



CARBON DRIVE™

Manual

for the Gates Carbon Drive™ System used with the

Rohloff SPEEDHUB 500/14



Content

Congratulations! / For your safety	4
Proper handling of the Gates Carbon Drive belt	5
Examples of improper handling	6
Uncoiling the belt	7
Examples of improper handling when mounting the drive belt	8
Dismounting the rear wheel	9
Mounting the rear wheel	9
Mounting the Front Sprocket	11
Offset Kit	12
Mounting the Front Sprocket at the crank adapter	12
Eccentric bottom bracket	13
Mounting the Gates Carbon Drive Rear Sprocket	15
Dismounting the Gates Carbon Drive Rear Sprocket	16
Mounting the Gates Carbon Drive Belt	17
Checking the belt tension	21
Checking the belt tension using the Eco Tension Tester	22
Checking the belt tension without the Tension Tester	24
Versions of Snubbers and spare parts	25
Mounting the Snubber	27
When does the Gates Carbon Drive Belt need to be replaced, when do the sprockets need to be replaced?	30
Replacing the belt after it has been damaged	30
Replacing the Sprockets when they have been damaged	31
Replacing belt and sprockets because of abrasion	31
Frame requirements when mounting the Gates Carbon Drive™	34
Possibilities for tensioning and adjustment	34
Opening the frame	34
Straightness and stiffness of the frame	36
Available sprockets for Rohloff SPEEDHUB 500/14	38
Allowed sprocket combinations for Rohloff SPEEDHUB 500/14	39
Tables of distance traveled per crank revolution for Rohloff SPEEDHUB 500/14 with Gates Carbon Drive Sprockets	40
Comparing the gear ratio of Rohloff SPEEDHUB 500/14 chain pinion to Gates Carbon Drive Sprocket	43
GATES CARBON DRIVE SYSTEM Product Warranty	44

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 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 turnups on pants, 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.

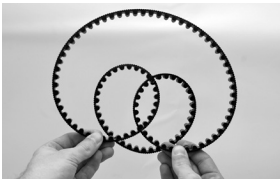


Please note:

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 fibers inside the belt.



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

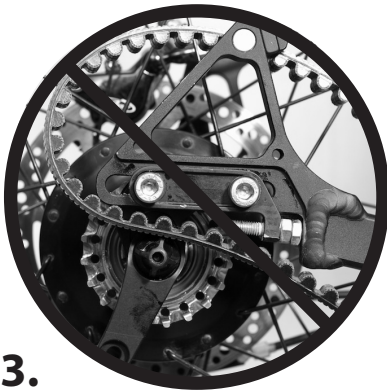
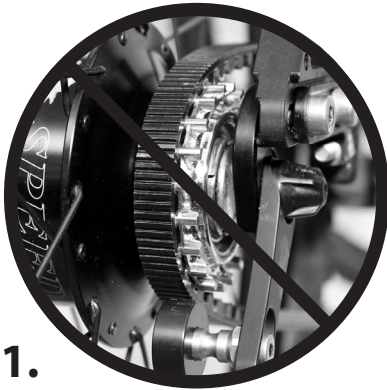


Move your hands away from each other slowly, until the belt uncoils on its own.



Now the belt is properly uncoiled.

Examples of improper handling when mounting the drive belt





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 / dismantling
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/ dismantling 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 Front Sprocket**
- **Offset Kit**
- **Mounting the Front Sprocket at the crank adapter**
- **Eccentric bottom bracket**
- **Mounting and Dismounting the Gates Carbon Drive Rear Sprocket**
- **Mounting the Gates Carbon Drive Belt**
- **Checking the belt tension**
- **Checking the belt tension using the Eco Tension Tester**
- **Checking the belt tension without the Tension Tester**
- **Using the Snubber to keep the Gates Carbon Drive Belt from ratcheting**
- **Versions of Snubbers and spare parts**
- **Mounting the Snubber**

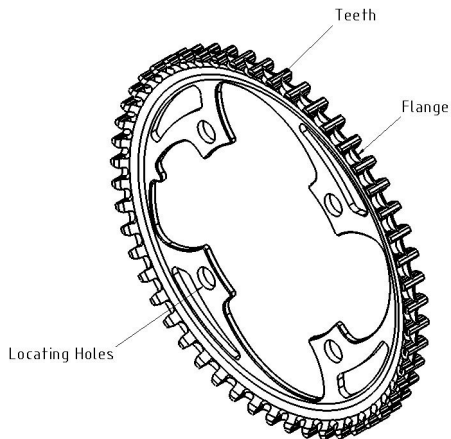
Mounting the Gates Carbon Drive Front Sprocket

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

Front Sprocket versions

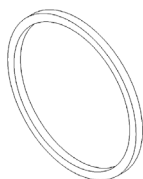
Teeth	Description	Partnumber
39	4-bolt 104mm BC	CDXF439
39	4-bolt 104mm BC	CDXF439E
42	4-bolt 104mm BC	CDXF442
46	4-bolt 104mm BC	CDXF446
46	4-bolt 104mm BC	CDXF446E
50	4-bolt 104mm BC	CDXF450
50	4-bolt 104mm BC	CDXF450E
55	4-bolt 104mm BC	CDXF455

Front Sprocket (shown here: 50 tooth/4-Arm)

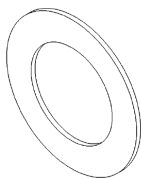


Offset Kit

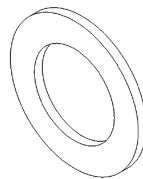
For further information please contact your Gates supplier.



Shim ring, bottom bracket
41x35x1 Art. No. CDEW0
41x35x0,5 Art. Nro CDEW1



**Shim ring, 0,5mm
Front Sprockets**
10x16x0,5 Art. No. CDEW3



**Shim ring, 1mm
Front Sprockets**
10x16x1 Art. No. CDEW2

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. 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. An overview of belt lines of the available Rohloff SPEEDHUB versions is shown in the following table.

Rohloff SPEEDHUB 500/14 belt lines

Model	OLD	Belt line*
500/14	135	55
500/14	142	55
500/14	148	52
XL 500/14	170	73
XL 500/14	177	73
XXL 500/14	190	73
XXL 500/14	197	73

*Tolerance of all dimensions +/- 1mm

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.

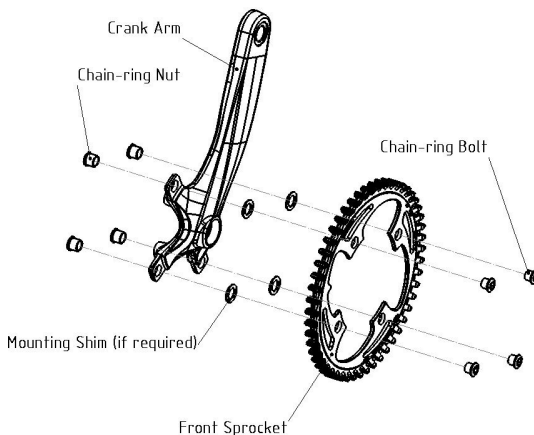


Illustration 1:
Mounting the front sprocket

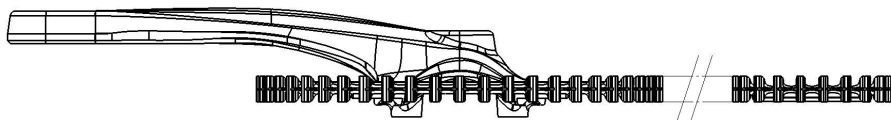


Illustration 2:
Sprocket alignment

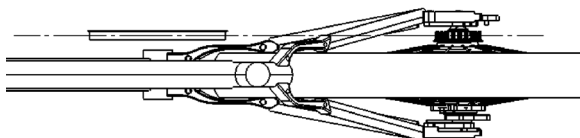
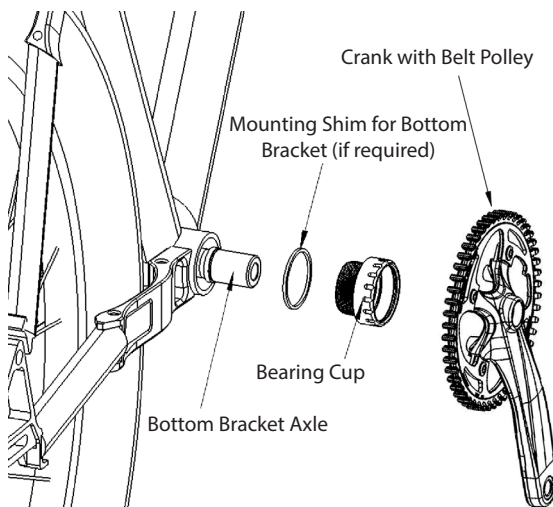


Illustration 3:
Aligning the front sprocket

Illustration 4:
Adjusting the beltline with shims at the bottom



Mounting the Gates Carbon Drive Rear Sprocket

The mounting that is used to mount a Gates rear sprocket on a Rohloff SPEEDHUB 500/14 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 Rohloff SPEEDHUB 500/14 hub or would like to replace an existing hub having a chain sprocket with a Gates sprocket, follow the appropriate instructions in your Rohloff SPEEDHUB 500/14 manual for mounting and removing a chain sprocket.

i Please note

The system of the Gates-Rohloff carrier M46x6 is no longer continued and replaced by the Rohloff Splined Carrier. This part is only available from Rohloff. With the Splined Carrier (part no. 8540L) a beltline of 55mm is possible. The Rohloff lock-ring tool (part no. 8518) is required for installation. Pay attention to the required torque of 30Nm!

The suitable sprockets are shown in the following table.

Versions of rear sprockets

Teeth	Description	Partnumber
19	Rohloff Spline	CDXR19ROS
20	Rohloff Spline	CDXR20ROS
22	Rohloff Spline	CDXR22ROS



Illustration 1: Rohloff SPEEDHUB 500/14 with Splined Carrier and Lock-Ring



Illustration 2: Mounted Rear Sprocket on a Rohloff SPEEDHUB 500/14

Dismounting the Gates Carbon Drive Rear Sprockets

The dismounting of the rear sprocket is done by using the Rohloff lock-ring tool, the lock-ring is screwed anti-clockwise from the hub. The Rear Sprocket must be countered with the help of the POM Sprocket Key Arm and the respective insert.

Illustration 3:
Dismounting of Rohloff Lock-Ring
from Rohloff SPEEDHUB 500/14



i Please note

Dismounting of the rear sprocket must always be done with the help of the POM Sprocket Key Arm (part no. CDPOMARM), otherwise there is a risk of injury. Do not use the Gates Strap Wrench (part no. CDTS)! The following table shows the available POM Sprocket Key Inserts for the different sizes

Available POM Sprocket Key Inserts

Teeth	Partnumber
19	CDTPOM19
20	CDTPOM20
22	CDTPOM22
24	CDTPOM24

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 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.

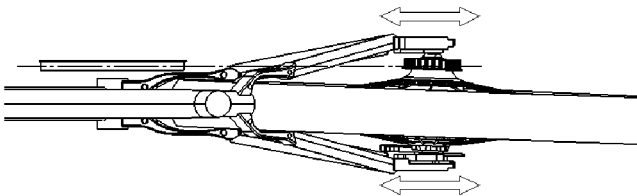
Rotate the crank again, check the alignment of the belt and adjust it until it runs noiseless. Please consider always the needed belt tension. Repeat these steps until the belt line is correct adjusted.

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.

i Please note:

The following instructions are for frames with horizontally slidable dropouts. These are used differently by various different manufacturers. For 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. It is also possible that the tension of the belt on your frame does not take place via the dropouts but via an eccentric at the bottom bracket of the frame. In this case, please also follow the appropriate mounting specifications of your bicycle or frame manufacturer.



Aligning the belt by adjusting the slidable 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.



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. CDTETT) 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

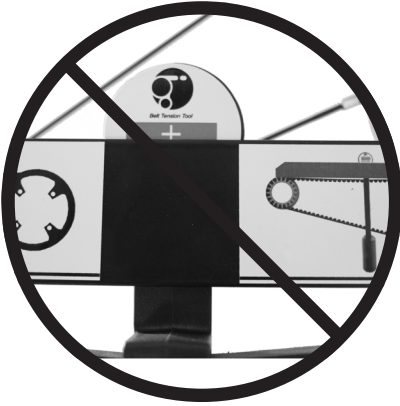


Illustration 1: Incorrect belt tension

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

If the tension is to be checked or adjusted, but no EcoTensionTester is available, the Gates CarbonDrive mobile app will help. This is free for iPhone or Android and is available for download in the Appstore (iPhone) or GooglePlay (Android).

i 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.

Versions of Snubbers and spare parts

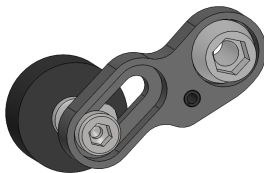
Title	Part Number	Application
RDM Snubber	CDECDR	Mounting on traditional derailleur hanger
RDM Shimano Snubber	CDERDMS	Mounting on Shimano DirectMount derailleur hanger
QR Snubber	CDECDQ	Mounting via quick release
Snubber Wheel	CDERO	Mounting on OEM Dropouts
Snubber Scew	CDESB	For Sparepart delivery
Spacer Kit	CDESK	See Table on P. 25, includes 2x 9mm Spacer, cylinder screw M6x30

i Please note:

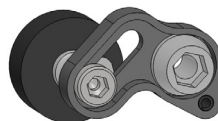
The spacer kit must be ordered in addition to the snubber, if required according to the table (P. 25). An overview of the components of the respective snubber variants and spare parts can be found at: www.carbondrive.net



**Illustration 1:
QR Snubber**



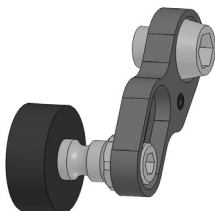
**Illustration 2:
RDM Snubber**



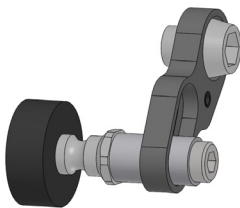
**Illustration 3:
RDM Shimano
Snubber**

Depending on OLD of the Rohloff SPEEDHUB 500/14 hub and the design of the derailleur hanger, a different number of spacers must be placed between the snubber support and the snubber axle in order to position the snubber coil with the greatest possible overlap with the belt. An overview of the possible configurations is given in the following table.

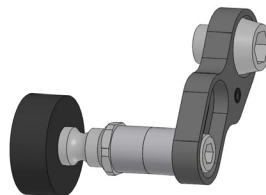
Rohloff Model	OLD	RDM Shimano Snubber	RDM + QR Snubber
500/14	135	1x Spacer, M6x30	without
500/14	142	1x Spacer, M6x30	without
500/14	148	2x Spacer, M6x30	1x Spacer, M6x30
XL 500/14	170	1x Spacer, M6x30	without
XL 500/14	177	1x Spacer, M6x30	without
XXL 500/14	190	2x Spacer, M6x30	1x Spacer, M6x30
XXL 500/14	197	2x Spacer, M6x30	1x Spacer, M6x30



**Illustration 4:
Without spacer**



**Illustration 5:
1x Spacer**



**Illustration 6:
2x Spacer**



Illustration 1:
Rohloff SPEEDHUB 500/14
with Snubber

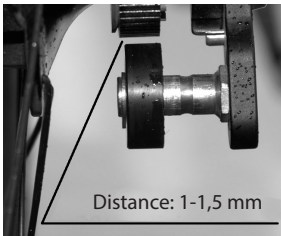


Illustration 2:
The Snubber wheel does
not touch the belt!



Illustration 3:
Side view of the installed
Snubber

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 slidable Snubber axle to the Snubber plate with a M4 screw.
2. The Snubber wheel is located on the Snubber axle. The Snubber wheel is slidable on the Snubber axle. The Snubber wheel latches into an inner and an outer catch position on the axle, to ease the dismantling 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. 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.

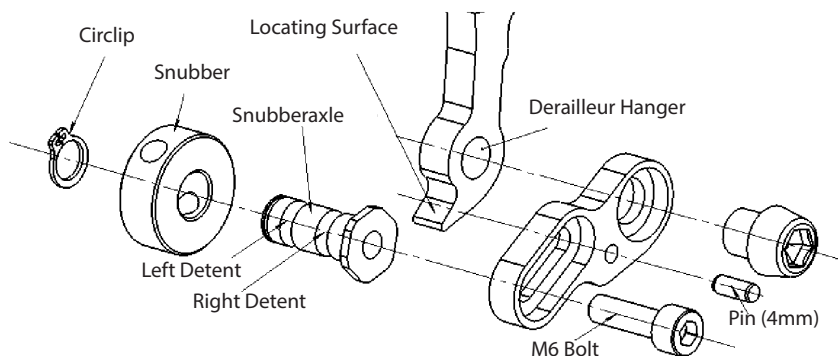


Illustration 4:
Parts of the Snubbers

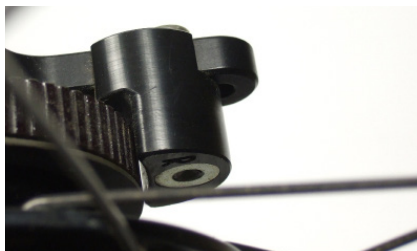


Please note:

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 hanger (for OEM frames)



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

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 fibers 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 rip 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

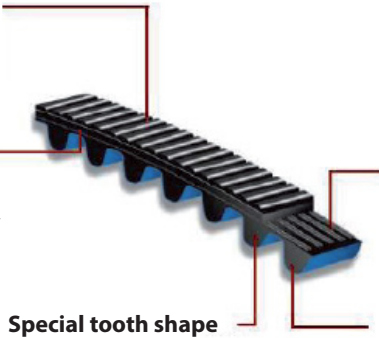
Both the belt and sprockets are parts that abrade or wear. Contrary to what you might expect, tests have shown that the belt tends to have a slightly longer life expectancy than the sprockets. You can check the abrasion of belt and sprockets with the Profile Wear Gauge as shown in illustrations 3 and 4. If the gauge result is equal to, or larger than 0.5mm, the particular belt or sprocket will need to be replaced. For a drive system in which all components have been used for the same amount of time it is recommended to replace all components, as soon as one of them needs to be replaced because of wear or abrasion. You can find further information about the use of your Profile Wear Gauge in the separate manual.

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 dedendum (the radial distance between the pitch circle and the bottom of the tooth), 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 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 adjuster around the bottom bracket. However, the safety of the belt can only be guaranteed if the correctly adjusted tension is not altered when the rear wheel is dismantled (in the case of a puncture, for example). The frame construction must allow for this. 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.

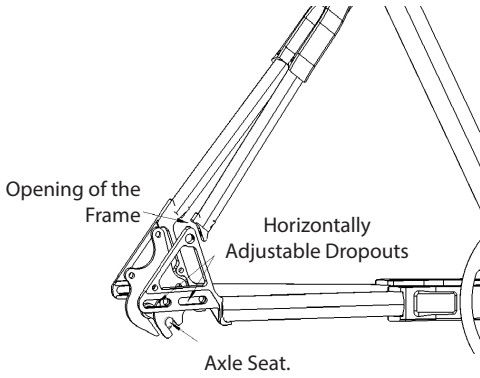


Illustration 2:
Example for frame construction

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.



Please note:

When using the Gates CarbonDrive with a Rohloff SPEEDHUB, the used frame model must have passed the Gates Carbon Drive stiffness test.

You can find an overview with already tested frames of many manufacturers under: www.gatescarbondrive.com/framestiffness

If your frame is not in the list already, please contact the relevant frame manufacturer or contact your nearest development center:

Europe chris.h@carbondrive.net

Asia keno@kor-design.com

USA marc.seemann@gates.com



Please note:

You can find all information and the frame construction requirements for using the Gates Carbon Drive System on www.gatescarbondrive.com/framestiffness

5

Gear Ratio Comparisum

- **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 at 13,6% over the entire transmission range.

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 for the complete selection.

Versions of Rear Sprockets

Teeth	Description	Part Number
19	Rohloff Spline	CDXR19ROS
20	Rohloff Spline	CDXR20ROS
22	Rohloff Spline	CDXR22ROS

Versions of Front Sprockets

Teeth	Description	Part Number
39	4 bolt 104mm BC	CDXF439
39	4 bolt 104mm BC	CDXF439E
42	4 bolt 104mm BC	CDXF442
46	4 bolt 104mm BC	CDXF446
46	4 bolt 104mm BC	CDXF446E
50	4 bolt 104mm BC	CDXF450
50	4 bolt 104mm BC	CDXF450E
55	4 bolt 104mm BC	CDXF455

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 38.

Gates Sprocket	19 Tooth rear	20 Tooth rear	22 Tooth rear
39 teeth front	(2,05) \approx 38/18	(1,95) \approx 38/19	not permitted
42 teeth front	(2,21) \approx 38/17	(2,10) \approx 38/18	(1,91) \approx 38/20
46 teeth front	(2,42) \approx 42/17	(2,30) \approx 38/67	(2,09) \approx 38/87
50 teeth front	(2,63) \approx 42/16	(2,50) \approx 40/16	(2,27) \approx 38/17
55 teeth front	(2,89) \approx 46/16	(2,75) \approx 44/16	(2,50) \approx 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 1,9. This equates to the sprocket-size combinations of 39/20 and 42/22.

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

Gates Sprocket	19 Tooth rear	20 Tooth rear	22 Tooth rear
46 teeth front	$(2,42) \approx 42/17$	not permitted	not permitted
50 teeth front	$(2,63) \approx 42/16$	$(2,50) \approx 40/16$	not permitted
55 teeth front	$(2,89) \approx 46/16$	$(2,75) \approx 44/16$	$(2,50) \approx 40/16$

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

5

Table of distance traveled per crank revolution Rohloff SPEEDHUB 500/14 for 20" wheels (wheel circumference 1.51m)

Gates Sprocket	19 Teeth rear		20 Teeth rear		22 Teeth rear	
	From	To	From	To	From	To
39 teeth front	0,86m - 4,54m		0,82m - 4,32m		not permitted	
42 teeth front	0,93m - 4,89m		0,88m - 4,65m		not permitted	
46 teeth front	1,02m - 5,36m		0,96m - 5,10m		0,88m - 4,63m	
50 teeth front	1,11m - 5,83m		1,05m - 5,54m		0,96m - 5,03m	
55 teeth front	1,22m - 6,41m		1,16m - 6,09m		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 Teeth rear		20 Teeth rear		22 Teeth rear	
	From	To	From	To	From	To
39 teeth front	1,18m - 6,20m		1,12m - 5,89m		not permitted	
42 teeth front	1,27m - 6,68m		1,21m - 6,35m		not permitted	
46 teeth front	1,39m - 7,32m		1,32m - 6,95m		1,20m - 6,32m	
50 teeth front	1,51m - 7,95m		1,44m - 7,56m		1,30m - 6,87m	
55 teeth front	1,66m - 8,75m		1,58m - 8,31m		1,44m - 7,56m	

Table of distance traveled per crank revolution Rohloff SPEEDHUB 500/14 for 27,5" wheels (wheel circumference 2.15m)

Gates Sprocket	19 Teeth rear		20 Teeth rear		22 Teeth rear	
	From	To	From	To	From	To
39 teeth front	1,23m - 6,47m		1,17m - 6,15m		not permitted	
42 teeth front	1,33m - 6,97m		1,26m - 6,62m		not permitted	
46 teeth front	1,45m - 7,64m		1,38m - 7,25m		1,38m - 7,17m	
50 teeth front	1,58m - 8,30m		1,50m - 7,89m		1,38m - 7,17m	
55 teeth front	1,74m - 9,13m		1,65m - 8,67m		1,50m - 7,89m	

Table of distance traveled per crank revolution Rohloff SPEEDHUB 500/14 for 28" wheels (wheel circumference 2.18m)

Gates Sprocket	19 Teeth rear		20 Teeth rear		22 Teeth rear	
	From	To	From	To	From	To
39 teeth front	1,25m - 6,47m		1,19m - 6,24m		not permitted	
42 teeth front	1,34m - 7,07m		1,28m - 6,72m		not permitted	
46 teeth front	1,39m - 7,32m		1,40m - 7,36m		1,27m - 6,69m	
50 teeth front	1,51m - 7,95m		1,52m - 8,00m		1,38m - 7,27m	
55 teeth front	1,66m - 8,75m		1,67m - 8,79m		1,52m - 8,00m	

Table of distance traveled per crank revolution Rohloff SPEEDHUB 500/14 for 29" wheels (wheel circumference 2.3m)

Gates Sprocket	19 Teeth rear		20 Teeth rear		22 Teeth rear	
	From	To	From	To	From	To
39 teeth front	1,32m - 6,93m		1,25m - 6,58m		not permitted	
42 teeth front	1,42m - 7,46m		1,35m - 7,09m		not permitted	
46 teeth front	1,55m - 8,17m		1,48m - 7,76m		1,34m - 7,05m	
50 teeth front	1,69m - 8,88m		1,60m - 8,44m		1,46m - 7,67m	
55 teeth front	1,86m - 9,77m		1,76m - 9,28m		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 lowest gear derailleur

front/rear	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
24/32	36/13 42/15 44/16 46/17	55/20
26/32	38/13 44/15 48/16 50/17	55/19
20/30	32/13 36/15 40/16 42/17	46/19 50/20 55/22
22/30	36/13 40/15 44/16 46/17	50/19
24/30	38/13 44/15 46/16 50/17	55/19

Sprocket-size combination highest gear derailleur

front/rear	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
46/11	38/13 44/15 46/16 50/17	55/19
42/12	32/13 36/15 40/16 42/17	46/19 50/20 55/22
44/12	34/13 38/15 40/16 44/17	50/20 55/22
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

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 www.gatescarbondrive.com). 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.





CARBON DRIVE™

Find more information for Europe:

Universal Transmissions GMBH

Walkmühlenstraße 195
99974 Mühlhausen Germany

Phone: +49 3601 888 64 84

info@carbondrive.net
www.carbondrive.net

Find more information for North America and South America:

CarbonDrive@Gates.com
www.GatesCarbonDrive.com

