lower one and vice versa. The movements should be quick and short. The second person should place their hand on each point where the wishbone is attached to the frame. If there is slack in any of the connections, it will be felt through their hands. There are two sliding bushes for each pivot point of the wishbone.

If wear is detected in one of the bushes in the connection, both should be replaced. To select the right parts, contact the dealer or handcycle manufacturer.

The second option causing slack in the connection between wishbones and the frame may be loose bolts. The bolts should be checked with an HX6 Allen key, a 13 mm open-ended spanner, and a 13 mm socket spanner in the case of the two lower wishbone connections. The tightening torque of these bolts is 25 Nm. The connection points between the front upper wishbone and the frame are shown in Figure 35.



Fig. 35. Bolts connecting the upper wishbone to the frame

The ball joints connecting the upper and lower wishbones with the steering knuckle, shown in Figure 36, should be checked in the same way as the sliding bushes.

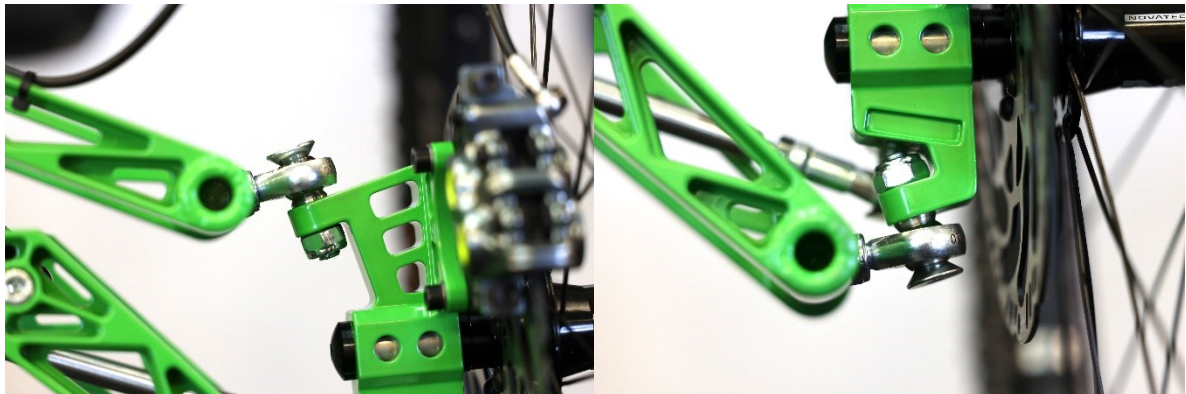


Fig. 36. Joints connecting the wishbones with the steering knuckle: the upper joint on the left, the lower joint on the right

If slack is found in any of them, it should be assessed whether the joint itself is worn out or whether the threaded connection is loose. If the joint is worn, it should be replaced immediately, and if slack is found in the threaded connection, the bolt should be removed using a 17 mm open-ended spanner and an HX6 Allen key and tightened with a torque of 25 Nm. Dirt accumulating on the spherical surfaces of the joints should be cleaned with a soft cloth. You

should protect the cleaned surface by spreading a drop of oil on it to preserve and protect it against weather conditions.

An extremely important parameter that should be maintained is sag, i.e., how much the suspension shock absorbers settle under the weight of the user. This parameter is adjusted by increasing or decreasing the pressure in the shock absorber's air chamber. This is accomplished with an appropriate pump, an example of which is shown in Figure 37. Be careful not to exceed the permissible pressure specified by the manufacturer. Its value is marked on the housing of each shock absorber.



Fig. 37. Pump for regulating the pressure in shock absorbers

The pump should be screwed to the valve in the shock absorber, which is shown in Fig. 38.

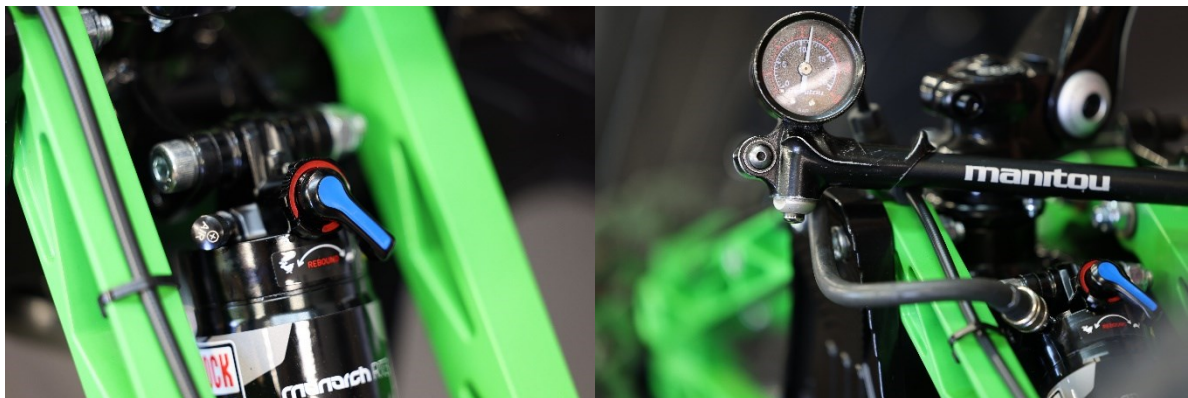


Fig. 38. On the left, a shock absorber valve with the cover marked "AIR". On the right, a pump connected to the valve

The setting should be checked by taking the riding position on the handcycle. A band mounted on the shock absorber piston is used to read the sag value (Figure 39).



Fig. 39. Adjusting sag in the Explorer handcycle

Sag in the front shock absorbers of an Explorer handcycle should be set within 20÷25%. If the sag markings are on more than 25% after the user is in the riding position, the pressure in the shock absorber air chamber should be increased. You should adjust the pressure in the shock absorber chamber when the handcycle is unloaded, i.e., when the user is not sitting in the vehicle.

8.7.2. Rear suspension

The rear suspension of the Explorer model is not as complex as the front suspension. The inspections include the threaded connections of the wishbone and the axle; the wishbone and the shock absorber axis; and the slack transverse to the axis of symmetry of the main frame. Inspection for transverse slack should be performed by two people, with the rear wheel of the handcycle raised. One person should stabilize the main frame of the handcycle to prevent it from moving sideways. The second person should grab the rear wishbone with both hands, as close to the rear wheel axis as possible, and move it alternately left and right in short movements. If the wishbone shows any slack transverse to the longitudinal axis of the frame, check the threaded connections of the wishbone and its axis of rotation. If the bolts are tightened correctly and transverse slack persists, the wishbone bearings are worn. They must be replaced with new ones. If you have trouble determining the type of bearings, please contact your dealer or handcycle manufacturer. The threaded connections of the wishbone and the shock absorber axis should be checked in accordance with the guidelines in section 8.1. The method of tightening individual bolts and screws is described in section 7.3.

The rear suspension is served by a shock absorber with a mechanical spring. The initial deflection and hardness of the rear suspension are set with a nut on the outer shock absorber housing. The shock absorber spring tension is strictly dependent on the weight of the user and

their preferences. Adjustments should be made individually during the first test drives. Initially, the spring tensioning nut should be tightened so that after sitting on the seat, the shock absorber piston rod slides approx. 10 - 15 mm into its housing. You can start a test drive with this setting and make corrections as you go.

8.7.3. Shock absorber maintenance

Due to the complicated structure of shock absorbers, it is strictly forbidden to carry out any repairs of any of these components yourself. Any defects should be repaired by an authorized service center. To prolong the failure-free operation of these parts, the user should wipe off any accumulated dirt after each ride and cover them with a thin layer of Technical Vaseline.

8.8. 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 engine and all electrical connections remain dry. Since the handcycle has electric assist, it should not be cleaned with high-pressure washers.

8.9. 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
- pressure in the shock absorbers
- frame and wishbones for mechanical damage.

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

8.10. 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 bicycles. 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 Explorer 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.

It is an exceptionally good practice to wipe the shock absorber piston rods after each ride to remove accumulated dust and other contaminants. It is best to do this with a dry microfiber cloth.


8.11. 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]
Handlebar stem	Steering column clamp - M5 screw	10-12
	Steering column clamp - M6 screw	14-16
	Ahead-type steering - M5 central screw	10-12
	Ahead-type steering - M6 central screw	14-16
Brake levers, gear shift levers	Brake lever clamp	6-8
	Rohloff shifter clamp	3
Brake discs	Screws connecting the disc to the hub	6
Rear wishbone	Wishbone rotation axis screws	40-50
	Screw connecting the wishbone and the shock absorber M8	20-25
Rear wheel	Wheel axle screws M10	40
Seat	Screws connecting the seat frame and the main frame	25
Brake calipers	Screws connecting the brake caliper adapter to the wishbone/steering knuckle	8-10
	Screws connecting the clamp to the adapter	8-10
Rohloff gear selector	Screw connecting the selector to the hub	3
Chest support	Bracket locking screws	8
Battery base	Screws connecting the base to the frame	5
Steering handle ball joints	Screw connecting the joint to the steering knuckle	20-25
	Screw connecting the joint to the steering column	20-25
Front wishbones	Screw connecting the wishbone to the frame	20-25
	Screw connecting the wishbone to the steering knuckle	20-25

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

Warranty Card	
	
Dealer	
Stamp and signature of the Dealer	
Handcycle Model	
Invoice number	
Date of Sale	
Frame Serial Number	
Motor Serial Number	
Battery Serial Number	
Customer	
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. 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 shock absorbers, 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 Chapter 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/or was 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 hook supporting the chain tensioner mounted on the rear hub has been damaged.
11. Interference with the shock absorbers exceeding the scope described in section “8. *MAINTENANCE*” has been found.
12. The paint was damaged during repairs or while using the handcycle, e.g., a chip caused by a stone thrown from under the tire.
13. Damage (dents, bends) to the frame, wishbones, and seat stay 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, ensuring 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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