

MAY 2022

# enviolo

Technical Manual  
CY 2022



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# Envisioned future

## **You will see enviolo products in every city, every day.**

Our products and services will empower bike makers to build personal mobility vehicles for great multitudes of urban dwellers. These bikes will change their riders' lifestyles, have a wide variety of uses, and solve problems in traditionally car-centered societies.

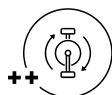
They will be available in many ways, so every person can afford them. We will maintain loyal business relationships to build a culture of authenticity and honesty with all stakeholders. These relationships will be a beacon of change in creating urban communities focused on sustainable, healthy, socially-responsible lifestyles. Soon, you will see enviolo products in every city, every day.



# Stepless manual and automatic shifting



Near silent



Pedal at your desired cadence



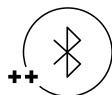
Stepless shifting



Automatic shifting



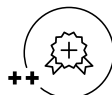
Effortless shifting even under load



Bluetooth connection



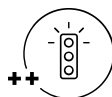
Greater gear ratio range



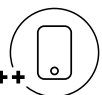
Extended product lifetime



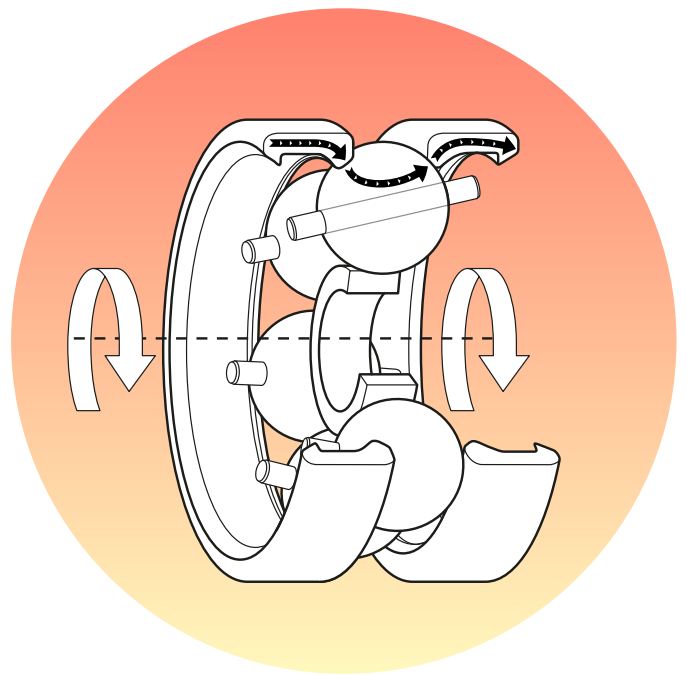
Maintenance free



Stoplight function



Mobile app



## Stepless Manual Shifting: As simple as adjusting the volume on a radio.

With our stepless manual technology, riders can effortlessly change their gear ratio, even under load. Thus we enable them to focus on the important aspects of their ride such as traffic or scenery. No more step changes, locked gears, empty pedaling, or creaking, just a unique ride feel created by the technology's ease of use.

The system enables low maintenance, long-lasting bikes, especially in a combination with a belt drive, the perfect fit for the new rider generation, focused on simplicity and comfort. Moreover, the technology can also be merged with powerful e-bike systems. The enviolo stepless manual technology was created based on use cases to serve specific rider needs, and consists of specifically designed internal gear hubs and matching controllers.

## Stepless Automatic Shifting: Why bother switching gears manually?

The stepless automatic technology takes the ride experience to the next level with its 'set it and forget it' approach. Cyclists only need to set up their desired cadence, and the stepless automatic technology will adjust the enviolo system so that they can always pedal at the same pace, even up or down hill.

To be in line with the trend of 'integrated systems', the technology can also be merged into the e-bike's control unit, thus cleaning up the handlebar and simplifying the ride experience.



# Product Overview

## Hub



Urban



City



Trekking



Heavy Duty



Extreme



Extreme Gearbox

## Manual controller



Twist Pure  
& Pro

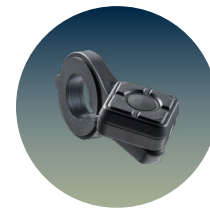


Twist Display Pure  
& Pro

## AutomatiQ controller



CliQ Pure



CliQ Plus



CliQ Pro

## Manual interface



Manual  
40T

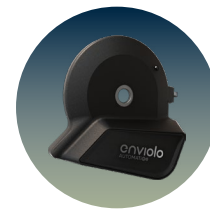


Manual  
44T

## AutomatiQ interface



AutomatiQ  
Pro 40T



AutomatiQ  
Pro 44T

# Component Specifications

Our high-tech components, designed specifically for their use cases, offer unrivaled possibilities.



# Internal Gear Hubs



Urban



City



Trekking

<b>Color</b>	Matt black	Matt black	Matt black
<b>Spline type</b>	44T	44T	44T
<b>Weight</b>	2.180 kg	2.450 kg	2.450 kg
<b>Max. speed RPM</b>	250 RPM	800 RPM	800 RPM
<b>Nominal ratio range</b>	256% (0.625 to 1.6)	310% (0.55 - 1.7)	380% (0.5 - 1.9)
<b>IP classification</b>	Hub = IP65, freewheel = IP54, hub interface = IP54	Hub = IP65, freewheel = IP54, hub interface = IP54	Hub = IP65, freewheel = IP54, hub interface = IP54
<b>Temperature range</b>	-20°C to 48°C	-20°C to 48°C	-20°C to 48°C
<b>Brake options</b>	6-bolt disc / rim	6-bolt disc / rim / roller	6-bolt disc / rim / roller
<b>Max. brake disc rotor</b>	180 mm	180 mm	180 mm
<b>Disc brake screw length requirements</b>	10-17 mm	10 - 17 mm	10 - 17 mm
<b>Max. disc brake screw torque</b>	Use disc brake manufacturers recommendation, but don't exceed 6.2Nm	Use disc brake manufacturers recommendation, but don't exceed 6.2 Nm	Use disc brake manufacturers recommendation, but don't exceed 6.2 Nm
<b>Spoke hole options</b>	36	36	32 and 36
<b>Spoke size</b>	2 mm-2.34 mm	2 mm - 2.34 mm	2 mm - 2.34 mm
<b>Spoke flange diameter</b>	114 mm	125 mm	125 mm
<b>Spoke hole diameter</b>	2.9 mm	2.9 mm	2.9 mm
<b>Wheel size</b>	Minimum 16"	Minimum 16"	Minimum 16"
<b>Axle threads</b>	M10 x 1	M10 x 1	M10 x 1
<b>Dropout width</b>	135 mm	135 mm	135 mm
<b>Dropout thickness</b>	6-10 mm	6 - 10 mm	6 - 10 mm
<b>Dropout length for no-turn washer engagement (measured from axle center)</b>	Recommended 14 mm, minimum 10 mm	Recommended 14 mm, minimum 10 mm	Recommended 14 mm, minimum 10 mm
<b>Total axle width (without acorn nuts)</b>	183 mm	183 mm	183 mm

# Internal Gear Hubs



Urban



City



Trekking

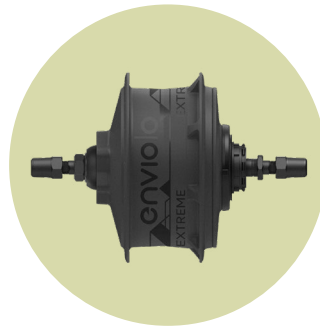
<b>Chainline</b>	48.5 +/- 0.5 mm	48.5 +/- 0.5 mm	48.5 +/- 0.5 mm
<b>Beltline (Gates)</b>	45.5 +/- 0.5 mm	45.5 +/- 0.5 mm	45.5 +/- 0.5 mm
<b>Sprocket thickness (chain)</b>	2.3 mm	2.3 mm	2.3 mm
<b>Sprocket thickness (belt)</b>	4.3 mm	4.3 mm	4.3 mm
<b>Sprocket sizes (chain)</b>	16 - 22T	16 - 22T	16 - 22T
<b>Sprocket sizes (belt)</b>	20 - 28T	20 - 28T	20 - 28T
<b>Sprocket type</b>	9-spline, one side flat	9-spline, one side flat	9-spline, one side flat
<b>Chain type</b>	3/32"	3/32"	3/32"
	1/8" with 3 mm offset cog	1/8" with 3 mm offset cog	1/8" with 3 mm offset cog
<b>Recommended lacing patterns</b>	2-cross for 26" or larger, 1-cross for 24" or smaller, radial spoke lacing not allowed	2-cross for 26" or larger, 1-cross for 24" or smaller, radial spoke lacing not allowed	2-cross for 26" or larger, 1-cross for 24" or smaller, radial spoke lacing not allowed
<b>Speed pedelec compatible</b>	No	No	No
<b>Commercial warranty</b>	No	No	No



# Internal Gear Hubs



Heavy Duty



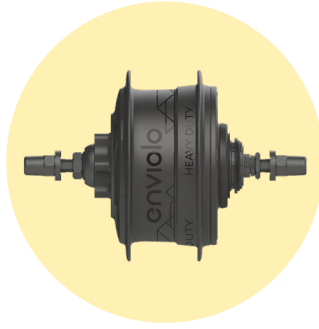
Extreme



Extreme Gearbox

<b>Color</b>	Matt black	Matt black	Matt black
<b>Spline type</b>	40T	40T	40T
<b>Weight</b>	2.450 kg	2.430 kg	2.340 kg
<b>Max. speed RPM</b>	800 RPM	800 RPM	800 RPM
<b>Nominal ratio range</b>	380% (0.5 - 1.9)	380% (0.5-1.9)	380% (0.5-1.9)
<b>IP classification</b>	Hub = IP65, freewheel = IP54, hub interface = IP54	Hub=IP65, freewheel=IP54, hub interface IP54	Hub=IP65, freewheel=IP54, hub interface IP54
<b>Temperature range</b>	-20°C to 48°C	-20°C to 48°C	-20°C to 48°C
<b>Brake options</b>	6-bolt disc / rim	6-bolt disc / rim	N/A
<b>Output sprocket mounting options</b>	N/A	N/A	6-bolt disc / 4-bolt 64 BCD
<b>Max. brake disc rotor</b>	203 mm	223 mm	N/A
<b>Disc brake screw length requirements</b>	9-11 mm (135mm Solid Axle) 16-18 mm (148mm Modular Axle)	9-11 mm (135mm Solid Axle) 16-18 mm (148mm Modular Axle)	N/A
<b>Max. disc brake screw torque</b>	Use disc brake manufacturers recommendation, but don't exceed 6.2 Nm	Use disc brake manufacturers recommendation, but don't exceed 6.2 Nm	N/A
<b>Spoke options</b>	32 and 36	36	N/A
<b>Spoke size</b>	2 mm - 2.34 mm	2.3-2.6 mm	N/A
<b>Spoke flange diameter</b>	125 mm	125 mm	N/A
<b>Spoke hole diameter</b>	2.9 mm	3.0 mm	N/A
<b>Wheel size</b>	Minimum 16"	Minimum 16"	N/A
<b>Axle threads (135 mm Solid Axle)</b>	M10 x 1	M12 x 1	M12 x 1
<b>Axle threads (148 mm Modular Axle)</b>	M12 x 1 no thread (Syntace) M12 x 1 flat (DT swiss) M12 x 1.5 (E-Thru) M12 x 1.75 (Maxle)	M12 x 1 no thread (Syntace) M12 x 1 flat (DT swiss) M12 x 1.5 (E-Thru) M12 x 1.75 (Maxle)	
<b>Dropout width</b>	135 mm solid axle 148 mm modular axle	135 mm solid axle 148 mm modular axle	135 mm solid axle
<b>Axle bolts (148 mm Modular Axle)</b>	M6 x 1	M8 x 1.25	N/A
<b>Dropout thickness</b>	6 - 10 mm	6-10 mm	6-10 mm
<b>Dropout length for no-turn washer engagement (measured from axle center)</b>	Recommended 14 mm, minimum 10 mm	Recommended 14 mm, minimum 10 mm	Recommended 14 mm, minimum 10 mm
<b>Total axle width (without acorn nuts)</b>	183 mm	182 mm	183 mm

# Internal Gear Hubs



Heavy Duty



Extreme



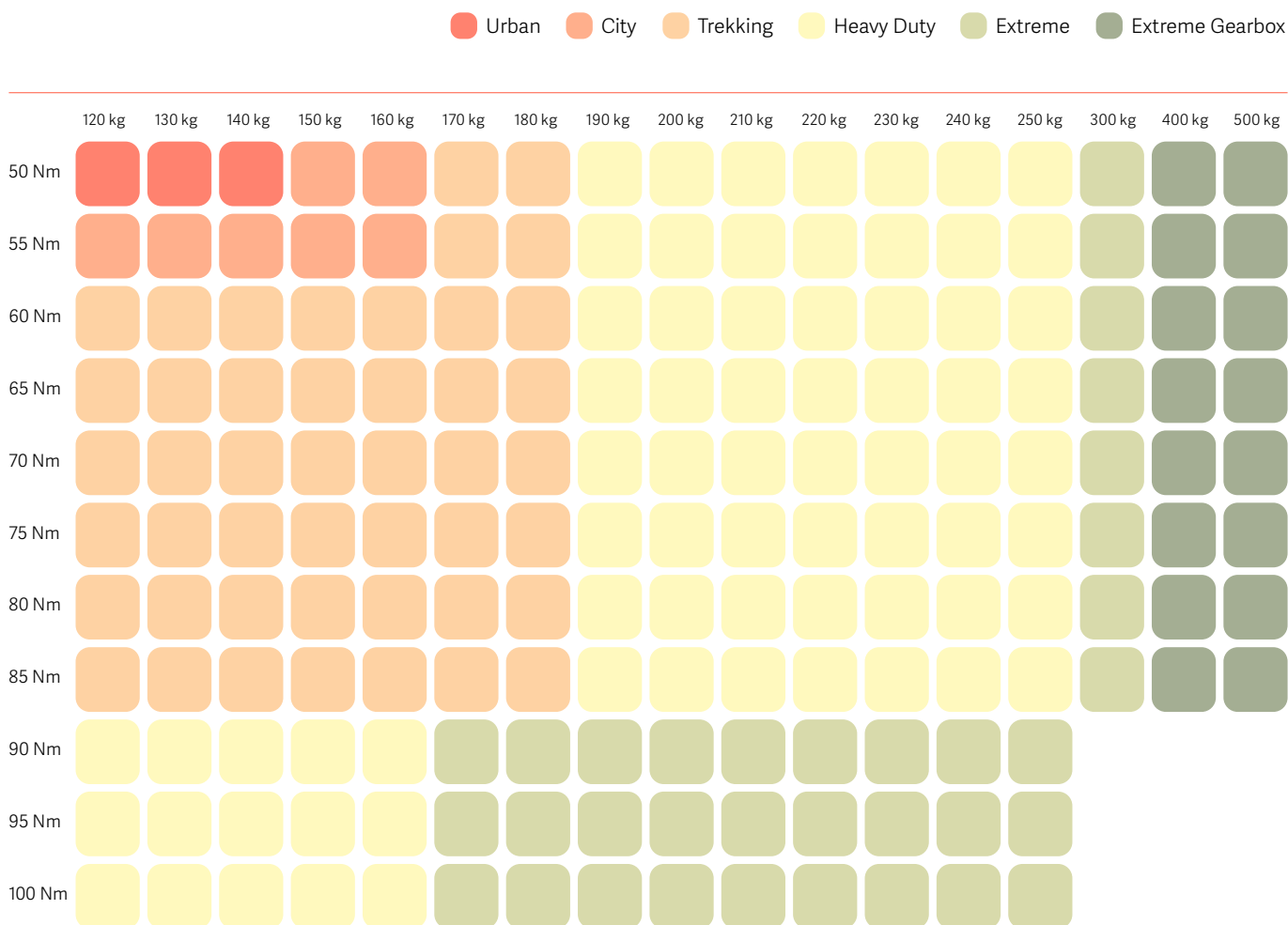
Extreme Gearbox

<b>Chainline</b>	48.5 +/- 0.5 mm for 135 mm and 51.1 +/- 0.5 mm for 148 mm dropouts	48.5 +/- 0.5 mm for 135 mm and 51.1 +/- 0.5 mm for 148 mm dropouts	48.5 +/- 0.5 mm for 135 mm and 51.1 +/- 0.5 mm for 148 mm dropouts
<b>Beltline (Gates)</b>	45.5 +/- 0.5 mm for 135 mm and 48.7 +/- 0.5 mm for 148 mm dropouts	45.5 +/- 0.5 mm for 135 mm and 48.7 +/- 0.5 mm for 148 mm dropouts	45.5 +/- 0.5 mm for 135 mm and 48.7 +/- 0.5 mm for 148 mm dropouts
<b>Sprocket thickness (chain)</b>	2.3 mm	2.3 mm	2.3 mm
<b>Sprocket thickness (belt)</b>	4.3 mm	4.3 mm	4.3 mm
<b>Sprocket sizes (chain)</b>	16 - 22T	16 - 22T	16 - 22T
<b>Sprocket sizes (belt)</b>	20 - 28T	20 - 28T	20 - 28T
<b>Sprocket type</b>	9-spline, one side flat	9-spline, one side flat	9-spline, one side flat
<b>Chain type</b>	3/32"	3/32"	3/32"
<b>Recommended lacing patterns</b>	1/8" with 3 mm offset cog 2-cross for 26" or larger, 1-cross for 24" or smaller, radial spoke lacing not allowed	1/8" with 3 mm offset cog 2-cross for 26" or larger, 1-cross for 24" or smaller, radial spoke lacing not allowed	1/8" with 3 mm offset cog N/A
<b>Speed pedelec compatible</b>	Yes	Yes	Yes
<b>Commercial warranty</b>	No	1 year	1 year



# Power Limits

enviolo requires the use of a sprocket ratio of minimally 2.0

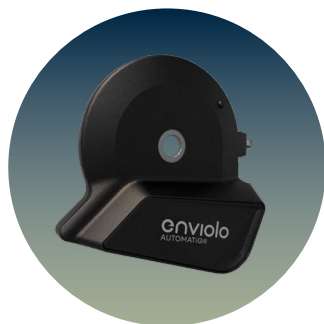


\* Only the Heavy Duty hub, Extreme hub, and Extreme Gearbox are allowed on Speed Pedelects.

# AUTOMATI*Q*

## Hub

## Interfaces



Pro

<b>Compatibility to all hubs</b>	Yes
<b>Spline interface</b>	40T and 44T
<b>IP classification</b>	IP54

### Electrical specifications:

<b>Nominal voltage range *</b>	12 V - 55 V
<b>Peak voltage</b>	60 V
<b>Min. voltage</b>	9.5 V
<b>Built-in fuse protection</b>	3A
<b>Average power consumption while shifting</b>	20W
<b>Peak power consumption</b>	48W < 3s
<b>Shut-down protection</b>	Data is saved at shutdown
<b>Sleep mode</b>	Time can be pre-set using app
<b>Power consumption Sleep mode</b>	0.5W
<b>Power consumption Non-shifting</b>	0.5W

### Wiring:

<b>Wire diameter</b>	I-Harness = 3.7mm
<b>Connector Ø on AHI</b>	4-pin = 9mm
<b>Connector Ø to power source</b>	10.2 X 14.2 mm



# Manual Controller



Twist



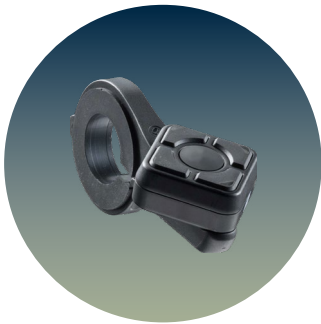
Twist Display

Type	Pure or Pro	Pure or Pro
Shift cable length	2,500 mm	2,500 mm
Grip rotation options	Multi-turn	Multi-turn
Handlebar diameter	22.2 mm	22.2 mm
Cable housing	Full cable housing recommended, dual cable route	Full cable housing recommended, dual cable route
Shift cable diameter	1.1 - 1.2 mm	1.1 - 1.2 mm
Compatibility to all hubs	Yes	Yes
IP classification	IP54	IP54
Grip material	Extended Durability	Extended Durability
Over-torque protection	Plastic (Pure) or Aluminum (Pro)	Plastic (Pure) or Aluminum (Pro)

# AUTOMATI*Q* Controller



CliQ Pure



CliQ Plus



CliQ Pro

Connection	Wireless	Wireless	Wireless
Handlebar diameter	22.2mm	22.2mm	22.2mm
Compatible with all hubs	Yes	Yes	Yes
IP classification	IP54	IP54	IP54
Expected battery life based on average use	12 months	12 months	24 months
Battery type	CR2032	CR2032	2*LR44

# Compatibility Matrix

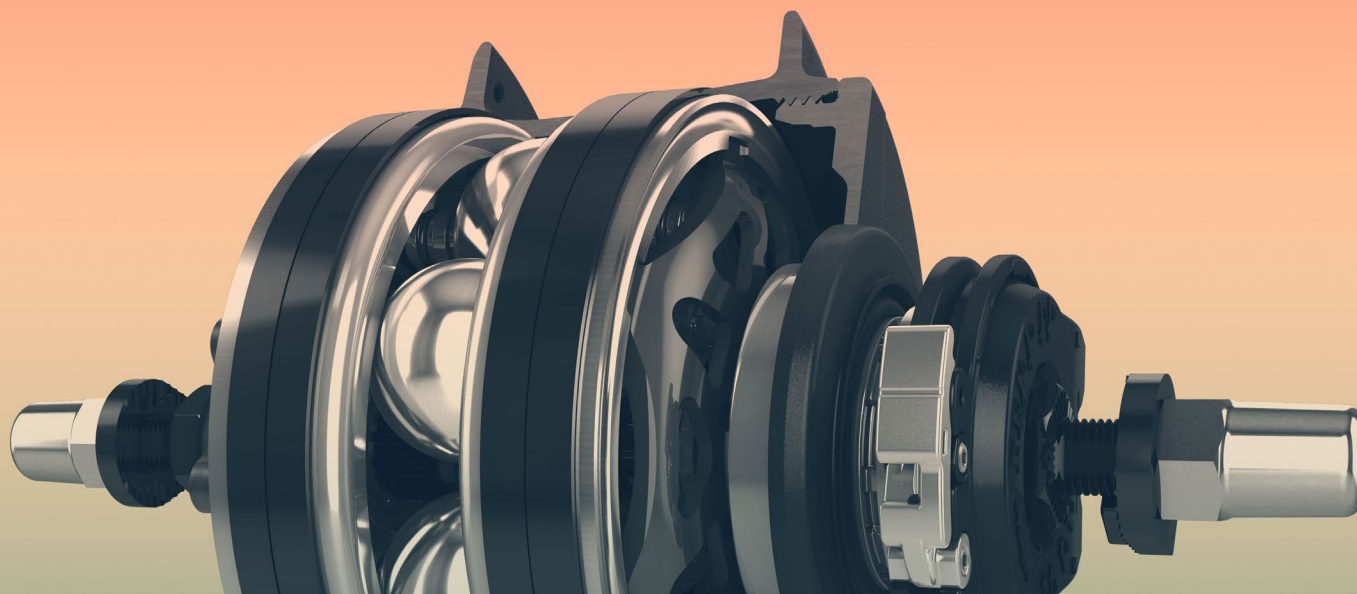
							
		Urban	City	Trekking	Heavy Duty	Extreme	Extreme Gearbox
Twist		✓	✓	✓	✓	✓	✓
Twist Display		✓	✓	✓	✓	✓	✓
Manual 40T		✗	✗	✗	✓	✓	✓
Manual 44T		✓	✓	✓	✗	✗	✗
CliQ Pure		✓	✓	✓	✓	✓	✓
CliQ Plus		✓	✓	✓	✓	✓	✓
CliQ Pro		✓	✓	✓	✓	✓	✓
AutomatiQ Pro 40T		✗	✗	✗	✓	✓	✓
AutomatiQ Pro 44T		✓	✓	✓	✗	✗	✗

# Frame Requirements

To assist you in designing your frames to be compatible with our products (e.g. sufficient clearance to chainstay/chain case) we have compiled an overview of our components with system measurements.

For 3D data please go to [support.enviolo.com](https://support.enviolo.com).

# Mechanical Frame Requirements



## Vertical dropout

Using a vertical dropout requires a secondary chain tension adjustment option (e.g. eccentric bottom bracket or chain tensioner). The advantage of vertical dropouts is that once the tension is set, the rear wheel can be reinstalled without readjusting the tension.

## Horizontal dropout

Horizontal dropouts are preferable for enviolo hubs, because they allow easy chain tension adjustment.

## Mechanical cable routing

As in any other cable system, the number and sharpness of bends influences the ease of shifting. We recommend that you consider this in your cable routing to limit required shift effort.

## 148 mm dropout configurations

On 148 mm dropouts, where you plan to use the AUTOMATiQ system, you require a sliding dropout, since the AHI is likely to interfere with derailleur hangers.

# Mechanical Frame Requirements

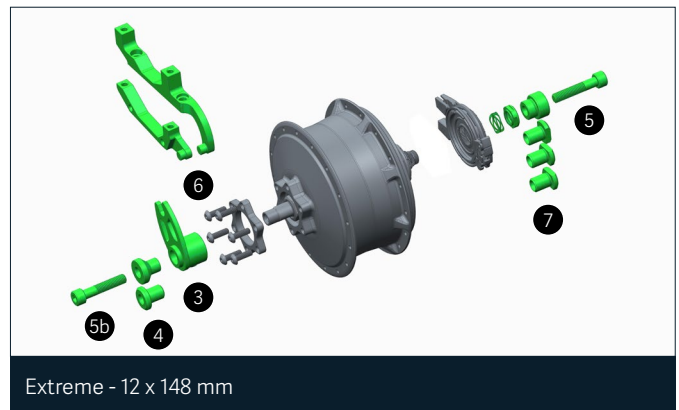
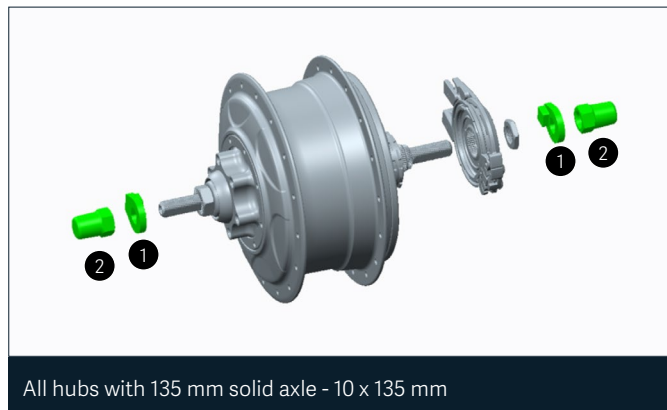
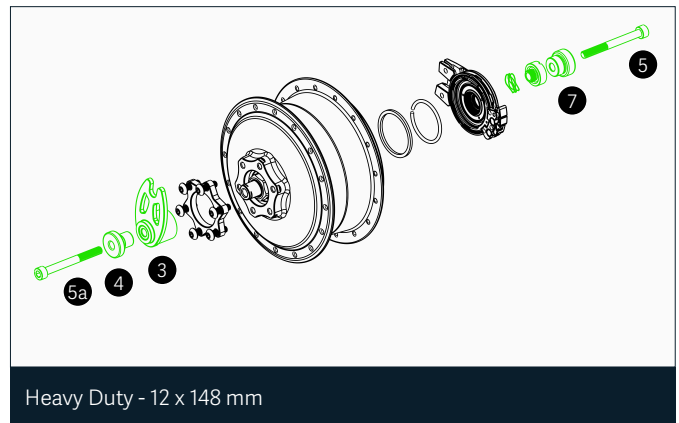
## Mounting hardware customization opportunities:

For OEMs that desire to design & use their own mounting hardware for our hubs, this section will outline requirements, such as axial and radial restraint of the hub and hub interface, as well as the torque reaction via a no-turn feature. These aspects have to be considered and validated by the OEM to avoid interferences or incorrect installation and function of our hub.

On top the industry standards ISO4210 and EN15194 have to be ensured as well.

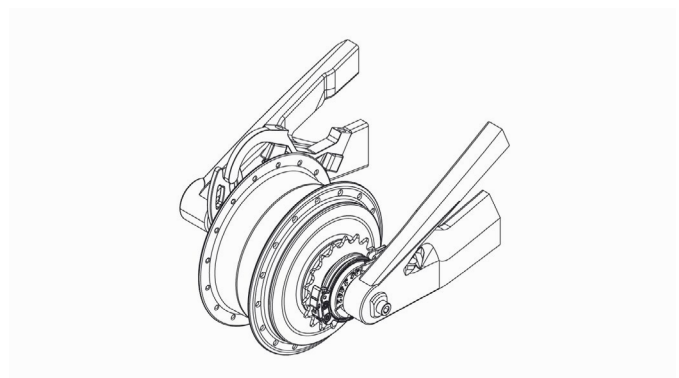
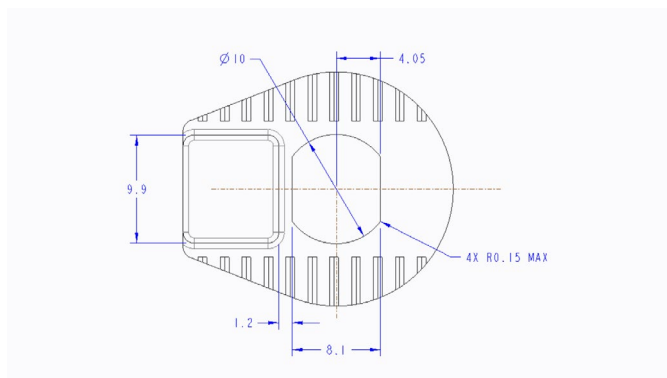
## Specific requirements for the hubs vary, and may include:

1. Minimum non-torque capability required through this part: 100 Nm
2. Thread size of the acorn nut interface thread: M10 \* 1
3. Minimum non-torque capability required through this part: 200 Nm
4. Minimum # of screw holes to utilize: 7
- 5a. Internal mainshaft interface thread: M6 \* 1
- 5b. Internal mainshaft interface thread: M8 \* 1.25
6. No-turn adapter screw interface thread: M4 \* 0.7v
7. Frame adapter interface thread: M10 \* 1



For all 135mm versions the mounting hardware consists of no-turn washers and acorn nuts that affix the hub to the bicycle dropout/ frame.

For all 148mm versions the mounting hardware consists of a variety of hardware components (Syntace, E-Thru, DT Swiss, Maxle) that affix the hub to the bicycle dropout/frame. Separate brake caliper mounts are available as IS or PM options.

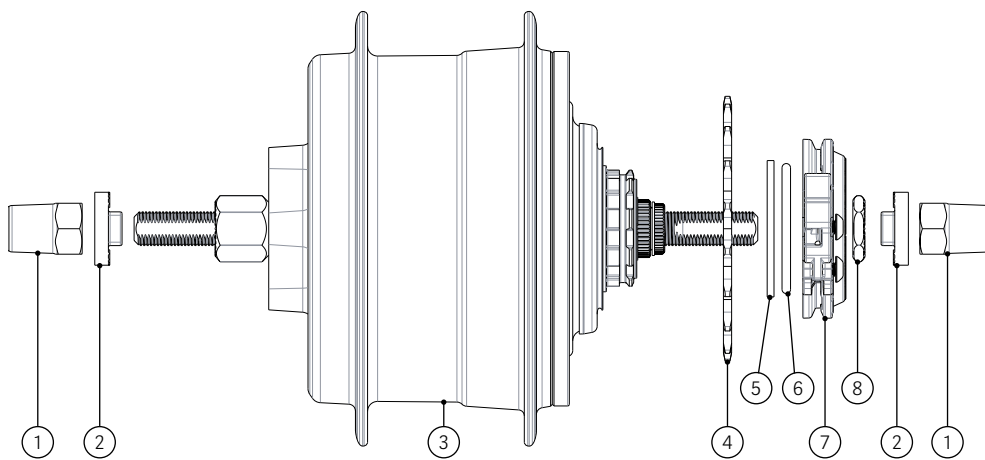


⚠ Grey parts can not be customized. Highlighted parts can be customized, but are required to be manufactured & validated by the OEM.



# Required Package Space Urban

## Components of Assembly

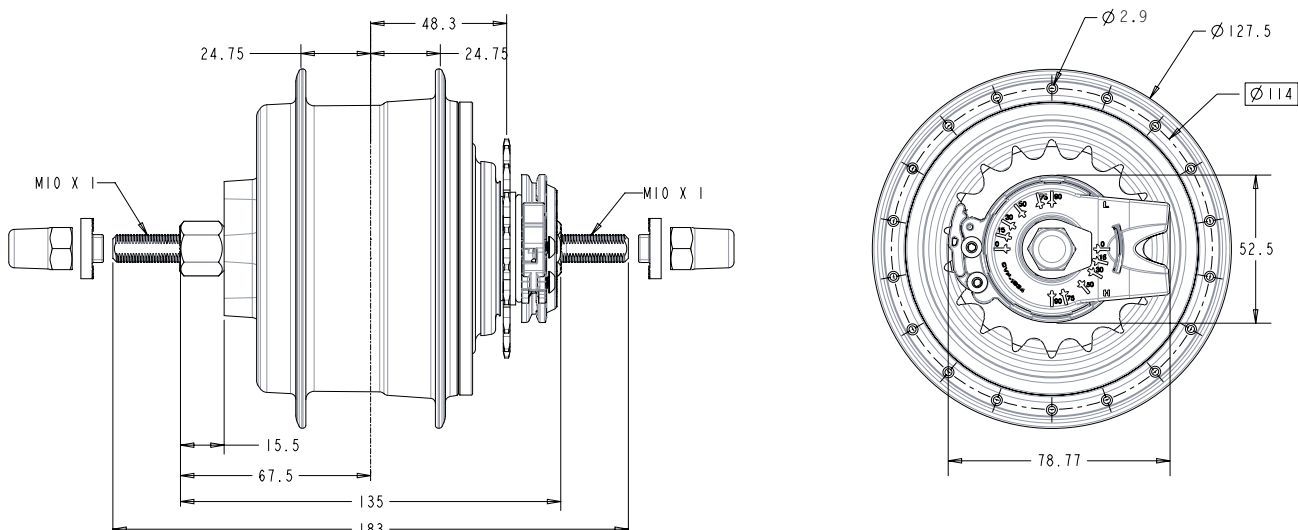


- 1 Acorn nut  
(HW-ANUT-OE)
- 2 No turn washer  
(HW-WASH-OE)
- 3 Hub  
(CVP-UR-36-DC-PRO-OE)

- 4 Chain cog 24 mm  
(customer provided)
- 5 Spacer 2.0 mm  
(HW-SPCR2-OE)
- 6 Wire ring retaining  
(HW-RING-OE)

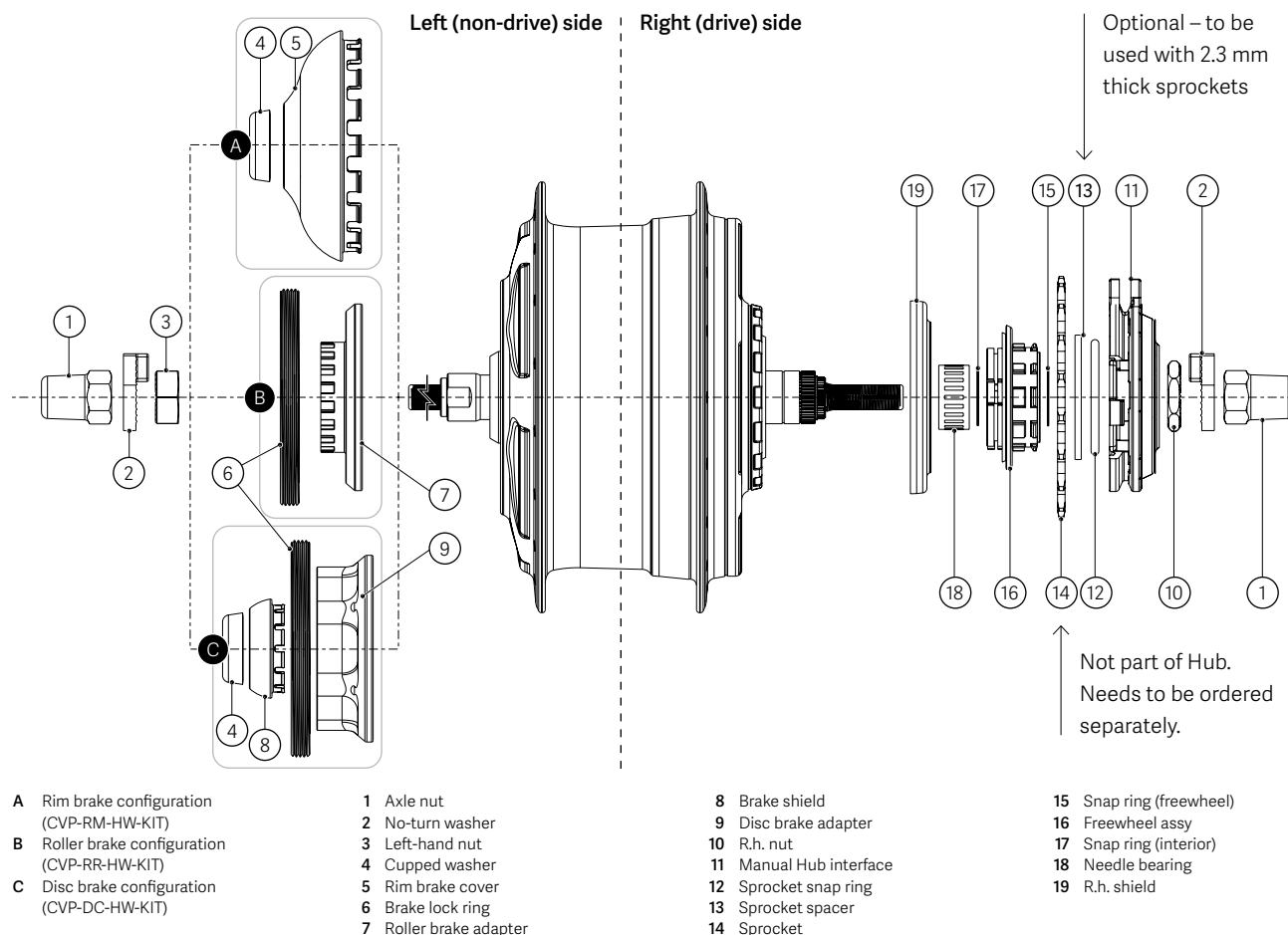
- 7 Manual hub interface 44T  
(MHI-MT-44T-OE)
- 8 RH HEX NUT  
(HW-HNUT-OE)

## Hub with Manual Hub Interface

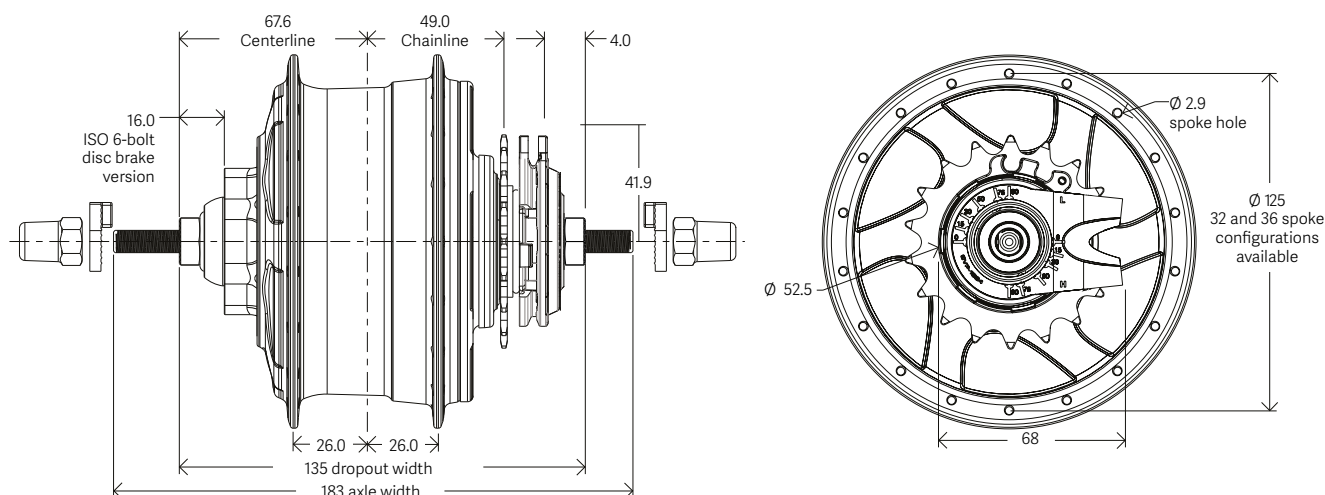


# Required Package Space City, Trekking

## Components of Assembly

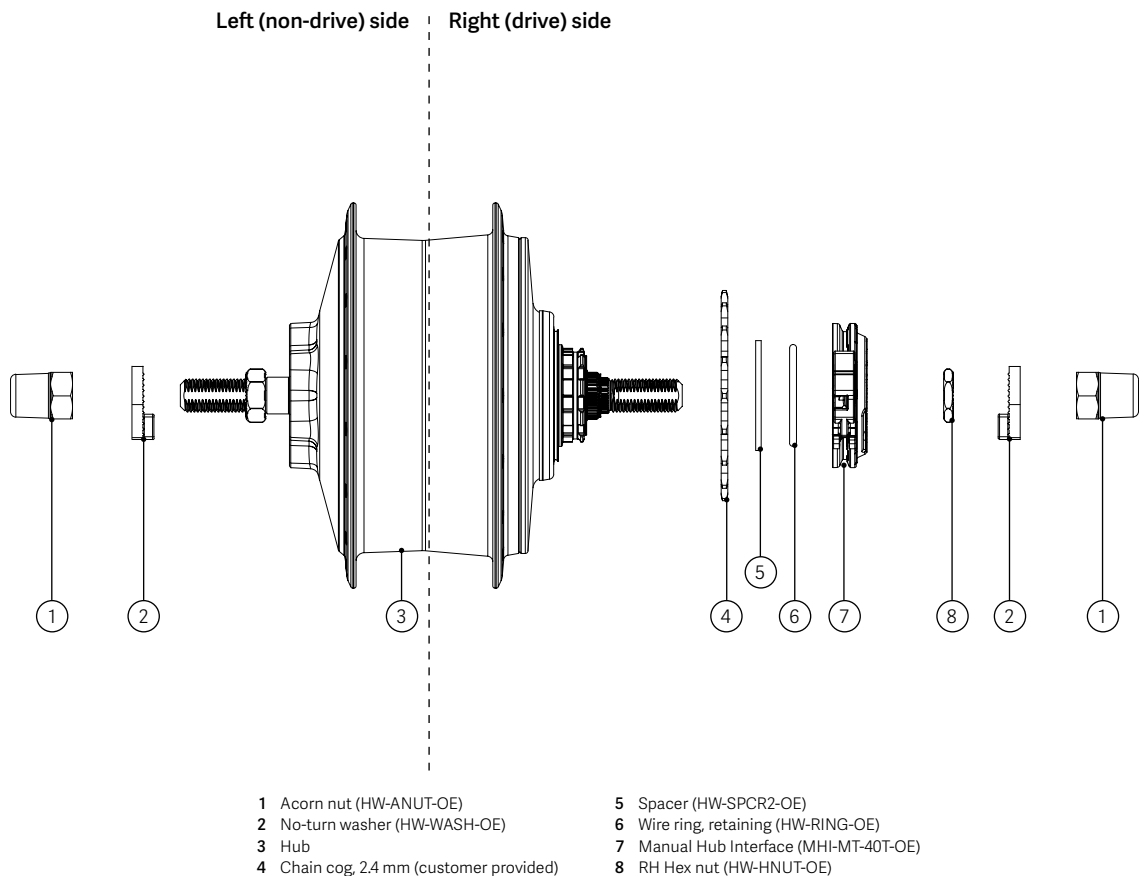


## Hub with Manual Hub Interface

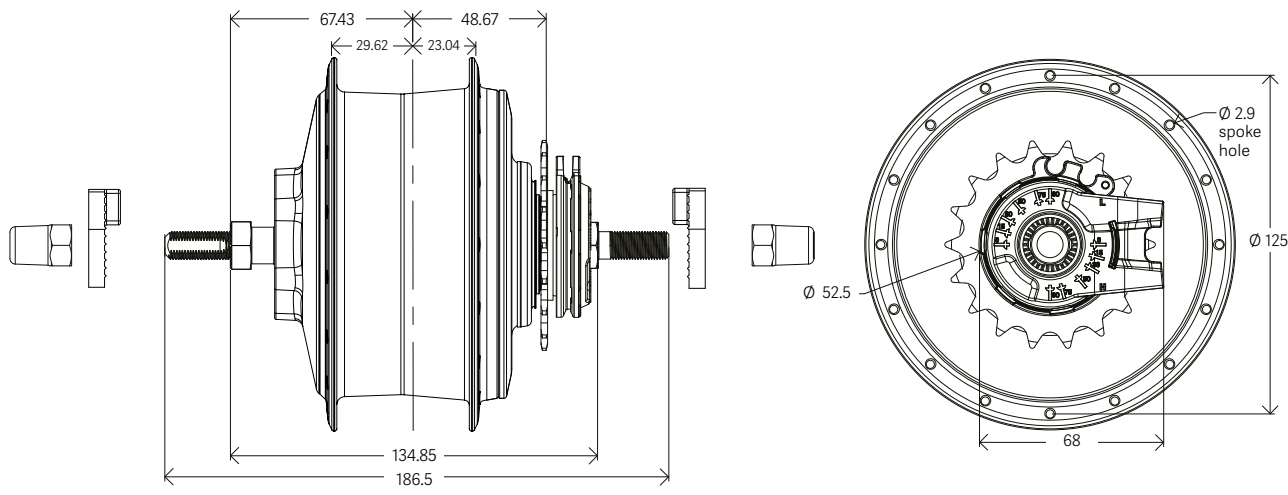


# Required Package Space Heavy Duty (135 mm)

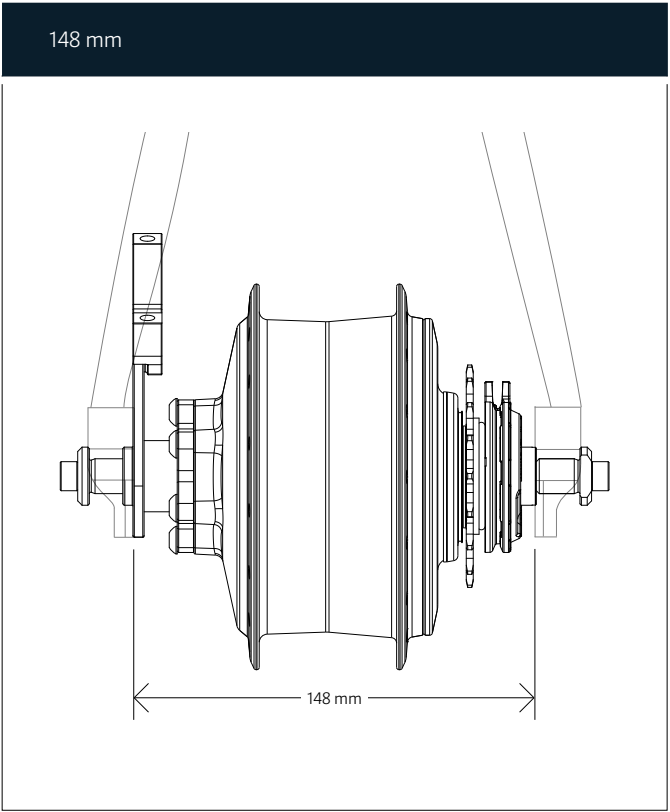
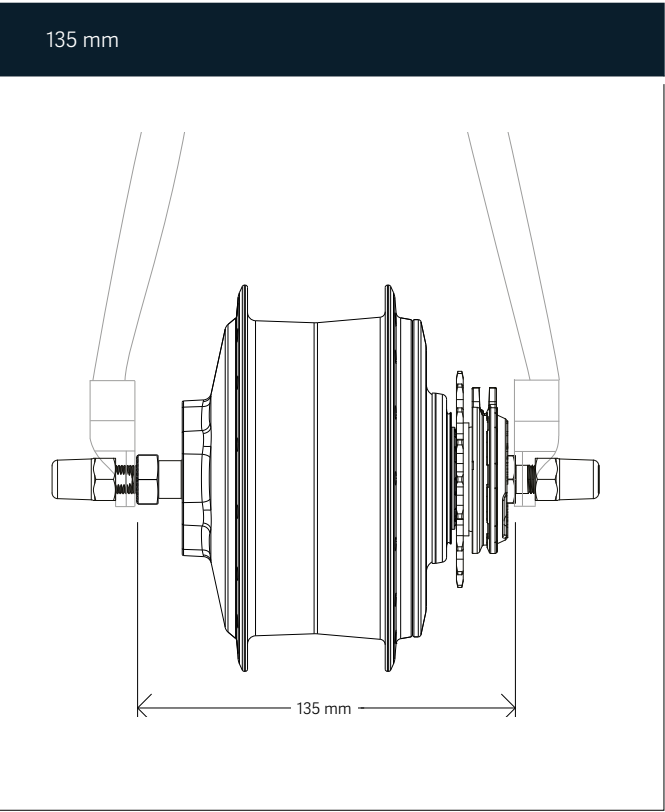
## Components of Assembly



## Hub with Manual Hub Interface

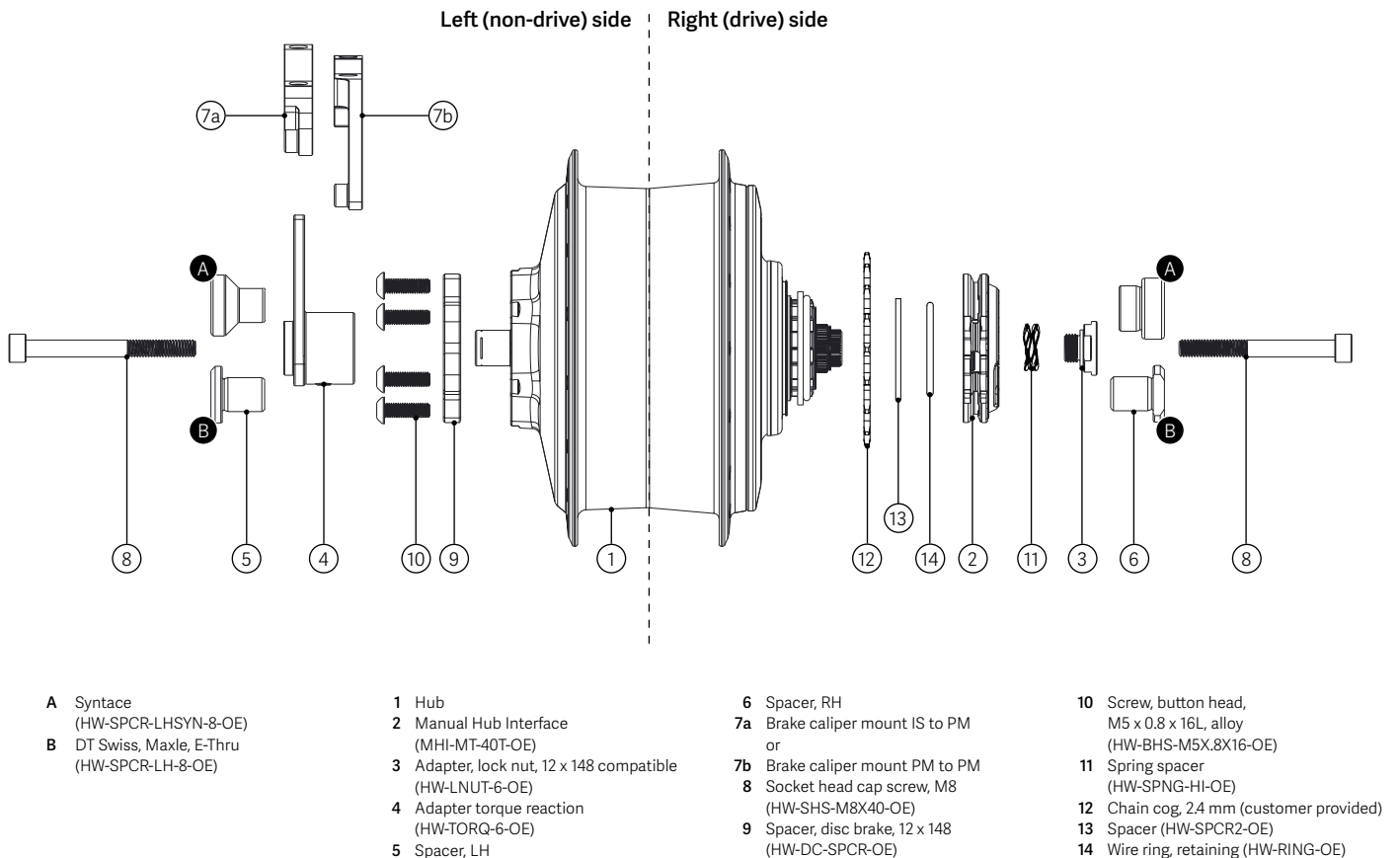


# Heavy Duty Dropout Options

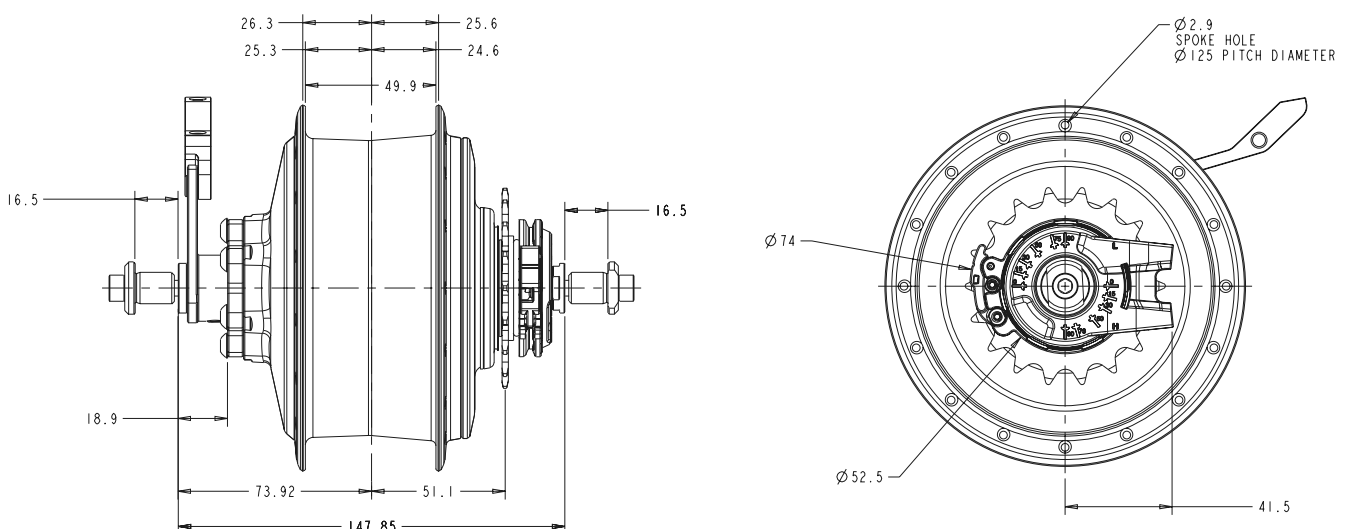


# Required Package Space Heavy Duty (148 mm)

## Components of Assembly



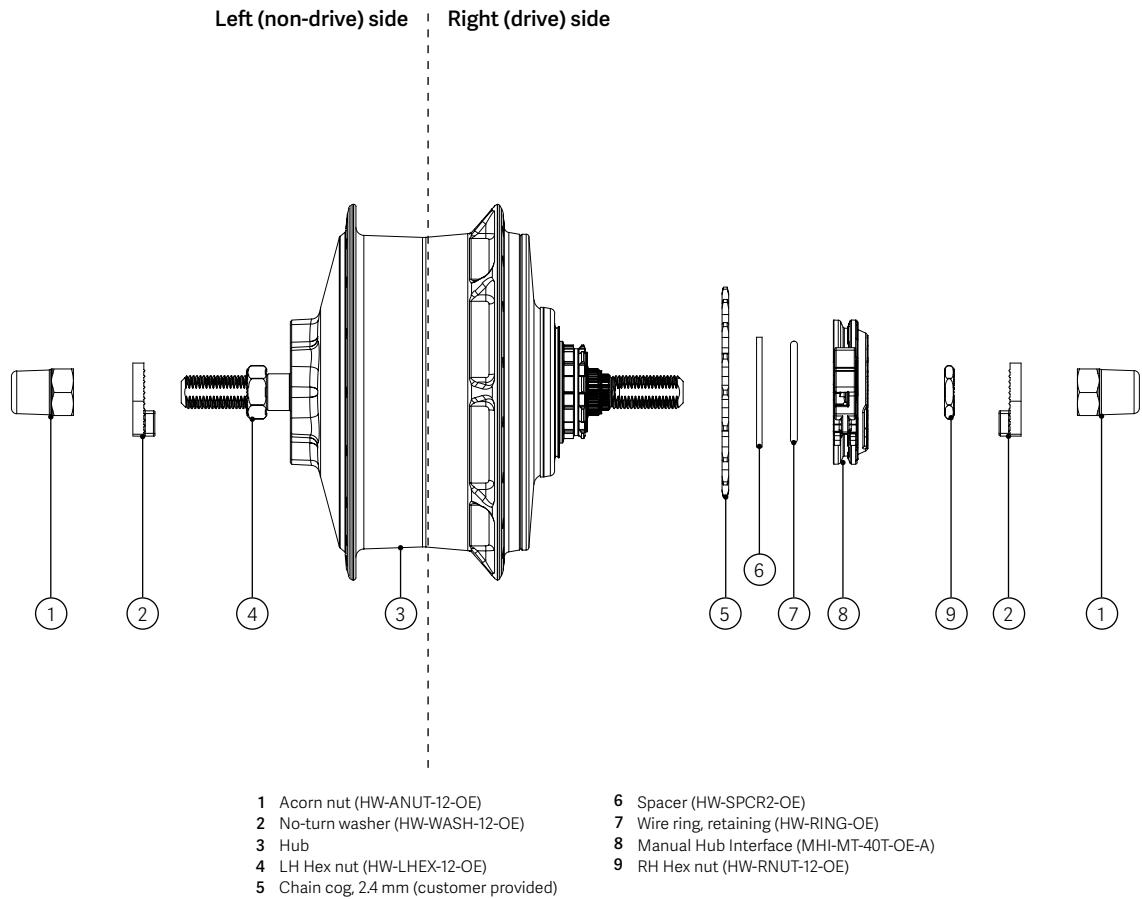
## Hub with Manual Hub Interface



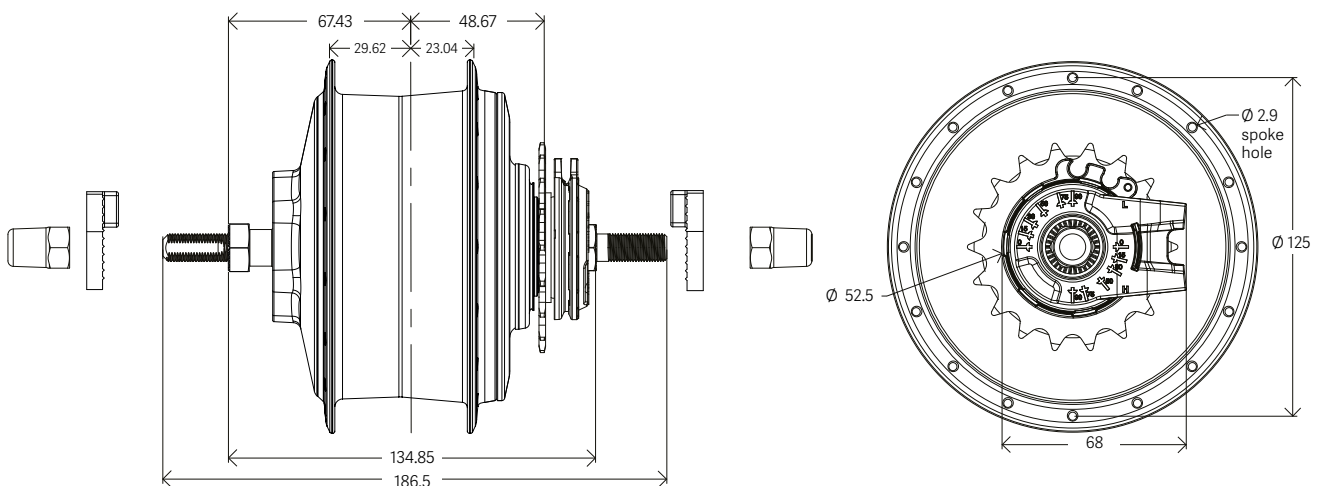


# Required Package Space Extreme (135 mm)

## Components of Assembly

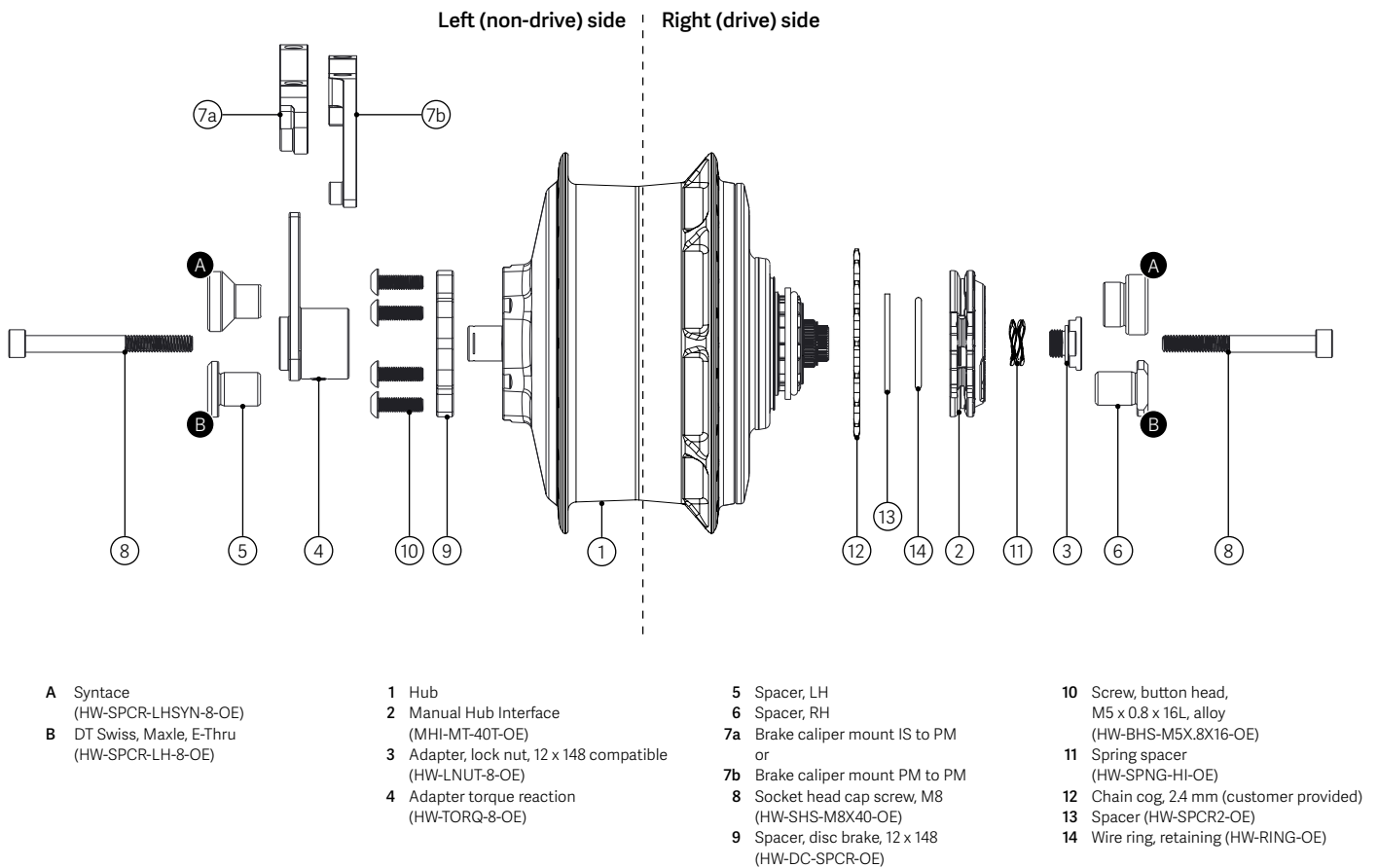


## Hub with Manual Hub Interface

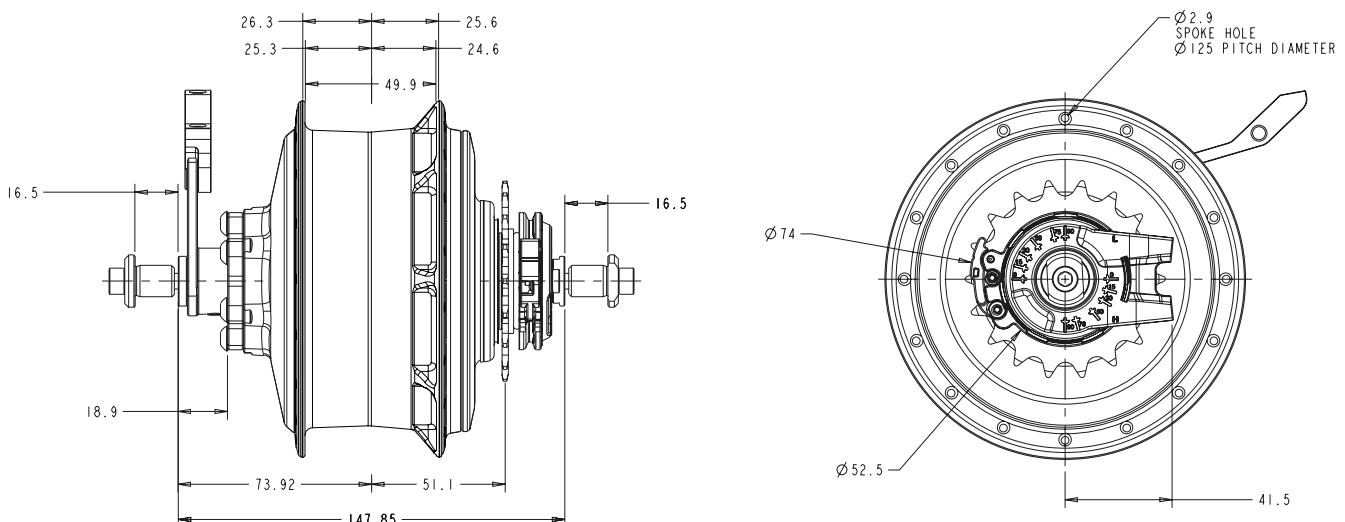


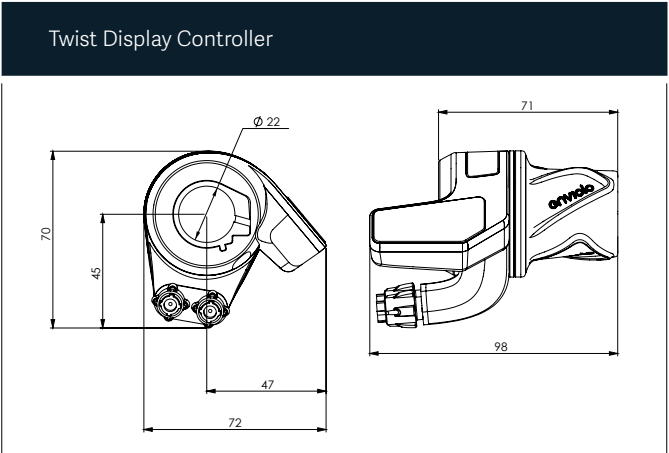
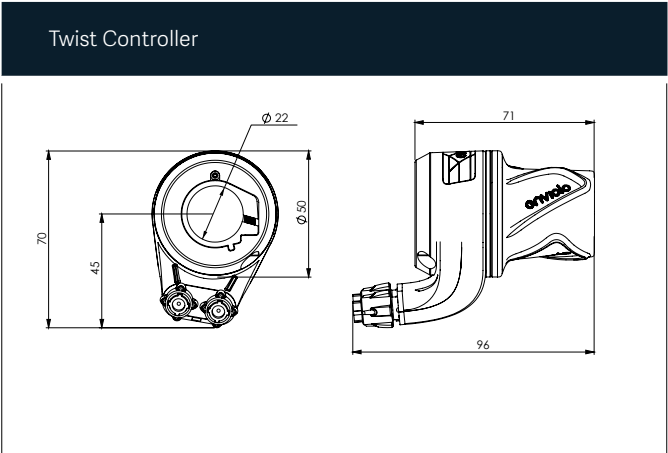
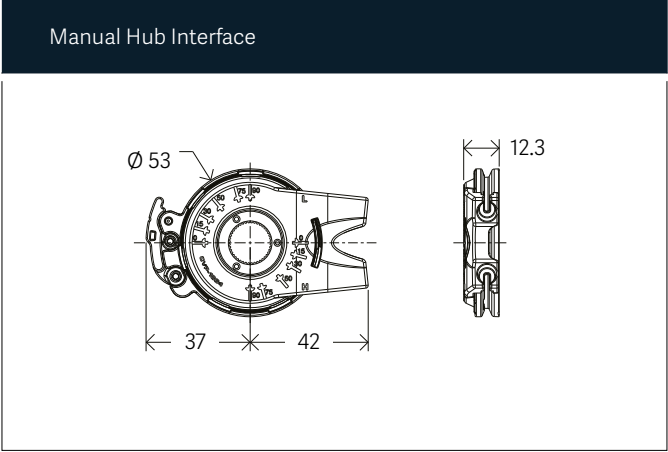
# Required Package Space Extreme (148 mm)

## Components of Assembly



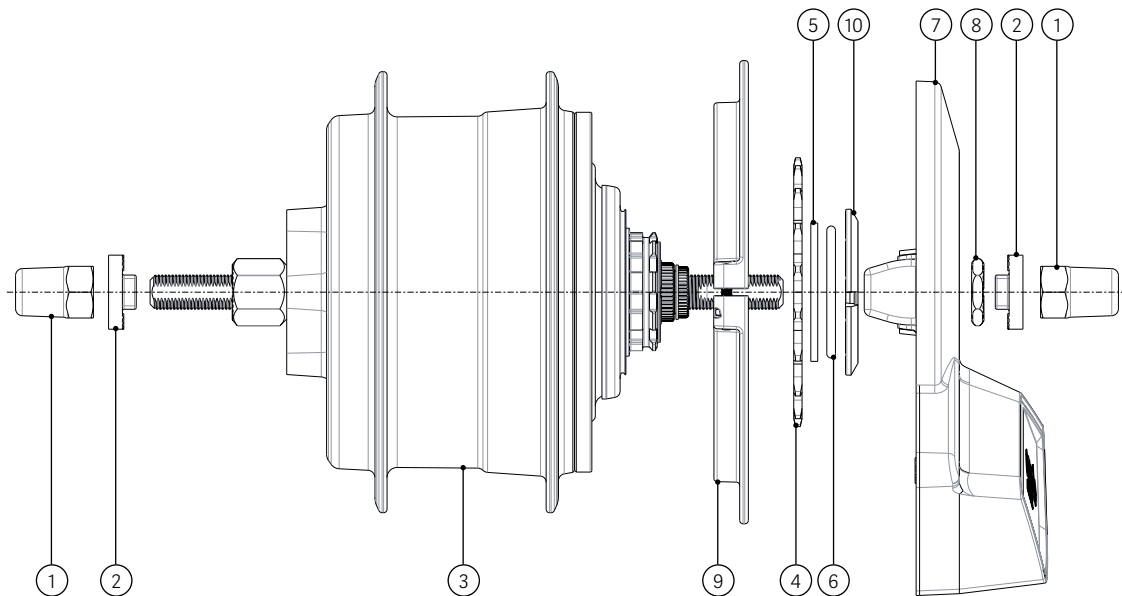
## Hub with Manual Hub Interface





# Required Package Space Urban

## Components of Assembly

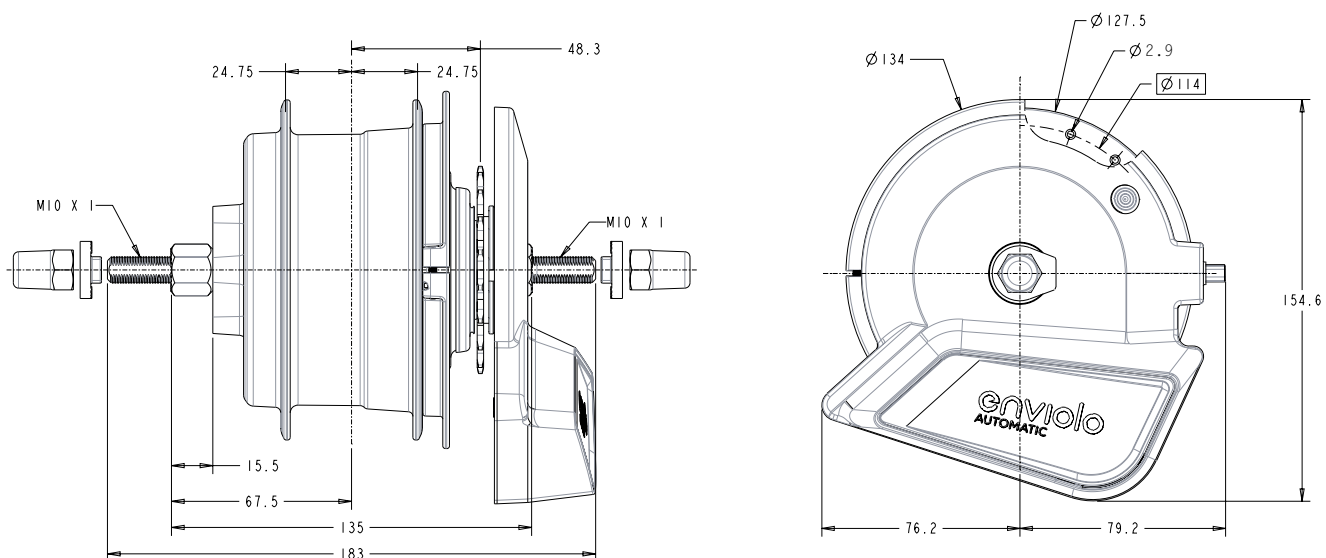


- 1 Acorn nut (HW-ANUT-OE)
- 2 No turn washer (HW-WASH-OE)
- 3 Hub (CVP-UR-36-DC-PRO-OE)
- 4 Chain cog 2.4 mm (customer provided)

- 5 Spacer, 2.0 mm (HW-SPCR2-OE)
- 6 Wire ring, retaining (HW-RING-OE)
- 7 Automatic hub interface 44T x 44T (AHI-PURE-44T-OE)
- 8 RH hex nut (HW-HNUT-OE)

- 9 Output speed ring (OSS2-UR-PRO-OE)
- 10 Input speed ring (AUT-ISS-OE)

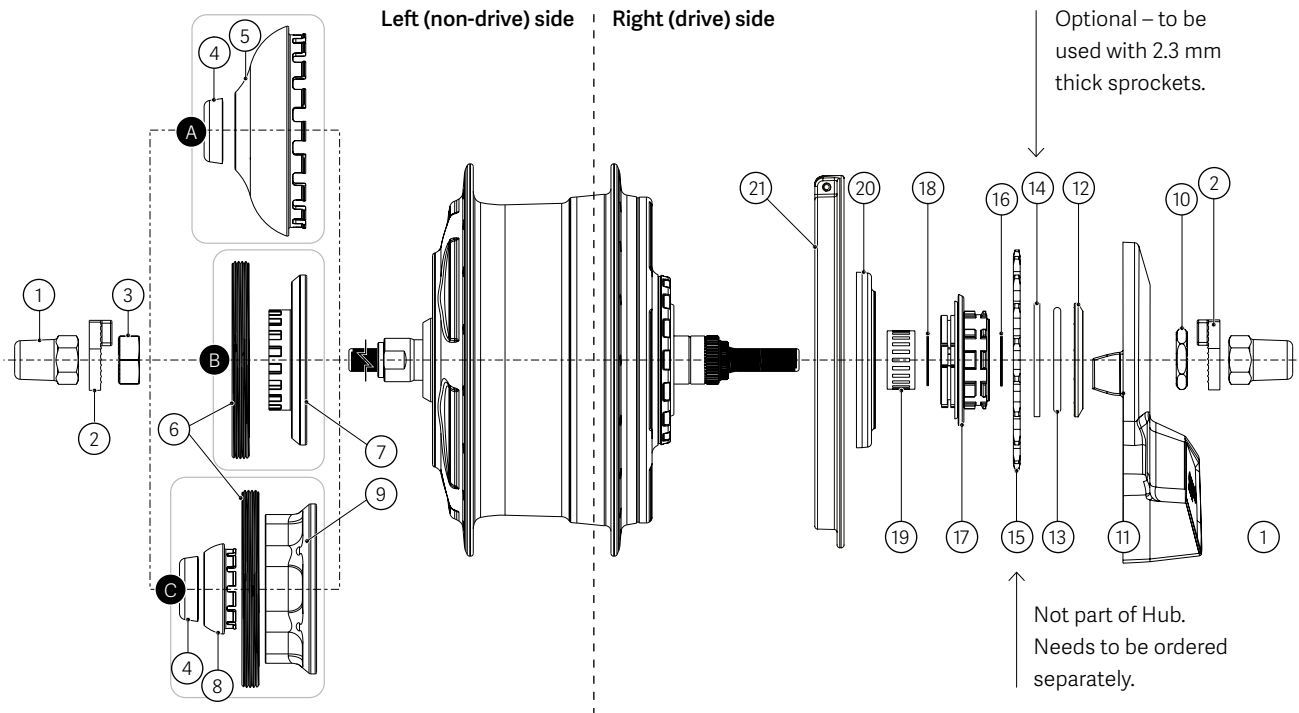
## Hub with AUTOMATiQ Hub Interface



# Required Package Space City, Trekking

**enviolo**  
AUTOMATiQ<sup>®</sup>

## Components of Assembly



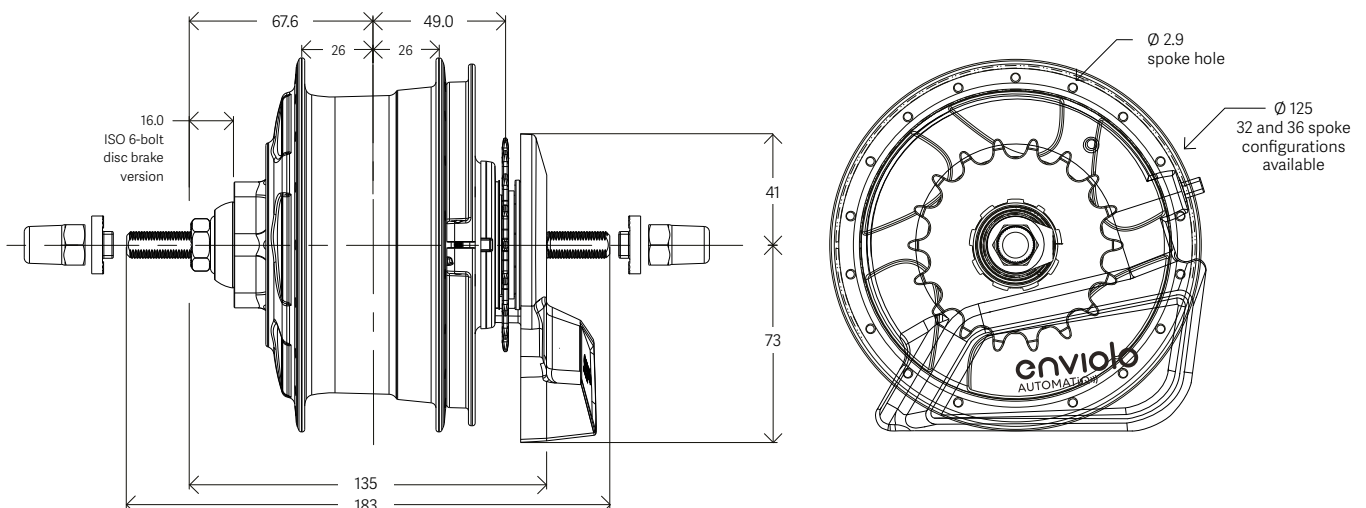
- A** Rim brake configuration (CVP-RM-HW-KIT)  
**B** Roller brake configuration (CVP-RR-HW-KIT)  
**C** Disc brake configuration (CVP-DC-HW-KIT)

- 1** Acorn nuts (HW-ANUT-OE)  
**2** No-turn washer (HW-WASH-OE)  
**3** Left-hand nut  
**4** Cupped washer  
**5** Rim brake cover  
**6** Brake lock ring  
**7** Roller brake adapter

- 8** Brake shield  
**9** Disc brake adapter  
**10** RH Hex nut (HW-HNUT-OE)  
**11** AUTOMATiQ Hub Interface (AHI-Pure-44T-OE or AHI-Pro-44T-OE)  
**12** Sprocket magnet ring (AUT-ISS-OE)  
**13** Retaining wire ring (HW-RING-OE)  
**14** Spacer (HW-SPCR2-OE)

- 15** Sprocket  
**16** Snap ring (freewheel)  
**17** Freewheel assy  
**18** Snap ring (interior)  
**19** Needle bearing  
**20** R.h. shield  
**21** Hub magnet ring (AUT-OSS2-OE)

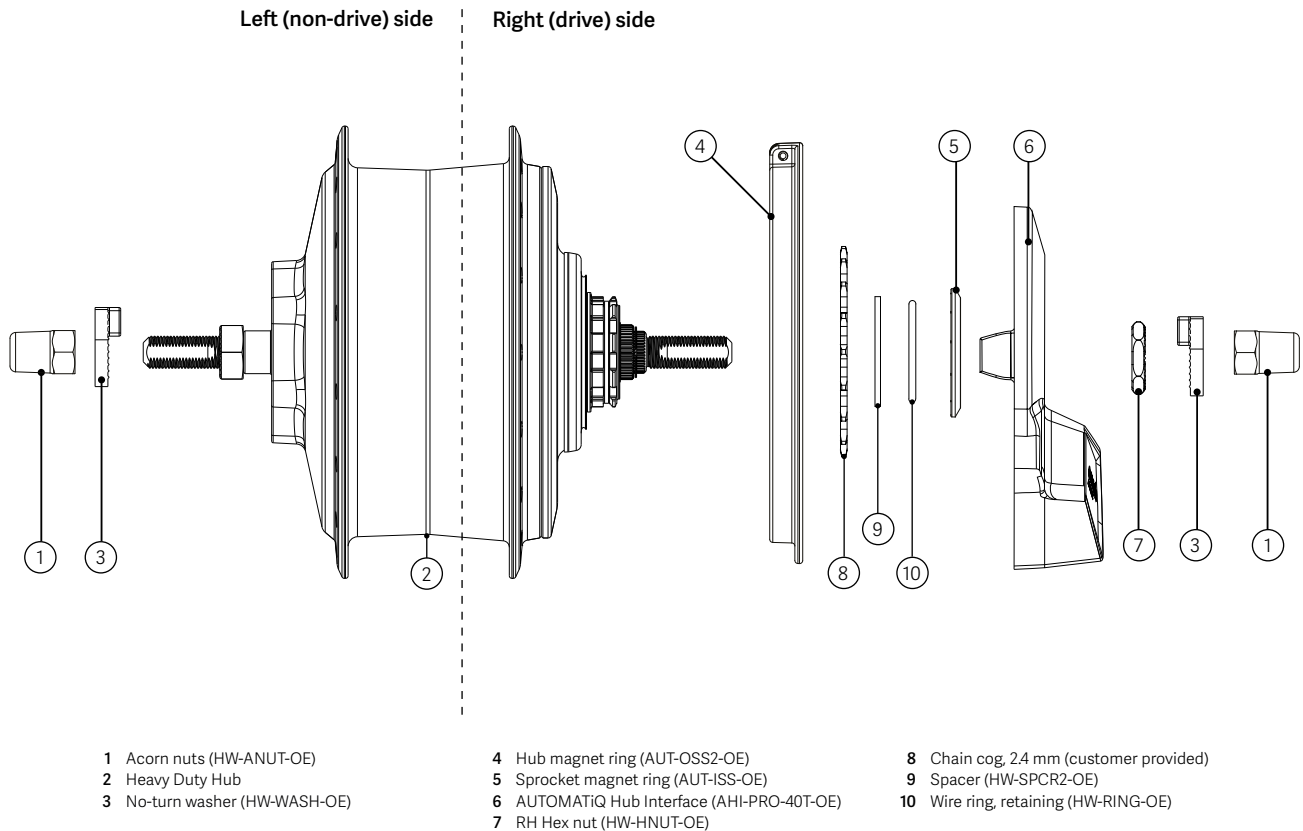
## Hub with AUTOMATiQ Hub Interface



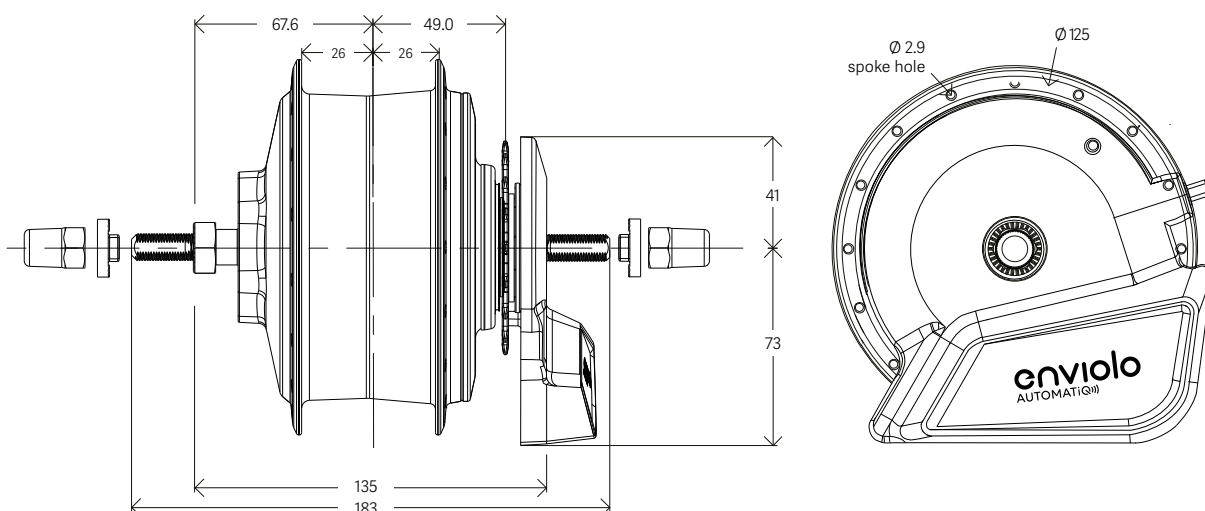


# Required Package Space Heavy Duty (135 mm)

## Components of Assembly

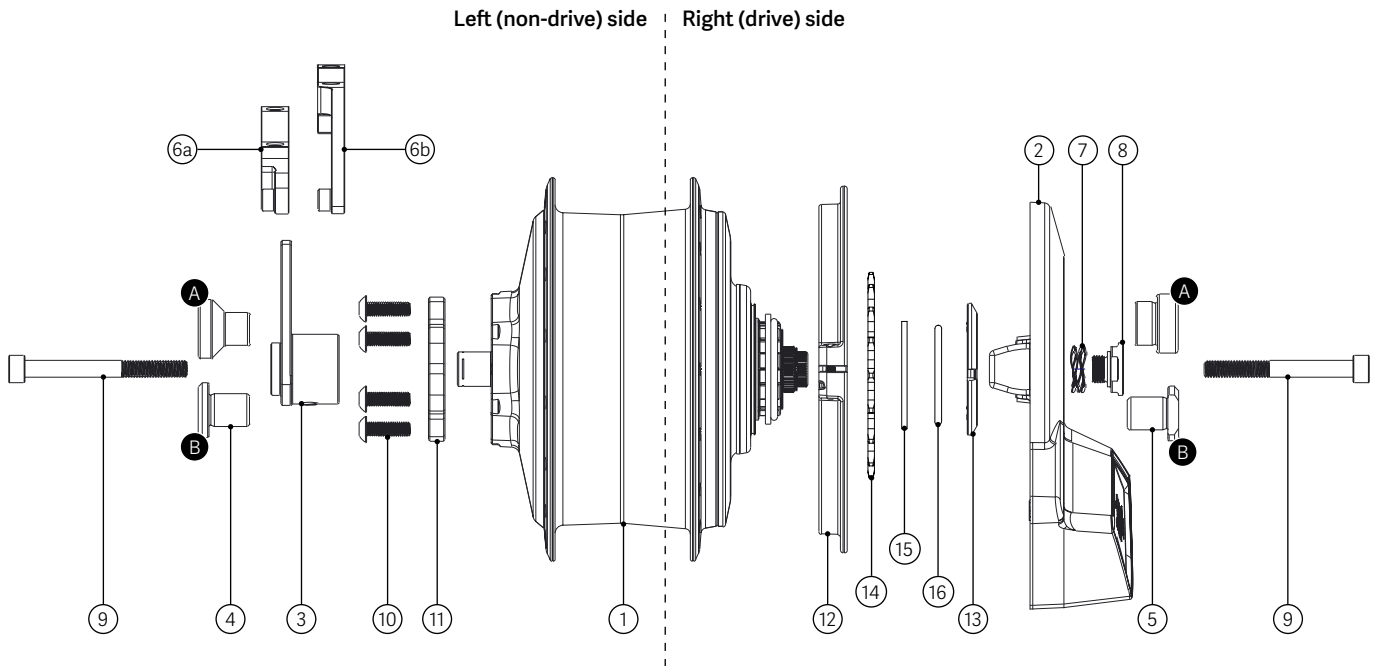


## Hub with AUTOMATiQ Hub Interface



# Required Package Space Heavy Duty (148 mm)

## Components of Assembly



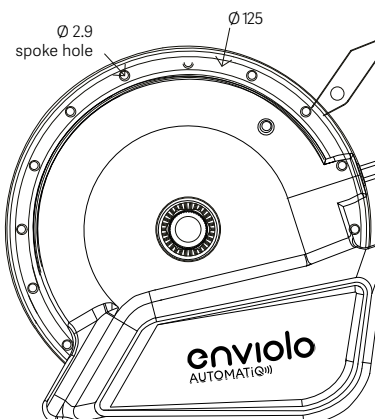
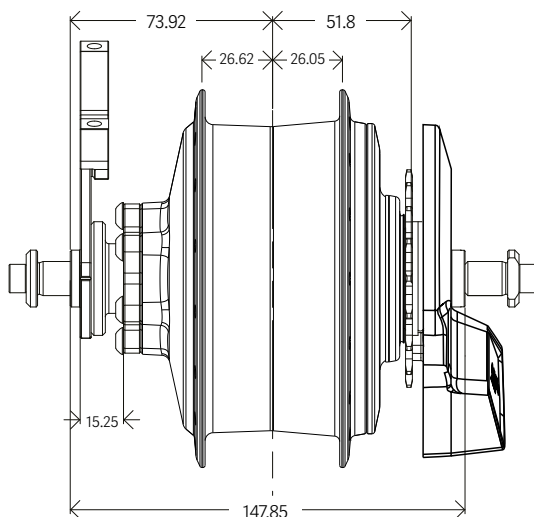
**A** Syntace  
(HW-SPCR-LHSYN-OE)  
**B** DT Swiss, Maxle, E-Thru  
(HW-SPCR-LH-OE)

**1** Hub  
**2** AUTOMATiQ Hub Interface  
(AHI-PRO-40T-OE)  
**3** Adapter torque reaction  
z(HW-TORQ-8-OE)  
**4** Spacer, LH  
**5** Spacer, RH  
**6a** Brake caliper mount IS to PM  
or  
**6b** Brake caliper mount PM to PM

**7** Spring spacer  
(HW-SPNG-HI-OE)  
**8** Adapter, lock nut, 12 x 148 compatible  
(HW-LNUT-OE)  
**9** Socket head cap screw, M6  
(HW-SHCS-M6X1X60-OE)  
**10** Screw, button head, M5 x 0.8 x 16L, alloy  
(HW-BHS-M5X.8X16-OE)

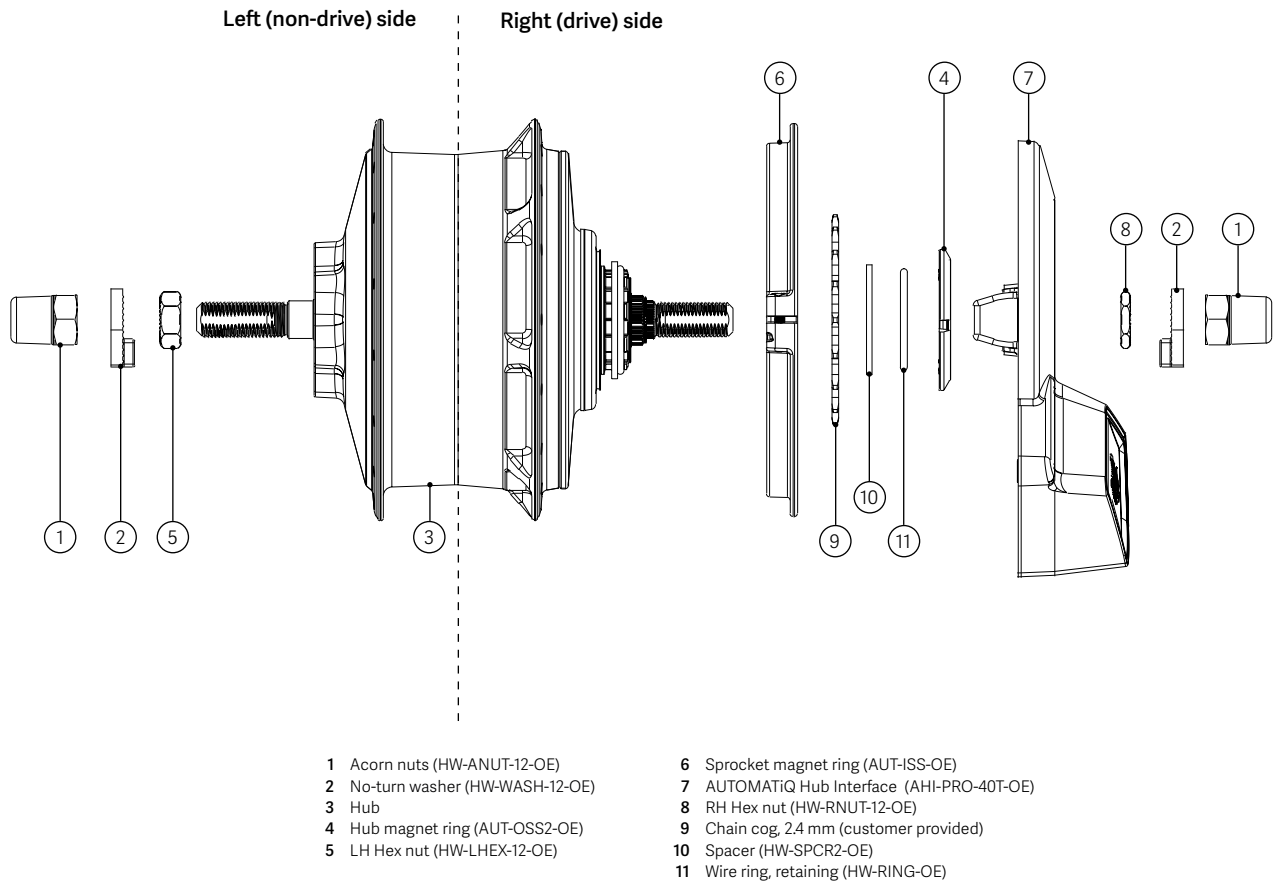
**11** Spacer, disc brake, 12 x 148  
(HW-DC-SPCR-OE)  
**12** Hub magnet ring  
(AUT-OSS2-OE)  
**13** Sprocket magnet ring (AUT-ISS-OE)  
**14** Chain cog, 2.4 mm (customer provided)  
**15** Spacer (HW-SPCR2-OE)  
**16** Wire ring, retaining (HW-RING-OE)

## Hub with AUTOMATiQ Hub Interface

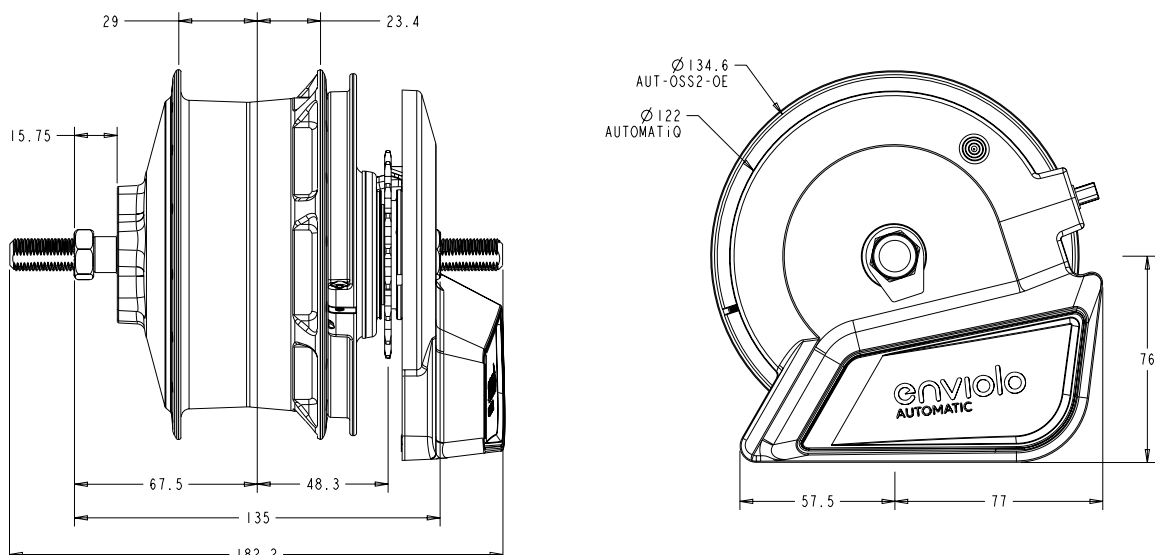


# Required Package Space Extreme (135 mm)

## Components of Assembly



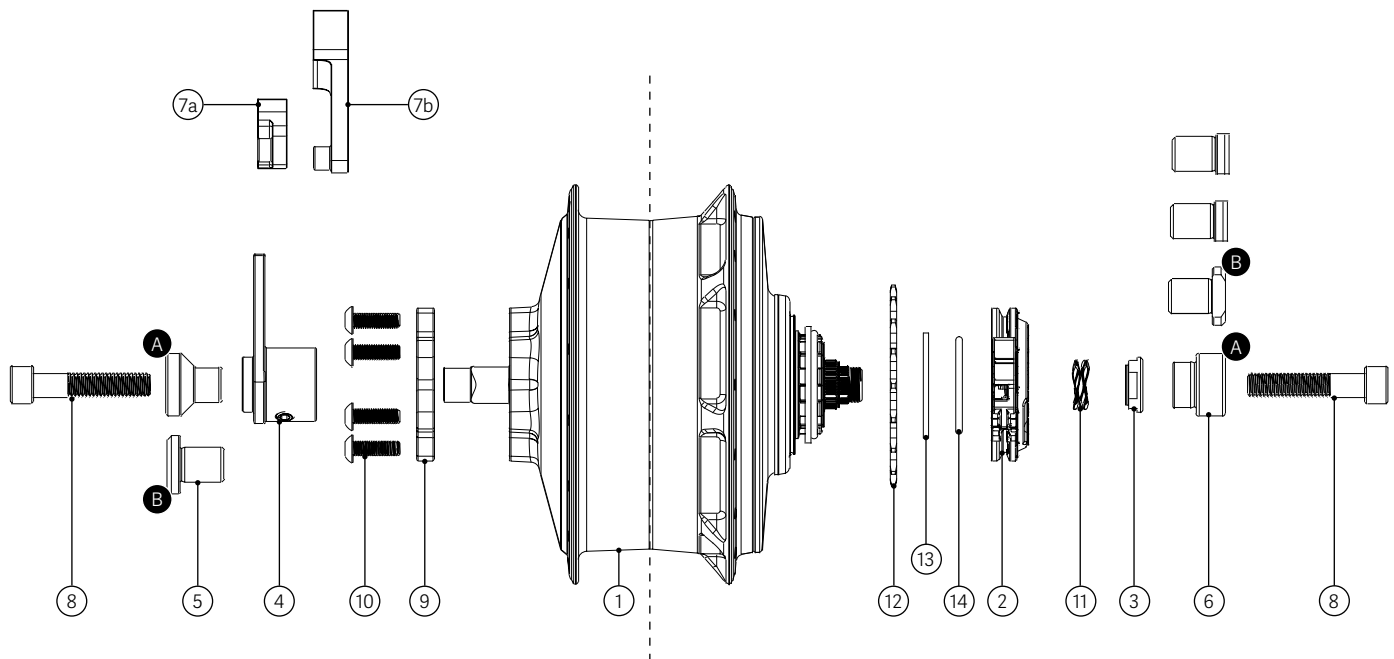
## Hub with AUTOMATiQ Hub Interface



# Required Package Space Extreme (148 mm)

**enviolo**  
AUTOMATiQ<sup>®</sup>

## Components of Assembly



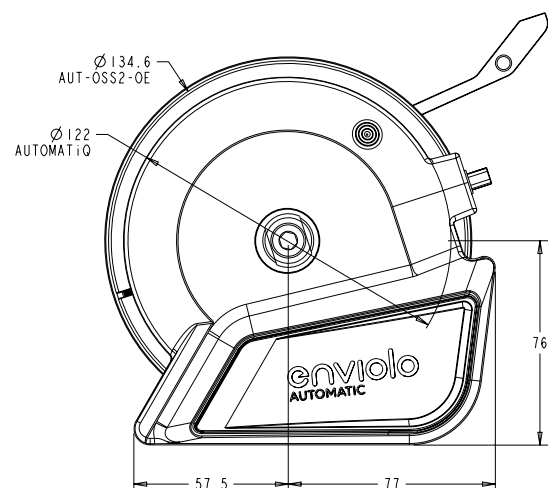
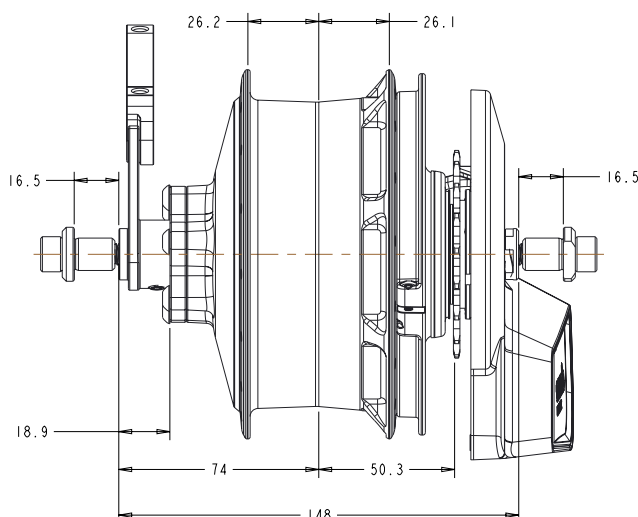
**A** Syntace  
(HW-SPCR-LHSYN-OE)  
**B** DT Swiss, Maxle, E-Thru  
(HW-SPCR-LH-OE)

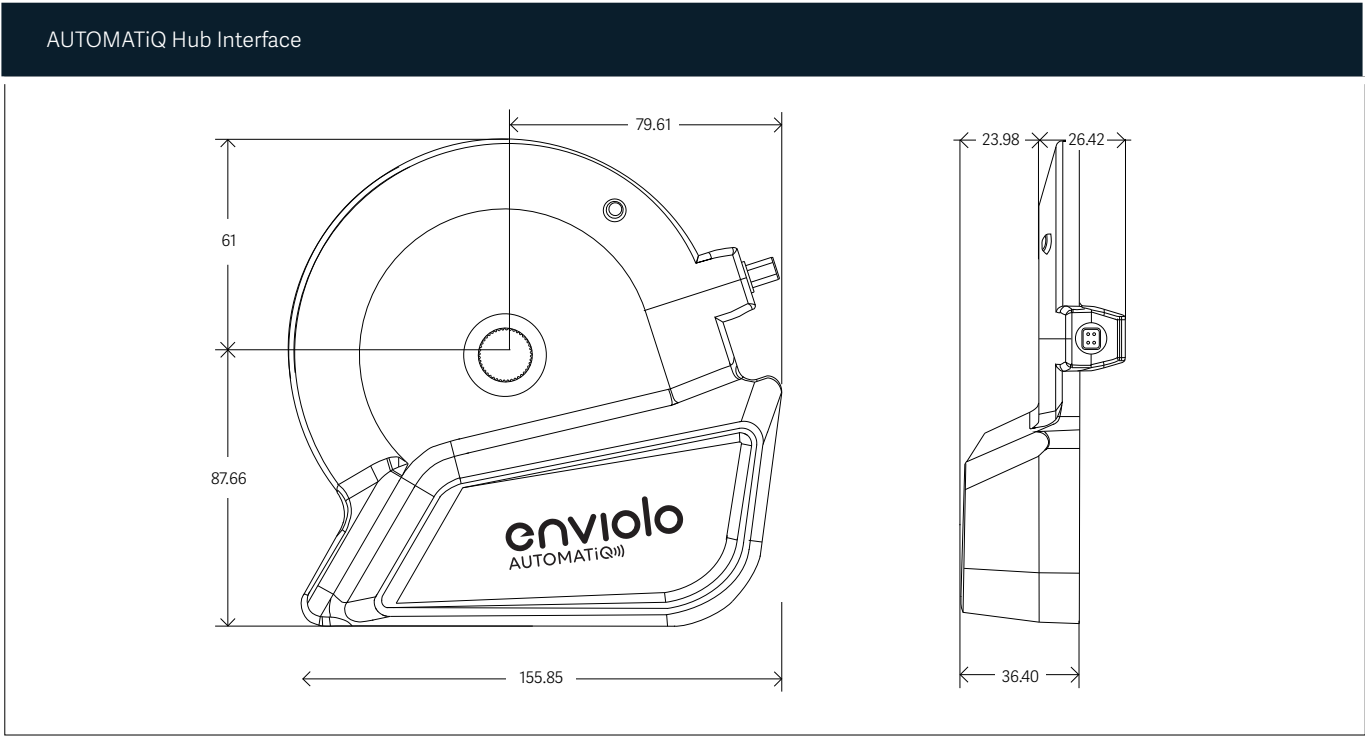
**1** Heavy Duty Hub  
**2** Manual Hub Interface  
(HW-LNUT-8-OE)  
**3** Adapter, lock nut, 12 x 148 compatible  
(HW-LNUT-OE)  
**4** Adapter torque reaction  
z(HW-TORQ-8-OE)  
**5** Spacer, LH

**6** Spacer, RH  
**7a** Brake caliper mount IS to PM  
or  
**7b** Brake caliper mount PM to PM  
**8** Socket head cap screw, M6  
(HW-SHCS-M6X1X60-OE)  
**9** Spacer, disc brake, 12 x 148  
(HW-DC-SPCR-OE)

**10** Screw, button head,  
M5 x 0.8 x 16L, alloy  
(HW-BHS-M5X.8X16-OE)  
**11** Spring spacer  
(HW-SPNG-HI-OE)  
**12** Chain cog, 24 mm (customer provided)  
**13** Spacer (HW-SPCR2-OE)  
**14** Wire ring, retaining (HW-RING-OE)

## Hub with AUTOMATiQ Hub Interface

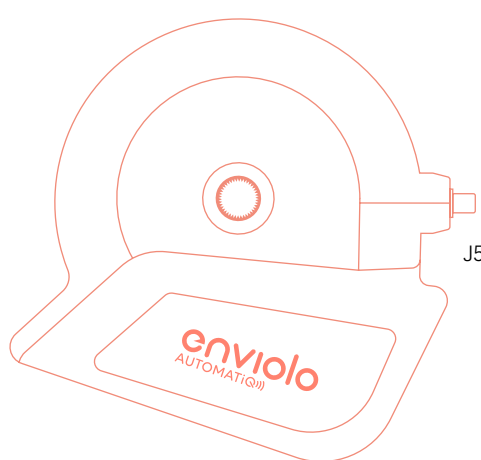
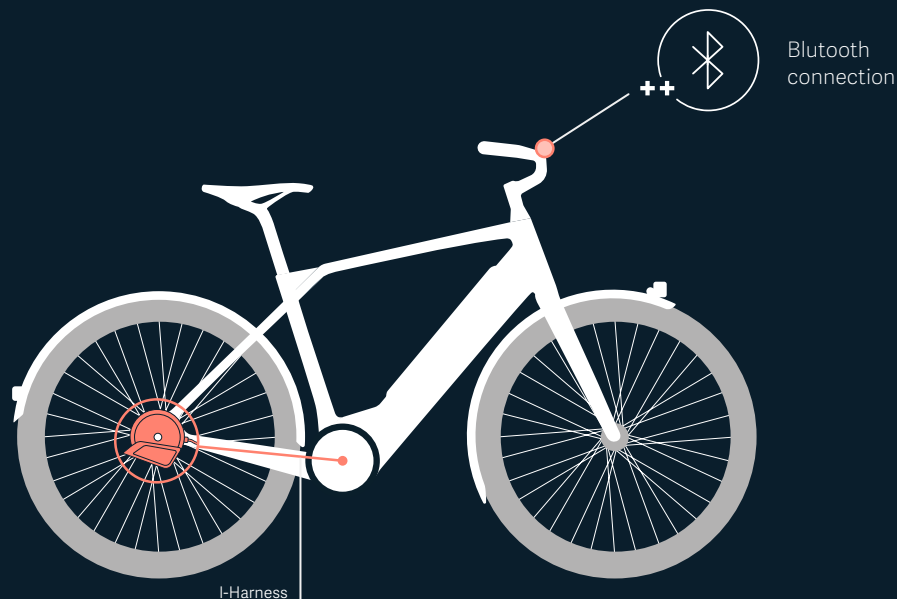






# AUTOMATI*Q* Wire Harness

**enviolo**  
AUTOMATI*Q*™



WIRE-AT3-DS-OE | 1.000 mm | Ø 3.7 mm

**OR**



WIRE-AT3-400-OE\* | 400 mm | Ø 3.7 mm  
WIRE-AT3-600-OE\* | 600 mm | Ø 3.7 mm

Available from drive system manufacturer

**OR**

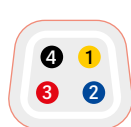


WIRE-AT3-600-OE-12V\* | 600 mm | Ø 3.7 mm  
WIRE-AT3-800-OE-12V\* | 800 mm | Ø 3.7 mm

**Note:** On the Bosch Smart System, our cable will directly connect into the HPP port of the Bosch engine, requiring a slightly longer cable than on previous systems.

**Note:** Pin numbering on AHI-side is different from pin numbering on cable-side

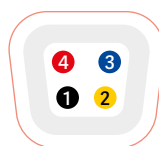
\* This connector is only required if the counterplug is not provided by the drive system manufacturer. Please contact the drive system manufacturer for further information. For Yamaha we offer an alternative cable. Please contact the sales team for further information.



J5

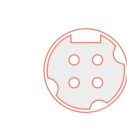
1  
2  
3  
4

V\_BAT  
GND  
CAN\_L  
CAN\_H



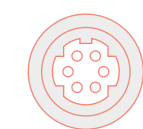
J6

2  
3  
4  
1



J9 Bosch HPP Socket

J10 Bosch HPP



J15 Bosch

J16 Bosch

# Further Information

## System efficiency



Besides the components themselves several other factors influence the battery range:

- Type of tires
- Tire pressure
- Riding at high assistance levels
- Rider and vehicle weight
- High carry-on weight
- Straight sitting position
- Headwind
- Topography
- Frequent starting and stopping
- Frequent riding under 20 km/h
- Frequent riding under 50 RPM
- Low pedaling force by rider
- Low outside temperatures
- Rider cadence

## Service Tools

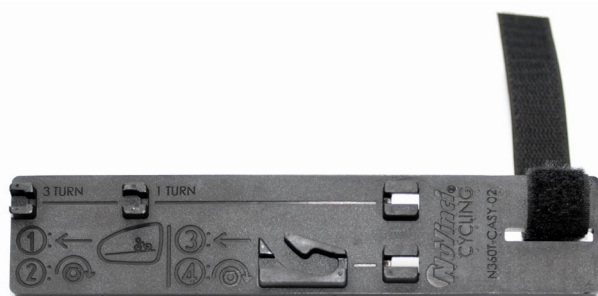
To support your assembly and maintenance of our products we offer four simple service tools:



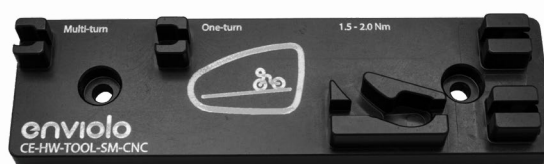
**BK-ADPT-TOOL**  
Brake adapter / disc assembly



**HW-SNUT-TOOL**  
Spline nut tool



**CE-HW-TOOL-SM-MLD**  
Cable hardware installation tool  
(Composite - suited for retail application)



**CE-HW-TOOL-LG-CNC**  
Cable hardware installation tool  
(Aluminum - suited for mass production application)



**WL-SP/CA-TOOL**  
Wheel lacing adapter for CA/SP

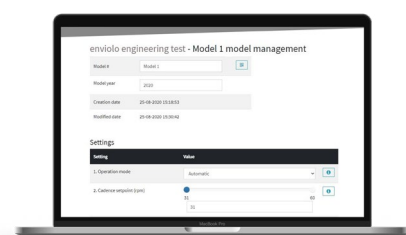
## AUTOMATiQ App



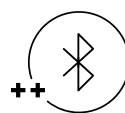
If the customer allows for a data transfer all system data incl. km ridden and selected ride characteristics will be uploaded to our cloud, which will also speed up any potential warranty processing.



Wireless  
connection



In addition OEMs have access to a backend ([www.AUTOMATiQ.enviolo.com](http://www.AUTOMATiQ.enviolo.com)), which enables them to have a simplified mass production bike setup, which in addition will then also speed up the assembly line efforts tremendously.



Bluetooth  
connection



Our new AUTOMATiQ system offers a bluetooth connection, which allows easy setup, customization and firmware updates via a mobile phone or tablet.



The app is offered in different hierarchy levels in order to grant the proper access to the according audience. To get access to the proper layer, simply register in the app.

# Assembly Torque Specifications

## Urban, City, Trekking, Heavy Duty (135 mm solid axle)

Acorn nut (HW-ANUT-OE)	30 - 40 Nm
Brake adapter + Loctite® 277 or similar	55 - 65 Nm
RH hex nut (HW-HNUT-OE)	8 - 10 Nm
LH hex nut (HW-SNUT-OE)	20 - 27 Nm

## Heavy Duty (148 modular mm)

Screw, button head, M5 x 0.8 x 16L, alloy (HW-BHS-M5X.8X16-OE)	5.5 - 6.2 Nm
Right side spacer (not threaded in all cases)	5 - 10 Nm
Axle bolts (HW-SHCS-M6X1X60-OE / HW-SHCS-M6X1X60-OE)	10 - 15 Nm
Adapter locknut (HW-LNUT-OE)	5 - 7 Nm

## Other Parts

Cable hardware	1.5 - 2.0 Nm
Manual controller	2.0 - 2.5 Nm
Hub magnet ring (AUT-OSS2-OE)	1.0 Nm
Controller cable cover screw	0.2 - 0.3 Nm (handtight)
AUTOMATiQ controller	1.0 Nm

## Extreme (135 mm solid axle)

Acorn nut, 12 mm (HW-ANUT-12-OE)	38 - 48 Nm
RH hex nut, 12 mm (HW-RNUT-12-OE)	8 - 10 Nm
LH hex nut, 12 mm (HW-LHEX-12-OE)	25 - 32 Nm

## Extreme (148 mm modular axle)

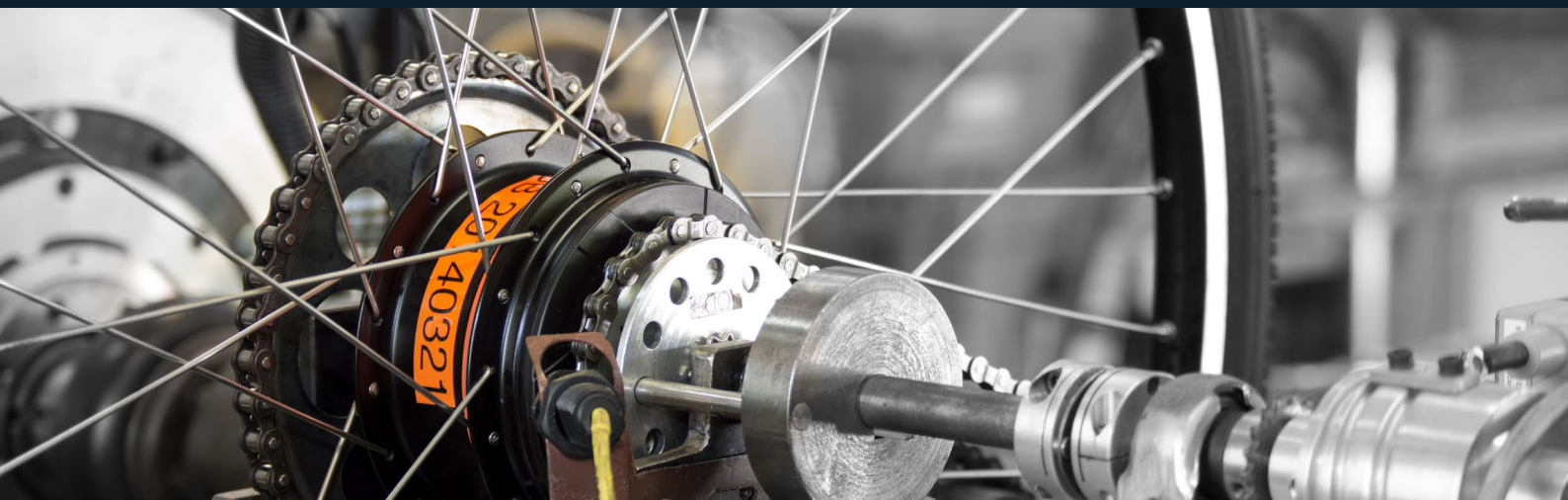
Socket head cap screw, M8 x 1.25 x 40 (HW-SHS-M8X40-OE)	15 - 20 Nm
Spacer, RH Maxle, Extreme, 12 x 148 compatible (HW-SPCR-RHMAX-8-OE)	5 - 10 Nm
Spacer, RH Shimano, Extreme, 12 x 148 compatible (HW-SPCR-RHSHIM-8-OE)	5 - 10 Nm
Spacer, RH DT Swiss, Extreme, 12 x 148 compatible (HW-SPCR-RHDS-8-OE)	5 - 10 Nm
Screw, button head, M5 x .8 x 16L (HW-BHS-M5X.8X16-OE)	5.5 - 6.2 Nm
Adapter, torque reaction, 8 mm, Extreme (HW-TORQ-8-OE)	5 - 6 Nm
Lock nut, Extreme (HW-LNUT-8-OE)	6 - 8 Nm

## Extreme Gearbox

Acorn nut, 12 mm (HW-ANUT-12-OE)	38 - 48 Nm
RH hex nut, 12 mm (HW-RNUT-12-OE)	8 - 10 Nm
Socket head cap screw, Torx, M4 x 0.7 x 6L (HW-SHCS-M4X.7X6-OE)	1.5 - 2 Nm



# Quality & Validation



Before we release our products to the market they have to run through a severe testing cycle, which is derived from automotive standards and includes an FMEA and functional safety analysis.

In addition all our products complete an extensive end-of-line testing and validation process.

## Build quality

- Ride audit (quantity & quality)
- Ratio range
- R&D function
- Assembly tolerances

## Design & overload tests

- Cold temperature operation test
- Torsional stress (DIN) test
- Wheel retention test
- Spoke flange ultimate load test
- Pedal drag test

## Durability / fatigue tests

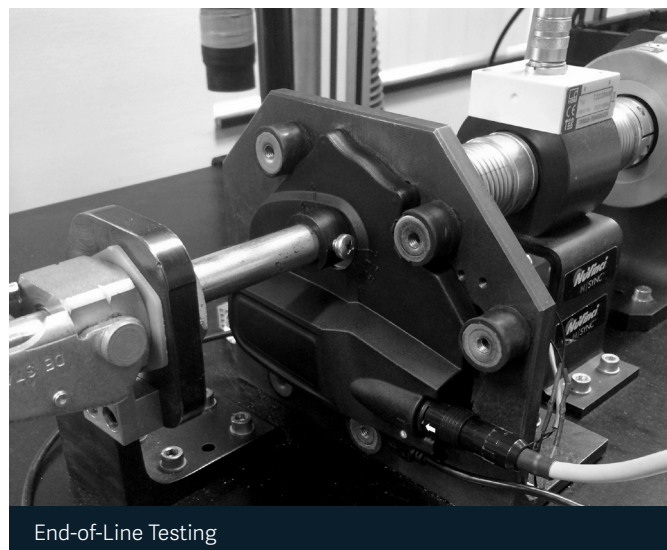
- Distributed fixed-ratio test (DFRT)
- Dynamic shift test (DST)
- Coasting test
- Canted wheel bump test
- Hub shell & cover fatigue test
- Spoke flange fatigue test
- Brake ultimate load & fatigue test
- Shifter system life test

## Environmental tests

- Corrosion (salt spray) test
- UV test
- Environmental intrusion test
- Durability



Production Line Testing

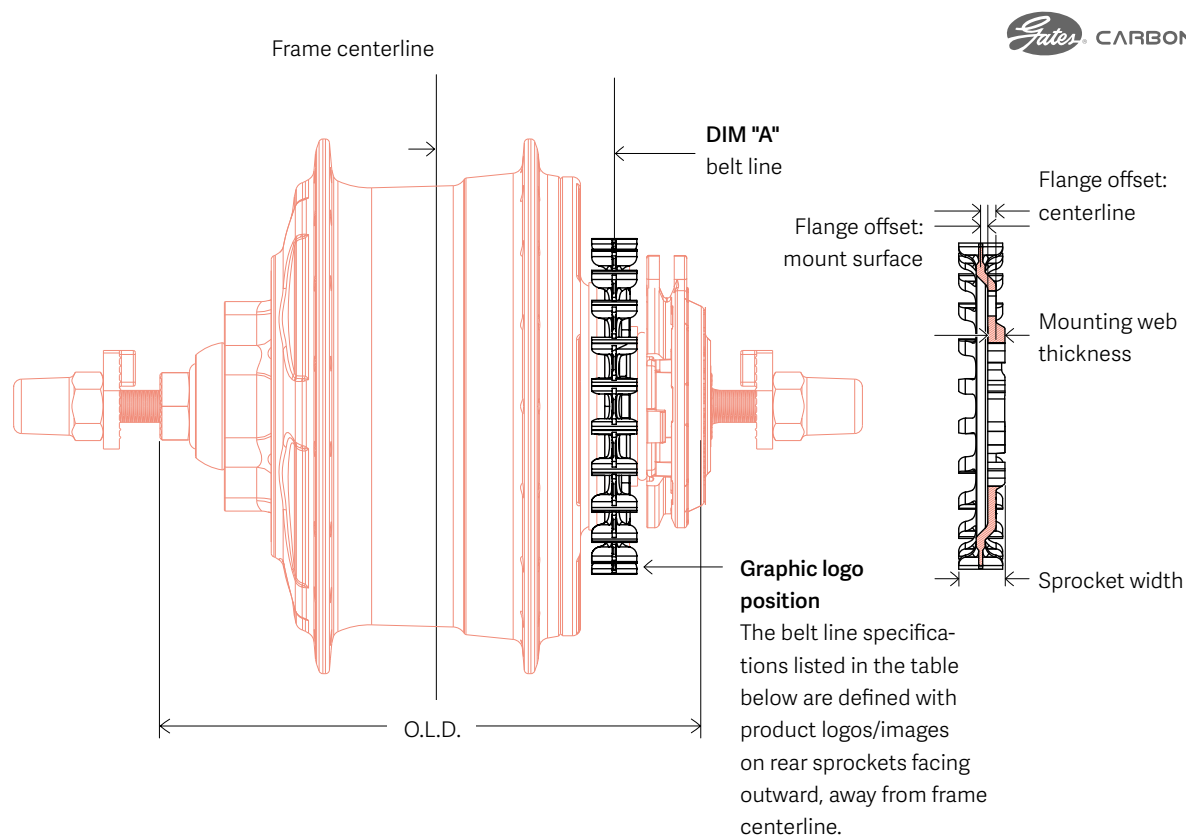


End-of-Line Testing

# Cooperation Partners



# Gates CDX Beltline Specifications



## Urban, City, Trekking, Heavy Duty, Extreme (135 mm solid axle)

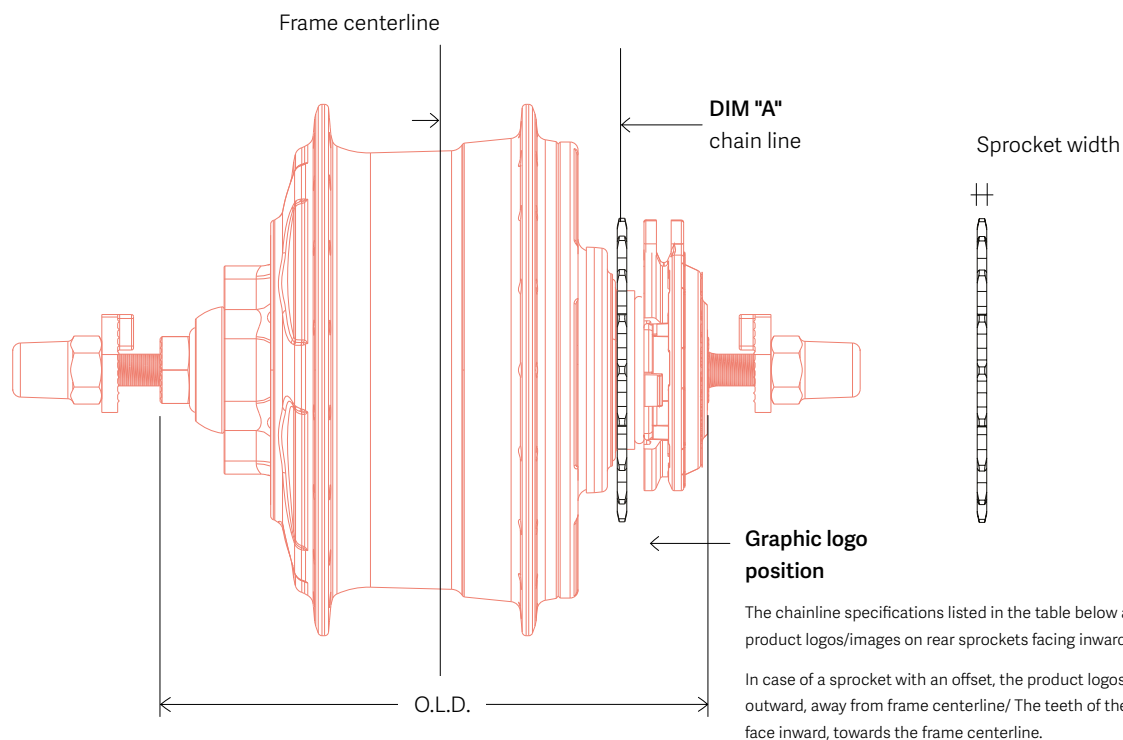
Teeth	DIM "A" belt line	Tooth outer diameter	Sprocket width	Mounting web thickness	Article number
22	45.5 mm	75.33 mm	11.6 mm	4.3 mm	CT1122VMN
24	45.5 mm	82.26 mm	11.6 mm	4.3 mm	CT1124VMN
26	45.5 mm	89.31 mm	11.6 mm	4.3 mm	CT1126VMN
28	45.5 mm	96.31 mm	11.6 mm	4.3 mm	CT1128VMN

## Heavy Duty, Extreme (148 modular mm)

22	48.7 mm	75.33 mm	11.6 mm	4.3 mm	CT1122VMN
24	48.7 mm	82.26 mm	11.6 mm	4.3 mm	CT1124VMN
26	48.7 mm	89.31 mm	11.6 mm	4.3 mm	CT1126VMN
28	48.7 mm	96.31 mm	11.6 mm	4.3 mm	CT1128VMN

# KMC Chainline Specifications

enviolo



## Urban, City, Trekking, Heavy Duty, Extreme

Teeth	DIM "A" chainline 135-142mm	DIM "A" chainline 148mm	Tooth outer Diam.	Sprocket width	Offset	Chain	KMC Article number
16	49 mm	52 mm	71.0 mm	2.2 mm	0 mm	1/2x3/32"	SRN50016
17	49 mm	52 mm	75.0 mm	2.2 mm	0 mm	1/2x3/32"	SRN50017
18	49 mm	52 mm	79.4 mm	2.2 mm	0 mm	1/2x3/32"	SRN50018
19	49 mm	52 mm	82.0 mm	2.2 mm	0 mm	1/2x3/32"	SRN50019
20	49 mm	52 mm	87.0 mm	2.2 mm	0 mm	1/2x3/32"	SRN50020
20	46 mm	52 mm	87.0 mm	2.2 mm	3 mm	1/2x3/32"	SRN51020*
21	49 mm	52 mm	91.0 mm	2.2 mm	0 mm	1/2x3/32"	SRN50021
22	49 mm	52 mm	95.0 mm	2.2 mm	0 mm	1/2x3/32"	SRN50022
17	49 mm	52 mm	75.0 mm	3.0 mm	0 mm	1/2x1/8"	SRN51817**
18	49 mm	52 mm	79.4 mm	3.0 mm	0 mm	1/2x1/8"	SRN51818
19	49 mm	52 mm	82.0 mm	3.0 mm	0 mm	1/2x1/8"	SRN51819
20	49 mm	52 mm	87.0 mm	3.0 mm	0 mm	1/2x1/8"	SRN51820
20	46 mm	52 mm	87.0 mm	3.0 mm	3 mm	1/2x1/8"	SRN50N20*
21	49 mm	52 mm	91.0 mm	3.0 mm	0 mm	1/2x1/8"	SRN50021
22	49 mm	52 mm	95.0 mm	3.0 mm	0 mm	1/2x1/8"	SRN51822

\* Sprockets with offset only on special request  
 \*\* SRN51817: only for KMC e101 and X101 chains.

**Note 1**  
 If you are using the 16T sprocket, please make sure to use 1mm spacers on each side of the sprocket.

**Note 2**  
 Wide sprockets for 1/2x1/8" chains require a thinner spacer. Spacers of 1.2 mm are available from KMC, Art. No. SRNRING12.

# Compatible Chain Cases



350R N16



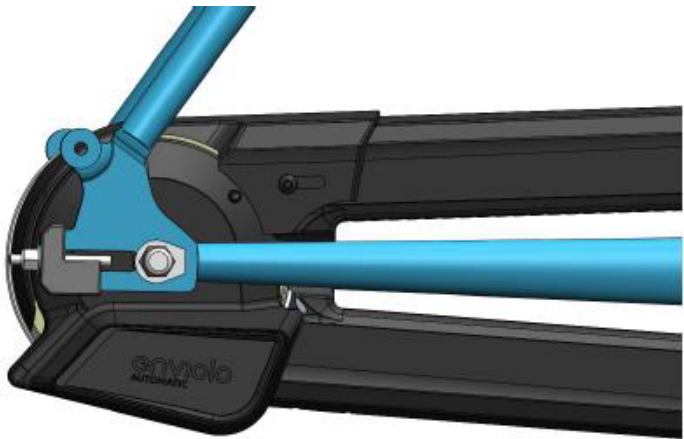
350R NV16

Chainglider

Compatible systems	Front part	Rear part	Chainstay length	Compatible sprocket size
Manual	350F 38 / 42 / 44 / 48	350R NV16	445 - 475mm	16 - 22
Manual	350F 38L / 42L / 44L / 48L	350R NV16	530 mm	16 - 22

\* AUTOMATiQ option in evaluation.

Hesling®  
bike parts



## Finura

### Compatible systems

Manual and AUTOMATiQ

### Chainstay length

450 - 490 mm

### Compatible front sprocket size

38

### Compatible rear sprocket size

18 - 22

# Compatible Bicycle Trailers

# Bike Trailer Adapters for Urban, City, Trekking, Heavy Duty, Extreme

enviolo

**BURLEY®**

**Trailer**

**Adapter**

Minnow, Bee,  
Honey Bee,  
Encore, Solo,  
Cub, D'Lite,  
Nomad, Flatbed,  
Tail Wagon



Art. No. 960038

**CROOZER®**  
The bicycle trailer

**Trailer**

**Adapter**

Croozer Kid  
Croozer Kid Plus  
Croozer Cargo  
Croozer Dog



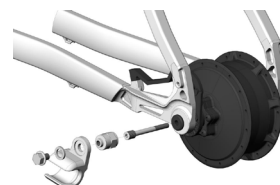
Art. No. 122003516



XL: + 10 mm  
Art. No. 122003716



Art. No. 122000715



Croozer axle nut adapter  
with Thule coupling

**THULE®**  
SWEDEN

**Trailer**

**Adapter**

Thule Chariot Lite  
Thule Chariot Cab  
Thule Chariot Cross  
Thule Chariot Sport  
Thule Coaster XT



Art. No. 20100798

Use of third party adapters has not been tested by enviolo and therefore we cannot guarantee their performance or safety and hereby disclaim any liability resulting from their use. Please carefully follow all installation instructions provided by third party product producers for the installation and maintenance of such products.

# Certificates & Declarations



## TEST REPORT

<b>Test:</b>	European Bicycle Standards (Rear Hub Durability and Strength Criteria)
<b>Test Articles:</b>	CVP's: enviolo CITY, enviolo TREKKING, enviolo HEAVY DUTY Shifters: enviolo Twist Pure, enviolo Twist Pro
<b>Date:</b>	30 JUN 2021
<b>Reference:</b>	ISO 4210:2014(E) which supersedes: <ul style="list-style-type: none"><li>• EN 14764:2005</li><li>• EN 14766:2005</li><li>• CEN/TC 333 N.96:2002</li><li>• DIN 79100-2:1999</li></ul> ISO 8098:2014(E), US CPSC 16 CFR Part 1512
<b>Test Method:</b>	Reference standard tests specific to rear hub durability and strength criteria
<b>Test Location:</b>	enviolo Inc., Leander, TX
<b>Test Results:</b>	

The enviolo CITY, enviolo TREKKING, and enviolo HEAVY DUTY are tested to industry standards for internal hubs, as well as proprietary additional tests specific to enviolo technology in use with traditional, as well as electric-assist bicycles (eBikes or pedelecs) up to 250W (rated) power for the enviolo CITY, and enviolo TREKKING and up to 500W (rated) power for the enviolo HEAVY DUTY. Specifically, the enviolo CITY, enviolo TREKKING, and enviolo HEAVY DUTY meet rear hub durability and strength criteria for bicycle standard ISO 4210:2014(E) and ISO 8098:2014(E). The enviolo TWIST Pure and Twist Pro shifters comply with requirements set forth in ISO 4210:2014(E) and ISO 8098:2014(E). In addition, the enviolo CITY, enviolo TREKKING, and enviolo HEAVY DUTY hubs and enviolo TWIST Pure, and enviolo TWIST Pro shifters meet US CPSC 16 CFR Part 1512.

Proprietary enviolo Inc. testing that exceeds industry standards include:

- Durability (simulating 20,000 km of use at extreme conditions)
- Dynamic Shift Test
- Canted Wheel Bump Fatigue Test
- Coasting Fatigue Test
- Drop Test / Accelerated Impact
- Hub Shell and Cover Axial Fatigue Test
- Hub Shell spoke Flange Fatigue and Ultimate Tests
- Brake Fatigue Test
- Shifter System Durability Test (Manual and AutomatiQ)
- Corrosion Resistance Test
- Weatherability / UV Test
- Environmental Intrusion Test
- Ride Audit Test (including cold weather testing)
- Mileage Accumulation Testing
- End of Line Efficiency, Ratio Range, and Leak Test

## CERTIFICATE OF COMPLIANCE – RoHS DECLARATION

12/05/17

Fallbrook Technologies certifies product compliance to the European Union Directive 2011/65/EU on the Restriction of the use of certain Hazardous Substances in electrical and electronic equipment (RoHS).

All enviolo automatic brand system components comply with the stated substances and maximum concentration values tolerated by weight in homogeneous materials.

- Lead (0,1 %)
- Mercury (0,1 %)
- Cadmium (0,01 %)
- Hexavalent chromium (0,1 %)
- Polybrominated biphenyls (PBB) (0,1 %)
- Polybrominated diphenyl ethers (PBDE) (0,1 %)

Fallbrook Technologies relies on its supply chain partners to ensure daily compliance.

Signed for on behalf of enviolo:



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VP of Operations

## DECLARATION OF CONFORMITY

**Manufacturer:**

enviolo  
Vijzelstraat 68-72  
1017 HL Amsterdam

**Authorized representative:**

Peter Kreuder  
enviolo  
Director of Product Management  
Vijzelstraat 68-72  
1017 HL Amsterdam

**Product name:**

enviolo AUTOMATiQ shifting system with belt drive compatibility. The enviolo AUTOMATiQ shifting system with belt drive compatibility consists of the following components:

(1) enviolo AUTOMATiQ Hub Interface ("AHI-CT/AHI-CO/AHI-TR/AHI-CA/AHI/SP"), (2) enviolo AUTOMATiQ "i" Harness, and (3) may include 3-button controller ("ARC"). A picture of the enviolo AUTOMATiQ Shifting System is attached as Exhibit A.

The object of declaration described above is in conformity with Directive 2004/108/EC of the European Parliament and the Council of 15 December 2004 on the approximation of the laws of the Member States relating to electromagnetic compatibility.

**Testing Body:**

DEKRA Certification B.V.  
Meander 1051  
6825 MJ Arnhem  
Company registration: 09085396  
Date of Conformity: 1 September 2019

This declaration is issued under the sole responsibility of the Manufacturer and is signed by its Authorized Representative described above.

Signed for on behalf of enviolo:



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Peter Kreuder  
Director of Product Management



Exhibit A

## REACH (REGULATION, EVALUATION, AND AUTHORIZATION OF CHEMICALS) DECLARATION

**Address:** 505 Cypress Creek Rd, Suite L  
Cedar Park, TX 78613

**Effective Date:** October 20, 2015

### **Supplier Declaration for Articles Provided:**

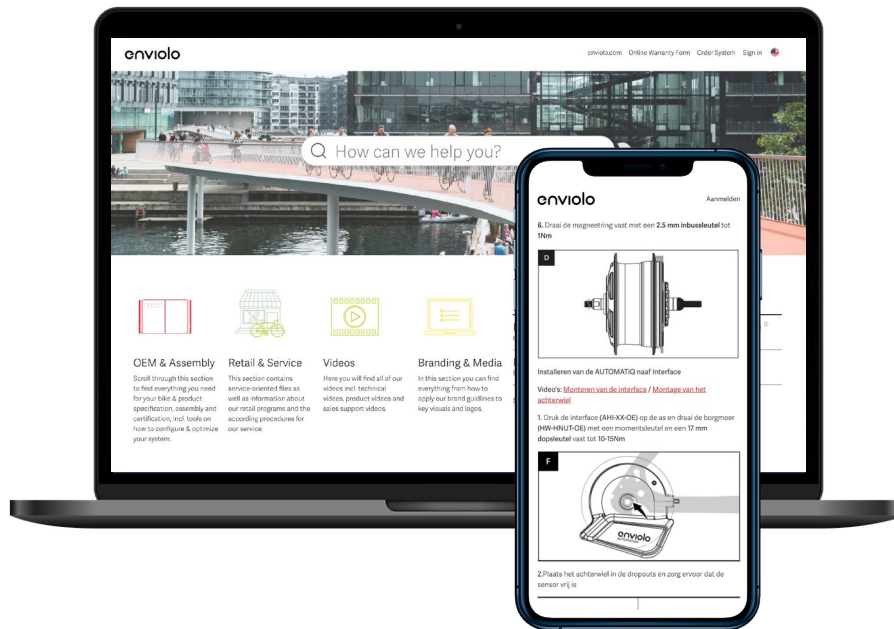
We declare that this information is true and complete to the best of our knowledge and that the articles we provide are compliant with restrictions on substances listed in Annex XVII of REACH regulations (15.06.2015). As a Non-EU company, we do not have a direct REACH obligation but we do verify compliance with Annex XVII to allow our customers to fulfill their REACH obligations. Fallbrook Technologies does not manufacture “substances” or “preparations” nor do we provide articles that involve the “intentional release of substances” per the definitions in Regulation (EC) No 1907/2006 – REACH.

Signed for on behalf of enviolo:

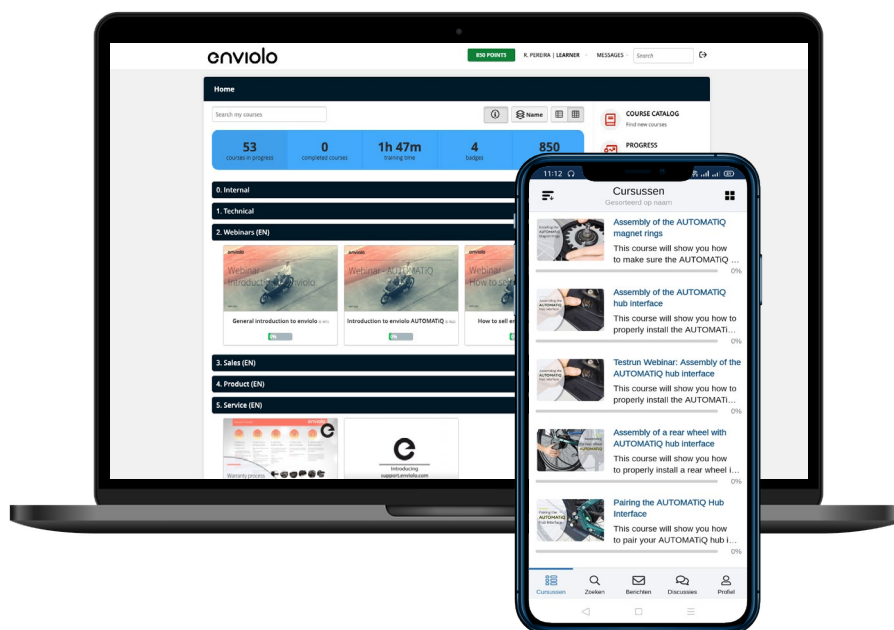


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Chief Legal Officer, Fallbrook Technologies



[support.enviolo.com](https://support.enviolo.com)



[university.enviolo.com](https://university.enviolo.com)

## Intellectual Property Notice

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