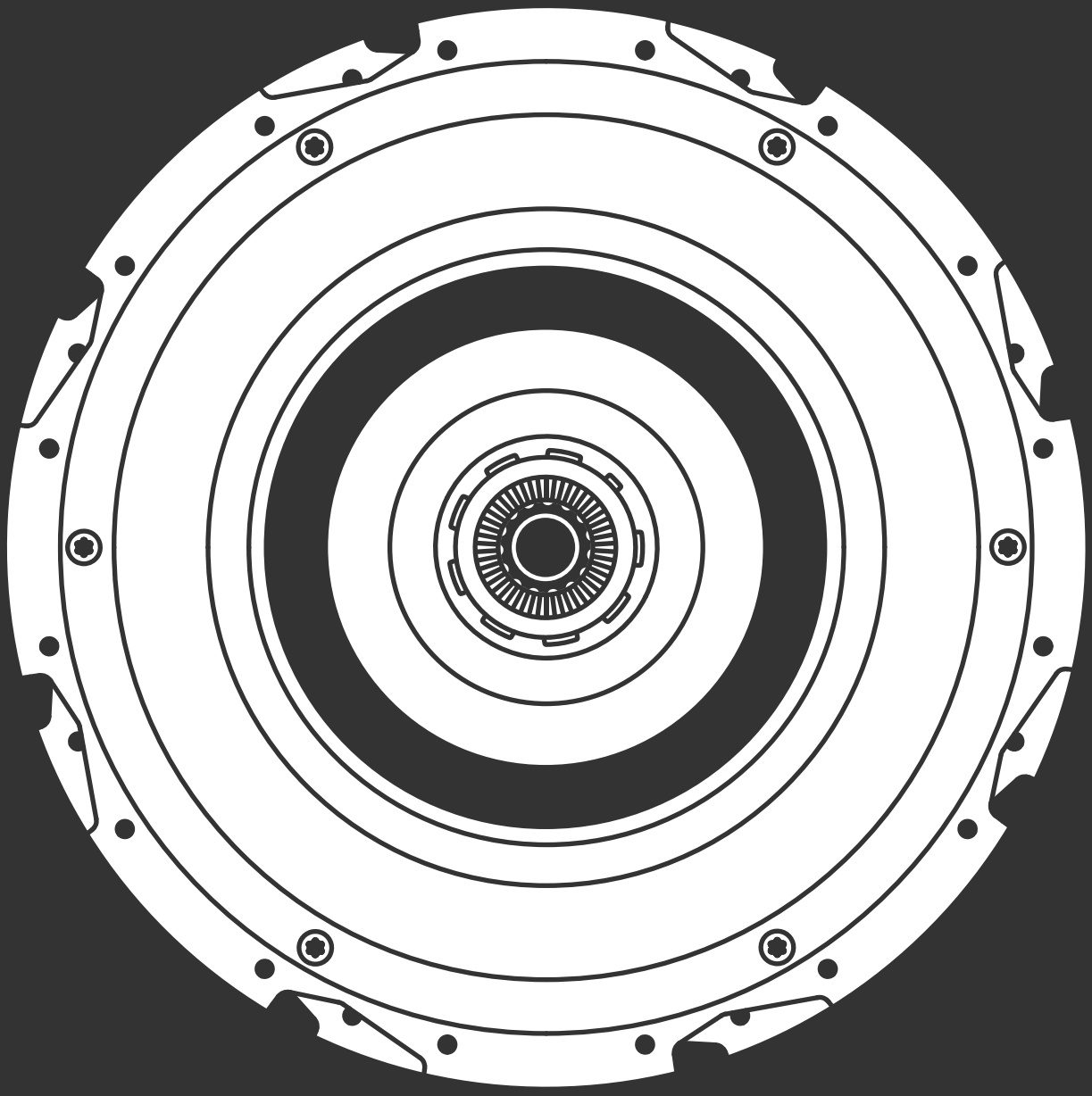


TECHNICAL MANUAL

Rev. 1.2 - 02/2025

Contents

This document contains detailed information about The All In One Horizon model year 2024 by Zehus.

1. Introduction

This manual contains detailed information about Zehus The All In One Horizon, how to build a bike frame compatible with this product and how to install it on a bike.

1.1 How to check my product generation?

Please check Zehus P/N on the order confirmation. The 5th char is referring to your system's generation:

P/N: YB99**1**XXX – previous model year

P/N: YB99**1**XXX – previous model year

P/N: YB99**2**XXX – previous model year

P/N: YB99**31**XX – previous model year

P/N: YB99**3N**XXPE – **N**≥2 – Model Year 24

Please check the S/N four initial characters indicating year of production:

90**23**XXXXXX - manufactured in 2023

90**24**XXXXXX - manufactured in 2024

90**25**XXXXXX - manufactured in 2025

2. Technical specifications

2.1 The All In One specifications

Motor	
Rated power	250 W
Maximum torque	40 Nm

Battery	
Cells	18650
Rated voltage	32,4 V
Rated capacity	6000 mAh
Rated energy	194,4 Wh

Hub	
Weight	3,2 kg
Operating temperature*	-10 to +40 °C
Storage temperature**	0 to +40 °C
Charging temperature	0 to +40 °C
Protection degree	IP X4

**Operating temperature is limited by software*
*** Optimal storage temperature is 23°C*

2.2 Charger specifications

Voltage input	100-240 V, 50/60 Hz
Voltage output	37,8 V
Charging current	2 A
Charging time	3 h

3. Wheel dimensions

In the following table it is reported the wheel dimension related to The All In One hub size.

Please check the product that suits the intended application before ordering.

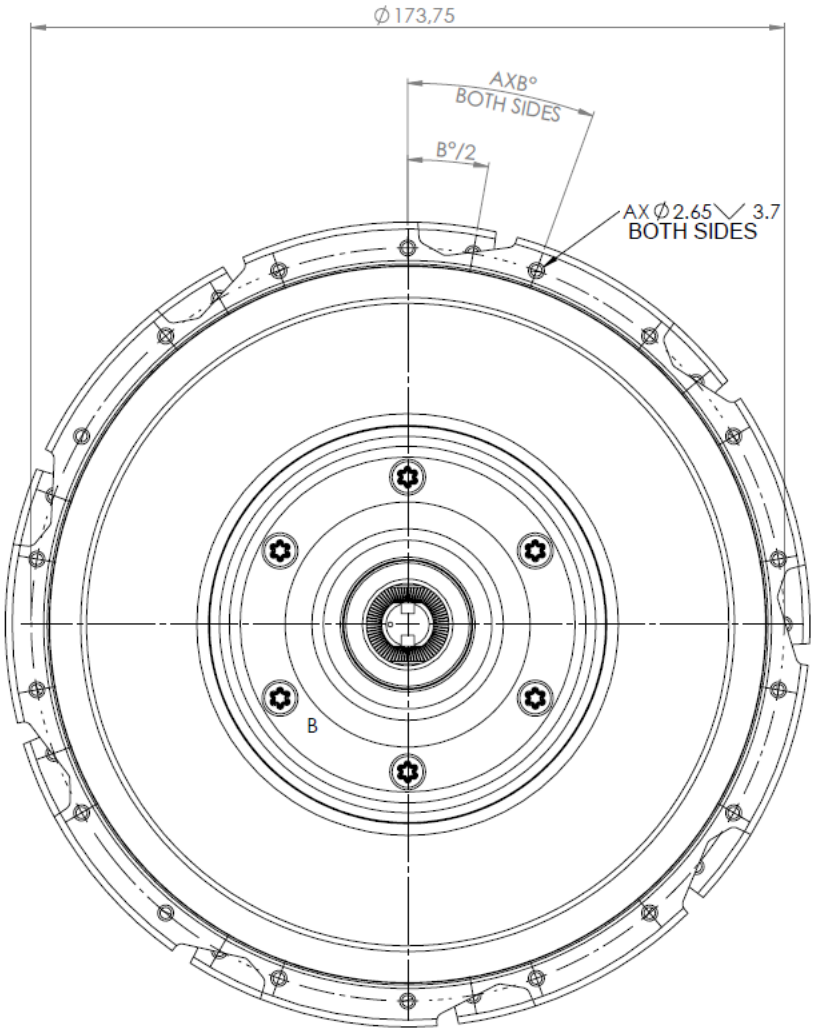
The All In One size	Wheel diameter (inch)	Wheel circumference (mm)	
		Min	*Max*
S	16” - 20”	1265	1650
L	24” - 29”	1900	2340

Attention: Since changes have been made respect to the previous The All In One model, check again the compatibility of your application to order the correct size.

4. Lacing specifications

4.1 Rim brake (single speed)

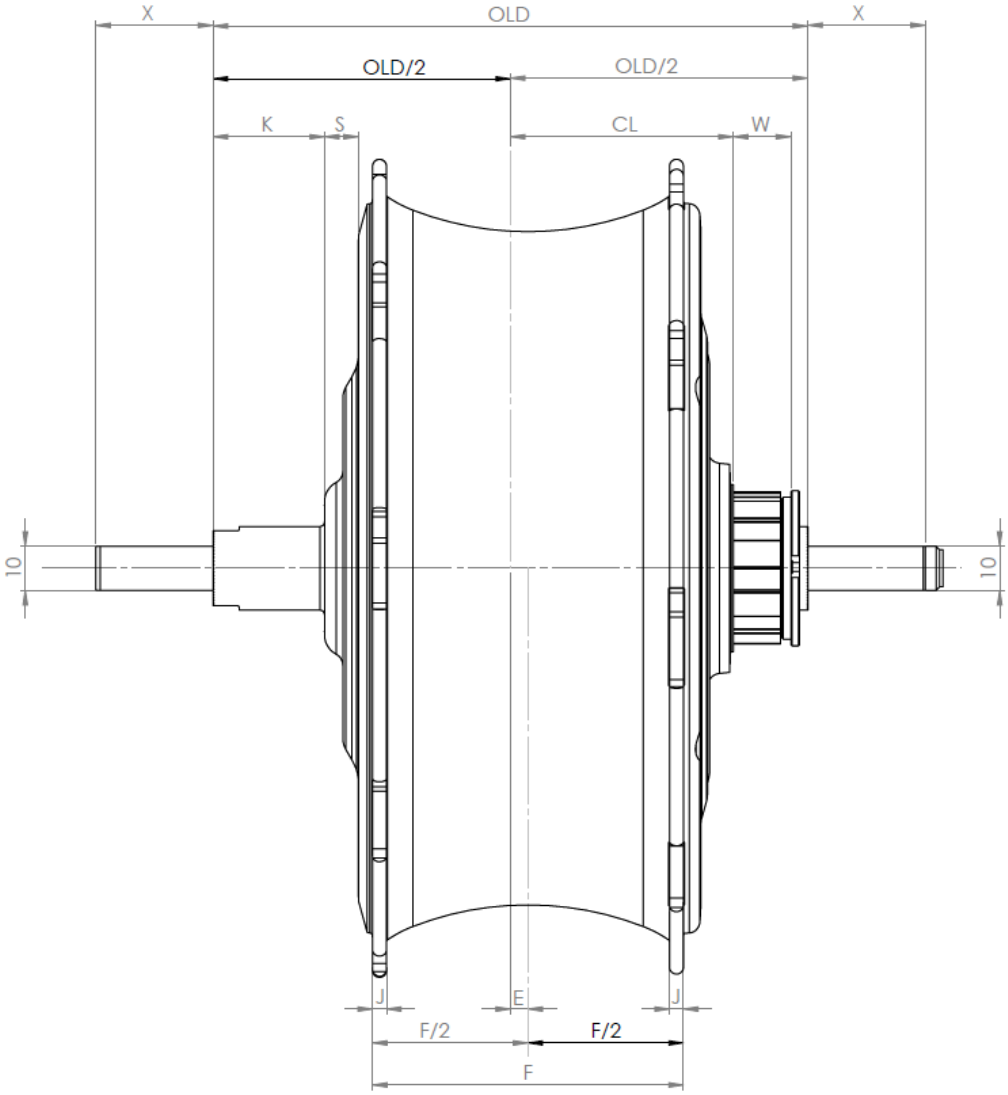
Front view



Holes	PCD (mm)	A	B
32	ø173,75	16	22,5°
36	ø173,75	18	20°

*dimensions are in mm

Side view



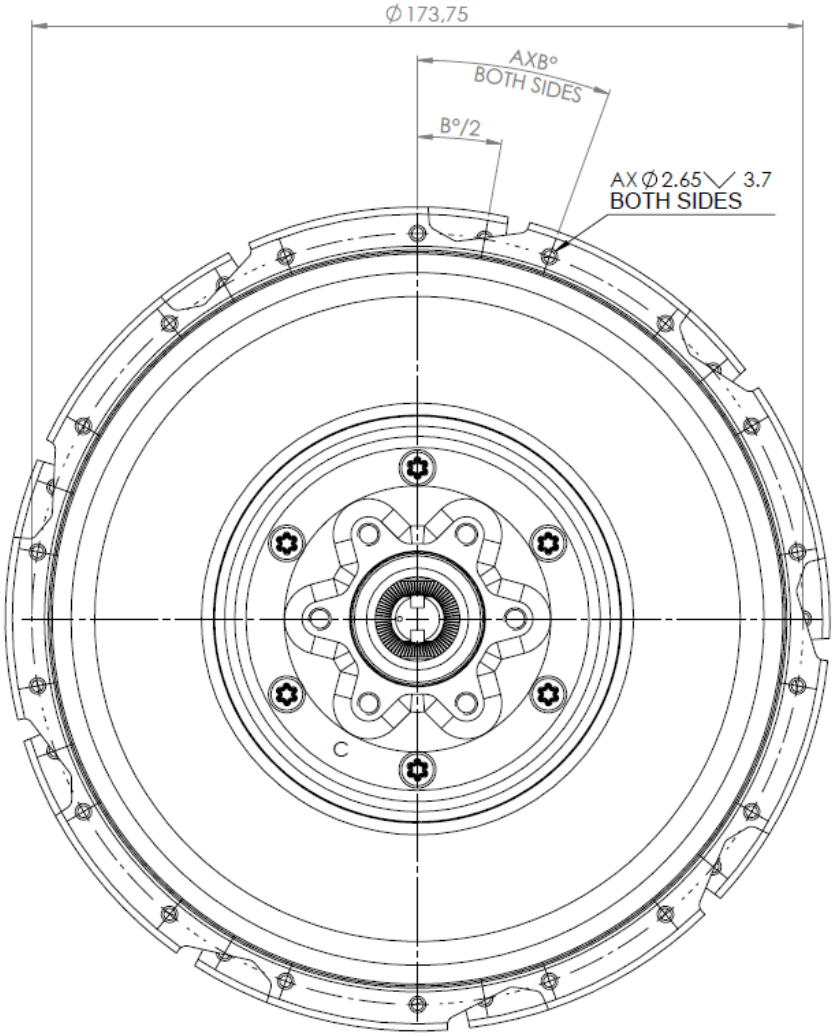
Speed	OLD	CL	W	E	F	J	K	S	X
1	120	50,6	13,1	4,0	70,6	3,2	10	4,5	26,6
1	135	50,6	13,1	4,0	70,6	3,2	15	14,5	26,6

*dimensions are in mm

FREEWHEEL is a Shimano Splines freewheel with custom lockring (provided by Zehus). For single speed applications, CHAINLINE can be adapted from “CL” mm for the length of the freewheel “W” using standard spacers.

4.2 Disc brake (single speed)

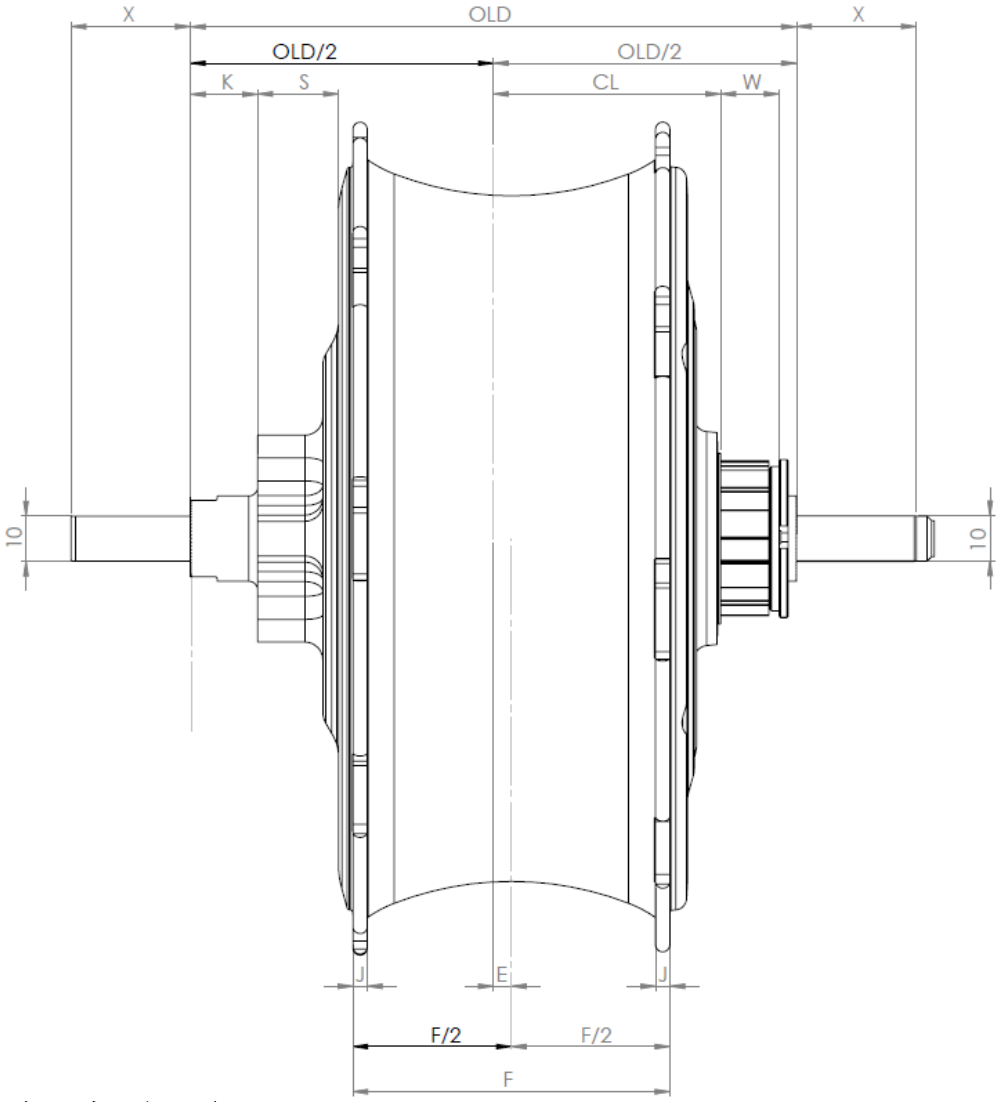
Front view



Holes	PCD (mm)	A	B
32	ø173,75	16	22,5°
36	ø173,75	18	20°

***dimensions are in mm**

Side view



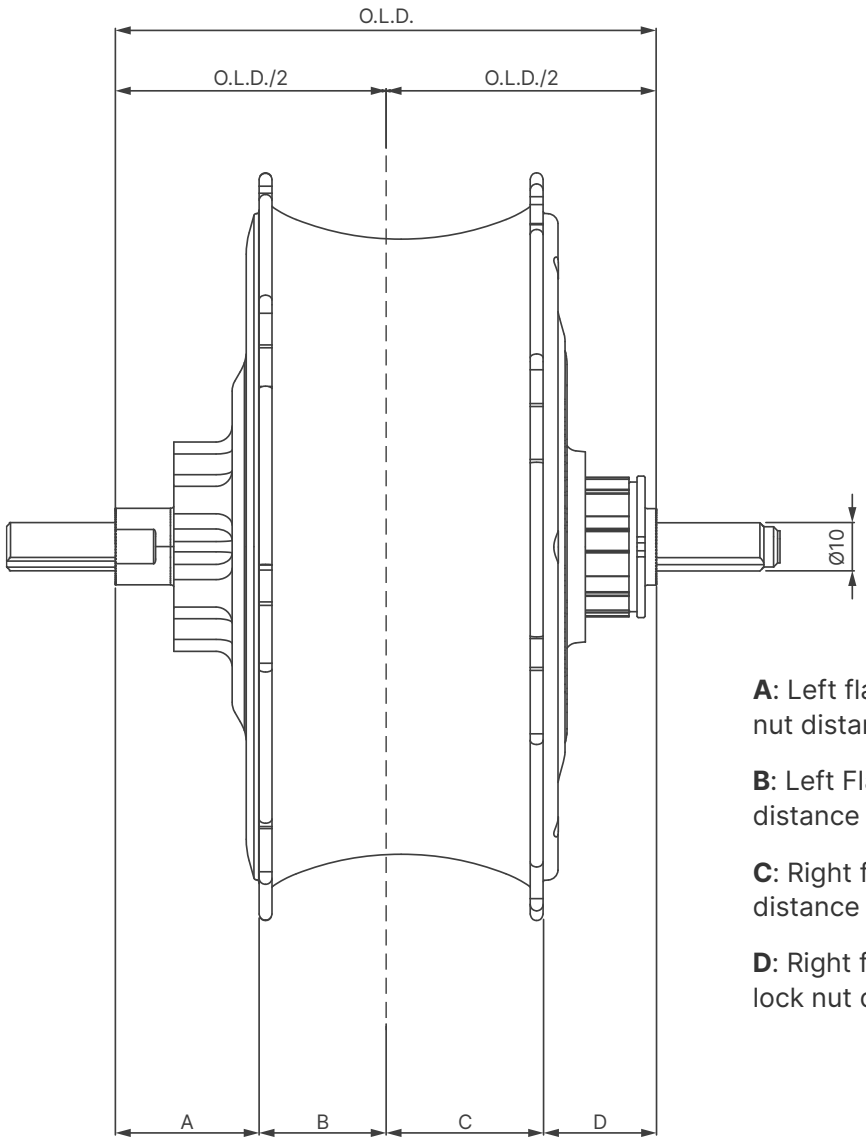
Speed	OLD	CL	W	E	F	J	K	S	X
1	135	50,6	13,1	4,0	70,6	3,2	15,0	14,5	26,6

*dimensions are in mm

FREEWHEEL is a HG Splines freewheel with custom lockring (provided by Zehus). For single speed applications, CHAINLINE can be adapted from “CL” mm for the length of the freewheel “W” using standard spacers. All dimensions are in mm.

4.3 Spoke length calculation

To calculate the correct spokes length through the online calculation tools it is necessary to consider these dimensions according to the hub version of interest.



A: Left flange to left lock nut distance

B: Left Flange to center distance

C: Right flange to center distance

D: Right flange to right lock nut distance

The All In One version	O.L.D.	B	C	A	D
Rim brake	120	31,3	39,3	28,7	20,7
Disc brake	135	31,3	39,3	36,2	28,2

*dimensions are in mm

5. Frame building guidelines

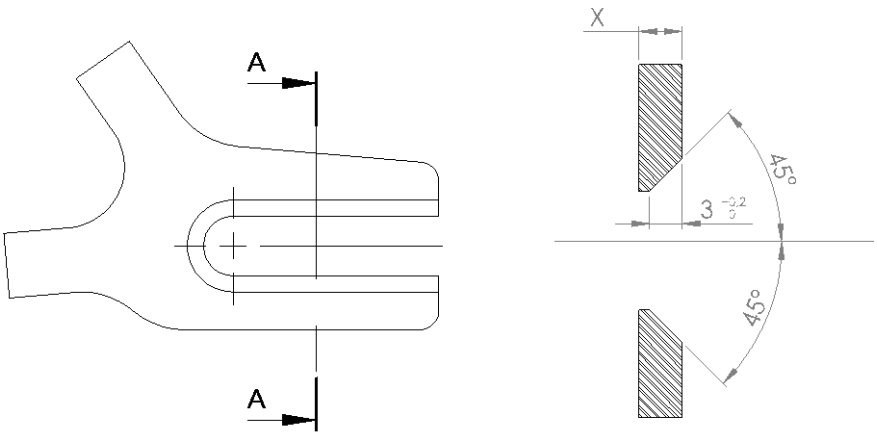
This part of the techdocs helps in frame design starting from measures above. Customers 3D models are available on request.
This part of the manual is intended to be a guide for building a frame that suites The All In One Horizon all in one. Please read this manual carefully. Applies to all item codes.

5.1 Rear dropout design and compatibility

The All In One Horizon embeds a slope sensor that must be mounted following these manual guidelines. In order to work properly, dropouts must be horizontal, and the anti-rotation system must follow these manual guidelines.

5.1.1 Steel track dropout

Dropout shaping

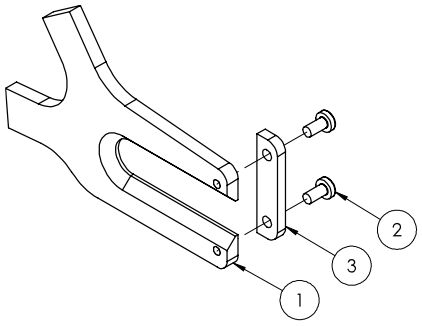


SECTION A-A

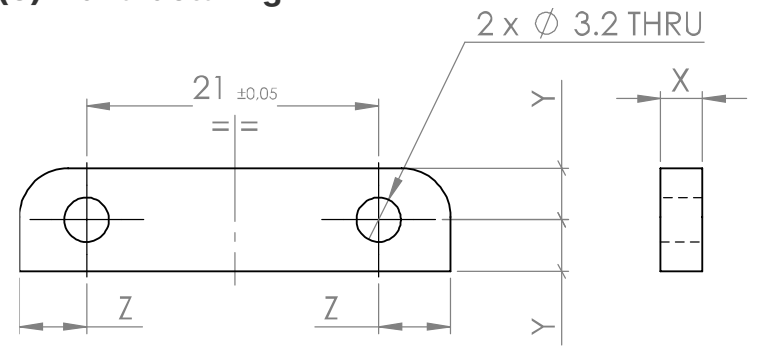
Dropout closing bracket

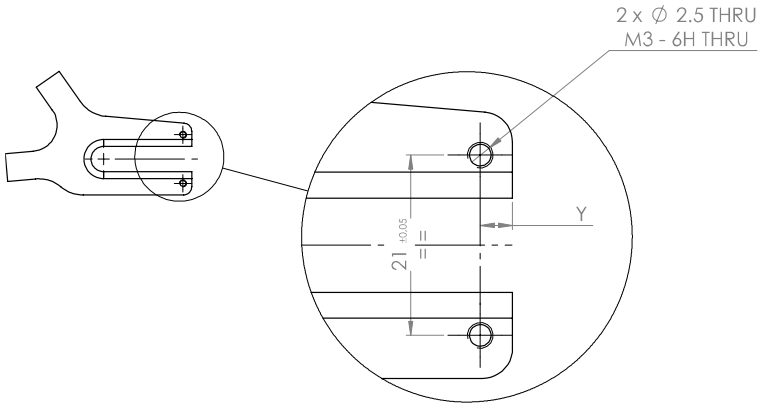
As the anti-rotation insert will act with a strong torque on the dropouts, a connection element between the two forks MUST be installed.

The instructions provided in the following figure show how to build and install a tested dropout closing bracket on a track dropout. Any suitable and equivalent solution can be adopted.



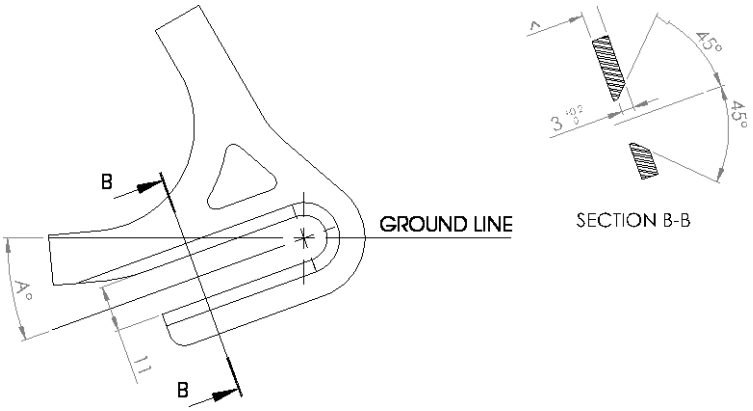
Closing bracket (3) manufacturing





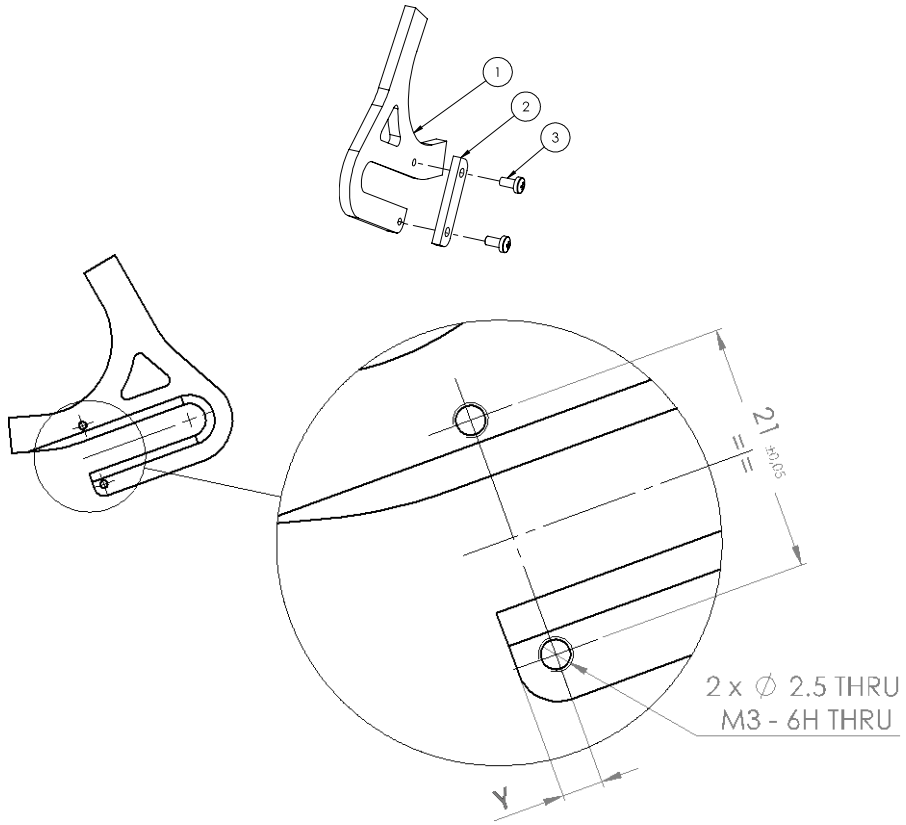
5.1.2 Horizontal steel dropout

It is not recommended to use horizontal reversed dropout with HORIZON all in one. However, some design rules for this kind of dropout are shown below.



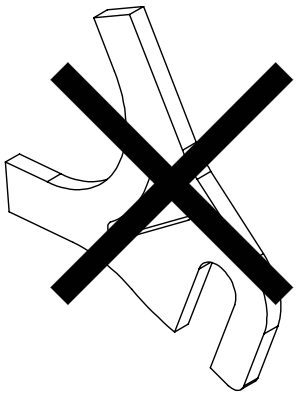
***WARNING**: the closer to 0° the better, slope sensor won't calibrate over 20°

As seen for the track dropout, a connection bracket between the fork ends is mandatory to maintain a good stiffness of the dropout itself.



5.1.3 Note on vertical dropout

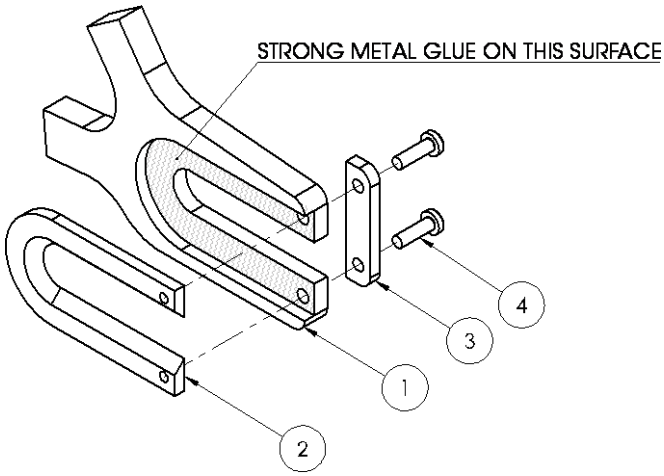
Vertical or Semi-vertical dropouts are NOT compatible with HORIZON all in one. Slope calibration won't work, and the hub will stop to run as the sensor will assume the bike is in a vertical position and it will turn off the assistance.



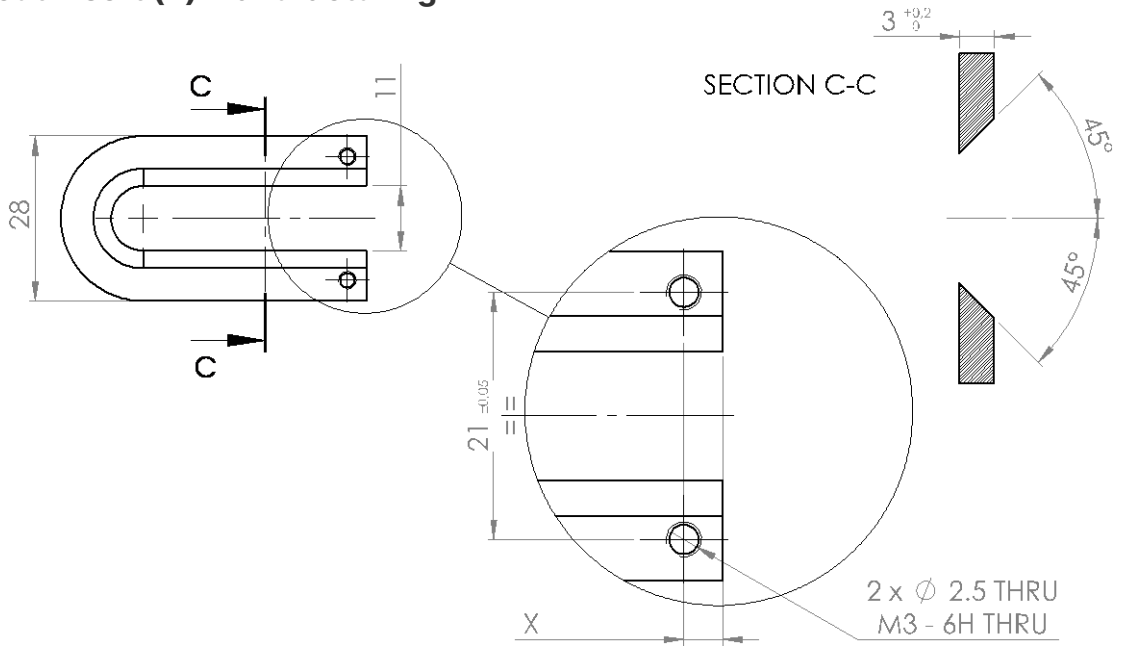
5.1.4 Aluminium track dropout

Aluminium dropouts need to be reinforced with a steel insert shaped as described below. Without the insert, the anti-rotation plate will shortly damage the dropout itself and it will be loose (so not effective).

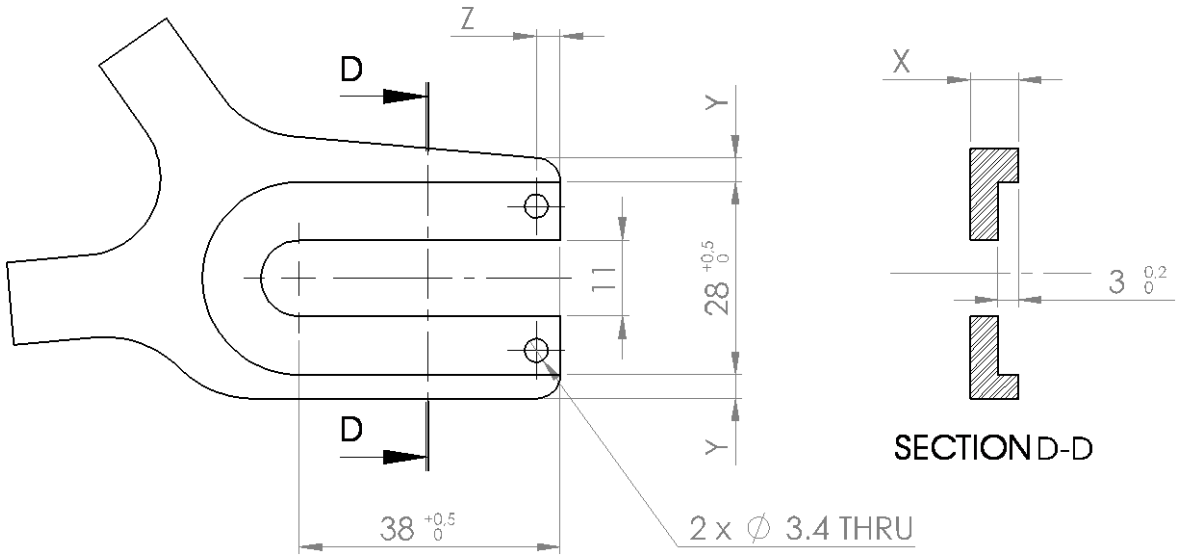
The instructions below show also how to design, mill and drill an aluminium dropout to t a steel insert compatible with The All In One HORIZON. Any equivalent solution can be adopted.



Dropout insert (2) manufacturing



Dropout (1) shaping

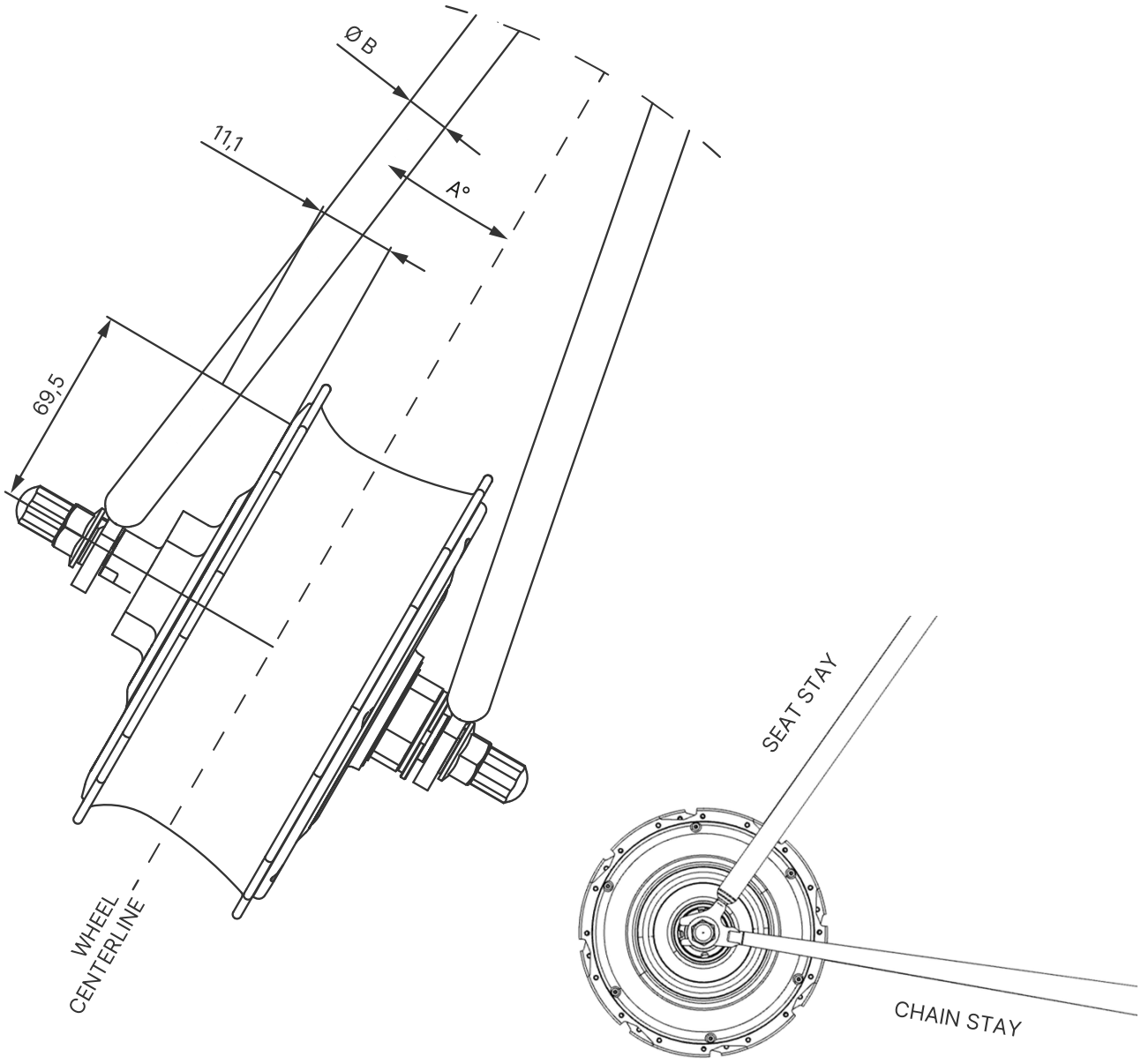


“H” cut

The “h” cut is the core of the anti-rotation system. Please follow this design rules strictly, considering the tolerances.

5.2 Chain stays and seat stays design

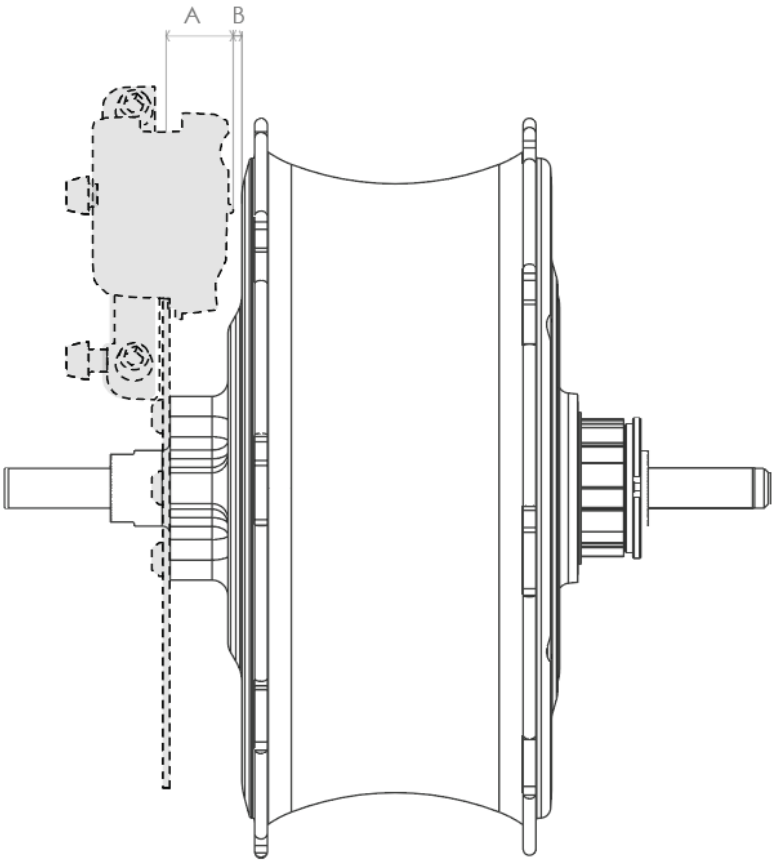
Frame builders must pay attention to the angle between the wheel centerline and both seat and chain stays, especially on the left side of The All In One.



The gap between The All In One and both chain and seat stays depends on many factors, such as the angle A°, the frame pipe diameter B and the dropout shape. The advice is to use pipes with a diameter B<12mm and angle A°<6°, using a standard track dropout. Please be careful when designing the frame.

5.3 Disc brake caliper compatibility

Please check the caliper dimensions with the brake manufacturer in order to fit correctly in the suggested distance of 2 mm between The All In One hub and the brake caliper.

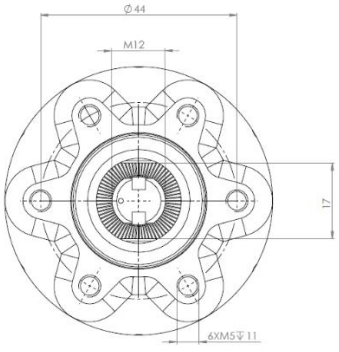


Note: please respect the clearance between the caliper and The All In One hub.

Note: please always check the dimensions of the brake calipers with the brake and adapters manufacturers.

5.4 Disc rotor compatibility

The All In One model year 2024 is compatible with all 6-bolts IS disc rotors. The diameter of the rotor must be 160 mm or superior.



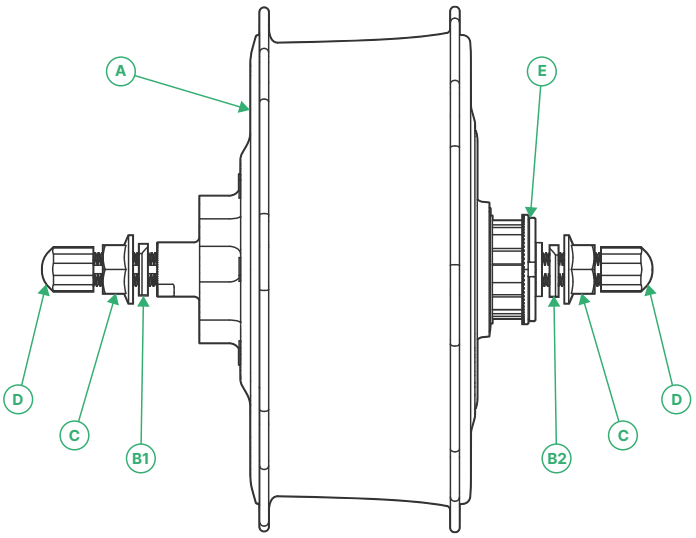
5.5 Disc brake mount dimensions

Please refer to the INTERNATIONAL STANDARD / POST MOUNT / FLAT MOUNT manuals to design or purchase the correct adaptor for The Zehus All In One system.

Attention: please always check The All In One hub dimensions to determine the final disc and caliper position.

6. Assembly instructions

6.1 Content of the box



The All In One Horizon (A) is packed with all the components pre-assembled*.

Anti-rotations (B1-B2), hex nuts (C), closed nuts (D) and lockring (E) are installed on the product.

*check the content of the box. If anything is missing, please contact us (support@zehus.it)

6.2 Wheel building (lacing)

The All In One Bike is compatible with rims from 16 inches on. For 16 inches wheels, custom motor and custom lacing should be produced; please contact directly your Zehus sales contact. For further information please contact us at support@zehus.it.

Evaluating the correct spoke length

To evaluate the spoke length to lace the wheel please refer to the measurements of your model. Please double check the item code to match with the chart provided above. You can then use a standard manual or an online calculator (e.g. SAPIM spoke calculator).

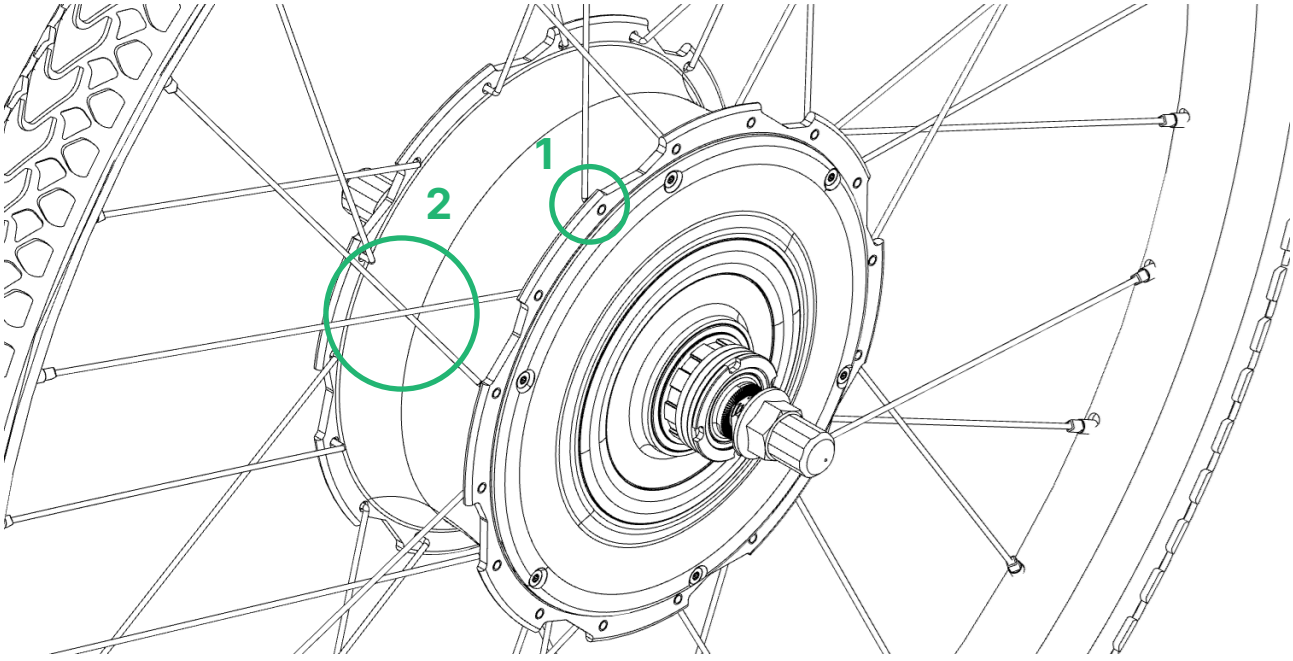
EN15194 Configuration

the following configuration has been successfully tested under the EN15194 conditions:

Rim	Tire	Tube	Spokes
Ambrosio Keba 28”	Schwalbe Marathon Plus 700x28c	Butyl 700x28c	Steel 2.3 mm tapered 2 mm

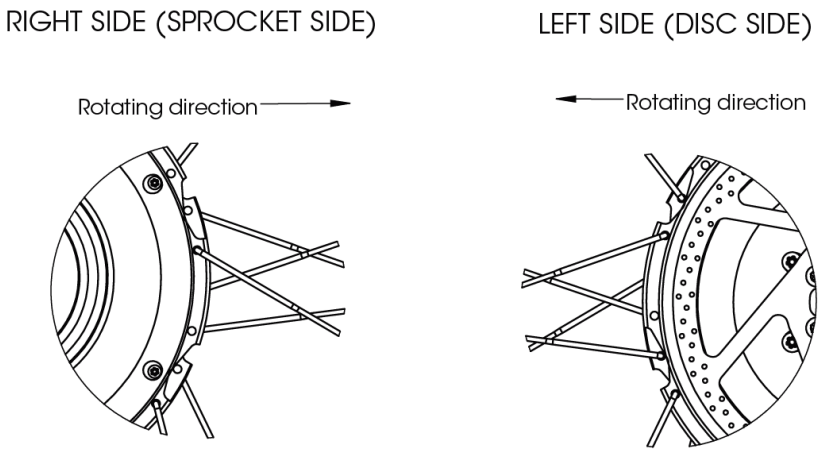
Zehus, formerly Zehus, is not responsible for the assembly of any wheel with different configuration than the one shown above. If your wheel configuration includes different components or different sizes or qualities from the ones listed above, it will be necessary to perform a preventive validation carried out by an expert wheel builder (that includes EN15194 test) before selling the vehicle to any end consumer”).

Important information



Attention: Zehus strongly recommends inserting the spokes from OUTSIDE to INSIDE the spoke hole (1).

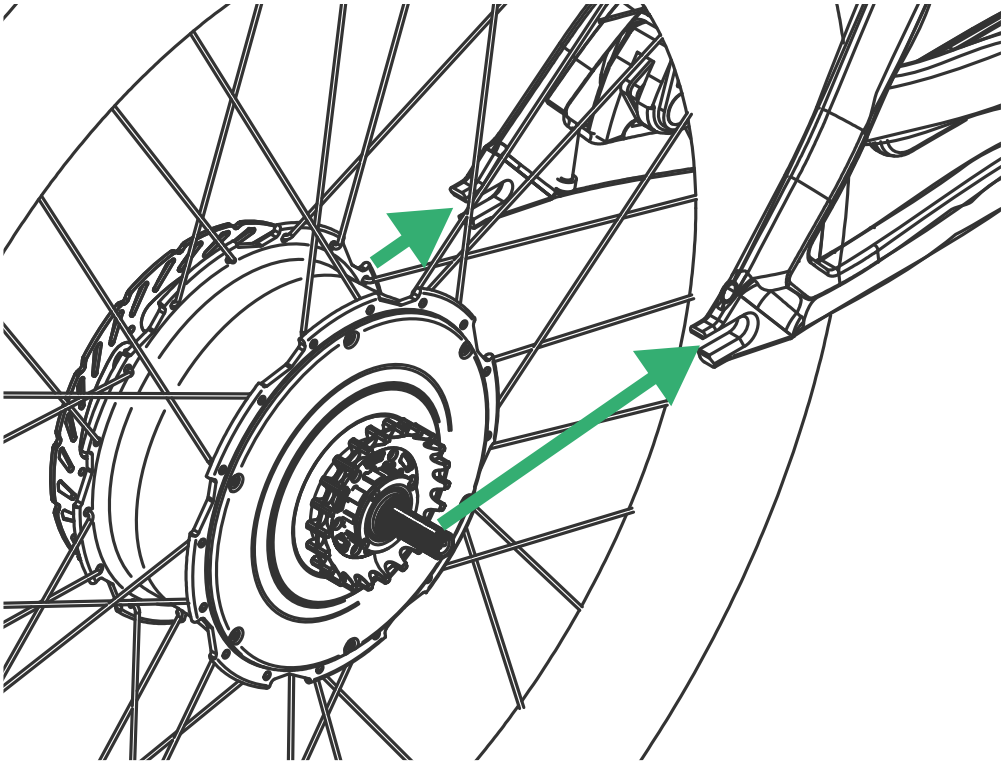
Attention: Zehus strongly recommends building 1-cross wheels for 26”-29” wheels (2), instead 16”-20” wheels should be laced with radial spoking (0-cross).



6.3 Mounting the wheel on the frame

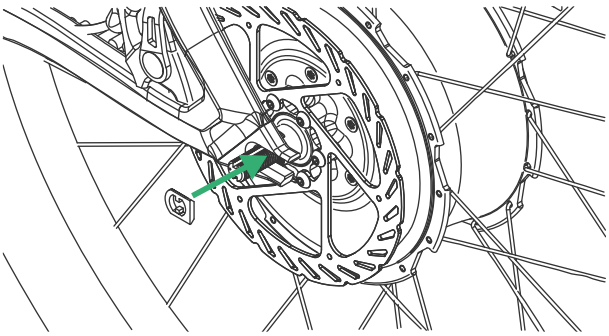
Step 1

Insert the wheel in the rear fork and put the chain/belt on the cog.

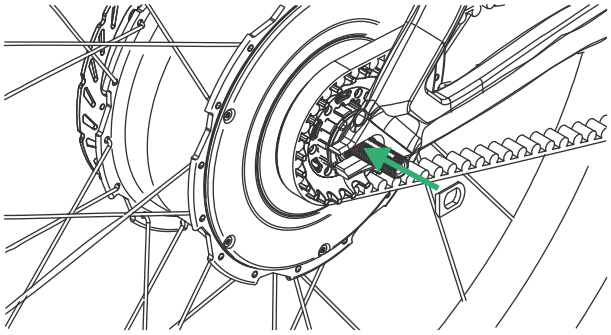


Step 2

Insert the proper anti-rotation adaptor (B1-B2) on the axle. B1 must be inserted on the left axle (non-drive) and B2 must be inserted on the right axle (drive).



B1 (non-drive side)



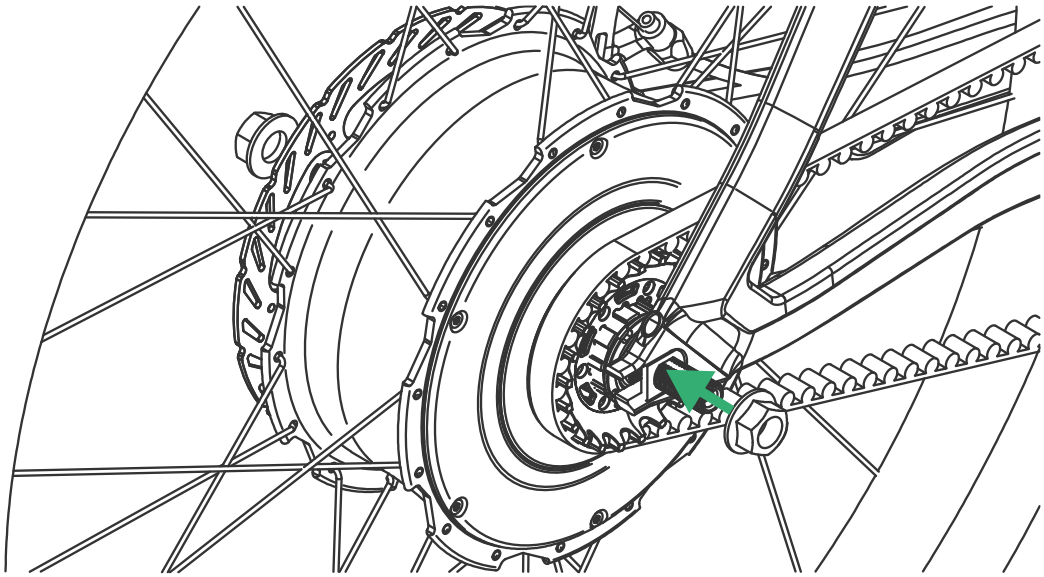
B2 (Drive side)

Step 3

If chain/belt tensioners are to be used, insert and tighten them on the shafts before installing the hub hexagonal nuts.

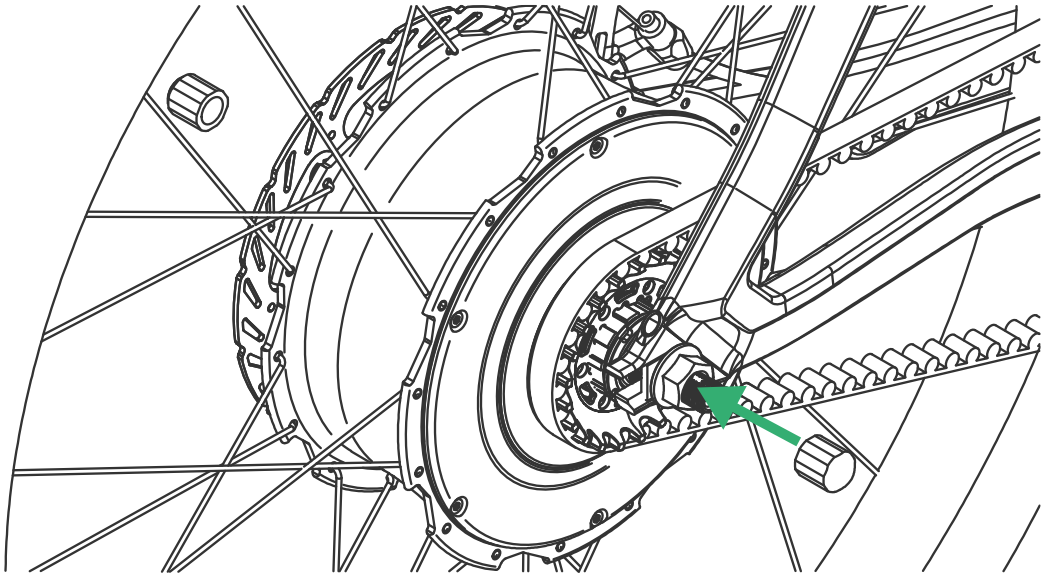
Step 4

Insert and tighten the hex nuts (C) up to **30 Nm** on both sides.



Step 5

Insert and tighten manually the protection closed nuts (D) on both sides.



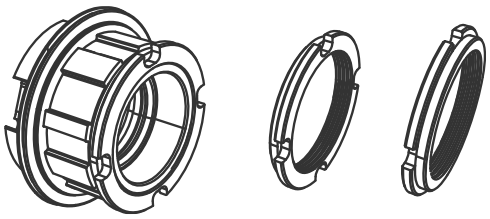
ALWAYS RIDE THE BIKE WITH THE CLOSE NUTS (D).
Damages occurred to the connector due to the lack of the close nuts is not covered by warranty.

7. Sprockets and gearbox compatibility

The All In One model year 2024 freewheel system is compatible with Shimano HG-Splines sprockets, a custom lockring is provided, and it may be necessary the use of spacers to adjust the sprocket for the correct chainline.

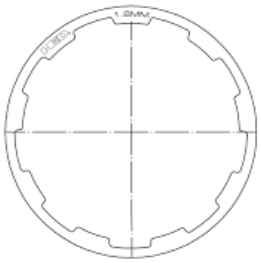
7.1 Lockring and lockring tools

In case of multi speed applications, the provided lockring is the following:



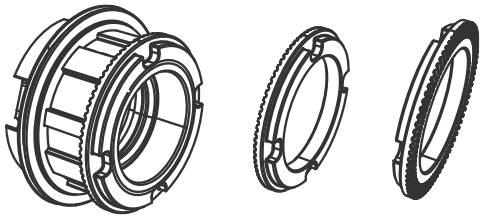
Then, first cassette sprocket should be an 11T.

In case of single speed applications, last sprocket spacer should be a 9 splined spacer like the following:

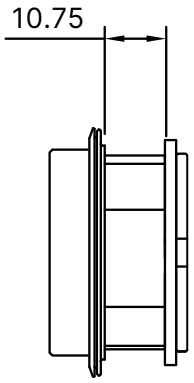


Tightening torque for any freewheel Lockring is 40 Nm. Please make sure that your lockring is correctly tightened to guarantee the correct functioning of the system.

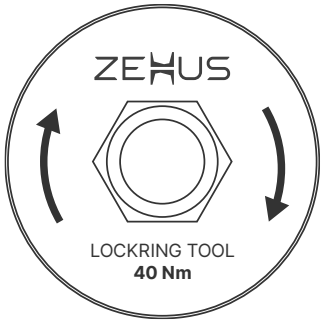
It is possible to request the lockring M0781300 specifically designed for single speed applications. This lockring is compatible with standard cassette spacers.



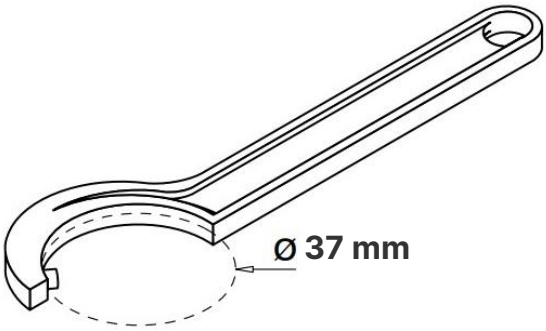
Single Speed Lockring



Zehus developed a tool to tighten this type of lockring with a H17 wrench. Please inquire with Sales for Price, Availability and Lead time.



For Single Speed versions, Zehus lockring can be tightened using a Hook Spanner. This tool is specific for certain diameters. Please make sure your Hook Spanner is compatible with a 37 mm diameter.



7.2 Gearbox systems

The All In One Halos embeds:

- → Safety turn on button: this button is available on the smartphone app and on the Remote Controller. If the customer does not want to use the app, procedure to activate the bike requires to pedal backwards per 3 revolutions at a speed faster than 10 Km/h.
- → KERS – regenerative braking capabilities. KERS is activated by pedaling backwards or via Remote control.

All the system that inserts a freewheeling between the chain and Zehus hub are not compatible with the 2 functions mentioned above. Please notice that all Pinion gearbox systems feature a freewheeling system!

**Products specs can change without notice. Please check on the producer's website*

8. Battery care

It is important to take care of the battery embedded in The All In One to maximize its durability and capacity.

8.1 Charging

Always charge the battery of your All In One to avoid full discharge that could damage its power. Please follow the instruction contained on the label of the battery charger. It is recommended to charge the battery in a safe environment, clean and protected by water. It is recommended not to charge the battery at night.

8.2 Storage conditions

The All In One has to be stored at the right temperature. The battery pack life can be maximized by following the rules for correct storage and handling. In case of malfunctioning your battery pack will have to be replaced. Please refer to a Zehus retailer to have your battery pack replaced.

Note: when not using the bike for long periods it is recommended to charge the battery pack to 60% and to check the battery condition at least every 6 months. Before using the bike after a long period it is recommended to fully charge the battery.

Store All In One in a well-ventilated location, dry if possible. Protect the hub from moisture and water. The optimal storage temperature is +23°C and the bike must be stored between 0°C and +40°C. It is preferred not to leave the bike under the direct sunlight during hot summer days.

8.3 Transport

Items with internal battery packs are subject to Dangerous Goods Legislation requirements. Private users can transport such undamaged items by road without further requirements.

When being transported by commercial users or third parties (e.g. air transport or FWD agencies), special requirements on packaging and labeling must be observed (e.g. ADR regulations). If necessary, an expert for hazardous materials can be consulted when preparing the item for shipping.

Dispatch The All In One only when the housing is undamaged. Protect the charger connector with the provided closed nut in such a manner that the connector itself cannot be damaged or broken. Inform your parcel service that the package contains dangerous goods. Please also observe the possibility of more detailed national regulations. In case of questions concerning transport of The All In One, please

refer to an authorized Zehus dealer. Bicycle dealers can also provide suitable transport packaging.

8.4 Disposal

The All In One and all its components should be sorted for environmental-friendly recycling.

Only for EC countries

According to European Guideline 2012/19/EU, electrical devices tools that are no longer usable, and according to European Guideline 2006/66/EC, defective or used battery packs/batteries. The All In One must be collected separately and disposed of in an environmentally correct manner.

Warnings

Handling of Li-Ion battery cells - risks and precautions

The user must have appropriate understanding of lithium-ion batteries before purchase.

Use caution when working with and using lithium-ion batteries as they are very sensitive to charging characteristics and may explode, burn, or cause a fire if misused or mishandled.

Always charge in or on a fire-proof surface. Never leave batteries charging unattended.

The batteries are sold for the use of system integrations with proper protection circuitry or battery packs with a battery management system or PCB (circuit board/module).

Buyer is responsible for any damage or injury caused by misuse or mishandling lithium-ion batteries and chargers.

Charge only with appropriate charger designed by ZEHUS for this specific type of lithium-ion battery pack.

→ MISUSING OR MISHANDLING LITHIUM-ION BATTERIES CAN POSE A SERIOUS RISK OF PERSONAL INJURY, PROPERTY DAMAGE, OR DEATH

→ BATTERIES MAY EXPLODE, BURN, OR CAUSE A FIRE IF MISUSED OR MISHANDLED

→ ONLY USE WITH PROPER CIRCUITRY IN A PROTECTED BATTERY PACK

→ ONLY USE WITHIN MANUFACTURER LISTED SPECIFICATIONS

→ DO NOT STORE LOOSE BATTERY IN A SIMPLY CARTOON BOX - ALWAYS USE A PROTECTIVE CASE OR BOX

→ KEEP AWAY from metal objects to prevent short circuiting

→ DO NOT short circuit
→ DO NOT use if wrapper or insulator is damaged or torn

→ DO NOT use if damaged in any way
→ DO NOT overcharge or over-discharge

→ DO NOT modify, disassemble, puncture, cut, crush, or incinerate

→ DO NOT expose to liquids or high temperatures

→ DO NOT solder, spot weld only

→ User must be familiar with handling lithium-ion batteries before purchase

→ Usage of batteries is AT YOUR OWN RISK

→ ALWAYS charge in or on a fire-proof surface and never leave charging batteries unattended

→ RESELLERS MUST FORWARD ALL WARNINGS TO ALL CUSTOMERS FOR THEIR REFERENCE AND SAFETY

Local regulations and laws pertaining to the recycling and disposal of lithium ion batteries vary so please consult your local jurisdiction regarding appropriate disposal.