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CARBON DRIVE™

Manual

for the Gates Carbon Drive™ System in use with

Shimano® Nexus™ and Alfine™ Hubs



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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 Shimano Alfine or Nexus 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 check 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 Shimano® Alfine™ or Nexus™. 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 dismounted.

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.

**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.

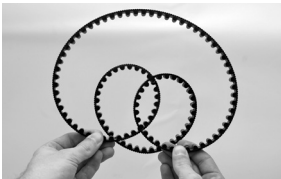


Please note

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.

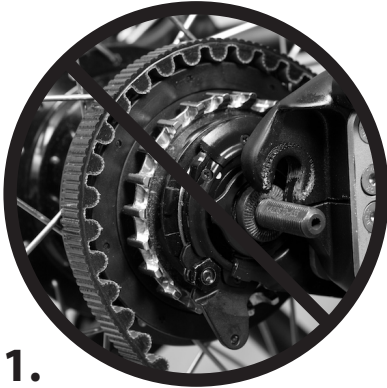


Move your hands away from each other slowly, until the belt uncoils on its own.



Now the belt is properly uncoiled.

Examples of improper handling when mounting the drive belt





7.



8.

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



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. Disconnect the gear control for the rear wheel. To do so, follow the instructions in the manual for the Shimano® Alfine™ or Nexus™ hub for your version of the hub. 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. In doing so, make sure you handle the belt correctly in accordance with the preceding instructions in this manual in the section called “Proper handling of the Gates Carbon Drive™ 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. To mount the rear wheel and the gear control, follow procedure described in your Shimano® Alfine™ or Nexus™ hub manual. Hang the drive belt over the bottom bracket of the frame and follow the instructions in this manual for “Mounting the Gates Carbon Drive™ belt.”

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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 Snubber**
- **Mounting the Gates Carbon Drive Front Sprocket**
- **Offset Kit**
- **Mounting the Front Sprocket at the crank adapter**
- **Differences between Shimano® Nexus™ and Alfine™ hubs**
- **Eccentric bottom bracket**
- **Removing the Front sprocket**
- **Mounting and removing the Gates Carbon Drive™ Rear Sprockets**
- **Comparison of possible Carbon Drive™ gear ratios with chain sprocket gear ratios**
- **Initial gear ratios for hub types**

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 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



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.

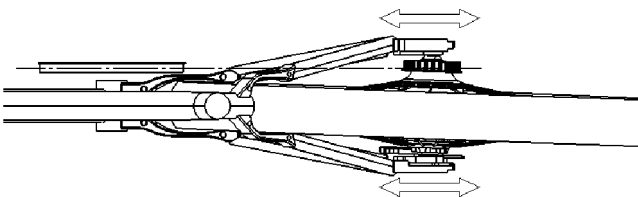
8. Reconnect the torque arm (if used with your version) and the gear mech of the hub. Please follow the instructions of the Rohloff SPEEDHUB500/14 manual for your version of the hub. Tighten all bolts of the rear wheel and quick release elements, according to the manufacturer's torque specifications.

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.



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.

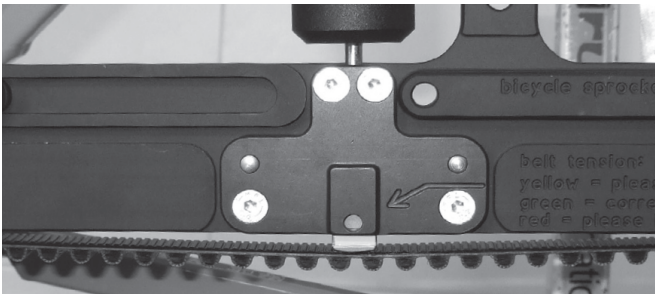
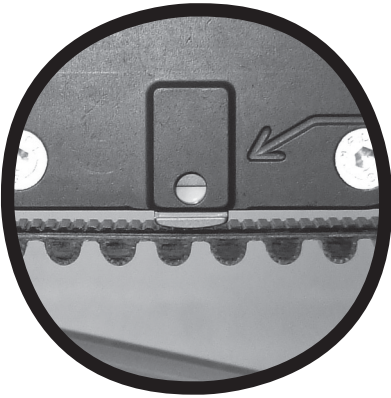


Illustration 1:
Belt Ruler in use



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 on the belt in the center of the span (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 1: 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**

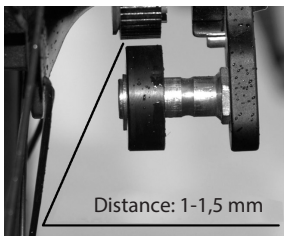


Illustration 2:
**The Snubber wheel does
not touch the belt!**

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.

4. 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.

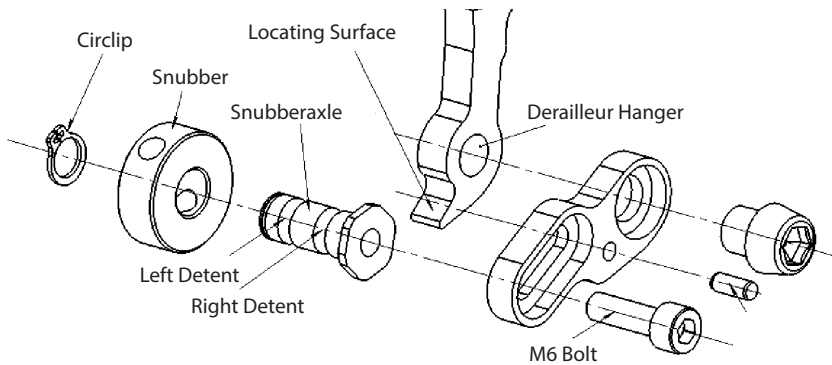


Illustration 4:
Parts of the Snubbers

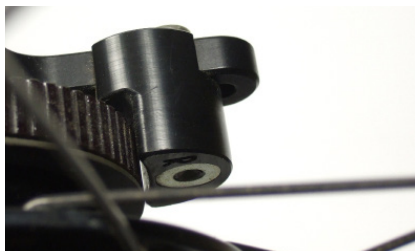


Please note

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.

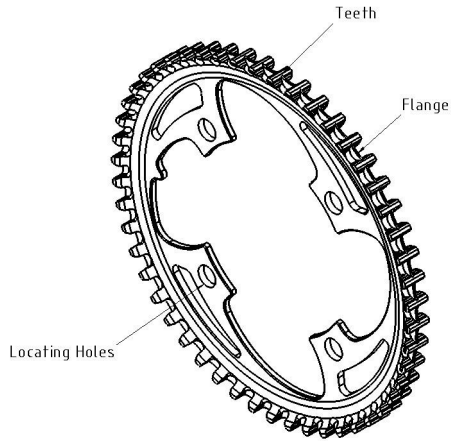
Mounting the Gates Carbon Drive Front Sprocket

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
39	4-Arm 104mm BC	11394AF10	CT11394AA
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: 55 tooth/5-Arm)



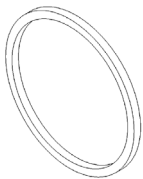
Offset Kit

For further information please contact your Gates supplier.

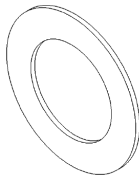
Offset Kit

Art. No.: 10300702-4bolt

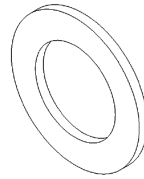
Art. No.: 10300703-5bolt



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.

Differences between Shimano® Nexus™ and Alfine™ hubs

The Shimano® Nexus™ and the Shimano® Alfine™ hubs have different belt lines/chainlines. Consequently, the lateral offset, i.e., the belt alignment at the front sprocket, will vary depending upon what type of hub your bicycle has.

Eccentric bottom bracket

As already mentioned, it is possible that your bicycle or bicycle frame is equipped with an eccentric bottom bracket for tensioning the belt. In this case, it may be possible to adjust the belt alignment of the front sprockets by moving the eccentric bottom bracket housing laterally. Please follow the mounting instructions of your particular bicycle or frame manufacturer.

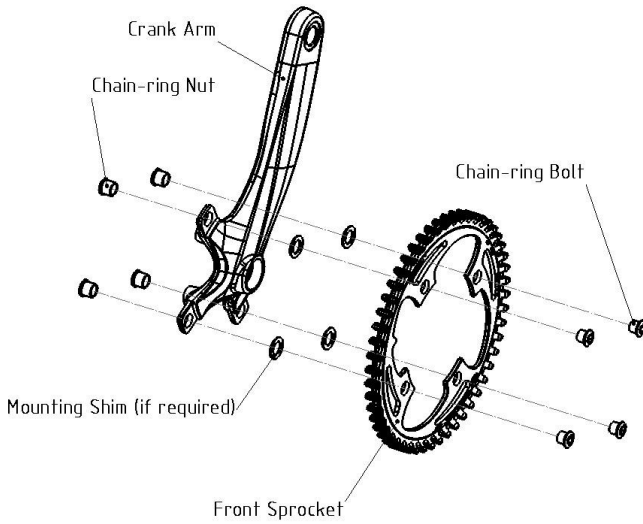


Illustration 1:
Mounting the front sprocket

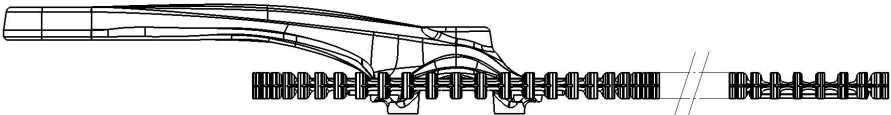


Illustration 2:
Sprocket alignment

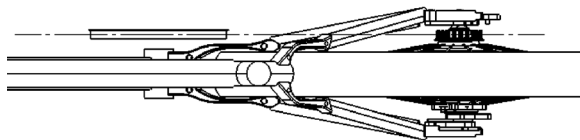
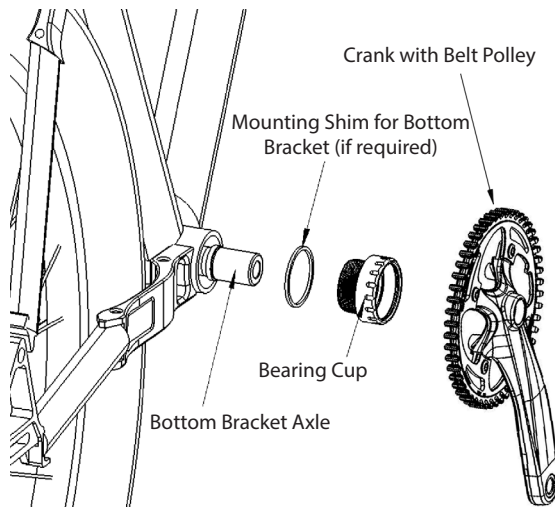


Illustration 3:
Aligning the front

Illustration 4:
Adjusting the belt alignment with shim rings at the bottom bracket



Removing the front sprocket

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

Mounting and removing the Gates Carbon Drive™ rear sprockets

The mounting that was used to mount a Gates rear sprocket on a Shimano® Alfine™ or Nexus™ hub is exactly the same as that of a regular chain sprocket. In the event that you would like to exchange or replace the Gates rear sprocket on your Shimano® Alfine™ or Nexus™ hub or would like to replace an existing hub having a chain sprocket with a Gates sprocket, follow the appropriate instructions in your Shimano® Alfine™ or Nexus™ manual for mounting and removing a chain sprocket.

Rear Sprocket versions

Teeth	Version	Item number	Item number
		CarbonDrive	CenterTrack
22	Alfine 8 und 11Spd	1122ASN10	CT1122NMN10
24	Alfine 8 und 11Spd	1124ASN10	CT1124NMN10
26	Alfine 8 und 11Spd	1126ASN10	-
22	Nexus 7 und 8 Spd	1122NSN10	CT1122NMN10
24	Nexus 7 und 8 Spd	1122NSN10	CT1124NMN10

Comparison of possible Carbon Drive™ gear ratios with chain sprocket gear ratios

Teeth	22 Teeth rear	Chain ratio
46 teeth front	2,09	38/18
50 teeth front	2,27	40/18
55 teeth front	2,50	44/18
60 teeth front	2,73	50/18

Teeth	24 Teeth rear	Chain ratio
46 teeth front	1,92	38/20
50 teeth front	2,08	38/18
55 teeth front	2,29	40/18
60 teeth front	2,50	44/18

Teeth	26 Teeth rear	Chain ratio
46 teeth front	1,77	36/18
50 teeth front	1,92	38/20
55 teeth front	2,12	38/18
60 teeth front	2,31	40/18

Initial gear ratios for hub types (Source: Shimano)

Nexus®

Type	Ratio
8 Speed	2 - 2,20
7 Speed	2 - 2,20
3 Speed	2 - 2,65

Alfine®

Type	Ratio
11 Speed	1,8 - 2,20
8 Speed	2 - 2,25

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

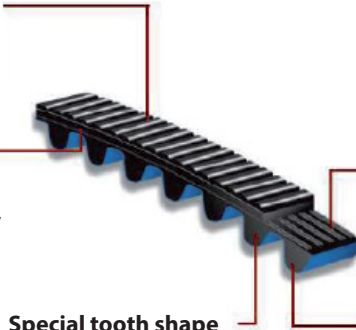
Illustration 1 shows the structure of the belt for Gates Carbon Drive™ with its individual layers. The belt has experienced wear when the nylon jacket has worn away and urethane is exposed. Belt ratcheting may indicate a worn sprocket. If adjusting tension on the belt to or above recommended values does 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.

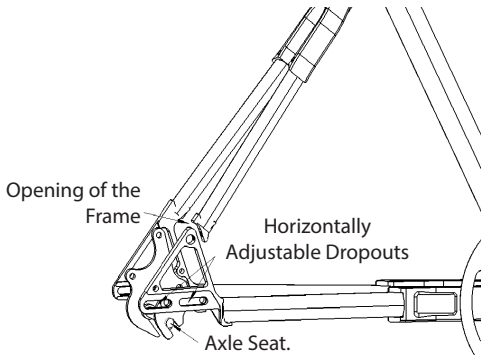


Illustration 2:
Example for frame construction

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

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 manuals.

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
Shimano® gear hubs



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