



# CARBON DRIVE™

## Manual

for the Gates Carbon Drive™ System in use with

**Rohloff SPEEDHUB 500/14**



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# 1

## first steps

- **Congratulations!**
- **For your safety**
- **Proper handling of the Gates Carbon Drive™ belt**
- **Examples of improper handling**
- **Uncoiling the belt**
- **Examples of improper handling when mounting the drive belt**
- **Dismounting the rear wheel**
- **Mounting the rear wheel**

## Congratulations!

Thank you very much for choosing the Gates Carbon Drive™ System for your Rohloff SPEEDHUB 500/14 drive hub. This manual will provide you with all the information necessary for a carefree use of this innovative drive system. If you still have questions about the Gates Carbon Drive System after reading this manual, please contact your retailer or checkk [www.gatescarbondrive.com](http://www.gatescarbondrive.com) for further information.



### Please note

We ask you to read this manual thoroughly and completely before you remove the Gates Carbon Drive components from the packaging, start the installation of the components, or use a bike equipped with this drive system. Please follow all the instructions and steps in this manual carefully and keep the manual in a safe place for future reference.

## For your safety

Before you ride your bike, always check if the drive belt is properly adjusted and tightened, and if the sprockets are bolted down tightly. Also, check if the Snubber is mounted correctly. Improperly adjusted drive belts might come off the sprockets when you ride the bike. The sprockets and/or the Snubber can also loosen during the ride if they are not tightened sufficiently. Incorrect mounting of the drive system can cause accidents and severe injuries.

Please always follow all of the handling instructions for the drive belt, especially when you mount or dismount your rear wheel. This is where extra care is needed to avoid damaging the belt.

Make sure that body parts do not get between belt and sprockets. Also watch out for any clothing, like pant cuffs, that might become caught in the drive system. When you ride the bike, make sure that you wear appropriate functional clothing.

Please use only original parts and tools to ensure their compatibility.

Follow all of the specific manufacturers' instructions for installing and maintaining the components of your bike. Improper mounting and maintenance of components may cause severe injuries. Therefore, it is recommended to always have the components installed and maintained by a qualified mechanic.

Have your bike checked regularly for safety at a service center that is certified for the mounting and maintenance of the Gates Carbon Drive System and the Rohloff Speedhub 500/14.

After an accident, check your bike for damaged parts and damage to the drive system. If you cannot be sure that the parts are all damage free, replace the components in question.

Make sure that no other bicycle components or objects can come into contact with the Carbon Drive Belt or driveline of the bicycle when transporting the bike, e.g. in the trunk of a car, or whilst being transported with other bicycles on a ski-lift/gondola etc. Be especially careful when your bike is being transported with the rear wheel dismantled.

The Gates Carbon Drive System is only approved as a drive system for bicycles which meet the requirements mentioned in the chapter "Requirements for the frame". The Gates Carbon Drive System is not approved for use on tandem or multi-rider bicycles.

Universal Transmissions GmbH, CD Enterprises and Gates Corporation assume no liability for malfunctions or injuries caused by improper mounting or improper maintenance.

## Proper handling of the Gates Carbon Drive™ belt

After proper installation, the Gates Carbon Drive™ is an almost maintenance-free system. With correct mounting and handling, it does not require any re-tensioning or lubrication. However, great care should be taken to avoid damaging the carbon fiber cords in the belt when handling this product. Carbon fiber cords are able to absorb high levels of tensile force, but at the same time they are sensitive to bending loads, shearing forces, indentations and impacts. Even if the carbon fiber cords in the belt have a sheathing, the same attention given to other carbon products is required when handling the Carbon Drive™. Incorrect mounting or improper handling such as bending or twisting the belt may damage the carbon fiber cords inside the belt. A previously damaged belt may fail abruptly and unexpectedly during operation, which could result in accidents and severe injuries.



### Please note

The Carbon Drive System is not suitable for retrofitting bikes that have not been engineered, designed and built especially for the Carbon Drive system. Only the perfect interaction of Carbon Drive System, crank, bottom bracket unit, hub, dropouts, and frame gate, as well as suited clamping and guidance elements allow for a safe and correct operation. The manufacturer of the frame or bicycle is responsible for choosing the correct components and verifying their proper function/operation.

### **i** Please note

Please be aware that use of the Gates Carbon Drive system in ice and snow, can lead to the teeth of the pulleys becoming clogged. This can lead to the belt being pushed off of the pulley, or lifted up and ratcheting over it. Both of these possibilities could reduce the safe operation of the system. For this reason, the use of the bike in snow and ice should be avoided. The use of the system in clay based mud should also be avoided for the same reasons.

## Examples of improper handling

The following illustrations show examples for improper handling of the drive belt. The manipulation illustrated damages the belt. A belt which has been damaged due to improper handling may fail during operation and cause an accident, injury or inconvenience. It should be clear that a damaged or mishandled belt can no longer be used.



**Crimping**



**Twisting**



**Back bending**



**Inverting**



**Zip tying**



**Using as a wrench**



**Mounting the tensioned belt with a lever, and/or by rotating the cranks.**



#### **Please note**

Drive belt and sprockets do not need lubrication of any sort. For cleaning, use only water and a soft brush. Please do not use any type of detergent.

## **Uncoiling the belt**

To uncoil the belt, follow the instructions below. Improper uncoiling may cause permanent damage to the belt. It will never be necessary to violently pull the belt. Make sure that the belt is never bent to smaller diameters, as this might damage the carbon fiber cords inside the belt.



Hold the belt chest high in front of your body. Hold the outer coils with both hands.

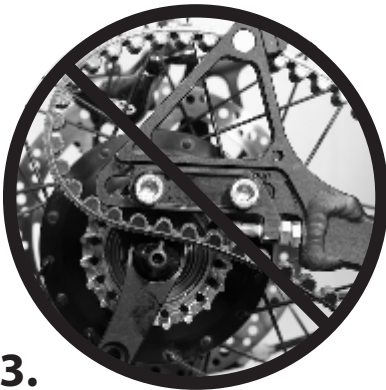


Move your hands away from each other slowly, until the belt uncoils on its own.



Now the belt is properly uncoiled.

## Examples of improper handling when mounting the drive belt







7.

1. Drive belt next to sprocket
2. Securing the belt with Zip ties.
3. Clamping belt in the dropout
4. Clamping belt behind the crank
5. Drive belt above Snubber wheel
6. Stepping on the belt
7. Clamping belt to the frame
8. Using pliers



8.



**Illustration 1:**  
**Before mounting / dismounting the rear wheel**

## Dismounting the rear wheel

To dismount the rear wheel, you need to follow the steps below one at-a-time. Separate the Rohloff SPEEDHUB500/14 shifter. Look up the procedure for your version of the hub in your Rohloff SPEEDHUB500/14 manual. Loosen the long torque arm (if used in your model) according to the Rohloff SPEEDHUB 500/14 manual. Push the Snubber wheel to the right latching position on the axle. (Illustration 1) Illustration 1: before mounting/ dismounting the rear wheel If applicable, unhinge the bowden cable of the rim brake. Loosen the quick release skewers or axle nut, and take the wheel from the dropouts. Remove the belt from the rear sprocket. Make sure you handle the belt carefully according to the instructions for proper handling of the belt.

## Mounting the rear wheel

Check the fit of the Snubber in the right latching position of the axle according to illustration 1 of the instructions for Dismounting the rear wheel. Hang the drive belt over the bottom bracket of the frame and follow the instructions for Mounting the Gates Carbon Drive Belt (start at step 4).

# 2

## mounting

- **Mounting the Gates Carbon Drive Belt**
- **Checking the belt tension**
- **Checking the belt tension using the Tension Tester**
- **Checking the belt tension without the Tension Tester**
- **Using the Snubber to keep the Gates Carbon Drive Belt from ratcheting**
- **Snubber assembly / Mounting the Snubber**
- **Removing the Snubbers**
- **Mounting the Gates Carbon Drive Front Sprocket**
- **Offset Kit**
- **Mounting the Front Sprocket at the crank adapter**
- **Dismounting the Front Sprocket**
- **Mounting the Gates Carbon Drive Hybrid Rear Sprocket M46x6**
- **Mounting the Rear Sprocket M46x6 to the Gates-Rohloff Carrier M46x6**
- **Retrofitting the rear sprocket to a Rohloff SPEEDHUB**
- **Retrofitting the rear sprocket to a Rohloff SPEEDHUB 500/14 with chain sprocket**
- **Removing the rear sprocket**
- **Removing the Gates-Rohloff Carrier from the Rohloff SPEEDHUB 500/14**
- **Removing the Gates-Rohloff Carrier from the rear sprocket**

## Mounting the Gates Carbon Drive Belt

The following steps describe how to mount the belt in a bike with already mounted sprockets. If your sprockets have not been mounted yet, please follow the instructions for Mounting front and rear sprockets first. If you have any difficulties with mounting the belt, the video at [www.gatescarbondrive.com](http://www.gatescarbondrive.com) will help you.



1. Open the frame break or 'gate' on the frame's rear triangle. Since this break may vary from one manufacturer to another, you'll need to follow the instructions of the manufacturer of your frame. In the following illustrations the frame is opened at the dropout. Insert the belt through the opening of the frame.



2. Hang the belt over the bottom bracket and lock the frame gate.



3. Place the belt on the rear sprocket and mount the rear wheel into the rear dropouts.



4. Minimize the distance between the axle of the bottom bracket and the rear axle so that the belt can be fitted to the front sprocket without tension. The tools required to reduce the distance may vary depending upon manufacturer. Always follow the instructions of the particular bicycle manufacturer.

In this example, the rear wheel is moved towards the bottom bracket by horizontally slidable dropouts. It might be necessary to loosen the screws of the disc brake caliper. When you reach the smallest distance between the center of the bottom bracket and the rear axle, fit the belt to the front sprocket as well.

5. Mechanisms used to tension the belt may vary by manufacturer. Always follow the instructions of the particular manufacturer. In this example, you now tension the belt on the drive side, using the sliding dropouts and the tensioning bolts inside the dropouts. After tensioning the right side (drive side), until the wheel sits evenly between both chainstays.



#### Please Note

Never try to pry the belt on, or “roll” it on by rotating the cranks. This may cause inner structural damage which will result in the belt no longer being useful.



**The handling illustrated above can damage the system!**



**Illustration 3:**  
**Correct alignment of the belt**



**Illustration 4:**  
**Incorrect alignment of the belt**



6. Rotate the cranks 10-15 times with free turning back wheel. The belt is aligned correctly when it runs straight without making noises.

7. Tension the dropouts on the drive side or loosening them on the non-drive side steers the belt towards the flange of the rear sprocket. Adjust the rear wheel to achieve the right alignment of the belt. Turn the crank again, re-check the belt alignment and re-adjust, if necessary. Make sure to maintain the proper belt tension. Repeat this step until you reach the perfect belt alignment.

Rotate the crank again, check the alignment of the belt and adjust it until it runs noiseless. Please consider always the needed belt tension. Repeat these steps until the belt line is correct adjusted.

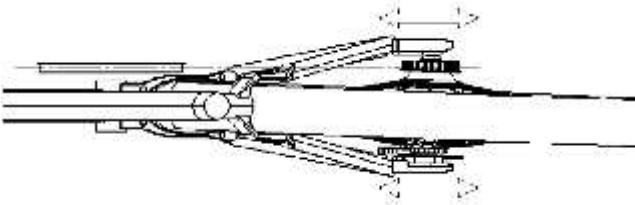
8. Reconnect the torque arm (if used with your version) and the gear mech of the hub. Please follow the instructions of the Rohloff SPEEDHUB500/14 manual for your version of the hub. Tighten all bolts of the rear wheel and quick release elements, according to the manufacturer's torque specifications.

9. If you have loosened the bolts of the brake caliper for the mounting, make sure to re-tighten them now. If you have unhinged the bowden cable of your brake, be sure to put it back.
10. If the belt does not align with the front and rear flanges of the sprockets after tightening all the bolts, one of the following actions will help you:
  - a. Adjustment of the belt alignment by fine adjustment of the rear wheel
  - b. Adjustment of the belt alignment at the crank (see Mounting the front sprocket)
11. Now follow the instructions for checking the belt tension.
12. Finally, check to make sure that the Snubber is correctly mounted.



### Please note

The following instructions are for frames with horizontal sliding dropouts. These are used differently by various different manufacturers. For a different frame version than described in the following example, please follow the instructions of the particular manufacturer, or ask your certified retailer how to align and tension the belt.



### Aligning the belt by adjusting the sliding dropouts

## Checking the belt tension

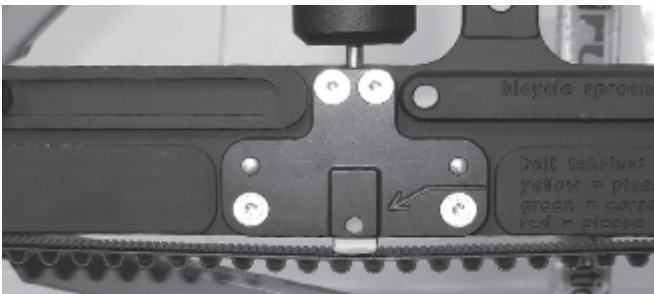
Proper belt tension is essential for optimum operation of the Gates Carbon Drive System.

Lack of belt tension can lead to so-called “ratcheting“. The teeth of the belt will slide over the teeth of the rear sprocket. This causes not only an unpleasant sound, the ratcheting can also cause damage to the carbon tensile cords. This would render a belt useless. If ratcheting has occurred you should replace the belt before the next time it is to be used.

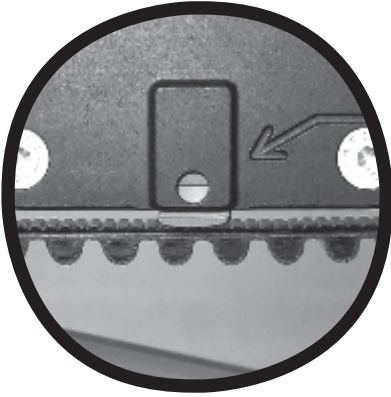
Too much tension can also cause damage to the bearings within the rear hub. It also increases the wear of your drive system and the system can drag.

## Checking the belt tension using the belt ruler

Construction: The belt ruler (Art. No. 10400009) is comprised of a base plate, a 1 kg test weight and a test indicator (Illustration 2). As option for the alignment of CenterTrack beltline are 2 adapters available (Art. No. 10400008). The belt ruler is placed with the lower bearing surface on the frame so that the test weight presses on the center of the belt (Illustration 1). A vertical force of 9,81 N is now applied to the belt. The resulting deflection of the belt is a measure of the initial tension of the drive system. The region of the belt tension may be read through the indicator opening in the guide plate.



**Illustration 1:**  
**Belt Ruler in use**



## Note for initial mounting of the belt

Explanation: A one-time settling of the carbon fiber takes place, causing a reduction in the belt tension. In order to counteract this reduction, the belt must be tensioned a little tighter during initial mounting. The optimal belt tension has been reached if the inspection window shows 50% green and 50% yellow.

## Checking the belt tension with the Eco Tension Tester

Construction: The Eco Tension Tester (Art. No. 10400010) includes a ruler (Illustration 1), a main tower (Illustration 2) and a measuring weight. Hang the main tower with the offset in the belt (Illustration 3). The belt is deflected vertically because of the weight. The deflection is an indication of the belt tension. To get a correct measurement, align the upper belt strand (tight side) horizontally to the ground. Place the ruler over both sprockets on the belt. Because of the weight, the indicator will also be pulled downwards. Now you can read the actual belt tension using the ruler. The color coding (green, yellow or red) that appears above the ruler, signals the belt tension. See below for further information on how to proceed with the belt.



Illustration 1: Ruler



Illustration 2:  
Main tower, with the measuring weight





**Illustration 3: Eco Tension Tester in use**

## Reading the belt tension – adjustment instructions Procedure for the belt ruler and Eco Tension Tester



**Illustration 1: Incorrect belt tension**

Red:

Belt tension is too low (Illustration 1) and can be rectified as follows: The belt tension must be regulated by the adjustable dropout. In addition, it is also possible to increase the belt tension by adjusting the eccentric bottom bracket. If the belt continues to have too little tension, ratcheting may occur, i.e., the belt jumps over teeth on the rear sprocket. If this happens, the Carbon Drive™ may be irreparably damaged and become unserviceable.



**Illustration 2: Too much belt tension**

Yellow:

Belt tension is too high. The belt tension must be regulated by the adjustable dropout or by adjusting the eccentric bottom bracket. If the belt tension is not adjusted, it may result in increased wear. In addition, the load on the bottom bracket bearing increases, which is associated with more rapid wear. See Illustration 2 for a visual example.



**Illustration 3: Optimal belt tension**

Green:

Belt tension is in an optimum range. See Illustration 3. No additional adjustment is required. This system setting produces the least wear and the highest degree of efficiency.

## Checking the belt tension without the Tension Tester

Should you need to check or adjust the tension of the belt and a Tension Tester is unavailable, you can apply the force deflection method. This method is not as accurate as using a Tension Tester, but it is still better than not checking the tension at all.

1. Press down on the upper side of the belt between front and rear sprocket with your finger, and exert a force of 20 to 45N (2-4.5 kg). The correct tension is achieved if this force can move the belt down by approximately 10mm.
2. Since the tension may vary a little along the belt, you should repeat this procedure several times. Rotate the cranks a quarter turn after each measurement and measure again.
3. If the tension of the belt is too high or too low, adjust the tension until the measurement is good.



### Please note

This re-adjustment of the belt tension is done with the tensioning mechanism of the frame. In this example it is done with the adjustment bolts of the dropouts. Proceed as you did when Mounting the Gates Carbon Drive Belt, this means the correct alignment of the belt has to be guaranteed at all times while you adjust the tension. You have to adjust both, the alignment and the tension.

## Using the Snubber to keep the Gates Carbon Drive Belt from ratcheting

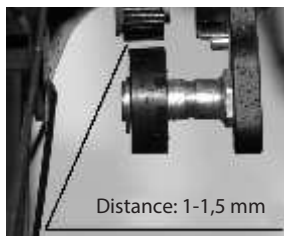
If the Gates Carbon Drive is used with the Rohloff SPEEDHUB 500/14, a so-called “Snubber” has to be installed. The Snubber guides the belt at the rear sprocket and prevents the belt from ratcheting over the teeth. Ratcheting teeth can damage the inner carbon structure of the belt. This can cause the belt to break when the bike is being used. If you think that the inner structure of your belt might be damaged, you should replace the belt.

## Snubber assembly

Title	Part Number
CD-RDM-Snubber	10001400
M10x1x12 Snubber-bolt	11002001
Snubber-plate	11002002
Snubber-axle	11002003
Snubber-spring pin	11002004
Snubber-spring	11002005
Snubber-wheel	11002006
Snubber-snap fit	11002007
Snubber-Clip-DIN6799-RA8	11202008
Snubber-long slot bolt	11202009
Snubber-long slot washer	11202010



**Illustration 1:**  
**Rohloff SPEEDHUB 500/14**  
**with Snubber**



**Illustration 2:**  
**The Snubber wheel does**  
**not touch the belt!**

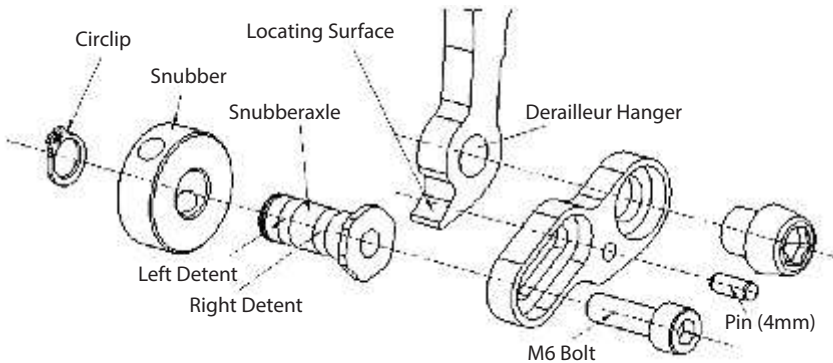
## Mounting the Snubber

1. The following illustration shows the Snubber mounted to the derailleur hanger. To mount the Snubber, you have to affix the Snubber plate in the thread of the derailleur hanger with a M10x1 screw. Then you have to affix the sliding Snubber axle to the Snubber plate with a M4 screw.
2. The Snubber wheel is located on the Snubber axle. The Snubber wheel is sliding on the Snubber axle. The Snubber wheel latches into an inner and an outer catch position on the axle, to ease the dismounting of the wheel. The Snubber does not influence the degree of efficiency or the smooth operation of the belt, as it does not touch the belt. The Snubber is only for safety purposes.
3. The Snubber plate is screwed to the derailleur hanger with an M10x1 screw. The correct position is shown in illustration 2. The center pin support has to be pushed against the locating surface of the derailleur hanger. The Snubber axle can be adjusted in an elongated slot and it can be affixed with a M6 screw.



**Illustration 3:**  
**Side view of the installed Snubber**

- The Snubber wheel can be slid along the Snubber axle. If the Snubber is located in the left position, it is active and can keep the belt from ratcheting, since the belt cannot slide across the teeth of the rear sprocket. When you adjust the position of the Snubber wheel, make sure that the wheel does not touch the belt.
- By moving the Snubber axle in the elongated slot of the Snubber plate, you can adjust the distance between the Snubber wheel and the belt. This distance should be between 1mm and 1.5mm.



**Illustration 4:**  
**Parts of the Snubbers**

**i Please note**

The Snubber, which is used as an example here, is one possibility to keep the drive belt from ratcheting. Different constructions are possible and used for bikes from other manufacturers. However, any other system has to be checked for its functionality and safety and has to be approved by both Rohloff and Gates.



**Snubber version for quick release, vertical dropout use without a derailleur**



**Snubber version from NICOLAI (distance between Snubber and belt is 1-1.5 mm)**

## Removing the Snubbers

Follow the instructions for Mounting the Snubber in the reversed order.

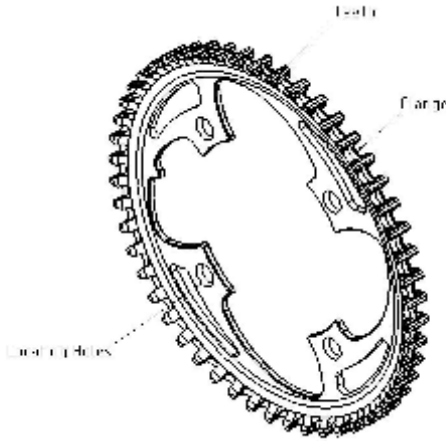
## Mounting the Gates Carbon Drive Front Sprocket

Front sprockets are available for the Gates carbon Drive System to fit both 4 and 5 arm crank-sets.

### Front Sprocket versions

Teeth	Description	Part Number	
		CarbonDrive	CenterTrack
42	4-Arm 104mm BC	-	CT11424AA
46	4-Arm 104mm BC	11464AF10	CT11464AA
46	5-Arm 130mm BC	11465AF10	CT11465AA
50	4-Arm 104mm BC	11504AF10	CT11504AA
50	5-Arm 130mm BC	11505AF10	CT11505AA
55	4-Arm 104mm BC	11554AF10	CT11554AA
55	5-Arm 130mm BC	11555AF10	CT11555AA
60	5-Arm 130mm BC	11605AF10	CT11605AA

**Front Sprocket**  
(shown here: 50 tooth/5-Arm)



**Offset Kit**

**For further information please contact your Gates supplier.**

**Offset Kit**

Art. No.: 10300702-4bolt

Art. No.: 10300703-5bolt



**Shim ring, bottom bracket**  
41x35x1 Art. No. 10300600  
41x35x0,5 Art. No. 10300601



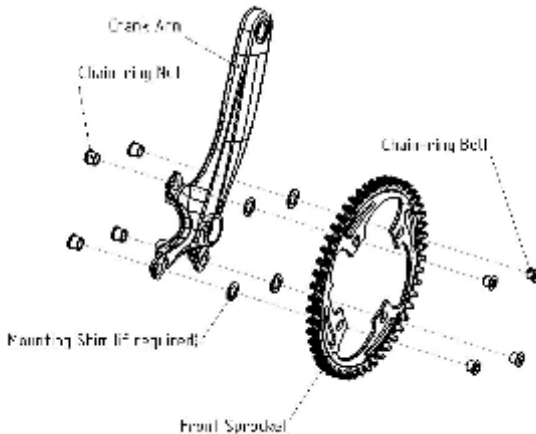
**Shim ring, 0.5mm front sprocket**  
10x16x0,5 Art. No. 10300602



**Shim ring, 1mm front sprocket**  
10x16x1 Art. No. 10300603

## Mounting the Front Sprocket at the crank adapter

The sprocket is put over the crank arm and affixed with the sprocket bolts (which were included with your crankset). As shown in illustration 1, the flange of the sprocket is turned outward. To guarantee proper operation of the Gates Carbon Drive System, both sprockets need to be exactly aligned with each other (illustrations 2 and 3). The belt alignment cannot be adjusted on the rear sprocket of the Rohloff SPEEDHUB 500/14. Therefore, you can only adjust it with the position of the front sprocket. Reasons the front sprocket may not align with the rear sprocket are: manufacturing tolerances of the components, weld warpage on the frame, cranks from different manufacturers, different inner bearings. The included shim rings have been designed to facilitate this adjustment. For some bottom brackets it is possible to adjust the alignment with shim rings (illustration 4). Please note the mounting instructions from the particular bottom bracket manufacturer.

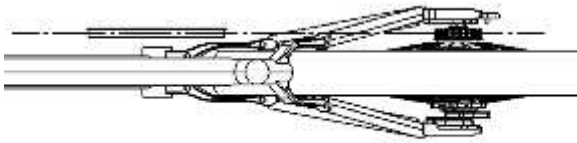


**Illustration 1:**  
**Mounting the front sprocket**

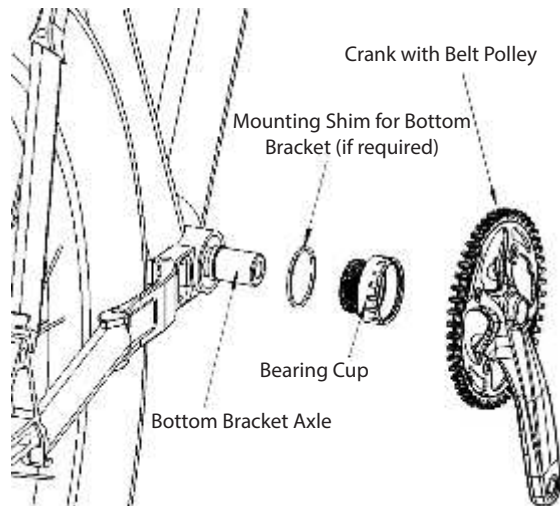




**Illustration 2:**  
**Sprocket alignment**



**Illustration 3:**  
**Aligning the front**



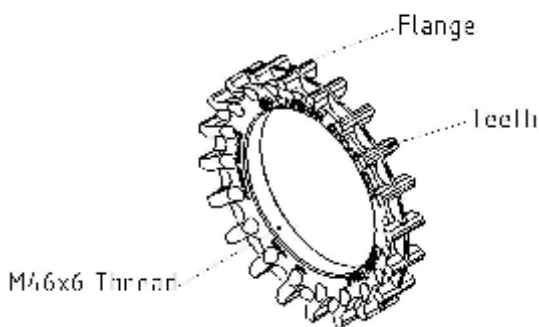
### Removing the front sprocket

Follow the instructions for the Mounting the front sprocket in the reversed order.

## Mounting the Gates Carbon Drive Hybrid Rear Sprocket M46x6

The Gates Carbon Drive Hybrid Rear Sprocket M46x6 allows you to mount the Gates Carbon Drive System to a carrier which will make it compatible to a variety of rear hubs. In this case to the Rohloff SPEEDHUB 500/14.

Teeth	Part Number	Part Number
	CarbonDrive	CenterTrack
19	1119RSN10	CT1119RMN10
20	1120RSN10	CT1120RMN10
22	1122RSN10	CT1122RMN10
24	1124RSN10	-



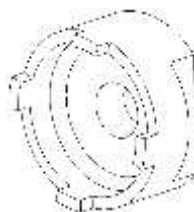
**Rear Sprocket M46x6**



**Gates-Rohloff Carrier  
M46x6**  
Art. No. 8224 Company -  
Rohloff



**Cone Wrench SW46**  
Art. No. 10400007



**Rohloff Sprocket Remover**  
Art. No. 8501 Company -  
Rohloff

**i Please note**

The Gates-Rohloff carrier and the Rohloff sprocket remover are only available from Rohloff.

**Flat Wrench SW46**

Art. No. 10400006

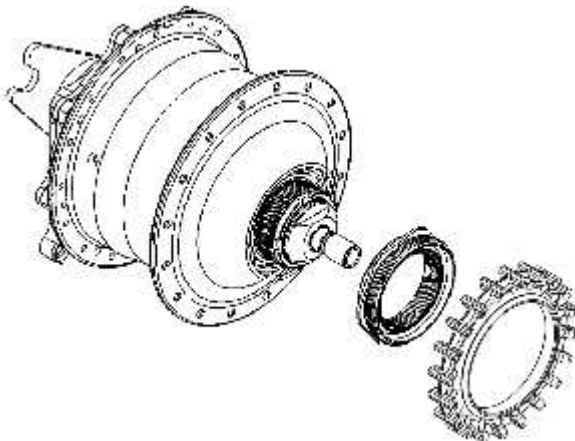
**POM-Sprocket-Key**

See table for Art. No.

Title	Part Number
Basic Tool	10400001
Attachment 19 Zähne	10400002
Attachment 20 Zähne	10400003
Attachment 22 Zähne	10400004
Attachment 24 Zähne	10400005

## Mounting the Rear Sprocket M46x6 to the Gates-Rohloff Carrier M46x6

The Gates-Rohloff Carrier M46x6 by Rohloff (Art. No. 10300101) is where the Gates Carbon Drive System and the Rohloff SPEEDHUB 500/14 (Illustration 1) come together. At the time of delivery the Gates Carrier may already be fitted to the hub. If this is not the case, please follow the instructions for retrofitting the carrier to your hub.



**Illustration 1:**  
**Rohloff SPEEDHUB 500/14**  
**with Gates-Rohloff Carrier**  
**M46x6 and Rear Sprocket**  
**M46x6**

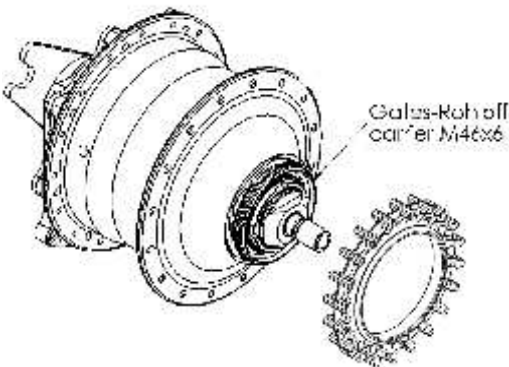
Lubricate the inner thread of the Rear Sprocket M46x6 and carefully screw it on to the Carrier as far as possible by hand (illustration 3). As shown in illustration 3, the flange of the rear sprocket needs to be on the hub side. Make sure to bring the parts together in the right angle and do not cant them. Tighten the Rear Sprocket M46x6 with the POM-Sprocket-Key (Art. No. 10400001, 1040000X), to keep the sprocket and the Carrier from loosening from the hub in future mounting processes. To keep the hub from rotating while you thread on the carrier, you may hold the driver (sprocket thread) in place with the Rohloff Sprocket Tool and an Open-end Wrench SW24 (illustration5). Always make sure that the Rohloff Sprocket tool is seated correctly and secured in place.

**i Please note**

Always secure the Sprocket tool, as described in the Rohloff Owners Manual (chapter Service, paragraph 3 „Sprocket reversing/replacing“), using a quick release skewer (CC versions), or an axle nut (TS versions), to avoid damage to the driver (sprocket thread). (Illustration 2).



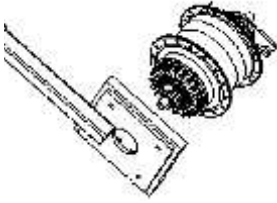
**Illustration 2:**  
**Securing the Rohloff Sprocket tool with quick release skewer or axle nut**



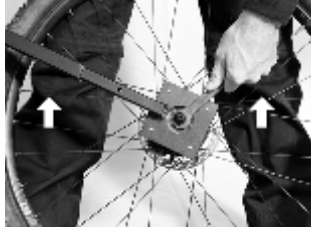
**Illustration 3:**  
**Rohloff SPEEDHUB 500/14 with Gates Rohloff Carrier M46x6 and Rear Sprocket M46x6**

**Illustration similar to original**

## Retrofitting the rear sprocket to a Rohloff SPEEDHUB



**Illustration 4:**  
**Putting the POM-Sprocket-Key on the Rear Sprocket M46x6**



**Illustration 5:**  
**Tightening the rear sprocket with the POM-Sprocket-Key and using the Open-end wrench SW24 to hold the Rohloff Sprocket tool in place.**



### Please note

Only the POM-Sprocket-Key (Art. No. 10400001, 1040000X) is to be used for tightening/loosening the rear sprocket. Never use pliers, a channel lock or similar, as they could damage the protective coating of the sprockets. Using the belt as a tool can damage it and it will not function properly afterwards. An alternative method of tightening the rear sprocket, is to exert pressure on the pedals in the 3 o'clock position when the rear wheel is mounted and the belt is installed. Please have the rear-wheel brake on for this procedure. (Illustration 6).



**Illustration 6:**  
**Alternative tightening of the Rear Sprocket by exerting pressure on the pedal when rear-wheel brake is on.**

### Retrofitting the rear sprocket to a Rohloff SPEEDHUB 500/14 with chain pinion

First remove the rear sprocket from the Rohloff SEEDHUB 500/14 and replace it with the Gates-Rohloff Carrier M34x6. After you have successfully removed the chain sprocket (see Rohloff Owners Manual chapter Service, paragraph 3 Sprocket reversing/replacing“), clean the

driver (sprocket thread), and lubricate the inner thread of the Gates Carrier M34x6.

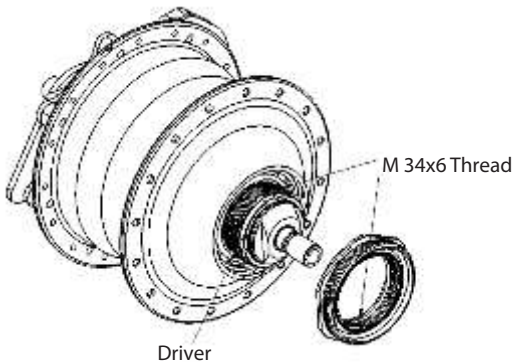
Ensure that the surfaces of the Carrier touching the Rohloff hub are clean and free of scratches. These two components together form the seal that hinders the oil from leaking out. Now carefully screw the Carrier on clockwise as far as possible by hand (illustration 7). The M46x6 outer thread has to be turned away from the hub. Please consult the instructions for using the Sprocket tool in the Rohloff Owners Manual. Afterwards follow the instructions above.

## Removing the Rear Sprocket



### Please note

As oil may leak from the hub when you remove the chain sprocket from the Rohloff SPEEDHUB 500/14, the driver side of the hub should be turned upward, if possible.



**Illustration 7:**

**Installing the Gates-Rohloff Carrier M46x6 to the M34x6 thread of the driver**



### Please note

When you remove the rear sprocket from the Rohloff SPEEDHUB 500/14, it is impossible to know if the rear sprocket will detach from the Carrier first, or if both components detach from the hub at the same time. Depending on which is the case, follow the particular instructions for separating the components.

As described in paragraph 3 “Sprocket reversing/replacing” in the chapter Service, of the Rohloff Owners Manual, place the Sprocket tool onto the driver (sprocket thread) and secure it in position with the quick release skewer (CC Versions), or the axle nut (TS Versions). Hold the Sprocket tool with the Open-end Wrench SW24 and loosen the rear sprocket with the POM-Sprocket-Key (Art. No. 10400001, 1040000X) by turning it in the opposing direction (illustration 8).

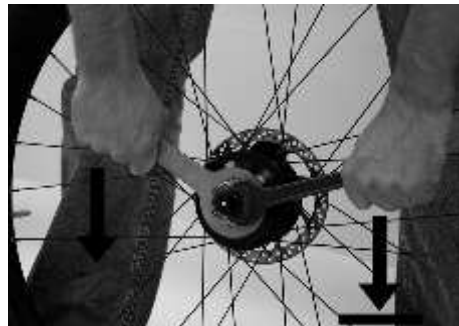
**Illustration 8:**  
**Mounting the Gates –**  
**Rohloff Carrier M46x6 onto**  
**the M34x6 thread of the**  
**SPEEDHUB 500/14 driver.**



## Removing the Gates-Rohloff Carrier from the Rohloff SPEEDHUB 500/14

The Rohloff Sprocket tool, secured with a quick release skewer or an axle nut, is locked in place by the open-end wrench SW24. You can now loosen the Gates-Rohloff Carrier with a Flat Wrench (Art. No. 10400006) by turning it in the opposing direction to the driver, as shown in illustration 9. To loosen the carrier, exert a sudden pressure on the Flat Wrench SW24 in the opposite direction as the driver.

**Illustration 9:**  
**Removal of the Gates -**  
**Rohloff Carrier from the**  
**SPEEDHUB 500/14**

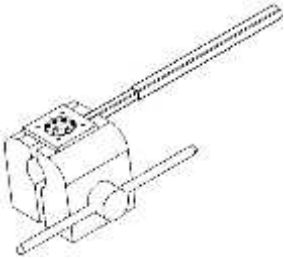


### **i** Please note

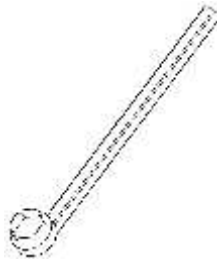
Always secure the Sprocket tool as described in the Rohloff Owners Manual (chapter Service, paragraph 3 „Sprocket reversing/replacing“), using a quick release skewer (CC versions), or an axle nut (TS versions), to avoid damage to the driver (sprocket thread).

## Removing the Gates-Rohloff Carrier from the rear sprocket

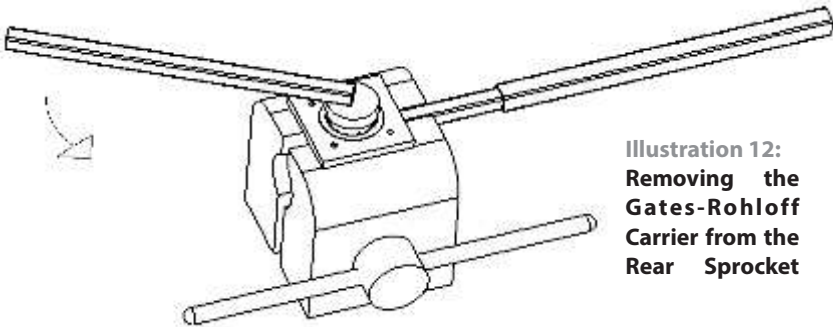
To remove the Carrier from the rear sprocket, you must secure the POM-Sprocket-Key (Art. No. 10400001, 1040000X) in a bench vice, the opening turned upward (illustration 10), and place the rear sprocket into the spanner socket. Turn the Cone Wrench SW46 (Art. No. 10400007, illustration 11) counter clockwise to loosen the Carrier (illustration 12).



**Illustration 10:**  
**POM-Sprocket-Key**



**Illustration 11:**  
**Cone Wrench SW46**



**Illustration 12:**  
**Removing the**  
**Gates-Rohloff**  
**Carrier from the**  
**Rear Sprocket**



# 3

## exchange

- **When does the Gates Carbon Drive Belt need to be replaced, when do the sprockets need to be replaced?**
- **Replacing the belt after it has been damaged**
- **Replacing the Sprockets when they have been damaged**
- **Replacing belt and sprockets because of abrasion**

## When does the Gates Carbon Drive Belt need to be replaced, when do the sprockets need to be replaced?

The durability of Carbon Drive System components depends on a number of exterior influences and conditions. The life expectancy of belt drive systems or common bike chains is always shorter in rough and muddy conditions, than when they are used in a dry environment. While the bike chain gets clogged with mud, the Gates Carbon Drive System generally stays clean. If a traditional chain is not lubricated correctly it will have a shorter lifespan. This is not the case with a belt, since it does not need any additional lubrication.



**Illustration 1:**  
**The Gates Carbon Drive System used in a muddy environment**



### Please note

When you first use your new Gates Carbon Drive System, **the blue layer on the inside of the belt will wear off quickly. This is no abrasion of the belt.** The blue layer is only for production-related purposes. It is a form release agent, used to make it easier to take the belt out of its form during the manufacturing process. It does not influence the function of the belt in any way.

## Replacing the belt after it has been damaged

The Gates Carbon Drive Belt should always be replaced if it has been damaged through improper handling (see examples for improper handling), or if it has been damaged through severe exterior conditions. For example, if a stone, a root, or a piece of clothing has been caught in the belt and has been pulled between belt and sprocket. This can cause damage to the sensitive carbon fiber cords inside the belt, even if there is no damage visible from the outside. If a belt is damaged in this way or if you assume that there might be damage to the belt, you should always replace it, as it might suddenly break when the bike is being used, and this can cause an accident or severe injury.

## Replacing the Sprockets when they have been damaged

The sprockets always need to be replaced if they have been damaged through severe use or exterior influences. If you ride over a rock, or a tree trunk, for example, and you bottom out hard with the front sprocket, it might deform and would have to be replaced. Stones caught between belt and sprocket can cause damage to the teeth of the belt. Teeth might break off partially or completely. When this happens, the particular sprocket has to be replaced. Whether or not the belt has to be replaced would have to be determined with the criteria mentioned above (Replacing the belt after it has been damaged).

## Replacing belt and sprockets because of abrasion

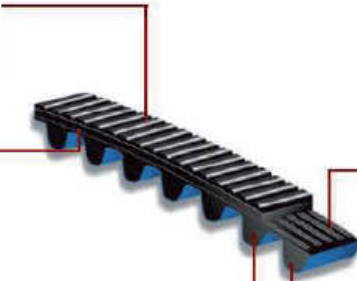
Illustration 1 shows the structure of the belt for Gates Carbon Drive™ with its individual layers. The belt has experienced wear when the nylon jacket has worn away and urethane is exposed. Belt ratcheting may indicate a worn sprocket. If adjusting tension on the belt to or above recommended values does not alleviate ratcheting, inspect the sprocket for wear. Check for sharp edges, teeth ground to a point, cracks. Another example of wear is if noticeable grooves are visible in the sprockets. Since the belt is narrower than the sprocket, wear will ultimately result in an indentation or offset where the belt rides in the sprocket. If you notice an indentation or offset, the sprocket should be replaced. .

**Ribbed back of the belt**

Reduced flexural stress increases the effectiveness of the system

**Core Compound**

The polyurethane plastic is highly resistant to UV radiation, corrosion and wear

**High-strength carbon**

Because of the belt's carbon fiber cords only a low amount of tension is required for every field of application

**Special tooth shape**

Optimal meshing of the sprockets and the belt teeth provides the best power transfer.

**Nylon jacket**

A rugged and flexible layer of fabric makes the teeth strong and resistant to wear

**Illustration 1:****Belt structure of the Carbon Drive™ System****Please note**

Small cracks on the back of the belt may occur after some amount of use. These are normal. If there are cracks at the tooth where it meets the back of the belt however, the belt will need to be replaced.

# 4

## for Frame builders

- **Frame requirements when mounting the Gates Carbon Drive**
- **Opening the frame**
- **Possibilities for tensioning and adjustment**
- **Straightness and stiffness of the frame**

## Frame requirements when mounting the Gates Carbon Drive

### Opening the frame

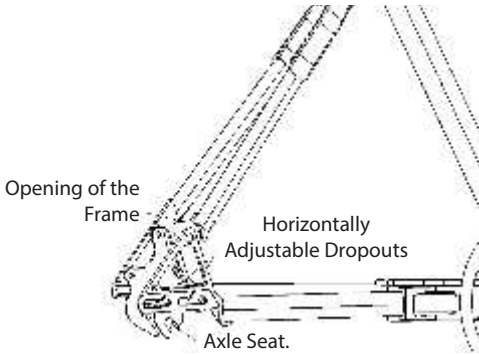
A specific rear triangle is required for mounting the Gates Carbon Drive System. Since the belt cannot be separated and rejoined like a bike chain, it has to be possible to open the frame at the rear triangle. This opening should allow a gap of at least 8mm. There are several possible solutions, depending upon desired style. Illustrations 1 and 2 show a frame with the opening at the dropout. A separation of the right chainstay or at the seatstay of the frame is also possible. (Illustration 3).



**Illustration 1:**  
**Opening the frame to  
mount the belt**

### Possibilities for tensioning and adjustment

It has to be possible to tension and adjust the belt after it is mounted in the frame. This is possible through the use of either adjustable dropouts (Illustration 2) or with an eccentric bottom bracket. However, the safety of the belt can only be guaranteed if the frame design allows for the rear wheel to be dismounted and mounted in a way that maintains the belt tension.



**Illustration 2:**  
**Example for frame construction**

4



**Illustration 3:**  
**Example for frame construction: separation of the seat stay**

## Straightness and stiffness of the frame

For the smooth operation of the Gates Carbon Drive System, the frame needs to be straight and stiff. These requirements are specified in the Gates Technical Manual for Frame Builders. Furthermore, the adjustable range of lengths between bottom bracket housing and rear axle should be between 16 and 30mm, to guarantee a sufficient tensioning function and the possibility of changing the gear ratio.



### Please note

General information can be found at: [www.gatescarbondrive.com](http://www.gatescarbondrive.com)

Information that is of interest to frame builders can be found at:

<http://manual.carbondrive.net>

This includes information about stiffness testing, tolerances and detailed operating

# 5

## Ratio overview

- **Available sprockets for Rohloff SPEEDHUB 500/14**
- **Allowed sprocket combinations for Rohloff SPEEDHUB 500/14**
- **Tables of distance traveled per crank revolution for Rohloff SPEEDHUB 500/14 with Gates Carbon Drive Sprockets**
- **Comparing the gear ratio of a derailleur system to that of the Rohloff SPEEDHUB 500/14 with Gates Carbon Drive Sprocket**
- **GATES® CARBON DRIVE™ SYSTEM Product Warranty**



## Available sprockets for Rohloff SPEEDHUB 500/14

The overall gear ratio is 526%, meaning the highest gear is 5.26 times higher than the lowest gear. The 14 gears are evenly graded. The gear ratio of the Rohloff SPEEDHUB 500/14 can be adapted to certain conditions by varying the choice of front and rear sprockets. You can choose from the versions listed in the table below. As the number of new versions increases, an up-to-date selection of available sprockets can be found under [www.gatescarbondrive.com](http://www.gatescarbondrive.com) for the complete selection.

### Versions of Rear Sprockets M46x6

Teeth	Part Number	
	CarbonDrive	CenterTrack
19	1119RAF10	CT1119RMN10
20	1120RAF10	CT1120RMN10
22	1122RAF10	CT1122RMN10
24	1124RAF10	-

### Versions of Front Sprockets

Tooth	Description	Part Number	
		CarbonDrive	CenterTrack
42	4 bolt 104mm BC	-	CT11424AA
46	4 bolt 104mm BC	11464AF10	CT11464AA
46	5 bolt 130mm BC	11465AF10	CT11465AA
50	4 bolt 104mm BC	11504AF10	CT11504AA
50	5 bolt 130mm BC	11505AF10	CT11505AA
55	4 bolt 130mm BC	11554AF10	CT11554AA
55	5 bolt 130mm BC	11555AF10	CT11555AA
60	5 bolt 130mm BC	11605AF10	CT11605AA

## Allowed sprocket combinations for Rohloff SPEEDHUB 500/14

The following table shows, which sprocket-size combination of chain sprockets for the Rohloff SPEEDHUB 500/14 equates to the possible combinations of the Gates Carbon Drive Sprocket. You can find the actual sprocket gear ratio in brackets.



### Please note

The following sprocket combinations are only allowed for users up to a weight of 100kg. The allowed combinations for tandems and users above a weight of 100kg are shown on page 44.

Gates sprocket	19 Tooth rear	20 Tooth rear	22 Tooth rear	24 Tooth rear
42 Tooth front	(2,21) ≈ 38/17	(2,10) ≈ 38/18	not permitted	not permitted
46 Tooth front	(2,42) ≈ 42/17	(2,30) ≈ 38/16	(2,09) ≈ 38/18	not permitted
50 Tooth front	(2,63) ≈ 42/16	(2,50) ≈ 40/16	(2,27) ≈ 38/17	not permitted
55 Tooth front	(2,89) ≈ 46/16	(2,75) ≈ 44/16	(2,50) ≈ 40/16	(2,29) ≈ 38/17
60 Tooth front	(3,16) ≈ 50/16	(3,00) ≈ 48/16	(2,73) ≈ 46/17	(2,50) ≈ 40/16



### Please note

Smallest permitted belt gear ratio: The belt gear ratio of the Rohloff SPEEDHUB 500/14 converts the low number of revolutions of the crank to a high number of revolutions at the rear sprocket and reduces the incoming torque for the transmission in the same ratio. To exclude an overload of the transmission, the sprocket gear ratio must not be lower than 2,09. This equates to the sprocket-size combinations of 42/20, 50/22 und 55/24.

**Allowed sprocket combinations for tandems and users above a weight of 100kg.**

Gates sprocket	19 Tooth rear	20 Tooth rear	22 Tooth rear	24 Tooth rear
46 Tooth front	(2,42) $\approx$ 42/17	not permitted	not permitted	not permitted
50 Tooth front	(2,63) $\approx$ 42/16	(2,50) $\approx$ 40/16	not permitted	not permitted
55 Tooth front	(2,89) $\approx$ 46/16	(2,75) $\approx$ 44/16	(2,50) $\approx$ 40/16	not permitted
60 Tooth front	(3,16) $\approx$ 50/16	(3,00) $\approx$ 48/16	(2,73) $\approx$ 46/17	(2,50) $\approx$ 40/16

5

**Tables of distance traveled per crank revolution for Rohloff SPEEDHUB 500/14 with Gates Carbon Drive Sprockets**

In the following tables the distance traveled per crank revolution is measured in meters for the 1st and the 14th gear of the Rohloff SPEEDHUB 500/14 respectively. Depending on the given gear ratio of the belt, the possible distances traveled per crank revolution for the common wheel circumferences (20", 26", and 28") can be read out. The tables are based on the following context:

Distance traveled per crank  
revolution

$$= \frac{U \times F \times \dot{U} \text{ Getr.}}{R}$$

The formula consists of:

**U** = wheel circumference

**F** = amount of teeth of the front sprocket

**R** = amount of teeth of the rear sprocket

**Gear ratio** = inner gear ratio according to table below

Gear	1	2	3	4	5	6	7	8
Gear ratio	0,279	0,316	0,360	0,409	0,464	0,528	0,600	0,682

Gear	9	10	11	12	13	14
Gear ratio	0,774	0,881	1,000	1,135	1,292	1,467

### Table of distance traveled per crank revolution Rohloff SPEEDHUB 500/14 for 20"

Gates sprocket	19 Tooth rear		20 Tooth rear		22 Tooth rear		24 Tooth rear	
	From	To	From	To	From	To	From	To
42 Tooth front	0,93m	4,89m	0,88m	4,65m	not permitted		not permitted	
46 Tooth front	1,02m	5,36m	0,96m	5,10m	0,88m - 4,63m		not permitted	
50 Tooth front	1,11m	5,83m	1,05m	5,54m	0,96m - 5,03m		not permitted	
55 Tooth front	1,22m	6,41m	1,16m	6,09m	1,05m - 5,54m		0,97m - 5,08m	
60 Tooth front	1,33m	7,00m	1,26m	6,65m	1,15m - 6,04m		1,05m - 5,54m	

### Table of distance traveled per crank revolution Rohloff SPEEDHUB 500/14 for 26" wheels (wheel circumference 2.06m)

Gates sprocket	19 Tooth rear		20 Tooth rear		22 Tooth rear		24 Tooth rear	
	From	To	From	To	From	To	From	To
42 Tooth front	1,27m	6,68m	1,21m	6,35m	not permitted		not permitted	
46 Tooth front	1,39m	7,32m	1,32m	6,95m	1,20m - 6,32m		not permitted	
50 Tooth front	1,51m	7,95m	1,44m	7,56m	1,30m - 6,87m		not permitted	
55 Tooth front	1,66m	8,75m	1,58m	8,31m	1,44m - 7,56m		1,32m - 6,93m	
60 Tooth front	1,81m	9,54m	1,72m	9,07m	1,57m - 8,24m		1,44m - 7,56m	

**Table of distance traveled per crank revolution Rohloff SPEEDHUB 500/14 for 27,5"**

Gates sprocket	19 Tooth rear		20 Tooth rear		22 Tooth rear		24 Tooth rear	
	From	To	From	To	From	To	From	To
42 Tooth front	1,33m	6,97m	1,26m	6,62m	not permitted		not permitted	
46 Tooth front	1,45m	7,64m	1,38m	7,25m	1,25m - 6,59m		not permitted	
50 Tooth front	1,58m	8,30m	1,50m	7,89m	1,38m - 7,17m		not permitted	
55 Tooth front	1,74m	9,13m	1,65m	8,67m	1,50m - 7,89m		1,37m - 7,23m	
60 Tooth front	1,89m	9,96m	1,80m	9,46m	1,64m - 8,60m		1,50m - 7,89m	

**Table of distance traveled per crank revolution Rohloff SPEEDHUB 500/14 for 28"**

Gates sprocket	19 Tooth rear		20 Tooth rear		22 Tooth rear		24 Tooth rear	
	From	To	From	To	From	To	From	To
42 Tooth front	1,34m	7,07m	1,28m	6,72m	not permitted		not permitted	
46 Tooth front	1,47m	7,32m	1,40m	7,36m	1,27m - 6,69m		not permitted	
50 Tooth front	1,60m	8,42m	1,52m	8,00m	1,38m - 7,27m		not permitted	
55 Tooth front	1,76m	9,26m	1,67m	8,79m	1,52m - 8,00m		1,39m - 7,33m	
60 Tooth front	1,92m	10,1m	1,82m	9,59m	1,66m - 8,72m		1,52m - 8,00m	

**Table of distance traveled per crank revolution Rohloff SPEEDHUB 500/14 for 29"**

Gates sprocket	19 Tooth rear		20 Tooth rear		22 Tooth rear		24 Tooth rear	
	From	To	From	To	From	To	From	To
42 Tooth front	1,42m	7,46m	1,35m	7,09m	not permitted		not permitted	
46 Tooth front	1,55m	8,17m	1,48m	7,76m	1,34m - 7,05m		not permitted	
50 Tooth front	1,69m	8,88m	1,60m	8,44m	1,46m - 7,67m		not permitted	
55 Tooth front	1,86m	9,77m	1,76m	9,28m	1,60m - 8,44m		1,47m - 7,73m	
60 Tooth front	2,03m	10,66m	1,93m	10,12m	1,75m - 9,20m		1,60m - 8,44m	

## Comparing the gear ratio of a derailleur system to that of the Rohloff SPEEDHUB 500/14 with Gates Carbon Drive Sprocket

The following chart shows, which gear ratio of the belt is needed with the Rohloff SPEEDHUB 500/14 to equate to the lowest gear and the highest gear of a derailleur system. For comparison purposes we have also stated the possible chain gear ratios.

### Sprocket-size combination highest gear derailleur

	14th gear of Rohloff SPEEDHUB 500/14 with a chain sprocket	14th gear of Rohloff SPEEDHUB 500/14 with a belt sprocket
42/11	34/13 40/15 42/16 46/17	50/19
44/11	36/13 42/15 44/16 48/17	55/20 60/22
46/11	38/13 44/15 46/16 50/17	55/19
48/11	40/13 46/15 48/16 52/17	60/20
50/11	42/13 48/15 50/16 54/17	60/19
52/11	42/13 50/15 52/16 56/17	60/19
54/11	44/13 52/15 54/16 58/17	60/19
42/12	32/13 36/15 40/16 42/17	46/19 50/20 55/22 60/24
44/12	34/13 38/15 40/16 44/17	50/20 55/22 60/24
46/12	34/13 40/15 42/16 46/17	50/19
48/12	36/13 42/15 44/16 48/17	55/20
50/12	38/13 44/15 46/16 50/17	55/19
52/12	40/13 46/15 48/16 52/17	60/20
54/12	40/13 48/15 50/16 54/17	60/19

**Sprocket-size combination lowest gear derailleur**

	1st gear of Rohloff SPEEDHUB 500/14 with a chain sprocket	1st gear of Rohloff SPEEDHUB 500/14 with a belt sprocket
22/34	32/13 36/15 38/16 40/17	46/19
24/34	34/13 38/15 42/16 44/17	50/19
26/34	36/13 42/15 44/16 48/17	55/20
20/32	32/13 42/15 38/16 40/17	46/19
22/32	34/13 38/15 40/16 42/17	50/20 55/22 60/24
24/32	36/13 42/15 44/16 46/17	55/20 60/22
26/32	38/13 44/15 48/16 50/17	55/19 60/20
20/30	32/13 36/15 40/16 42/17	46/19 50/20 55/22 60/24
22/30	36/13 40/15 44/16 46/17	50/19 60/22
24/30	38/13 44/15 46/16 50/17	55/19 60/20
26/30	42/13 48/15 50/16 54/17	60/19

## **GATES CARBON DRIVE™ SYSTEM Product Warranty**

CARBON DRIVE™ SYSTEMS LIMITED PRODUCT WARRANTY We make this quality commitment: at the time of sale to our customers, Carbon Drive Systems products will be free from defects in materials and workmanship. Further, the Products will meet our written specifications and standards. Products will be warranted only to the original retail purchaser for a period of two years from the original date of purchase. If we determine a product does not comply, we will, at our option, replace or repair the product. This is your exclusive remedy. Damage to the product due to abuse, improper use, inadequate maintenance, or failure to follow Carbon Drive Systems' published recommendations for installation, use and service will automatically void this warranty. Before using this product, please read the handling and installation instructions carefully (a copy of which is located at <http://www.carbondrivesystems.com/installation.php>). For warranty service, please contact the retailer from whom the product was purchased.

THERE IS NO OTHER EXPRESS WARRANTY. FURTHER, WE DISCLAIM ALL IMPLIED WARRANTIES, INCLUDING THE WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE AND MERCHANTABILITY. LIABILITY FOR CONSEQUENTIAL, INCIDENTAL AND PUNITIVE DAMAGES UNDER ANY AND ALL LEGAL THEORIES IS EXCLUDED.

Some states do not allow the exclusion or limitation of damages, and some states do not allow limitations on how long a warranty lasts, so the above limitation and exclusion may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.



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**CARBON DRIVE™**

**Manual**

for the Gates Carbon Drive™  
in use with  
Rohloff® gear hubs



A Tomkins Company

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