

DT SWISS

DICUT WHEELS
TECHNICAL MANUAL

V2022.06

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1. GENERAL

1.1 VALIDITY

This manual describes the component specified on the front page and the footer. This manual is valid for the design of the product as of 04.07.22. Deviations are possible and all items are subject to technical changes.

1.2 SAFETY

The safety instructions are classified as follows:



DANGER

...indicates a hazardous situation that, if not avoided, will result in death or serious injury.



CAUTION

... indicates a hazard with a medium level of risk which, if not avoided, may result in minor or moderate injury.



NOTE

... indicates a potentially hazardous situation that may result in damage to property.

1.3 TARGET GROUP

This manual is intended for the user of the component and dealers. This manual offers the experienced user the possibility to carry out minor service work himself. If you have any doubts about your own abilities, you should definitely contact an expert or a DT Swiss Service Center. Any warranty claims will lapse if work is not carried out properly.

1.4 LAYOUT

The cover page and the footing provide information about the type of product and manual as well as the version of the manual. The DT Swiss contact details can be found on the back. A list of all DT Swiss service centers can be found at www.dtswiss.com.

This manual is intended for being printed as an A5 booklet. Only print this manual if electronic usage is not possible.

1.5 DT SWISS MANUAL CONCEPT

The DT Swiss manuals are split into the following types of manuals:

- User Manual: Information for the end user on how to install and use the component.
- Technical Manual: Detailed information for the end user and the dealer on how to maintain the component, spare parts and technical data.

1.6 GENERAL MAINTENANCE INFORMATION

Unless otherwise specified, moving parts, threads, O-rings and sealings must be greased before assembly.

CLEANING

For an optimal result of the maintenance work, every component that will be disassembled must be cleaned. Only use cleaners and degreasers which do not damage the components. Especially the cleaning of O-rings and sealings requires mild cleaners. Observe the instructions for use of the respective cleaner.

DT Swiss recommends the following cleaners:

- Motorex Rex
- Motorex Swissclean
- Motorex OPAL 2400, 3000 OPAL, OPAL 5000

Use soap water or similar mild cleaners for external cleaning.

TOOLS

To ensure a damage-free mounting and dismounting of the components, only use the tools which are mentioned in this manual. Special tools are indicated at the beginning of a chapter in the table "Required material".

The use of different tools is at the discretion of the user. If components are damaged by the usage of differing tools, the user is liable.

DT Swiss special tools are precision tools. Damage-free mounting and dismounting of the components can only be ensured if the tools are working properly and if the condition of the tools are perfect. Always keep the tools in their original packaging or adequate devices to prevent damage.

1.7 ENVIRONMENTAL PROTECTION

The statutory regulations shall apply. Whenever possible, avoid creating waste. Waste, especially carbon, lubricants, cleaners and any other fluids must be disposed in an environmentally compatible manner. Only print this manual if electronic usage is not possible.

1.8 EXCLUSION OF LIABILITY

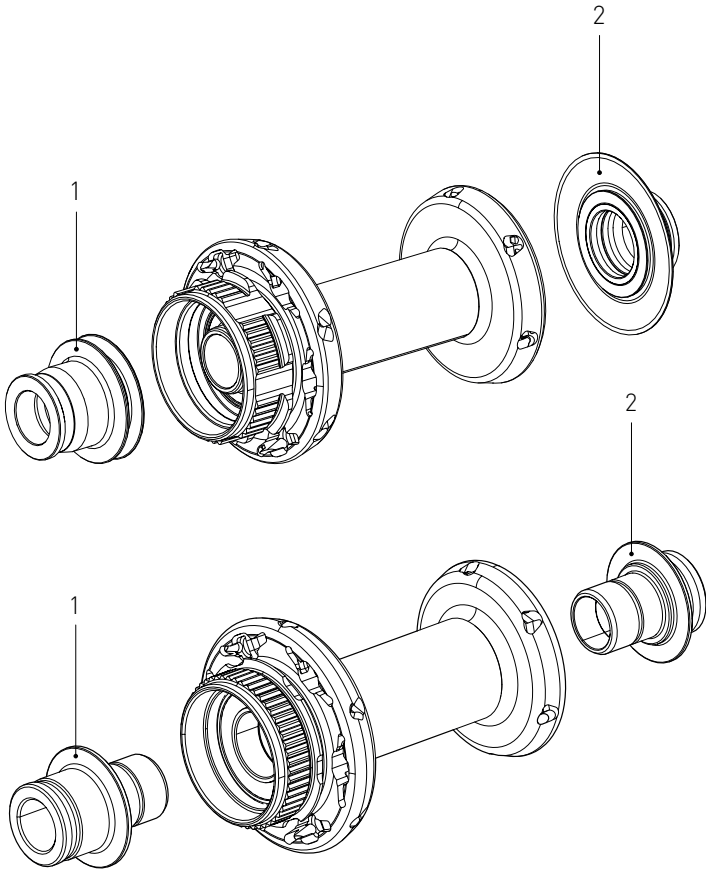
The activities listed in this manual may only be carried out by persons with sufficient specialist knowledge. The user is liable for any damage or consequential damage caused by wrongly maintained or installed components. If you have doubts, please contact an expert or your region's DT Swiss pro level service center.

1.9 WARRANTY

Warranty conditions, see www.dtswiss.com

2. CONVERTING THE END CAPS

2.1 CONVERTING THE END CAPS ON THE FRONT WHEEL [PLUGGED-IN END CAPS]



1 | end cap non drive side

2 | end cap drive side

You can find the possible conversion options for your wheel at dtswiss.com/en/support/product-support.

REQUIRED WEARING PARTS AND MATERIALS

| Wearing parts / Materials | Specification | Quantity | Article number |
|---------------------------|---|----------|----------------|
| DT Swiss universal grease |  | 20 g | HXTXXX00NMG20S |

1. Pull off both end caps by hand.

If the end caps cannot be pulled off by hand, clamp the end caps carefully into a vise with ground clamping jaws and pull the hub / wheel upwards.



2. Clean both end caps and ball bearings with a dry cloth.



3. Grease the bearings and the inner surface of both end caps.

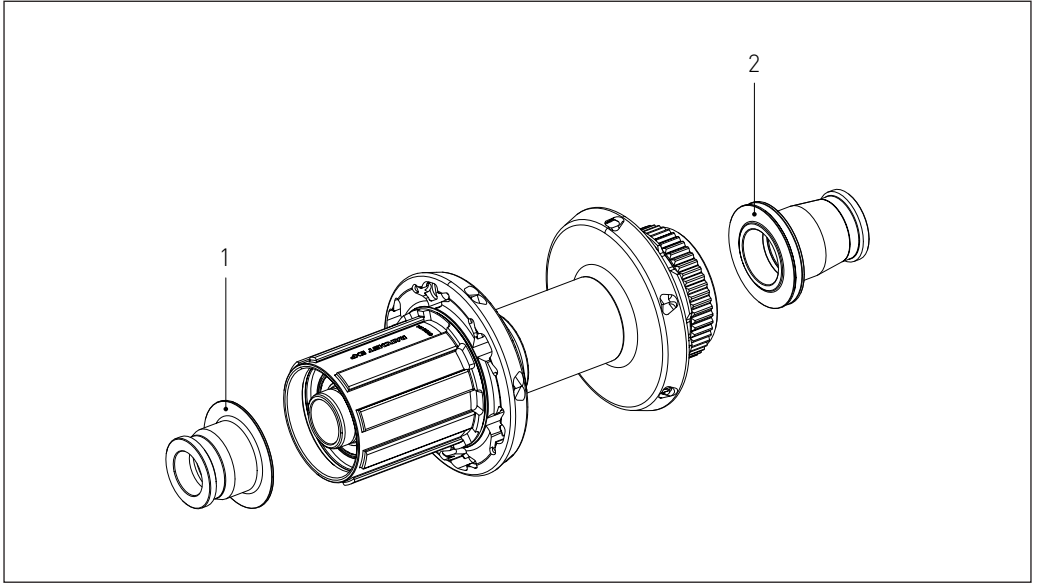


4. Put on the left and the right end cap.
→ The shorter end cap must be placed on the drive side.
5. Push in end caps by hand.



2.2 CONVERTING THE END CAPS ON THE REAR WHEEL

OVERVIEW



1 | end cap drive side

2 | end cap non drive side

You can find the possible conversion options for your wheel at dtswiss.com/en/support/product-support.

REQUIRED WEARING PARTS AND MATERIALS

| Wearing parts / Materials | Specification | Quantity | Article number |
|---------------------------|--|----------|----------------|
| DT Swiss universal grease |  | 20 g | HXTXXX00NMG20S |

1. Pull off both end caps by hand.

If the end caps cannot be pulled off by hand, clamp the end caps carefully into a vise with ground clamping jaws and pull the hub / wheel upwards.



2. Clean both end caps and ball bearings with a dry cloth.



3. Grease both bearings and the inner side of both end caps.



4. Put on the left and the right end cap.
→ The shorter end cap must be placed on the drive side.
5. Push in end caps by hand.



3. HUB MAINTENANCE

This chapter describes a small hub service. This includes:

- End caps: Disassemble, clean, grease and assemble
- Freewheel body: Disassemble, clean, grease and assemble
- Freewheel system: Cleaning and degreasing.

The description of a full hub service can be found in the technical manual of the respective hubs at www.dtswiss.com.

3.1 SERVICE INTERVALS

The following regular maintenance and care work is recommended by DT Swiss:

| Task | Interval |
|---|----------------------------|
| Small Service <ul style="list-style-type: none">• Under normal operating conditions• in extreme operating conditions (frequent riding in rain, mud, snow) | 6 months as required |
| Full hub service (see Technical Manual at dtswiss.com) <ul style="list-style-type: none">• Under normal operating conditions• in extreme operating conditions (frequent riding in rain, mud, snow) | 12 months as required |
| Check the hub for damage | Before and after each ride |
| Clean with soft cloth and a suitable cleaner (see "Cleaning" on page 4). Do not use high pressure cleaners or aggressive cleaning agents! | After each ride |

3.2 SAFETY



DANGER

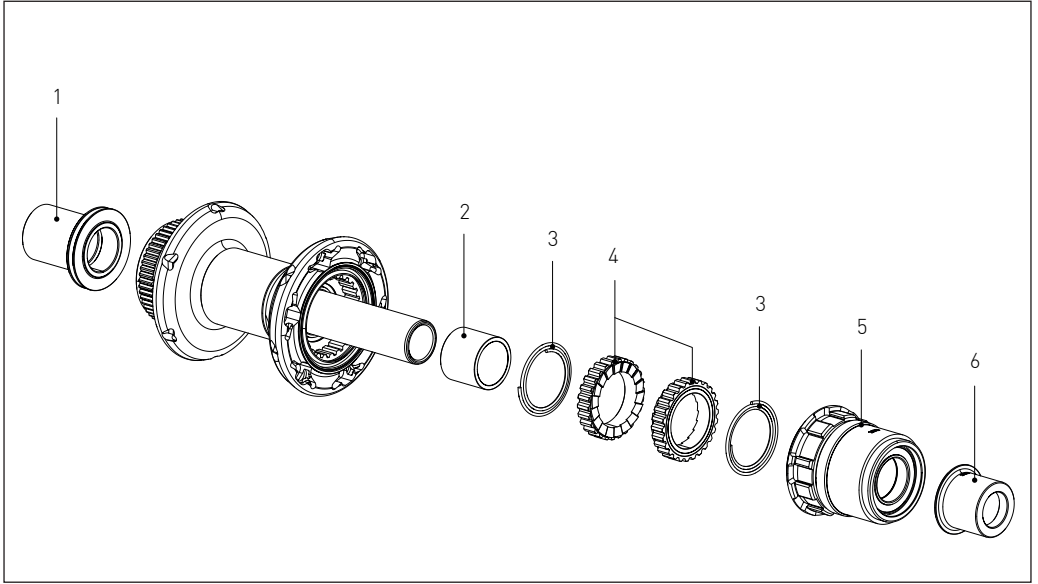
DANGER TO LIFE DUE TO INCORRECT MAINTENANCE AND INCORRECT SPARE PARTS!

Unpredictable malfunctions can occur due to incorrect maintenance, incorrect installation or incorrect spare parts.

- Maintenance may only be carried out by experienced specialists.
- Use only original DT Swiss spare parts or spare parts approved by DT Swiss.
- In cases of doubt, please contact a DT Swiss Service Center.



3.3 MAINTENANCE OF THE REAR WHEEL HUB WITH RATCHET SYSTEM

OVERVIEW



| | | | |
|---|------------------------|---|--------------------|
| 1 | end cap non drive side | 4 | ratchet |
| 2 | spacer | 5 | freewheel body |
| 3 | spring | 6 | end cap drive side |

REQUIRED WEARING PARTS AND MATERIALS

| Wearing parts / Materials | Specification | Quantity | Article number |
|---------------------------|---|----------|----------------|
| DT Swiss universal grease |  | 20 g | HXTXXX00NMG20S |
| DT Swiss Special Grease |  | 20 g | HXT10032508S |

REMOVING END CAPS, FREEWHEEL BODY AND FREEWHEEL SYSTEM

1. Pull off both end caps by hand.

If the end caps cannot be pulled off by hand, clamp the end caps carefully into a vise with ground clamping jaws and pull the hub / wheel upwards.



2. Pull the freewheel body off the hub.



3. Remove springs, ratchets and spacer from the hub.



CLEANING AND CHECKING ALL PARTS

1. Thoroughly clean all parts of the hub. The existing grease must be completely removed from the hub body and from the ratchets.
2. Check the ratchets for wear.

The wear of the ratchets usually starts at the outer circumference and shows itself by strongly flattened edges with uneven wear.

In case of heavy wear, the ratchets must be changed immediately.



3. Check the freewheel body for damages.
→ Grooves from the cassette are no damages. These are normal signs of usage.
4. Remove bad notches on the freewheel body using a file.
5. Clean the freewheel body. Metal chips and metal particles must be removed completely.



DANGER

RISK OF INJURY DUE TO LIMITED FREEWHEEL FUNCTION DUE TO INCORRECT LUBRICATION!

If too much grease is applied on the ratchets, the actuation of the ratchets may not work. The ratchets may slip during pedaling.

- Only apply a thin, even layer of grease.
- Only use the red DT Swiss Special Grease.

1. Apply DT Swiss Special Grease evenly to the outer and the inner tothing of the ratchets using a fine brush.
→ For an optimal functionality of the freewheel system, a thin layer of grease is sufficient.



2. Grease the teeth of the freewheel body and the ring nut with DT Swiss Special Grease.



3. Attach the spacer and the first spring.
→ The spring must rest on the hub with its large diameter.



4. Attach both ratchets and the second spring.
5. The spring must rest with its small diameter on the ratchet.



PUTTING ON THE FREEWHEEL BODY AND THE END CAPS

1. Put the freewheel body onto the hub.
2. Check if the freewheel body can be turned and if the ratchets are engaging.



3. Grease the bearings and the inner surface of both end caps.



4. Put on the left and the right end cap.
 - The shorter end cap must be placed on the drive side.
5. Push in end caps by hand.

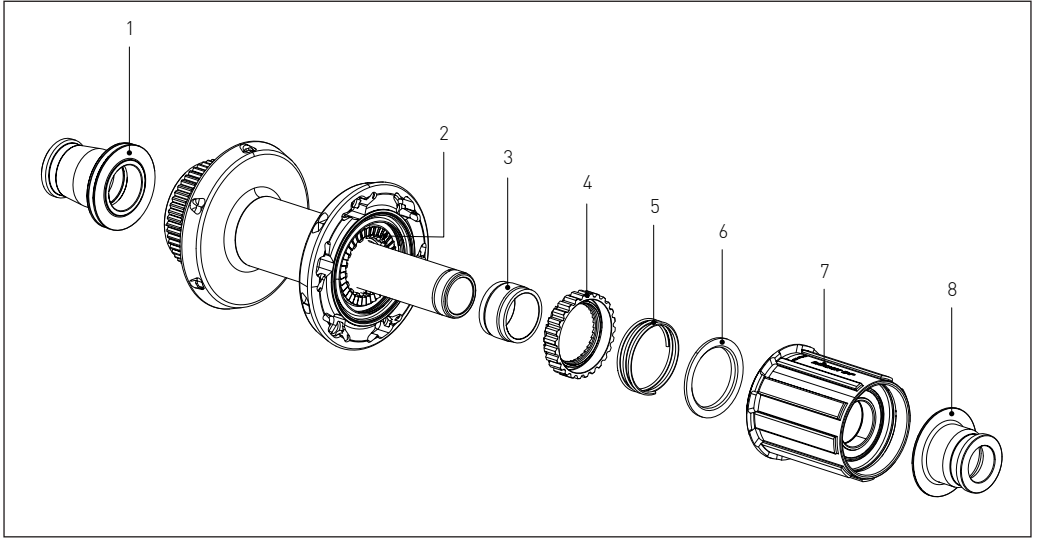


CHECK THE FUNCTIONALITY

1. Turn the freewheel body in both directions.
 - The freewheel body can be turned counterclockwise easily.
 - The ratchets engage audibly and perceptibly.
 - The freewheel body cannot be turned clockwise.
2. Check the tightness of the end caps.
 - The end caps are firmly seated on the axle and are fully pushed on.



3.4 MAINTENANCE OF THE REAR WHEEL HUB WITH RATCHET EXP® SYSTEM

OVERVIEW



| | | | | | |
|---|------------------------|---|---------------|---|--------------------|
| 1 | end cap non drive side | 4 | loose ratchet | 7 | freewheel body |
| 2 | threaded ratchet | 5 | spring | 8 | end cap drive side |
| 3 | spacer | 6 | washer | | |

REQUIRED WEARING PARTS AND MATERIALS

| Wearing parts / Materials | Specification | Quantity | Article number |
|---------------------------|---|----------|----------------|
| DT Swiss universal grease |  | 20 g | HXTXXX00NMG20S |
| DT Swiss Special Grease |  | 20 g | HXT10032508S |

REMOVING END CAPS, FREEWHEEL BODY AND FREEWHEEL SYSTEM

1. Pull off both end caps by hand.

If the end caps cannot be pulled off by hand, clamp the end caps carefully into a vise with ground clamping jaws and pull the hub / wheel upwards.



2. Pull the freewheel body off the hub.



3. Remove the spring, the ratchet and the spacer from the hub.



CLEANING AND CHECKING ALL PARTS

1. Thoroughly clean all parts of the hub. The existing grease must be completely removed from the hub body and from the ratchets.
2. Check the ratchets for wear.

The wear of the ratchets usually starts at the outer circumference and shows itself by strongly flattened edges with uneven wear.

In case of heavy wear, the ratchets must be changed immediately.



3. Check the freewheel body for damages.
→ Grooves from the cassette are no damages. These are normal signs of usage.
4. Remove bad notches on the freewheel body using a file.
5. Clean the freewheel body. Metal chips and metal particles must be removed completely.



DANGER

RISK OF INJURY DUE TO LIMITED FREEWHEEL FUNCTION DUE TO INCORRECT LUBRICATION!

If too much grease is applied on the ratchets, the actuation of the ratchets may not work. The ratchets may slip during pedaling.

- Only apply a thin, even layer of grease.
- Only use the red DT Swiss Special Grease.

1. Apply DT Swiss Special Grease evenly to the outer and the inner tothing of the ratchets using a fine brush.
→ For an optimal functionality of the freewheel system, a thin layer of grease is sufficient.
2. Grease the teeth of the freewheel body with DT Swiss Special Grease.



3. Fit the ratchet, the spacer and the spring.



PUTTING ON THE FREEWHEEL BODY AND THE END CAPS

1. Put the freewheel body onto the hub.
2. Check if the freewheel body can be turned and if the ratchets are engaging.



3. Grease both bearings and the inner side of both end caps.



4. Put on the left and the right end cap.
→ The shorter end cap must be placed on the drive side.
5. Push in end caps by hand.



CHECK THE FUNCTIONALITY

1. Turn the freewheel body in both directions.
 - The freewheel body can be turned counterclockwise easily.
The ratchets engage audibly and perceptibly.
 - The freewheel body cannot be turned clockwise.
2. Check the tightness of the end caps.
 - The end caps are firmly seated on the axle and are fully pushed on.

4. MAINTENANCE OF THE WHEEL

This chapter describes activities that affect the entire wheel:

- Truing the wheel
- Replacing a spoke

The description of a full hub service can be found in the technical manual of the respective hub at www.dtswiss.com.

4.1 SERVICE INTERVALS

The following regular maintenance and care work is recommended by DT Swiss:

| Task | Interval |
|--|----------------------------|
| Check the spoke tension, dish and wear of the wheel. Spoke tensions and tolerances, see "6. Technical data" on page 32 | 10 operating hours |
| Check the wheel for damage | Before and after each ride |
| Clean with soft cloth and a suitable cleaner. Do not use high pressure cleaners or aggressive cleaning agents! | After each ride |
| Check that the fork is correctly fastened. | before each ride |
| Rim brake wheels: <ul style="list-style-type: none">• Remove any contaminations (especially oil and traces of grease) from the brake surfaces• Check the degree of wear of the brake pads• Remove any entrenched impurities (grit, swarf, etc.)• Check the degree of wear on the braking surfaces of the rim. If in doubt, or if there is any visible wear, have it checked by an expert. | before each ride |

4.2 SAFETY



DANGER

DANGER TO LIFE DUE TO INCORRECT MAINTENANCE AND INCORRECT SPARE PARTS!

Unpredictable malfunctions can occur due to incorrect maintenance, incorrect installation or incorrect spare parts.

- Maintenance may only be carried out by experienced specialists.
- Use only original DT Swiss spare parts or spare parts approved by DT Swiss.
- In cases of doubt, please contact a DT Swiss Service Center.

4.3 CHANGING A SPOKE: BASICS

HOW DO I LOOSEN / TIGHTEN A NIPPLE?

The nipple can be screwed on in two ways:



With the help of the DT Swiss Spokey, the nipple can be turned on the inside of the rim. This method is particularly useful for:

- Small corrections of the spoke tension
- Repairs "on trail"
- Corrections / repairs to a spoke where the nipple does not need to be replaced.

Neither the tire nor the Tubeless Ready Tape must be removed. The disadvantage of this method is that traces of the tool can often be seen on the nipple.

The following Spokey is required:



red / square

Item No:
TTSXXXXR05633S



With the help of the DT Swiss nipple key, the nipple can be turned on the outside of the rim. This is the common method for:

- Wheels with hidden nipples. In these wheels, the nipple does not protrude from the rim on the inside of the rim .
- More extensive work on several spokes.
- All work where the nipple must be replaced.

After completion of the work, a new Tubeless Ready Tape must be installed.

Three different nipple keys are available:



black / Torx

Item No: TTSXXXXS05630S



red / square

Item No: TTSXXXXR05631S

Flat spokes must be held while loosening a nipple, see following.

HOW DO I HOLD A SPOKE?

Spokes must be held during loosening and during tensioning.

Flat spokes



Flat spokes must be held while the nipple is tightened and loosened. This must be done with a spoke holder depending on the spoke type. It is important here to ensure that the spoke holder is pushed as far as possible in the direction of the nipple.

There are two different spoke holders available:



red / spoke holder Aero 0.8 - 1.0 mm (DT aerolite®)

Item No.: TTSXXXXR05641S



black / spoke holder Aero 1.0 - 1.3 mm

(DT aero comp®, DT new aero®, DT aero speed®)

Item No.: TTSXXXXS05644S

4.4 PHR SYSTEM: BASICS

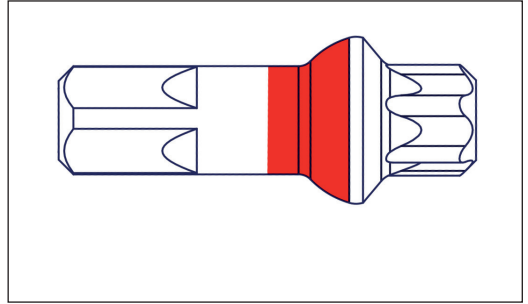
Some of the DT Swiss wheels are equipped with the PHR system. The DT Swiss PHR (PRO HEAD® REINFORCEMENT) system consists of a washer and a specially shaped nipple. The shape of the washer (PHR washer) acts as a ball joint and perfectly aligns the specially developed DT Squorx Pro Head® ball head nipple in the direction of pull, minimizing the risk of spoke breakage.

REQUIRED WEARING PARTS AND MATERIALS

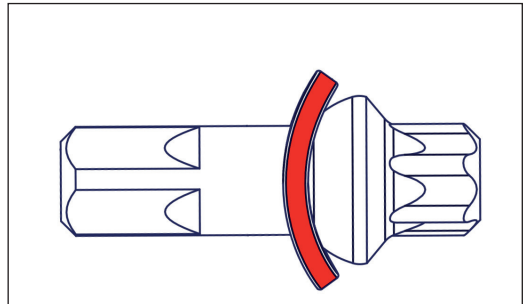
| Wearing parts / Materials | Specification | Quantity | Article number |
|---------------------------|---|----------|----------------|
| DT Swiss Special Grease |  | 20 g | HXT10032508S |

MOUNTING OF THE PHR SYSTEM

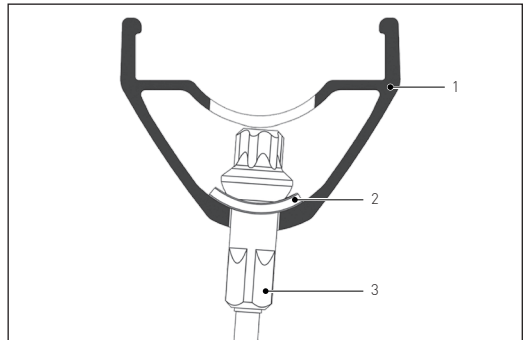
1. Grease the contact surface of the PHR Washer and Squorx nipple with DT Swiss Special Grease.



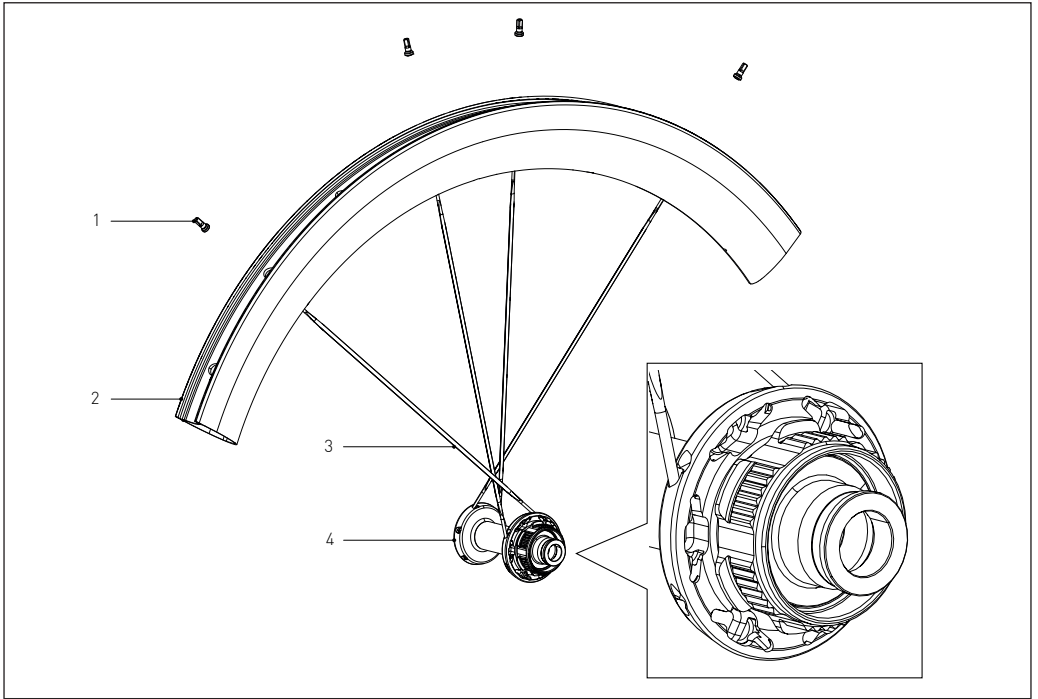
2. Slide the PHR washer onto the Squorx nipple. See figure for orientation.



3. Push the spoke through hub and rim.
4. Screw the Squorx nipple onto the spoke.
5. Check the alignment of the PHR washer. The bends of the PHR Washer [2] must lie in the radius of the rim [1] and the markings on the PHR Washer must be aligned in the running direction of the rim.



4.5 SWAP SPOKE [DICUT AERO]



| | | | |
|---|--------|---|-------|
| 1 | Nipple | 3 | Spoke |
| 2 | Rim | 4 | Hub |

REQUIRED TOOLS

| Tools | Specification | Quantity | Article number |
|---|---------------|----------|----------------|
| see "4.3 Changing a spoke: Basics" on page 23 | | | |

1. Clamp the wheel in a truing stand.
2. Hold the spoke with the red spoke holder (0.8 to 1.0 mm) and turn out the nipple of the spoke to be replaced completely.



3. Also turn out completely the nipple of the spoke that crosses the spoke to be changed at the hub flange.



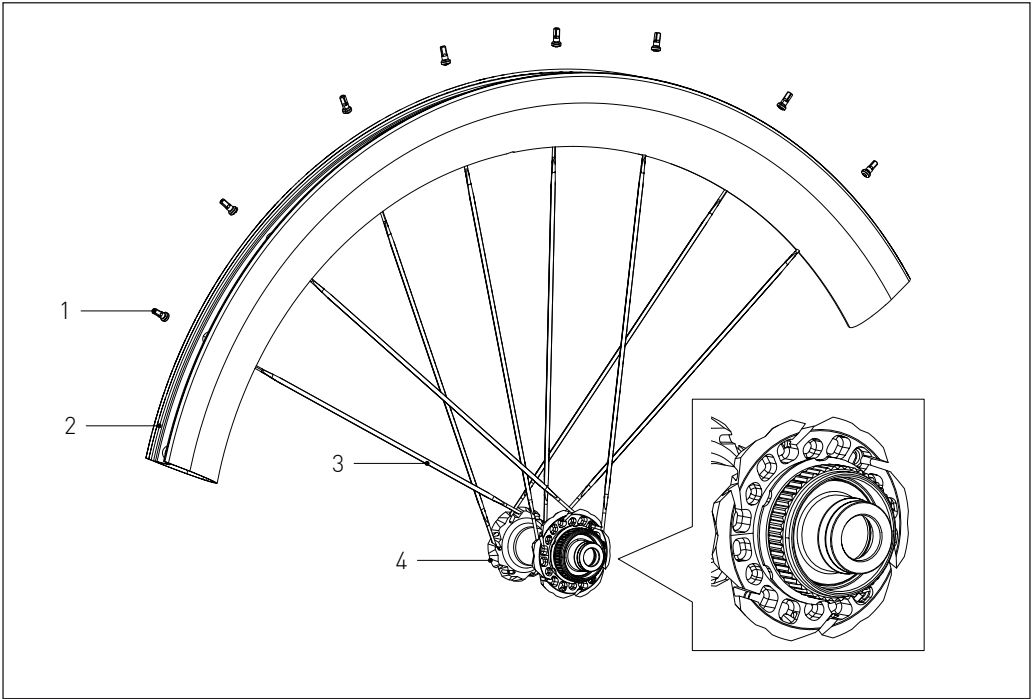
4. Unlace both spokes so that they can be slid out of the hub without tension.
5. Carefully push the spoke through the hub.
6. Push the new spoke through the hub. Be sure to align the spoke head correctly.
7. Interlace the spoke and carefully push the spoke end through the rim.



8. Hold the spoke with the red spoke holder (0.8 to 1.0 mm) and screw on the nipple of the spoke to be replaced.
9. Increase the spoke tension and center the wheel.



4.6 SWAP SPOKE [DICUT DISC]



| | | | |
|---|--------|---|-------|
| 1 | Nipple | 3 | Spoke |
| 2 | Rim | 4 | Hub |

REQUIRED TOOLS

| Tools | Specification | Quantity | Article number |
|---|---------------|----------|----------------|
| see "4.3 Changing a spoke: Basics" on page 23 | | | |

1. Clamp the wheel in a truing stand.
2. Turn out the nipple of the spoke to be replaced completely.
There is a washer between the nipple and the rim. Make sure that the washer and nipple do not fall into the rim profile.



3. Also completely unscrew the nipple of the spoke that crosses the spoke to be changed at the hub flange.



4. Unlace both spokes so that they can be slid out of the hub without tension.
5. Unlace both spokes from the hub flange.



6. Put a new spoke and the previously removed spoke in the hub flange. Make sure that the spoke head is correctly positioned and aligned.
7. Lightly grease the nipple with DT Swiss Special Grease, put the PHR Washer on the nipple and screw the nipple onto the spoke ("4.4 PHR System: Basics" on page 25).
8. Increase the spoke tension and center the wheel.



5. TROUBLE SHOOTING

5.1 TROUBLE SHOOTING HUBS

| Problem | Reason | Solution |
|--|---|---|
| Freewheel locks when fastening the wheel | Spacer was forgotten during assembly. | Check correct assembly, see "3.3 Maintenance of the rear wheel hub with Ratchet System", page 10 or "3.4 Maintenance of the rear wheel hub with Ratchet EXP® System", page 16 |
| | Spacer was compressed by overtightening the thru axle. | Measure the length of the spacer. If the spacer is shorter than 15.4 mm (Ratchet) or 10.7 mm (Ratchet EXP), it must be replaced. |
| | Stop of the cassette on the freewheel body broken. | Replace the freewheel body. |
| Freewheel does not engage / slips | One or both ratchets are mounted upside down. | Check correct assembly, see "3.3 Maintenance of the rear wheel hub with Ratchet System", page 10 or "3.4 Maintenance of the rear wheel hub with Ratchet EXP® System", page 16 |
| | Too much or wrong grease on the ratchets. | Clean and grease ratchets, see "Mounting the freewheel system", page 13. or "Mounting the freewheel system", page 19 |
| | Ratchets are worn. | Replace ratchets. |
| | One or both springs were forgotten during assembly. | Check correct assembly, see "3.3 Maintenance of the rear wheel hub with Ratchet System", page 10 or "3.4 Maintenance of the rear wheel hub with Ratchet EXP® System", page 16 |
| Hub has axial play | Ball bearings were not mounted correctly. | Check correct assembly, see "3.3 Maintenance of the rear wheel hub with Ratchet System", page 10 or "3.4 Maintenance of the rear wheel hub with Ratchet EXP® System", page 16 |
| | Ball bearings are worn out. | Replace ball bearings. |
| Hub rotates stiffly | Ball bearings are worn out. | Replace ball bearings. |
| | Ball bearing non drive side too tight. | Check correct assembly, see "3.3 Maintenance of the rear wheel hub with Ratchet System", page 10 or "3.4 Maintenance of the rear wheel hub with Ratchet EXP® System", page 16 |
| | Mounting sequence of the ball bearings not observed. | Check correct assembly, see "3.3 Maintenance of the rear wheel hub with Ratchet System", page 10 or "3.4 Maintenance of the rear wheel hub with Ratchet EXP® System", page 16 |
| Hub makes noise | Ball bearings are worn out. | Replace ball bearings. |
| Notches from the cassette on the freewheel body. | The steel cassette works itself into the alloy web of the freewheel body. | Remove bad notches on the freewheel body using a file. |

| Problem | Reason | Solution |
|---|---|-----------------------------|
| Freewheel body rotates with difficulty. | Ball bearings in the freewheel body are worn out. | Replace freewheel body. |
| | Stop of the cassette on the freewheel body broken. | Replace the freewheel body. |
| Freewheel is too noisy / too quiet. | The perception of the freewheel sound is very subjective. While some riders prefer a loud freewheel sound, other riders want a quiet freewheel. In principle, the freewheeling sound can be influenced by the amount of grease between the ratchets. Less grease increases the freewheeling sound, but at the same time leads to higher wear. | |

5.2 TROUBLE SHOOTING WHEELS

| Problem | Reason | Solution |
|---|--|--|
| Wheel has lateral or radial runout | Loose spokes or external force. | True the wheel and check spoke tension, adjust if necessary |
| Wheel feels "soft" | Check maximum permissible system weight. | If exceeded, replace wheels with new ones corresponding to the system weight. |
| | Check spoke tension. | correct if necessary |
| | Check clamping in the bike | tighten more strongly if necessary (axle or quick release) |
| Nipples loosen | Check maximum permissible system weight, ensure that this is not exceeded. | Re-build wheel with new PL nipples or Spoke Freeze |
| Creaking noises from spoke crossings | Friction of the spokes at crossing points. | short term: Lightly grease/oil crossing points Long-term: have new spokes fitted by Service Center |
| Clicking noise from nipple and / or PHR Washer | Worn-in nipples/PHR washers. | Have nipple and PHR washer replaced by Service Center. |
| Wheel jams, rotates sluggishly when quick release or axle is tightened. | Slammed spacer in the hub. | Replace spacer. |
| Air loss with TL setup | TL tape perforated or otherwise damaged | apply new TL tape |
| Decreasing braking effect with rim brakes | Worn or dirty brake surfaces. | Clean braking surface and pads, replace rim if necessary. |

6. TECHNICAL DATA

Further technical data, such as spoke types, spoke lengths etc., can be found in the Product Support Tool at www.dtswiss.com.

Technical data of products from older model years can also be found in the DT Swiss Techbook. Service intervals

6.1 SPOKE TENSION

| Wheel type | | max. permissible spoke tension of the higher tensioned wheel side [N] | min. permissible spoke tension of the higher tensioned wheel side [N] | average spoke tension of the higher tensioned wheel side [N] |
|------------|-------------|--|--|---|
| Disc Brake | Front wheel | 1 200 | 950 | 1150 - 1000 |
| | Rear wheel | 1 300 | 1 050 | 1250 - 1100 |
| Rim Brake | Front wheel | 1 100 | 900 | 1050 - 950 |
| | Rear wheel | 1 300 | 1 050 | 1250 - 1100 |

6.2 TOLERANCES

| Wheel type | Lateral runout [mm] | Radial runout [mm] | Dish [mm] |
|-------------------|---------------------|--------------------|-----------|
| carbon rim brake | 0.3 | 0.5 | 0.3 |
| carbon disc brake | 0.3 | 0.5 | 0.3 |
| Aluminum welded | 0.3 | 0.3 | 0.3 |
| Aluminum sleeved | 0.4 | 0.4 | 0.4 |

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