

OEM GUIDELINE

FOR GEARBOXES OF C-LINE AND P-LINE

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PART 2 – PRODUCTION

PART 3 – PERIPHERAL COMPONENTS

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Please note that you not only endanger the health of the rider or fitter, but also your liability claims for material defects if you do not work in accordance with our current OEM guideline!

The OEM guideline is intended to support developers, designers and manufacturers of an OEM company (original equipment manufacturer) in manufacturing a bicycle frame that is suitable for the integration of a Pinion gearbox.

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SYMBOLS

INFO This instruction identifies particularly important information and gives you additional messages or tips.

→ The arrow shows you results, requirements or prerequisites or how you can avoid a dangerous circumstance.

C-Line Instructions marked in this way refer exclusively to the corresponding gearbox line or to the gearbox type.



The camera draws your attention to a Pinion video on the topic at <https://pinion.eu/service-videos/>.



The book draws your attention to an article in one of the current Pinion owner's manuals that matches the topic. Corresponding contributions must be observed!

Warning instructions

WARNING This instruction warns of a hazardous situation, which if not avoided can result in death or serious injury.

→ ... and shows you how to avoid it.

CAUTION This instruction warns of a hazardous situation, which if not avoided can result in minor or moderate injury.

→ ... and shows you how to avoid it.

NOTICE / **NOTICE – ENVIRONMENT** This instruction warns of potential material or environmental damage.

→ ... and shows you how to avoid it.

OEM GUIDELINE

FOR GEARBOXES OF C-LINE AND P-LINE

PART 1 – DESIGN

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INFO In "Part 1 – Design" of the OEM guideline we explain the different materials for bicycle frame construction in combination with the Pinion gearbox and their possible interaction.

We then specify the requirements for the bicycle frame construction which you must comply with in order to guarantee the perfect functioning of the Pinion gearbox.

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MATERIAL

Steel, aluminium, carbon and titanium are generally used in bicycle frame construction.

On a bicycle there are often material pairings which can have different interactions with one another.

Sensitive material pairings can lead to contact corrosion, which can result in component failure.

To prevent this, care must be taken during the design of the bicycle frame to avoid contact corrosion.

P-Line The gearbox housing is made of a high-strength aluminium alloy. The geometry of the housing lid is elaborately milled from an aluminium block. The surface is colour-anodised, offers excellent properties and requires no further corrosion prevention.

C-Line The gearbox housing is made of a light, high-strength magnesium alloy and is manufactured in cooperation with one of the most renowned German suppliers of magnesium die-cast parts.

Magnesium alloys are used in the automotive industry or in toolmaking, where they have to withstand the most adverse conditions.

In order to maintain this resistance and to avoid contact corrosion, the material properties of the components in direct contact with the magnesium alloy (gearbox retaining screws, gearbox interface (bridge), etc.) must be carefully matched to the properties of the magnesium alloy.

In addition, care must be taken to ensure that no permanent moisture can form between the gearbox and the gearbox interface (bridge), since it will act as an ion bridge.

If the gap between the gearbox and the gearbox interface is too small, water will be held there due to the adhesive force.

NOTICE **C-Line** **Contact corrosion on the gearbox housing due to the use of critical materials on components in direct contact.**

- Never use any type of uncoated steels.
- Always use materials which do not have critical properties:
 - Aluminium.
 - Carbon.
 - Titanium.
 - Powder coatings without metal content.
 - Varnishes.
 - Plastics.
- Always make the gap dimensions between gearbox and gearbox interface (bridge) or add-ons sufficiently large.

A definitive statement about which material pairings have a tendency to contact corrosion and which do not is only possible after a salt spray test due to the variety of materials and geometric influences (ion bridge)!

FRAME

The following points must be observed and adhered when developing and designing a bicycle frame which is to be suitable for integration of a Pinion gearbox:

- Take account of the mounting position – see **Mounting position**, page 9.
- The mounting surface for axial alignment of the gearbox in the gearbox interface is the left connection side (non-drive side).
- Take the necessary installation spaces into account and perform a collision test with gearbox and add-ons (e.g. tyres – see **Tyre clearance**, page 9).
- Make sure there is easy access to the gearbox (change of oil, shifting cable, etc.).
- Take the different chain lines of P and C-Line gearboxes into account – see OEM CAD package and OEM guideline (Part 3 – Peripheral components).
- Take the different installation dimensions of the pinion rear hubs into account (135 mm, 142 mm, 148 mm (Boost)).
- Take the different chain ring sizes into account – see OEM guideline (Part 3 – Peripheral components).
- Make the rear triangle (chain/seat stays, dropouts/rear wheel mount) sufficiently stiff – see **Torsional stiffness**, page 10.
- Preferably design dropouts/rear wheel mount for thru axle – see OEM guideline (Part 3 – Peripheral components).
- Take the shifting cables into account – see **Add-ons**, page 11 – see OEM guideline (Part 3 – Peripheral components).

Mounting position

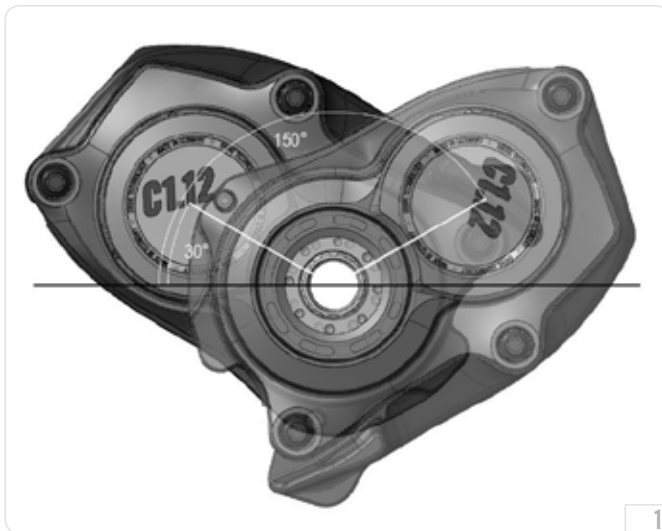
We prescribe an inclination angle between 30° and 150° to the horizontal for the positioning of the gearbox. (fig. 1)

The input shaft about which the gearbox is tilted and the vertical axis of the gearbox serve as reference axes.

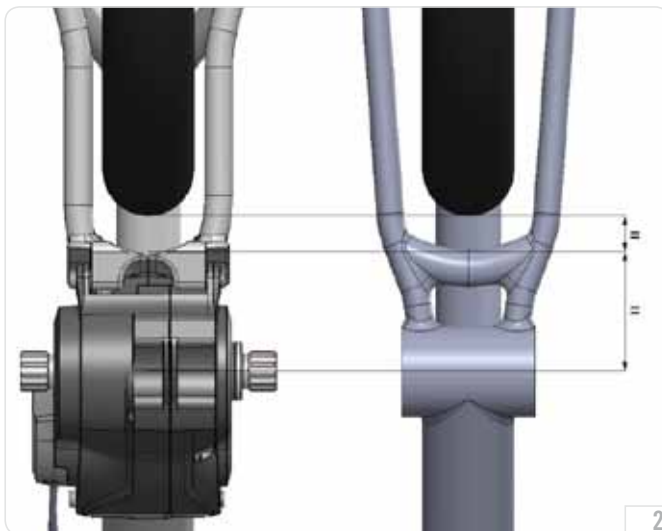
NOTICE Gearbox damage caused by dry running.

- Always comply with the prescribed tilt angle range.

INFO The screw points of the Pinion gearbox are configured symmetrically. The gearbox interface or bridge must be positioned centrally to the frame centre line so that the cranks and pedals will be positioned centrally.



1



2

Tyre clearance

The Pinion gearbox interface (bridge) is very stiff in the area of the chain stays; an additional cross strut between the chain stays can be dispensed with if they are designed with sufficient stiffness – see **Torsional stiffness**, page 10.

In addition, the chain stays are welded to the gearbox interface (bridge) at a greater distance from one another than with conventional bottom bracket housings.

This means that using the Pinion gearbox does not restrict the tyre clearance in the rear triangle of the bicycle frame – despite the larger outer diameter. (fig. 2)

Torsional stiffness

With the Pinion gearbox, higher chain forces are transmitted between the gearbox interface and the rear wheel mount in the low gears than with a derailleur or hub gearshift.

For this reason, the rear triangle of the bicycle frame must be sufficiently stiff not to twist too much. This is determined by the design of the chain stays and the rear wheel mount.

In addition, the dropouts must be sufficiently strong. We recommend the combination with adjusting screws. These are used to easily adjust the chain or belt tension and increase the stiffness of the rear triangle.

The Pinion gearbox interface (bridge) is very stiff in the area of the chain stays; an additional cross strut between the chain stays can be dispensed – see Tyre clearance, page 9).

⚠ WARNING Skipping/jumping of chain or toothed belt due to strongly twisting rear triangle because of insufficient stiffness or skewed running can cause an accident.

- Make the rear triangle (chain/seat stays, dropouts/rear wheel mount) sufficiently stiff.
- Ensure sufficient stiffness by testing on a suitable frame test rig.
- The minimum stiffness value is 55 N/mm.
- Ensure that the chain or toothed belt runs in a straight line.

NOTICE Noise and increased wear due to skewed running of chain or toothed belt.

- Ensure that the chain or toothed belt runs in a straight line.

The Pinion chain force calculator is available in the OEM CAD package for calculating the applied chain force – in the OEM portal at <https://pinion.eu/en/manufacturer-portal/>.

As a guide, refer to the following stiffness values which have been calculated on a Gates frame test rig with the system weight (rider plus luggage) of 110 kg:

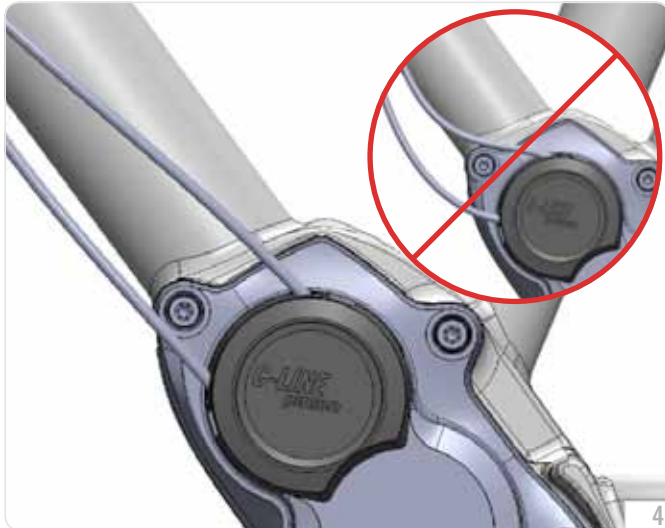
	X-direction [N/mm]	Y-direction [N/mm]
very good	60	330
adequate	55	260
inadequate	< 55	< 260

INFO The strength and stiffness of a bicycle frame which is to be suitable for the integration of a Pinion gearbox must be ensured by the frame manufacturer. This guideline does not replace verification on a suitable frame test rig.



The following companies offer the suitable testing of bicycle frames:

North and South America	Europe	Asia, Australia and New Zealand
Gates Carbon Drive 1551 Wewatta St Denver, CO 80202 Tel.: +303 744 4593 E-mail: marc.seemann@gates.com	Universal Transmission GmbH Walkmühlenstraße 194 D-99974 Mühlhausen Tel.: +49 3601 888 6484 E-mail: chris.h@carbondrive.net	Ken O'Rourke No. 6 Lane 105, Shiangshang North Rd. West District, Taichung City, Taiwan. 403 Tel.: +866 4 2301 6876 E-mail: keno@kor-design.com



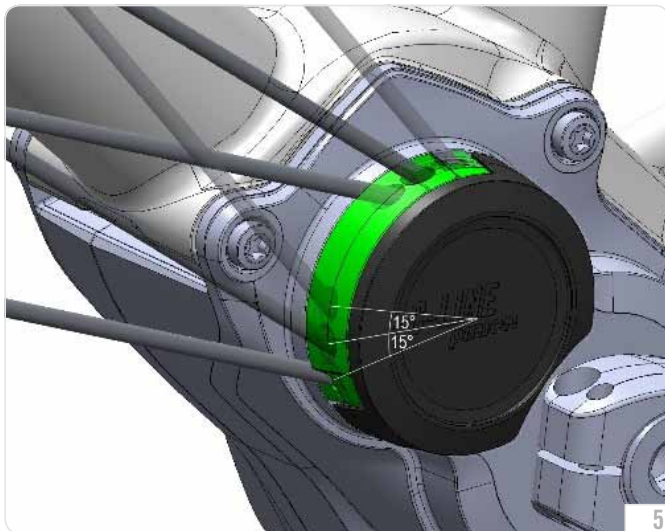
Add-ons

Cable guides, line holders

Cable guides or line holders must be attached to the bicycle frame in such a way that

- as few radii as possible have to be laid (fig. 4),
- harmonious radii can be laid (fig. 4),
- the steering angle is not affected,
- cables or lines cannot be affected or damaged by the steering angle,
- the compression of the fork or rear triangle is not impaired,
- cables or lines cannot be affected or damaged by the compression of the fork or rear triangle,
- cables or lines are not jammed,
- cables or lines cannot rub against the gearbox.

INFO – see Cable feedthrough between gearbox interface and gearbox, page 13.



C-Line The cable box can be fixed in 3 different positions on the gearbox. Depending on the mounting position and frame geometry, this allows almost direct control of the cable box. (fig. 5)

Screws

Exclusively use original Pinion screws to fasten the gearbox to the gearbox interface and for all other Pinion components (chain tensioner, cable box, rotary shifter, etc.).

Chain tensioner

Only the Pinion chain tensioner is allowed to be mounted on the chain tensioner socket of the gearbox housing.

WARNING Housing breakage due to overload can cause accidents.

- Never mount a bashguard or similar on the chain tensioner socket of the gearbox housing.

Genuine Pinion add-ons

We offer various add-ons (cranks, chain rings, rear and front hubs, etc.) in different dimensions and installation dimensions – see OEM guideline (Part 3 – Peripheral components).



GEARBOX CONNECTION

The gearbox connection is made using the gearbox interface or bridge. It forms the connecting component or the interface between the bicycle frame and the gearbox.

Pinion weld-in gearbox interfaces are available to developers and designers. Under certain conditions, an independent design is also permissible – see **Independent design of the gearbox interface**, page 14.

Basically, the gearbox interface must be provided by the developer or designer as a supporting element of the bicycle frame.

Frame elements (classic: down tube, seat tube, chain stays) must always be connected together via the gearbox interface.

The gearbox is not allowed to be a supporting element of the bicycle frame.

Fitting system for the gearbox interface



The width tolerance of the gearbox interface creates a defined assembly play. (fig. 6)

The Pinion gearbox is fixed to the gearbox interface with 6 M6 retaining screws. The power transfer takes place via all 6 retaining screws.

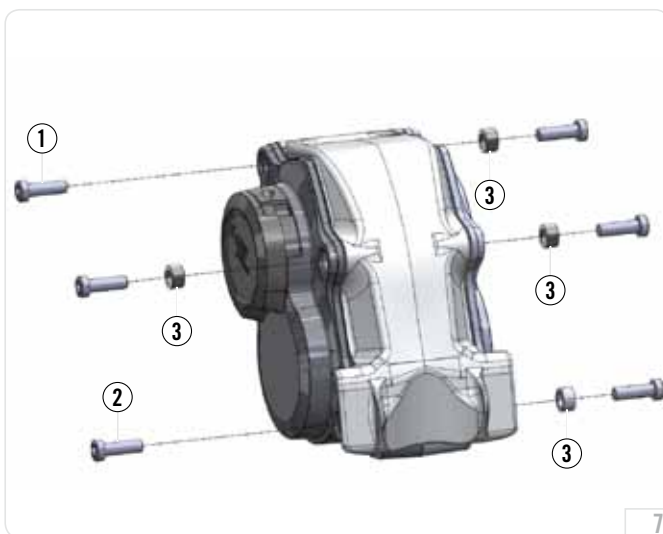
With the retaining screws (1) and (2) first mounted on the left side, the gearbox is aligned with the chain line (fixed screw points without key sleeves). (fig. 7)

4 screw connections are fitted with key sleeves (3) to compensate for production tolerances and weld delay (compensating screw points with key sleeves).

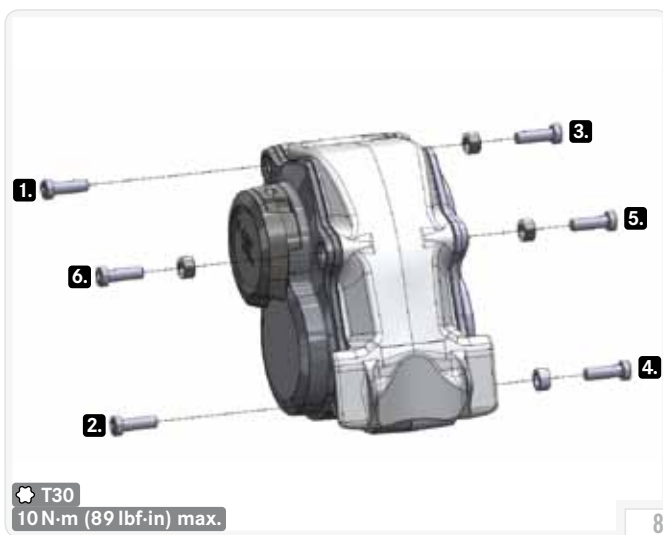
Tightening torques of the gearbox retaining screws: 10 N·m (89 lbf·in)

NOTICE Damage to the gearbox housing, malfunctions in the gearbox, leakage, oil loss – due to distortion.

- Always secure the gearbox with all 6 retaining screws.
- Always comply with the correct sequence when tightening the retaining screws. (fig. 8)
- Ensure stress-free installation of the gearbox.



INFO The four key sleeves (3) are pressed into the holes provided for this purpose in the side plates of the gearbox with a transition fit and can be moved in the hole by moderate pressing force. During assembly, the required force is applied by tightening the retaining screw to move the corresponding key sleeve into the correct position. By shifting the sleeve, production tolerances and weld delay can be compensated.



T30
10 N·m (89 lbf·in) max.

Pinion gearbox interfaces

The Pinion gearbox interface is optimised with reinforced wings as welding surfaces for the chain stays for stiff bicycle frames.

When used in a fully suspended frame, these wings may interfere with the positioning of the pivot or the chain stays and they are allowed to be reworked taking into account the strength requirements.

The Pinion gearbox interface (bridge) is very stiff in the area of the chain stays; an additional cross strut between the chain stays can be dispensed with if they are designed with sufficiently stiffness – see **Tyre clearance**, page 9), – see **Torsional stiffness**, page 10.

The Pinion gearbox interface meets or exceeds the strength requirements of DIN EN ISO 4210 "Cycles - Safety requirements for bicycles".

Item no.	Designation	Version
P9001	Pinion gearbox interface for P-Line, C-Line	Weld-in part for frame construction for gearbox integration (P-Line, C-Line). Forged from EN-AW 6061.
P9002	Pinion gearbox interface for P-Line, C-Line	Weld-in part for frame construction for gearbox integration (P-Line, C-Line). Forged from EN-AW 7005.
P9003	Pinion gearbox interface for P-Line, C-Line	Weld-in part for frame construction for gearbox integration (P-Line, C-Line). Steel 4130 CrMo.

INFO If a different material is to be used for the frame construction, please contact the Pinion headquarters at <https://pinion.eu/kontakt/pinion-international/> or phone Technical Support on +49 711 217 491 500.

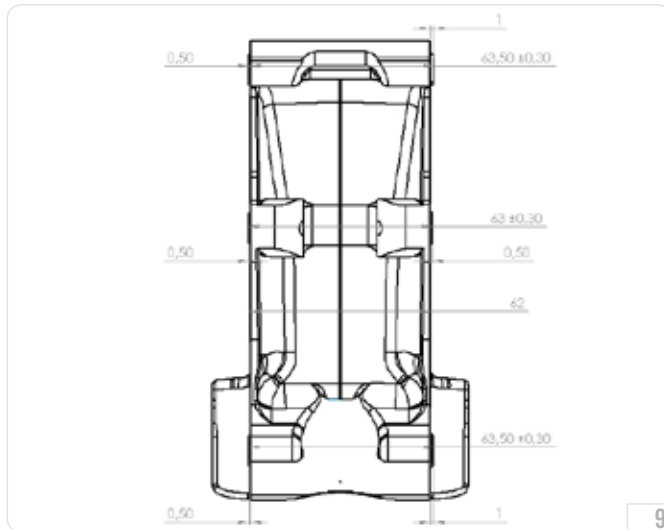
Cable feedthrough between gearbox interface and gearbox

INFO Cables are allowed to be laid between gearbox interface (bridge) and gearbox – depending on positioning and connection of the gearbox interface to the bicycle frame.

The Pinion gearbox interface is allowed to be reworked inside the frame tubes. For example, a hole in the down tube that extends to the inside of the weld has little influence on the stability and stiffness of the bicycle frame.

The larger the opening, the easier it is to install larger line diameters (e.g. brake line or motor cable) between the gearbox interface and gearbox.

C-Line On the non-drive side, there are recesses on the housing which facilitate the feed-through.



Independent design of the gearbox interface

Gearbox interfaces made of a metal material are welded in, soldered in or laminated in – see **MATERIAL**, page 8.

In the case of a gearbox interface made of composite materials, special attention must be paid to the durability and stability requirements for the screw points.

The gearbox interface is not allowed to be designed as a supporting element of the bicycle frame. The bicycle frame must be self-supporting together with the gearbox interface. Frame elements (classic: down tube, seat tube, chain stays) must be connected together via the gearbox interface.

The gearbox is not allowed to be a supporting element of the bicycle frame!

The gearbox is not allowed to abut with the inside of the gearbox interface – minimum distance 1 mm. If necessary, take the subsequent paint coating into account.

The gearbox interface must be designed with sufficient stability and torsional stiffness to absorb torsional forces between frame elements. Under no circumstances are these torsional forces allowed to be transmitted to the gearbox.

The gearbox interface must be designed with sufficient stability and torsional stiffness to absorb forces acting axially in relation to the retaining screws. The gearbox can only absorb forces that act radially to the retaining screws.

The screw points for fixing the gearbox must be connected to one another by a direct connection as short as possible so that the gearbox cannot become a supporting element of the bicycle frame.

All 6 screw points must be included – see **Fitting system for the gearbox interface**, page 12.

Pedal forces are transmitted from the crank into the gearbox. The gearbox housing conducts these as reaction forces into the gearbox interface. The gearbox interface must be designed in such a way that these forces are distributed as evenly as possible over all screw points.

In summary:

- Take account of reaction forces.
- Take account of increased chain forces.
- Carry out a collision test.
- Comply with the chain line exactly.
- Screw points:
 - Pay attention to tolerances. (fig.9)
 - Provide the 2 fixed screw points (without key sleeves) as an elevation opposite the gearbox interface – height 1 mm, \varnothing min. 11.3 mm.
 - Provide the 4 fixed screw points (without key sleeves) as an elevation opposite the gearbox interface – height 0.5 mm, \varnothing min. 11.3 mm.
 - Observe the minimum diameter of the screw-on surfaces.
 - Make screw-on surfaces plane-parallel.
 - Never use threaded inserts or screw sleeves.

NOTICE Damage to the gearbox housing, malfunctions in the gearbox, leakage, oil loss – due to distortion.

- Always secure the gearbox with all 6 retaining screws.
- Always comply with the correct sequence when tightening the retaining screws. (fig.8)
- Ensure stress-free installation of the gearbox.
- Design the gearbox interface to be sufficiently stable and torsionally stiff.
- Carefully design the screw points according to the specifications.

INFO The housing volumes of the P and C-Line gearboxes differ in the area of the gearbox interface. When designing your own gearbox interface, it is essential that you use the current OEM CAD package – in the OEM portal at <https://pinion.eu/en/manufacturer-portal/>.

As far as possible, we recommend that you design your own gearbox interface to fit both gearbox lines. The universal installation space is defined within the OEM CAD package.

INFO The prescribed tolerances for the design of the gearbox interface are available in the OEM CAD package – in the OEM portal at <https://pinion.eu/en/manufacturer-portal/>. (fig.9)

The generally applicable technical rules and standards for bicycle construction apply (e.g. DIN EN ISO 4210 "Cycles - Safety requirements for bicycles"). Moreover, take account of the increased chain forces. The Pinion chain force calculator is available in the OEM CAD package for calculating the applied chain force – in the OEM portal at <https://pinion.eu/en/manufacturer-portal/>.

OEM GUIDELINE

FOR GEARBOXES OF C-LINE AND P-LINE

PART 2 – PRODUCTION

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INFO In "Part 2 – Production", we explain the production process of a bicycle frame that is suitable for integrating a Pinion gearbox. We then specify the requirements for the appropriate surface treatments – the finish.


SYMBOLS

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NOTICE / **NOTICE – ENVIRONMENT** This instruction warns of potential material or environmental damage.

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INFO The gearbox connection is made using the gearbox interface or bridge. It forms the connecting component or the interface between the bicycle frame and the gearbox.
Pinion weld-in gearbox interfaces are available to developers and designers. Under certain conditions, an independent design is also permissible – see OEM guideline (Part 1 – Design, **GEARBOX CONNECTION**).

WELDING

In the conventional welding process, a bicycle frame which is suitable for integrating a Pinion gearbox, is produced on a welding table.

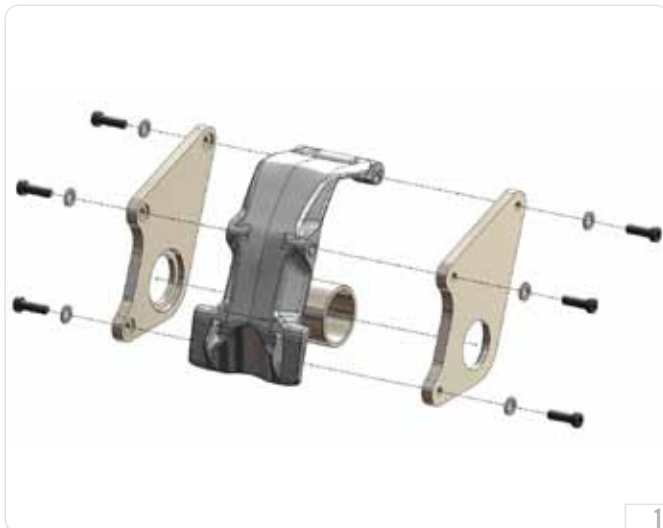
NOTICE **Damage to the gearbox connection (bridge) due to irreversible weld delay caused by high temperature.**

→ "Smooth Welding" welding procedures should only be performed by experienced welders.

The Pinion welding jig is available to facilitate welding. This enables stresses and weld delays to be reduced.

In addition, the welding jig serves as an alignment aid and fixation during tack-welding.

Item no.	Designation	Version
P9501	Pinion welding jig	Steel, burnished



The welding jig consists of two steel plates and a spacer sleeve. (fig. 1)
Before welding, the welding jig is fixed at all screw points of the gearbox interface with 6 M6 retaining screws.

- The middle plane of the gearbox interface is arranged symmetrically to the two steel plates of the welding jig.
- The holes in place of the bottom bracket shaft are used for mounting and alignment on the welding table.
- The spacer sleeve between the steel plates ensures that the welding jig will not distort when fixed on the welding table.

The welding jig is not removed during the entire welding process.

- The supporting effect has a positive effect on the usual weld delay.
- Compared to conventional bicycle frames, no additional effort is required during subsequent straightening.

Immediately after the welding process, the welding jig is removed and the correct alignment of the screw points is checked using a Pinion gearbox. Pinion assembly samples are available for this purpose:

Item no.	Designation	Version
P9508	Pinion assembly sample, P-Line	P-Line
P9509	Pinion assembly sample, C-Line	C-Line

NOTICE **Damage to the gearbox housing, malfunctions in the gearbox, leakage, oil loss – due to distortion.**

- Ensure stress-free installation of the gearbox.
- If necessary, straighten the bicycle frame immediately after welding.

Then the welding jig is fixed again with 6 M6 retaining screws at all screw points of the gearbox interface until the frame has completely cooled down.

We recommend leaving the welding jig in the bicycle frame even during the final heat treatment.

TOLERANCES

INFO The prescribed production and bearing tolerances are available in the OEM CAD package – in the OEM portal at <https://pinion.eu/en/manufacturer-portal/>.

We recommend that the screw points on the gearbox interface (bridge) of the finished bicycle frame should be set in exactly parallel or flush alignment by face milling.

Compare the tolerances of your bicycle frame with our prescribed production and bearing tolerances!

FINISH

The bicycle frame which is suitable for integrating a Pinion gearbox is allowed to be powder-coated, galvanically coated, anodised or painted as desired.

NOTICE **Damage to the gearbox housing, malfunctions in the gearbox, leakage, oil loss – due to distortion.**

- Ensure stress-free installation of the gearbox.
- Mask the screw points before painting.
- Face-mill screw points after powder coating or painting.



2

OEM GUIDELINE

FOR GEARBOXES OF C-LINE AND P-LINE

PART 3 – PERIPHERAL COMPONENTS

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APPLICATION NOTES

INFO We regularly update the various parts of our OEM guideline and make them available on the OEM portal at <https://pinion.eu/en/manufacturer-portal/>. Always work with the current OEM guideline – as indicated by the date in the footer of each page and in the name of the file. Please note that you not only endanger the health of the rider or fitter, but also your liability claims for material defects if you do not work in accordance with our current OEM guideline!

The OEM guideline is intended to support developers, designers and manufacturers of an OEM company (original equipment manufacturer) in manufacturing a bicycle frame that is suitable for the integration of a Pinion gearbox.

The OEM guideline represents an extension to and/or assistance for the generally valid standards and regulations according to the state of the art.

The contents of the OEM guideline are protected by copyright. Even a partial reproduction is only permitted if the source is cited.

In addition to the OEM guideline, the OEM CAD package and other OEM documents are also available to the developer, designer or manufacturer on the Pinion website in the OEM portal at <https://pinion.eu/en/manufacturer-portal/>.

Your access data to the OEM portal can be obtained from your sales contact at sales@pinion.eu.

It is prohibited to pass on the access data to the OEM portal, all OEM documents and OEM data to third parties.

If you have any questions regarding the OEM guideline, please contact the Pinion headquarters at <https://pinion.eu/kontakt/pinion-international/> or phone Technical Support on +49 711 217 491 500.


INFO In "Part 3 – Peripheral components" we explain the Pinion component programme which is optimally matched to the Pinion gearboxes. We then specify the requirements for third-party components and their own designs and provide important information on their use.


SYMBOLS

INFO This instruction identifies particularly important information and gives you additional messages or tips.

→ The arrow shows you results, requirements or prerequisites or how you can avoid a dangerous circumstance.

C-Line Instructions marked in this way refer exclusively to the corresponding gearbox line or to the gearbox type.

 The camera draws your attention to a Pinion video on the topic at <https://pinion.eu/service-videos/>.

 The book draws your attention to an article in one of the current Pinion owner's manuals that matches the topic. Corresponding contributions must be observed!

Warning instructions

WARNING This instruction warns of a hazardous situation, which if not avoided can result in death or serious injury.

→ ... and shows you how to avoid it.

CAUTION This instruction warns of a hazardous situation, which if not avoided can result in minor or moderate injury.

→ ... and shows you how to avoid it.

NOTICE / **NOTICE – ENVIRONMENT** This instruction warns of potential material or environmental damage.

→ ... and shows you how to avoid it.

All Pinion components are tested for safety, function and durability and also guarantee optimum compatibility with the Pinion gearbox.

⚠ WARNING Component failure can cause accidents.

- Never modify Pinion components.
- Always assemble and treat Pinion components in accordance with regulations.
- Always observe and follow the regulations and notes in the corresponding Pinion owner's manual.
- Only ever use approved third-party components.

CRANKS

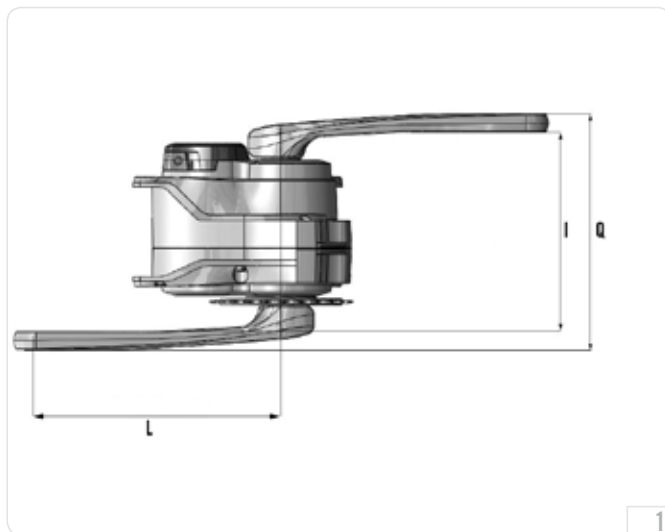


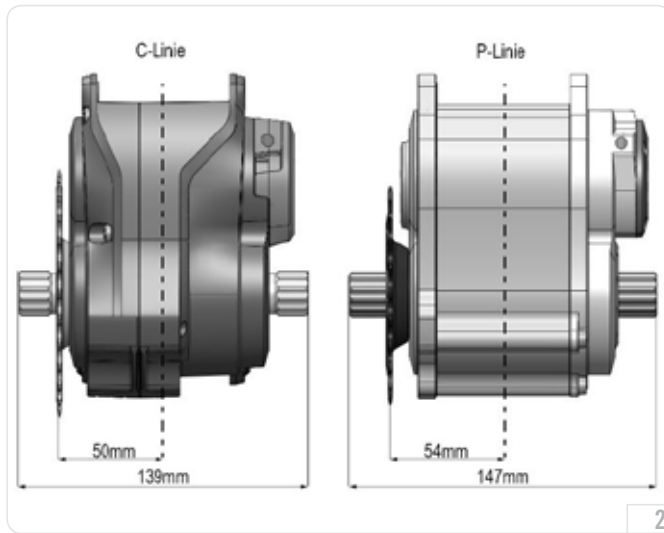
Only the original Pinion cranks are approved for use on the Pinion gearbox!

⚠ WARNING Unsuitable components can cause accidents.

- Make sure that there is no risk of collision between the crank and the bicycle frame.
- Always use only pedals with a contact surface diameter of 18 mm.

Item no.	Designation	Crank length L	Q-factor P-Line	I-factor P-Line	Q-factor C-Line	I-factor C-Line
P8500–P8505	Crank set CNC	155/160/165/170/175/180 mm	174 mm	149 mm	166 mm	141 mm
P8510/P8511	Crank set Forge	170/175 mm	174 mm	149 mm	166 mm	141 mm
P8530	Crank set CNC Fatbike	175 mm	214 mm	189 mm	206 mm	181 mm





CHAIN RINGS AND SPIDERS



With the Pinion chain rings with different numbers of teeth or the Pinion spider with a conventional single chain ring (from 32 T), the secondary ratio can be adapted to different requirements.

INFO The Pinion ratio calculator is available in the OEM CAD package for calculating the different developments and the resulting chain force which is applied – in the OEM portal at <https://pinion.eu/en/manufacturer-portal/>.

Gearbox chain rings

Item no.	Designation	Teeth [T]	Chain line P-Line	Chain line C-Line	Diameter
P8124	Chain ring gearbox ¹	24	54 mm	50 mm	105 mm
P8130		30	54 mm	50 mm	129 mm
P8130L	Chain ring gearbox longlife ²	30	54 mm	50 mm	129 mm
P8132	Belt sprocket gearbox	32	56 mm	52 mm	110 mm

¹ Chain with external width 6.6 – 6.8 mm (9-spline or Singlespeed)
² Chain with external width max. 8 mm

Spider gearbox

Conventional single chain rings can be mounted on the Pinion spider.

INFO The Pinion spider cannot be used in conjunction with the Pinion chain tensioner.

Item no.	Designation	Pitch circle ϕ	Chain line P-Line	Chain line C-Line
P8500	Spider gearbox	104 mm, 4-hole	54 mm + $\frac{1}{2}t$ ¹	52 mm + $\frac{1}{2}t$ ¹
P8105	Spider gearbox Fatbike	104 mm, 4-hole	64.5 mm - $\frac{1}{2}t$ ² 69 mm + $\frac{1}{2}t$ ³	60.5 mm - $\frac{1}{2}t$ ² 65 mm + $\frac{1}{2}t$ ³

¹ t = Thickness of chain ring
² Chain ring mounted internally
³ Chain ring mounted externally

Rear wheel chain rings/spiders

Conventional single chain rings can be mounted on the Pinion spider.

Item no.	Designation	Teeth [T]	External ϕ	Pitch circle ϕ	Universal spacer set
P8222	Chain ring rear wheel ¹	22	98 mm	–	P7958
P8224		24	105 mm		
P8226		26	112 mm		
P8230		30	129 mm		
P8226L		26	112 mm		
P8230L	Chain ring rear wheel longlife ²	30	129 mm		
P8200	Spider rear wheel	–	–	104 mm, 4-hole	P7954 ³ / P7955 ⁴
–	Belt sprocket rear wheel	see GATES Tech Manual	–	–	P7956 ³ / P7957 ⁴

¹ Chain with external width 6.6 – 6.8 mm (9-spline or Singlespeed)
² Chain with external width max. 8 mm
³ 9/10-spline freewheel
⁴ Singlespeed

CHAIN TENSIONER



INFO The Pinion chain tensioner is not compatible with the Pinion spider (gearbox) because the chain lines are different.

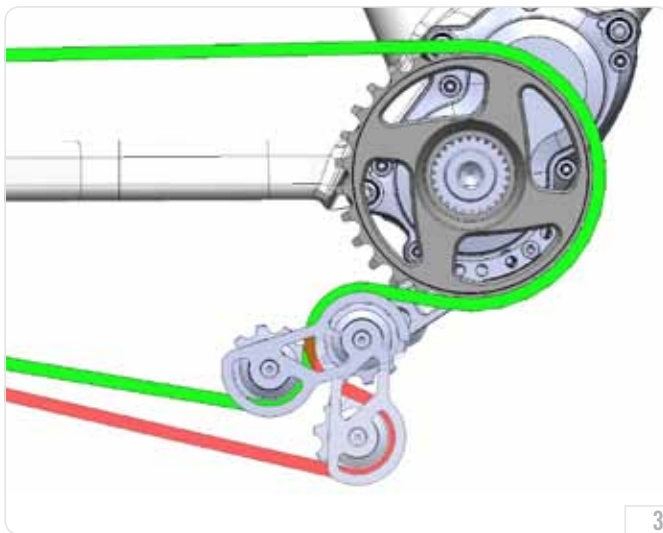
We recommend mounting the Pinion chain tensioner on bicycles that are not equipped with moveable dropouts:

- The correct chain tension remains guaranteed.
- Elongation of the chain due to wear is compensated.

With full-suspension bicycles, the Pinion chain tensioner is required – depending on the rear triangle:

- Differences in length due to compression/rebound are compensated.
- This prevents the chain from jumping off on rough ground.

Item no.	Designation	Max. capacity Chain ring	Max. capacity Chain elongation	Max. deflection
P8551	Chain tensioner KS1.2	31 teeth	130 mm	120°



WARNING If a chain tensioner fails because of improper use, it can cause an accident.

- Exclusively equip Pinion gearboxes with a Pinion chain tensioner.
- Mount Pinion chain tensioners exclusively on a Pinion gearbox.
- Make sure that there is no risk of collision between the chain tensioner and the bicycle frame or tyre.
- Ensure that the chain tensioner can fully exert its tensioning effect.
- In full-suspension bicycles, always check the chain length, freedom of movement and mobility of the chain tensioner with the rear triangle suspension fully compressed.

NOTICE **C-Line** Stainless steel screws will cause corrosion on the gearbox housing.

- Use original Pinion screws exclusively.

The chain tensioner can be installed in 3 positions, depending on the mounting position of the gearbox.

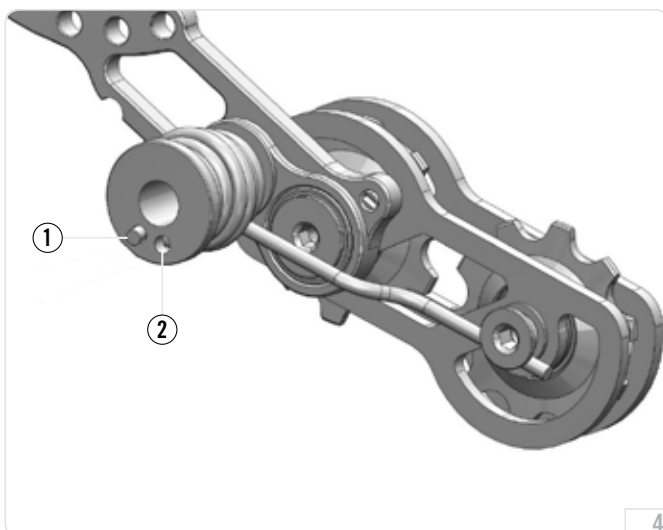
The chain has the correct length if the tension mechanism of the chain tensioner is pretensioned, but can still be moved upwards further.

When the rear triangle suspension is fully compressed, the chain tensioner should be as close as possible to the end stop.

- The chain is guided optimally and jumping off is prevented.

The chain tensioner has two possible positions (1)(2) for spring pre-tensioning. (fig. 4)

In the delivery condition, the maximum spring pre-tension is (1). This position is recommended for full-suspension bicycles.



ROTARY SHIFTER



The Pinion gearbox can only be operated with the corresponding Pinion rotary shifter.

When selecting the handlebar, stem and brake levers, make sure that the rotary shifter can be mounted and operated without any problems.

⚠ WARNING Incorrectly mounted handlebar can fail and cause an accident.

- Mount the rotary shifter only on handlebars with a diameter of 22.2 mm.
- Never mount the rotary shifter on racing bike handlebars (exception – see APPROVED COMPONENTS, page 29).
- Always follow the manufacturer's directions for carbon handlebars.
- Make sure that the clamping ring is present so that the clamp screws do not act directly on the handlebar surface.

Incorrect installation can restrict braking and steering and cause accidents.

- Make sure that the position of the rotary shifter does not interfere with the full range of operation of the brake lever blade.
- Make sure that the shifting cables do not interfere with the handlebar movement.

SHIFTING CABLES AND OUTER SLEEVES



Approved shifting cables:

- Ø 1.1–1.25 mm, end nipple 4.4×4.4 mm.

Approved shifting cable outer sleeves:

- Ø 4 mm, outer sleeve end caps Ø 5.8 mm, plastic.

NOTICE The shifting cables have a tendency to come unspliced on outer sleeve end caps made from metal.

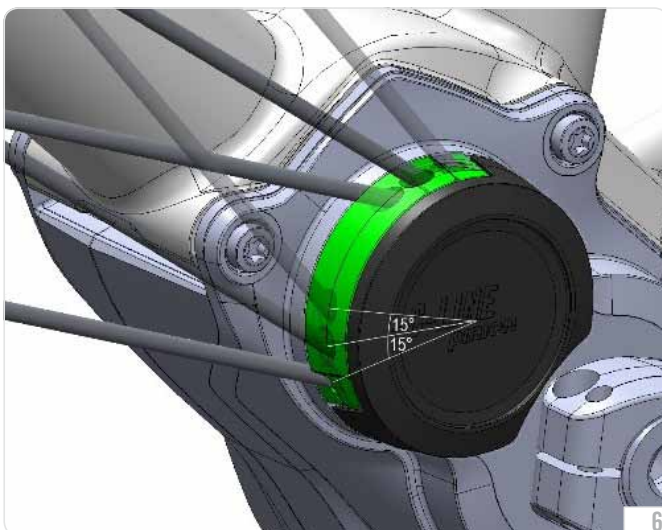
- Use outer sleeve end caps made from plastic (Ø 5.8 mm).

The shifting cables must be routed in such a way that

- as few radii as possible have to be laid (fig. 5),
- harmonious radii can be laid (fig. 5),
- the steering angle is not affected,
- cables or lines cannot be affected or damaged by the steering angle,
- the compression of the fork or rear triangle is not impaired,
- cables or lines cannot be affected or damaged by the compression of the fork or rear triangle,
- cables or lines are not jammed,
- cables or lines cannot rub against the gearbox.



Item no.	Designation	Length	Diameter	Nipple
P8957	Universal shifting cable set	1550 mm	1.1 mm	4.4×4.4 mm



C-Line The cable box can be fixed in 3 different positions on the gearbox. Depending on the mounting position and frame geometry, this allows almost direct control of the cable box. (fig. 6)

INFO Cable feedthrough between gearbox interface and gearbox.

Cables are allowed to be laid between gearbox interface (bridge) and gearbox – depending on positioning and connection of the gearbox interface to the bicycle frame.

The Pinion gearbox interface is allowed to be reworked inside the frame tubes. For example, a hole in the down tube that extends to the inside of the weld has little influence on the stability and stiffness of the bicycle frame.

The larger the opening, the easier it is to install larger line diameters (e.g. brake line or motor cable) between the gearbox interface and gearbox.

C-Line On the non-drive side, there are recesses on the housing which facilitate the feed-through.

HUBS

INFO With the Pinion gearbox, rear hubs with conventional Singlespeed 9-spline or 9/10-spline freewheel bodies can be used.

As increased chain forces act on the rear hub due to the gearbox, we recommend a freewheel body made of steel as well as designing the freewheel mechanism so it is able to transmit the force adequately and has fine gear teeth.

The Pinion chain force calculator is available in the OEM CAD package for calculating the applied chain force – in the OEM portal at <https://pinion.eu/en/manufacturer-portal/>.



Within the Pinion gearbox, the pawls function as a freewheel due to their design. To prevent the chain or belt from running along when freewheeling without crank movement (e.g. when riding downhill), an additional freewheel is required on the rear wheel.

Each freewheel has a certain idle travel until reaching power transfer.

The idle travels of the gearbox and rear wheel freewheels add up, which can be noticeable when starting to pedal. This effect is clearly noticeable with a coarsely toothed rear wheel freewheel (1). (fig. 7)

We therefore strongly recommend the use of a Pinion H2R rear hub (2) in combination with the Pinion gearbox.

WARNING Failure of fixing resulting in rear wheel slip can cause accidents.

- Ensure that the quick release skewers used apply at least 4000 N closing pressure.
- Preferably use a thru axle.

Rear hubs H2R

- Singlespeed hub.
- Wide spoke flange spacing for symmetrically spoked, particularly robust wheels.
- Extremely finely toothed freewheel (120 engagement points) with significantly reduced idle travel.
- Freewheel body made of steel.
- Optimised for combination with the Pinion gearbox.
- Approved for all applications.

Item no.	Designation	Number of spoke holes	Axle system	Installation dimension
P7540–P7543	H2R	32	135 mm × 10 mm quick release	135 mm
P7520–P7523	H2R	32	142 mm × 12 mm thru axle	142 mm
P7030	H2R Boost	32	148 mm × 12 mm thru axle	148 mm

Universal spacer set

The chain line or beltline at the rear hub is adjusted with the Pinion Universal spacer set.

Item no.	Designation	Freewheel body
P7958	Universal spacer set, Pinion chain ring from 2018 onward, Gates Carbon Drive™	9/10-spline, Singlespeed, Boost
P7954	Universal spacer set, Pinion spider	9/10-spline
P7955		Singlespeed
P7956	Universal spacer set, Gates Carbon Drive™	9/10-spline
P7957		Singlespeed

Front hubs H2F

Item no.	Designation	Number of spoke holes	Axle system	Installation dimension
P7510–P7512	H2F	32	100 mm × 9 mm quick release	100 mm
P7520–P7522	H2F	32	100 mm × 15 mm thru axle	100 mm

Currently there are components from third-party suppliers which are offered in combination with a Pinion gearbox. We do not classify all of them as suitable. The following lists of released and impermissible components must therefore be observed.

Using third-party peripheral components is always at your own risk.

We recommend that you coordinate the use of peripheral components with us in advance.

Using non-approved peripheral components will jeopardise your liability claims for material defects.

APPROVED COMPONENTS

The peripheral components listed below have been tested by us for perfect function and compatibility and are approved for installation in combination with a Pinion gearbox.

Component	Manufacturer – product	Remark
Handlebar	Van Nicolas – Divisible Drop	Divisible racing bike handlebar. Allows the use of the Pinion rotary shifter with a racing bike handlebar.
Shifting cable outer sleeve	Jagwire – LEX	Only use shifting cable outer sleeve with Ø 4 mm.
Shifting cables	Jagwire – SLS	Only use shifting cables Ø 1.1–1.25 mm and end nipples 4.4×4.4 mm.
Outer sleeve end caps	Jagwire	Only use outer sleeve end caps made from plastic (Ø 5.8 mm).
Pipes/angle pieces	90°-pipes – Jagwire	With PTFE-liner only.
Handlebar grips, grips	GP series, GS series, GA2 – Ergon	Short grips with or without internal clamping reduce safety and impair ergonomics.
Chains	X1 – Pinion/KMC	External width 6.7 mm
Chains longlife	X101 – Pinion/KMC	External width 8.0 mm
Toothed belt	Carbon Drive CDX – Gates	
Belt sprockets	Carbon Drive CDX/CDX SL – Gates	
Chain ring	–	Singlespeed or single chain ring with pitch circle Ø 104 mm, 4-hole
Chain ring screws	–	4.5 mm + t (chain ring thickness), external Ø 10 mm
Belt tensioner	GPI – Nicolai	Can only be used on a corresponding bicycle frame.
	Belt tensioner – Mi-Tech	
Belt/chain guard	Chainbar Gates – Hebie	

Lubricants	Manufacturer – product	Remark
Gearbox oil	All-season gearbox oil – pinion	P8900 (60 ml), P8902 (240 ml), P8901 (1000 ml)
Assembly paste	Carbon assembly paste – Dynamic	
Grease	–	Resin-free, soap-based grease (white).

NON-APPROVED COMPONENTS

The peripheral components listed below are not approved by us for installation in combination with a Pinion gearbox.

Components that are intended for mounting on the chain tensioner socket of the gearbox housing or on the screw points of the gearbox must be approved by us. We recommend that you coordinate the use of peripheral components with us in advance.

Using non-approved peripheral components will jeopardise your liability claims for material defects.

Component	Remark
Bashguard	The chain tensioner socket of the gearbox housing is only partially suitable for mounting a bashguard or an underride guard. Any bashguard or underride guard must be designed in such a way that the forces occurring cannot act on the gearbox housing.
Add-ons made of stainless steel	C-Line Add-ons made of uncoated steels of any kind are not allowed to be mounted – otherwise contact corrosion on the gearbox housing will result! This also applies to the stainless steel key sleeves of the P-Line used up to 2017.
Screws	Exclusively use original Pinion screws to fasten the gearbox to the gearbox interface and for all other Pinion components (chain tensioner, cable box, rotary shifter, etc.).
Rear hubs	Freewheels with a disc freewheel or fewer than 60 engagement points per revolution in conjunction with a Pinion gearbox generate a large idle travel when starting to pedal. Freewheels with a weak design cannot reliably transmit the increased chain forces and will quickly be damaged. – see HUBS , page 28
Fixed hubs	Using fixed hubs in combination with a Pinion gearbox is not permitted. To prevent the chain or belt from running along when freewheeling without crank movement (e.g. when riding downhill), an additional freewheel is required on the rear wheel.
Quick release skewer	A rear wheel quick release skewer with a closing pressure of less than 4000 N is not permitted.
Chain tensioner	Exclusively the Pinion chain tensioner is allowed to be used on a Pinion gearbox.
Flexible pipes	Using flexible shifting cable outputs increases the required shifting forces and is not permitted.