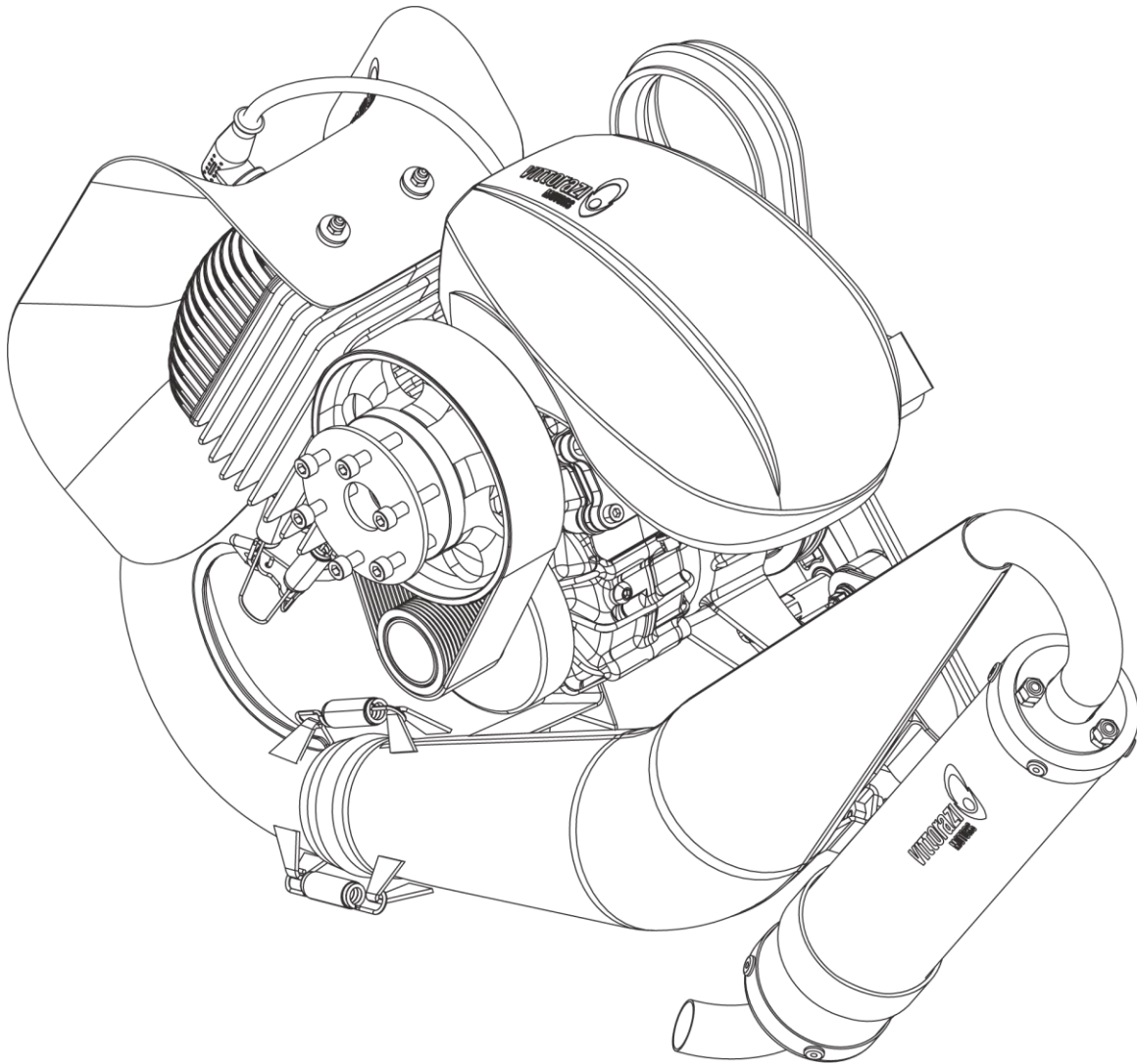


MOSTER 185 FACTORY R

Maintenance manual

release V1/2022

valid for MY20-MY22 versions



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1 Introduction

Congratulations and thanks for being a Vittorazi qualified professional.

This manual is intended as a point of reference for aircraft manufactures, dealers, professional people dealing with Vittorazi Motors. Please study this professional manual carefully before starting the maintenance activity. The purpose of this manual is to provide all the necessary information to the professional in order to allow a proper maintenance of the engine, carried out autonomously and in total security. The professional manual includes: technical descriptions of the maintenance phase and reference values.

All the components of Vittorazi Motors are checked and tested in a process of industrial quality control before the assembling. Then by sampling the complete motors are checked to assure the functionality of all the parts through a complete test of twenty minutes on the bench. Note that the reliability, performance and durability of the engine also strongly depend on the correct maintenance of which you are in charge.

In case you need further explanations, you can contact directly the headquarters of Vittorazi Motors. Please include in the request, the six-digit serial number that identifies the motor and a photo of the item in question.

Also take into account the availability of Illustrated Parts Catalogue (IPC), manual updates, service bulletins, FAQs, other documents in our official website. The video tutorials are available on the Vittorazi Motors official YouTube channel. Below the links.

IPC, manuals, bulletins, newsletter, warranties, FAQ

<https://www.vittorazi.com/en/services/>



Vittorazi Official YouTube channel: video and free tutorials available

<https://www.youtube.com/user/VITTORAZIMOTORS>



Reading tips:

Attention, danger, risk
Any situation or condition which may result in a serious danger



Recommendation, warning, important advice



2 Be careful! Read it completely



To fly in total safety, you must read the following recommendations:

- This engine is not certified. This engine does not fulfil airworthiness regulations. The products are dedicated to non-certified aircraft and flying as a recreational or sporting activity.
- Final-user must be aware that the engine can stop, break or shut down at any time. Such an event may require an immediate and forced landing in inadequate, congested or impervious areas, with the possibility in the end of causing the death of the pilot or other persons involved.
- The aircraft equipped with this engine must be conducted in full compliance with rules and regulations in force relating to the activity of leisure and sport aviation, with regard to the country in which the operations are carried out.
- Vittorazi Motors and its distributors decline any direct or indirect responsibility related to this kind of activity. By using a new engine, the owner agrees that these terms and conditions have been accepted at the time of purchase of the product.
- The engine is not covered by any liability insurance. The use of the engine automatically determines the assumption of all risks and personal liability for personal injury or damage to third parties resulting from the activity.
- Improper use of the products or improper technical service (in relation to the specifications contained in the user, installation and maintenance manual) will hold harmless the company from any liability for any damage due to the malfunctioning and immediately void the warranty of the product. So, do not use the motor if it has not been properly maintained or if it has not been used correctly over time.
- Vittorazi does not assume any responsibility for those engines that are used with parts that are not original, not approved, modified or that have suffered an improper use. Use of spare parts not original and not recognized by Vittorazi, can make the engine dangerous and will void the warranty.
- Unauthorized modifications to the motor, to the reduction, to the propeller can invalidate the warranty of the motor and can compromise the reliability of the aircraft and its safety. In case it is necessary to intervene, we invite you to contact an authorized dealer Vittorazi.
- Some geographical areas, due to particular weather conditions such as pressure, temperature and humidity can affect the performance of the engine. Before taking off, test the engine on the ground and make sure it does not behave abnormally.

- Always start the engine on a flat and clean surface, without stones or sand. During all phases in which the engine is kept running near the ground (such as heating, take off, landing) it is necessary to maintain a safe distance from the engine. A good safety distance is 100 meters in every direction.



The following engine speed limits must be respected to avoid engine failures, to keep the warranty valid and to have a correct maintenance scheduling according to the Vittorazi program:

- Do not keep the engine at full revs for more than 60 seconds.
- Do not keep revs higher than 7.000 RPM during long cruising flights or long climbs. The average power delivered by the engine during a flight should remain below the indicated threshold. Contact the aircraft manufacturer for further clarification.



The temperature limit of CHT is 220° Celsius. Do not persist above this temperature threshold, engine overheating and irreversible damage could occur.



The use of an EGT instrument is mandatory. Install the sensor in the prearranged position of the manifold (thread the hole according to the size of the sensor). The temperature limit of EGT is 650° Celsius. Do not persist above this temperature threshold, engine overheating and irreversible damage could occur.



The use of the head cooling shroud in combination with Vittorazi approved propellers is mandatory in this model to ensure performance and correct engine temperatures.

3 Maintenance

To ensure a safe, long-lasting product and to keep the warranty valid, the user must follow a maintenance schedule as outlined in the manuals and record the service work in the service booklet (available in the Warranty chapter of the user manual). An hour meter integrated in the aircraft is required, always working and well installed to the engine.

Any procedure of installation, maintenance and/or repair of the products must be carried out exclusively with the original Vittorazi Motors parts and tools specified by Vittorazi, in compliance with the specifications contained in the user, installation and/or maintenance manual of the products; to ensure maximum safety and performance of the products, the above-mentioned procedures will be carried out by mechanics with proven experience in the ultralight aviation or general aviation or with experience gained by Vittorazi Motors professional training courses. Failure to do so, will held harmless the company from any liability for any damage due to the malfunctioning and immediately void the warranty of the product.



Maintenance work must be carried out when the engine is cold.

3.1 Maintenance schedule

Refer to the following maintenance indicated time schedule to fly in total safety. Work on the engine is only allowed to be carried out by experienced mechanic and authorized dealers. These are prescribed checks at certain interval times to avoid engine problems through preventative maintenance.

Caption:



Cleaning



Check



Measuring






















Replacement




















Lubricate with WD-40

Note:











- 1) or after a year
- 2) rope, spring, hooks or a new pull starter system
- 3) springs
- 4) each time the component is disassembled
- 5) head, exhaust port, decompressor hole
- 6) tensioning

Flight hours	Before each flight	Every 10 h	Every 25 h	Every 50 h	Every 100 h	Every 150 h	Every 200 h
Pre-flight checklist							
Screws and nuts (tightening)							
Carburation from spark plug colour							
Spark plug							
Spark plug connector							
Carburettor							
Carburettor membranes					 1)		
Airbox Snaplock							
Airbox			 				
Airbox sponge and sleeve			 		 1)		
Reed valve petals							
Pull starter system					 2)		




The table follows in the next page

Flight hours	Before each flight	Every 10 h	Every 25 h	Every 50 h	Every 100 h	Every 150 h	Every 200 h
Kit exhaust bushing (1 st joint)							
Exhaust bushing (2 nd joint)				  3)			
Exhaust manifold with springs							
Soundproofing material silencer							
Silencer rubber						 1)	
Gaskets (cylinder, carburettor, reed valve, exhaust, silencer)				 4)			
Piston				 			
Piston roller bearing							
Head and cylinder				 5) 			

The table follows in the next page

Flight hours	Before each flight	Every 10 h	Every 25 h	Every 50 h	Every 100 h	Every 150 h	Every 200 h
O-ring head				 4)			
Rubber mountings (engine, exhaust)						 1)	
Oil seal carter case							
Crankshaft bearings							
Crankshaft							
Belt		 6)					
Reduction bearings							
Centrifugal clutch							
Clutch bell							

3.2 Spark plug

 Components to replace	Spark plug (ACC090).
 Special tools	Not required.
 Values	Distance between the spark plug electrodes: 0,7 mm (new spark plug) 0,9 mm (worn spark plug limit). Spark plug: 25 Nm.

3.2.1 Spark plug disassembly

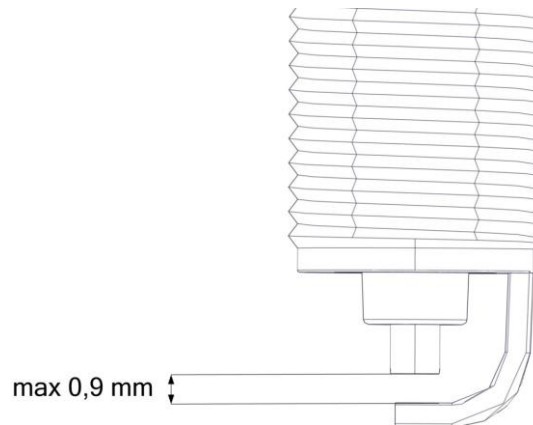
Disconnect the connector and unscrew the spark plug.

3.2.2 Spark plug maintenance

Check the colour of the spark plug: see user manual.

Use a feeler gauge to measure the distance between the spark plug electrodes.

Worn spark plug limit (mm)
0,9



If the distance between the electrodes is equal to or greater than the indicated limit or if scheduled maintenance is required, replace the spark plug.



The new spark plug for the engine must be of the same type and rating as the one to be replaced (NGK BR9EIX).

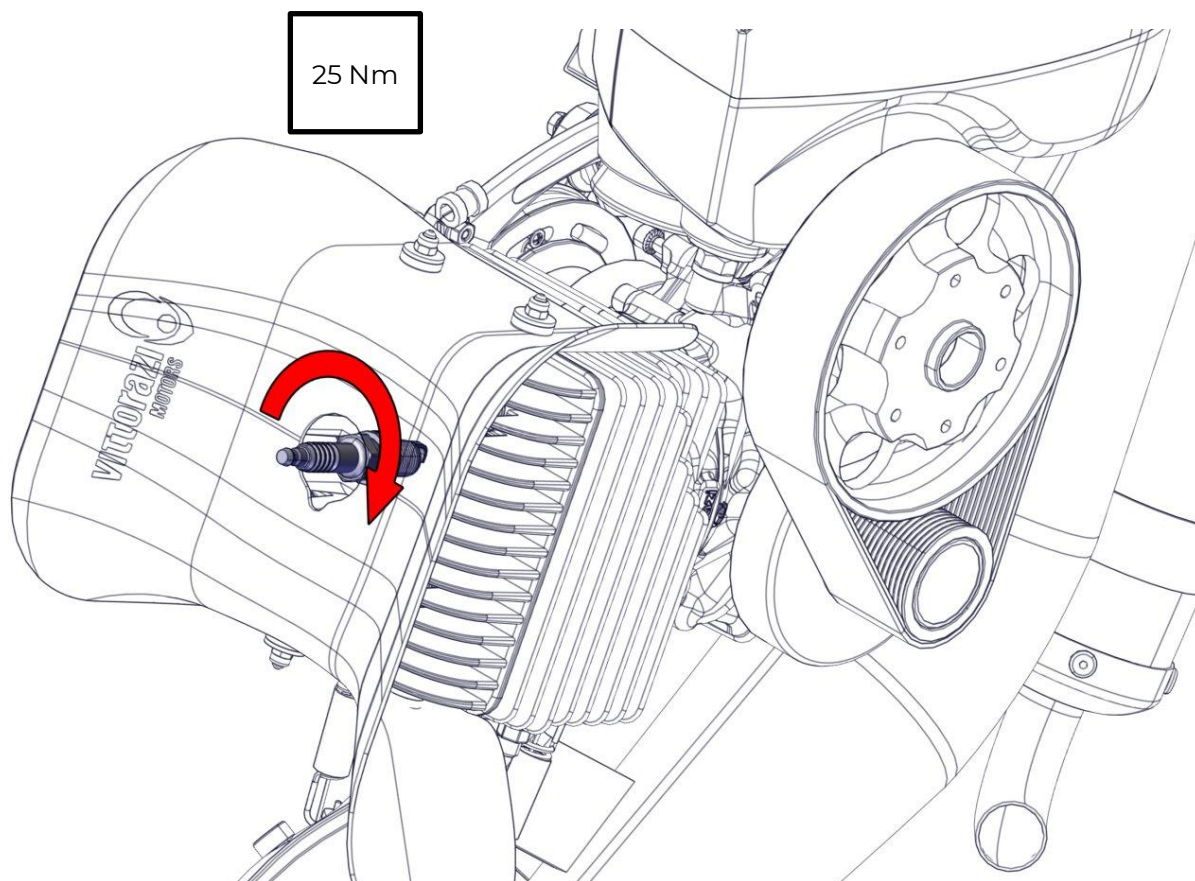
Check the connector: if it is damaged or the connection to the spark plug is not stable, replace it. Check the ignition cable: there must be no cuts or cracks, otherwise replace the ignition coil (including ignition cable).

3.2.3 Spark plug assembly






The distance between the electrodes of the new spark plug must be 0,7 mm, otherwise adjust.

Screw the spark plug into the head and tighten with the torque shown in the figure.

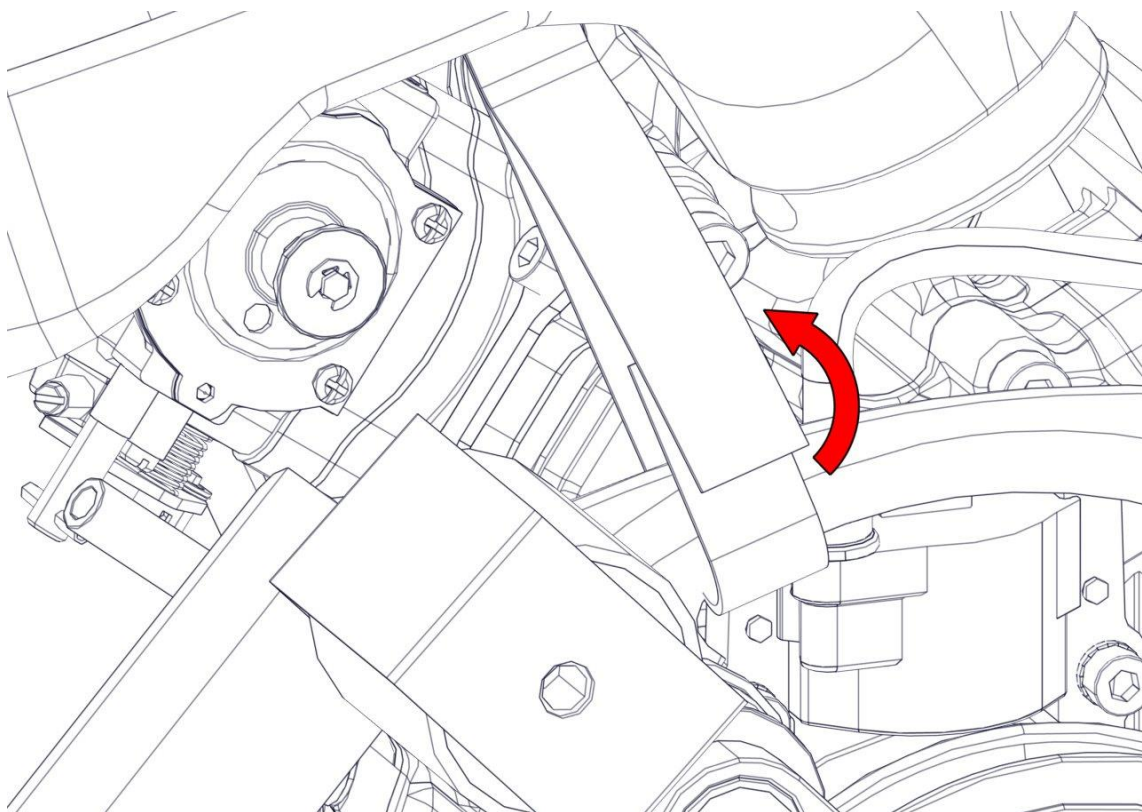


3.3 Airbox

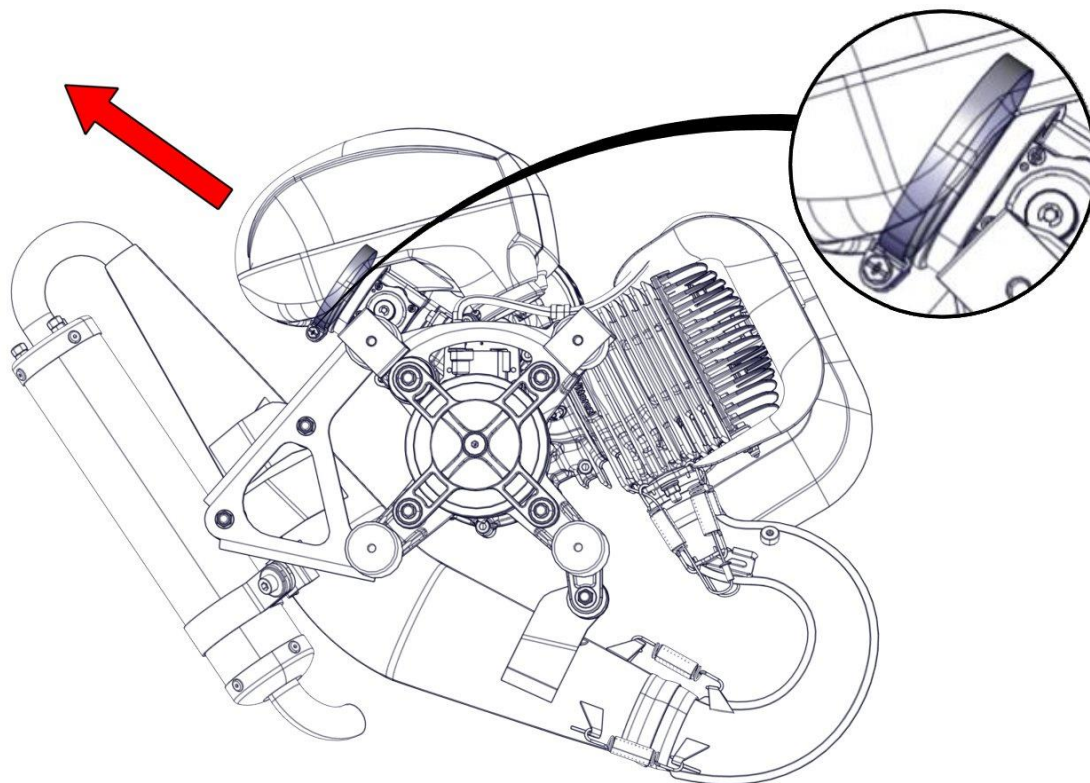
 Components to replace		Time limit
	Sleeve with filter (AT093a).	100h or 1 year
	Snaplock (MP093d).	25 h
 Special tools	Not required.	
 Values	Clamp screw: 2,5 Nm.	

3.3.1 Airbox disassembly

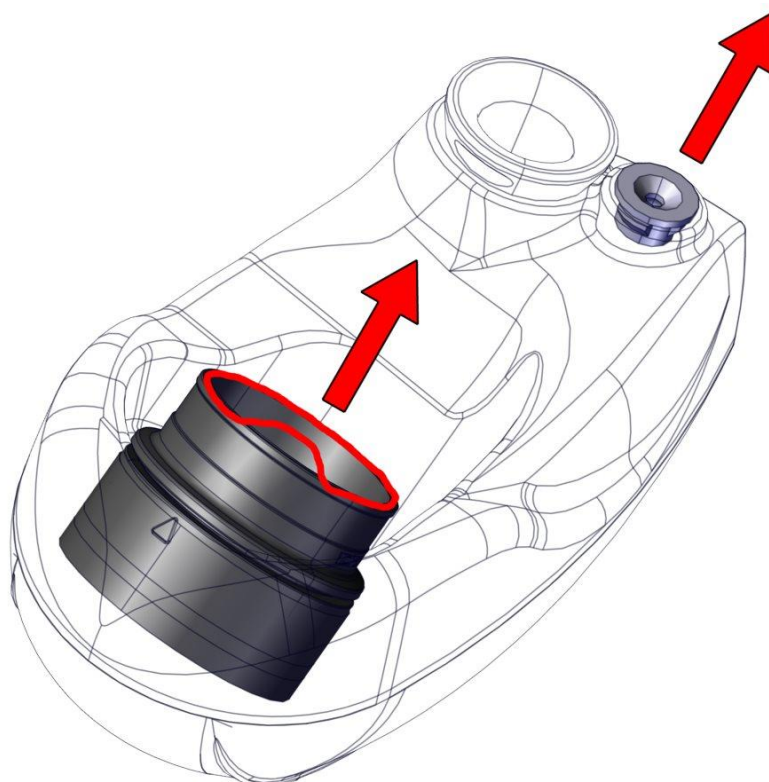
Unhooking the safety strap.



Loosen the screw of the clamp securing the sleeve to the carburettor and remove the airbox.

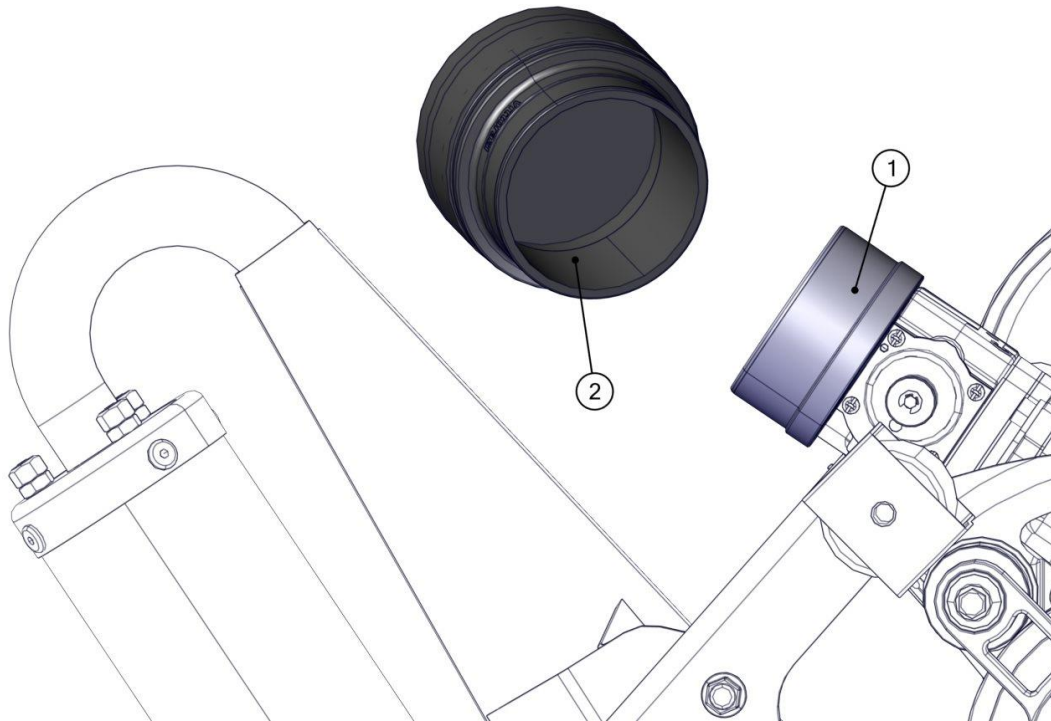


Fold the sleeve inwards and remove it from the airbox.
Remove the Snaplock.



3.3.2 Airbox check

Clean the sponge with specific filter chemicals. Clean the airbox cavity with compressed air. To obtain a good seal between the components, degrease the connector of the airbox (1) and the internal part of the sleeve (2) with a product suitable for cleaning rubber (the sleeve is made up of a mixture of NBR and PVC).



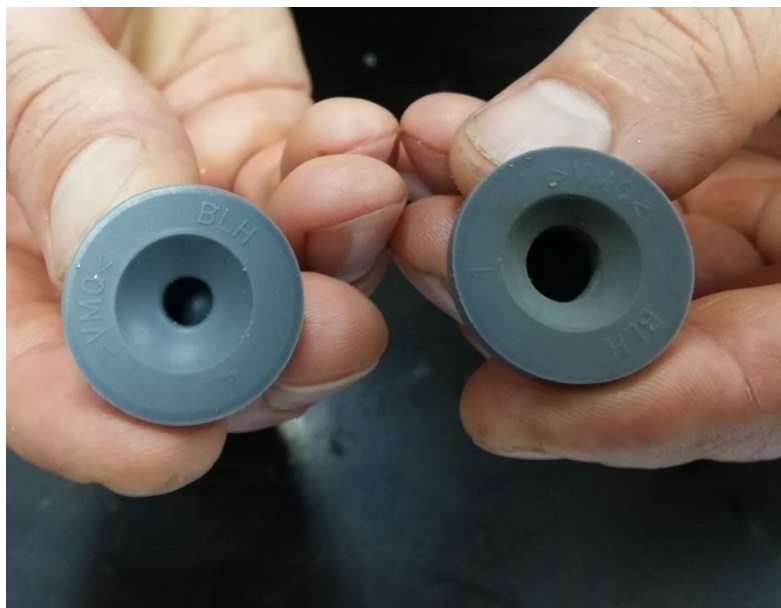
Check the integrity of the airbox.
Check the sleeve groove.



Check the filter, in particular the bonding with the sleeve and the various parts of the sponge.



Check the Snaplock, in particular the central hole (the photo shows a comparison between a new component on the left and a worn one on the right).
Connect the Snaplock to the pin on the motor to check that the engagement is stable.



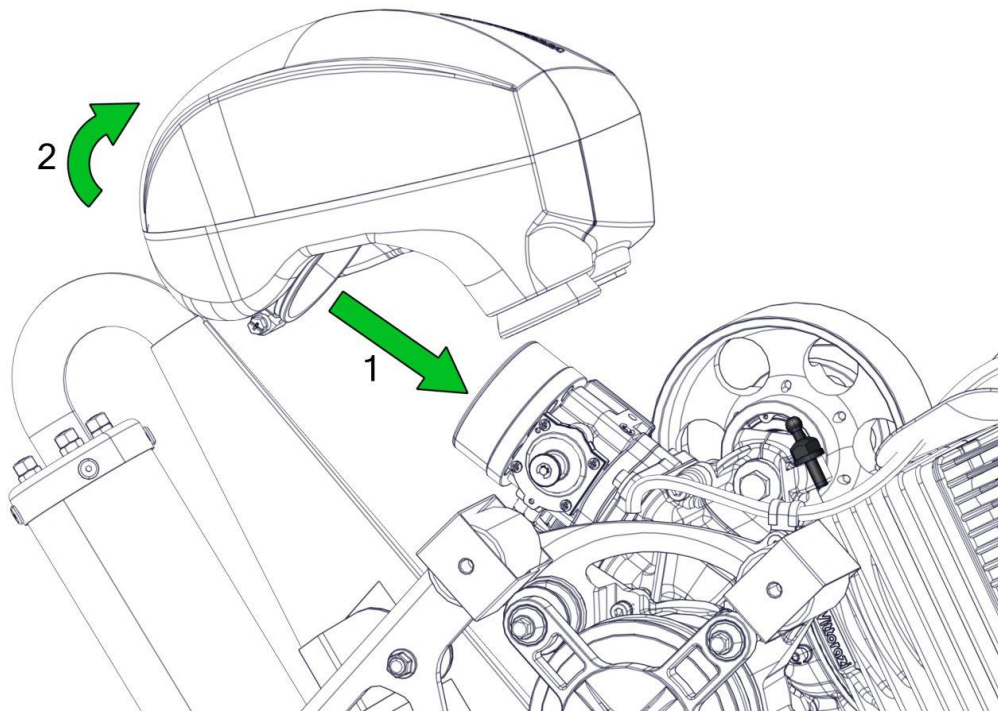
If the above components are damaged, replace them immediately. For routine maintenance, follow the table.

Use extreme caution when checking, as failure to replace damaged components can lead to detachment of the airbox and impact with the propeller.

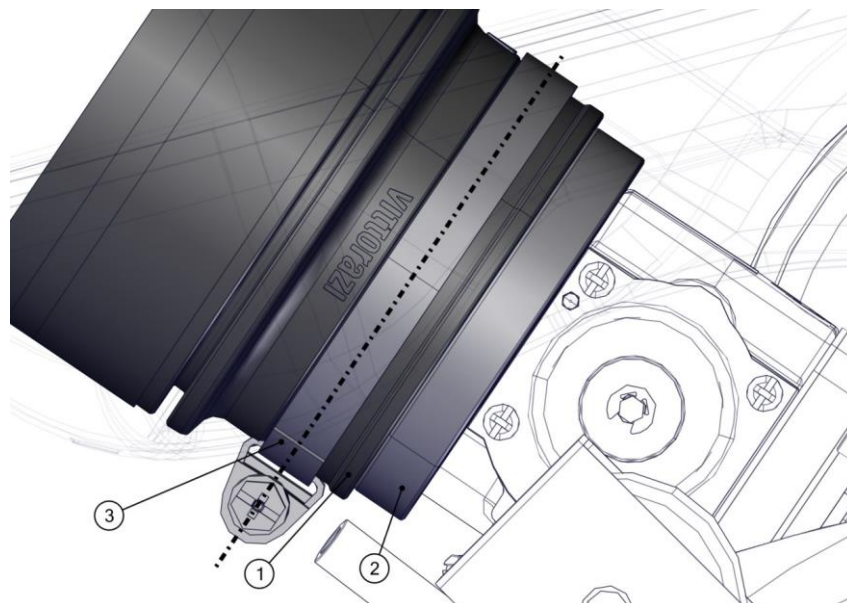
3.3.3 Airbox assembly

Insert the sleeve into the airbox. Insert the Snaplock

Connect the sleeve of the airbox to the carburettor (1), after having inserted it rotate the airbox to fix the Snaplock (2).



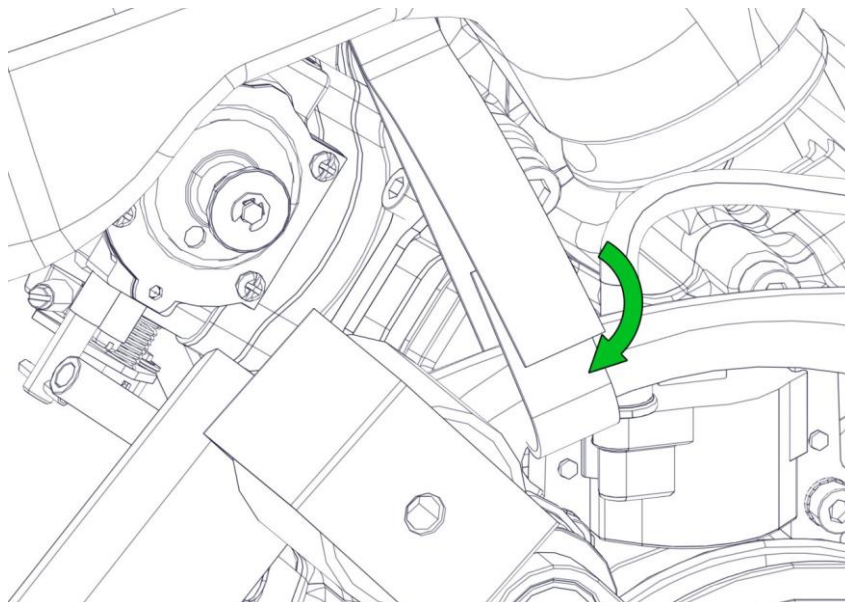
The airbox sleeve (1) must be completely inserted into the Airbox connector (2), the fixing clamp (3) correctly inserted on the seat and aligned as in the figure.



Tighten the fixing clamp by applying 2,5 Nm torque to the screw.






Attach the safety strap to the bracket between the vibration damper and the ignition coil, ensuring that the strap is tightened firmly.



After installation, check that there is no relative movement between the rubber sleeve and the Airbox connector.

3.4 Carburettor

 Components to replace		
		Time limit
	O-ring (MFR091a).	150h or 1 year
	Gaskets (MFR088) *	50h or 1 year
	Internal carburettor diaphragms and gaskets.	100h or 1 year
	Loxéal 55-03/Loctite 243.	50h or 1 year
 Special tools	Walbro instrument for measuring metering lever.	
 Values	Metering lever opening pressure: 1,05-1,15 bar. Screws M5x60: 6 Nm.	

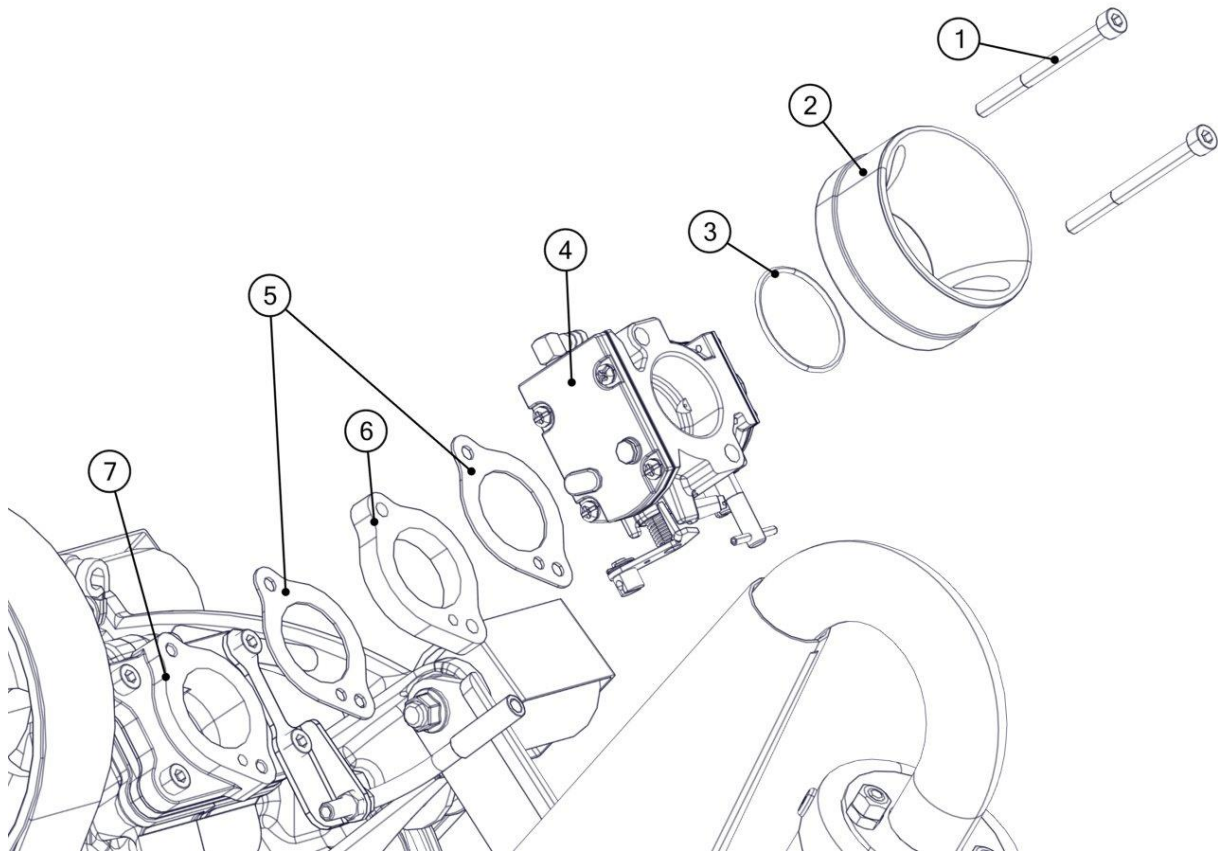
*Always replace it when disassembled.

3.4.1 Carburettor disassembly



Before disassembling the carburettor, remove the airbox (3.3 Airbox).

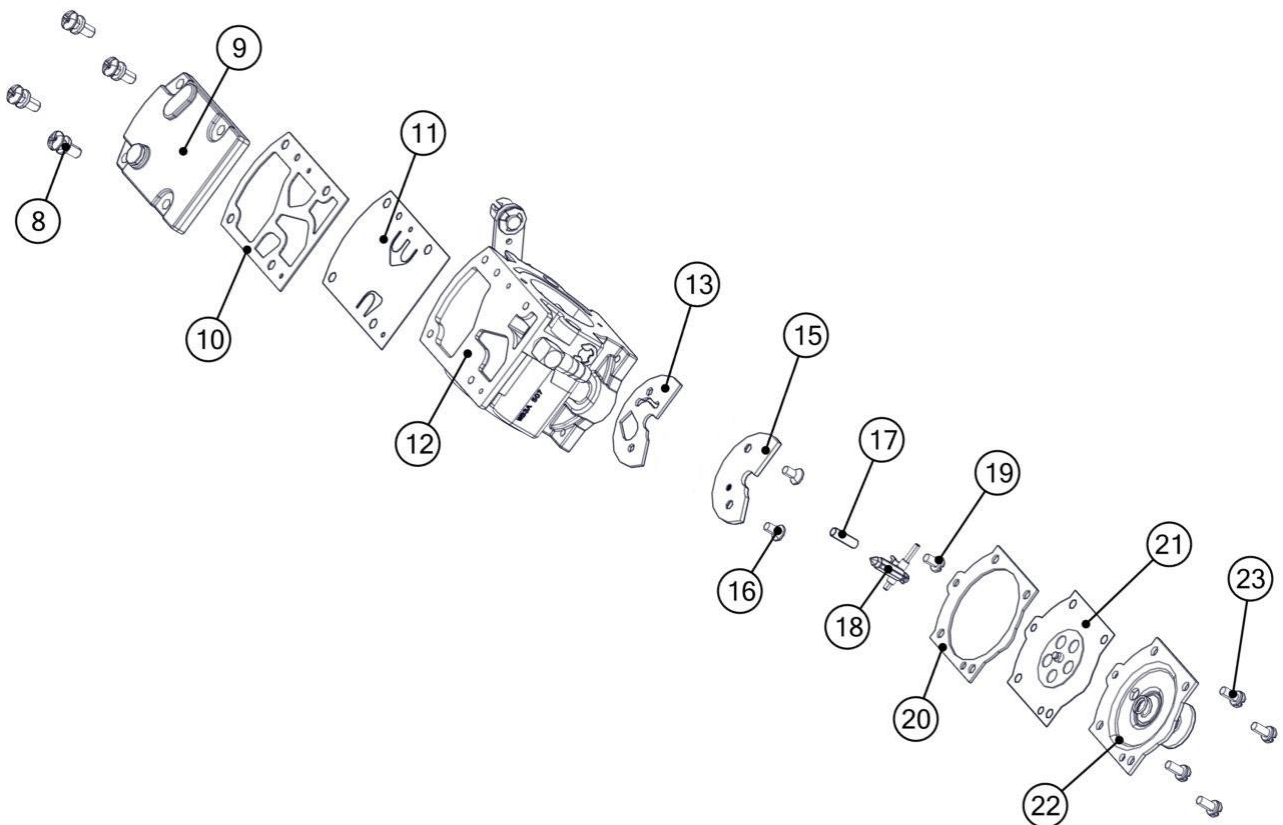
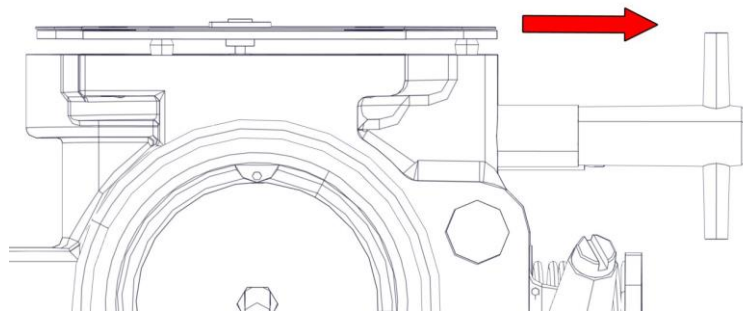
Remove the 2 Allen screws M5x60 (1) from the airbox connector (2).
Remove the connector of the airbox (2).
Remove the O-ring (3).
Remove the carburettor (4).
Remove the following components from the carburettor flange (7): the gasket (5), the spacer (6), the gasket (5).



Disassemble the carburettor by removing the components shown in the figure.



Remove the metering diaphragm (21) by sliding it sideways in the direction of the adjusting screws, without lifting it up, so as not to bend the metering lever (18).

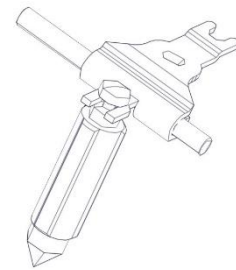
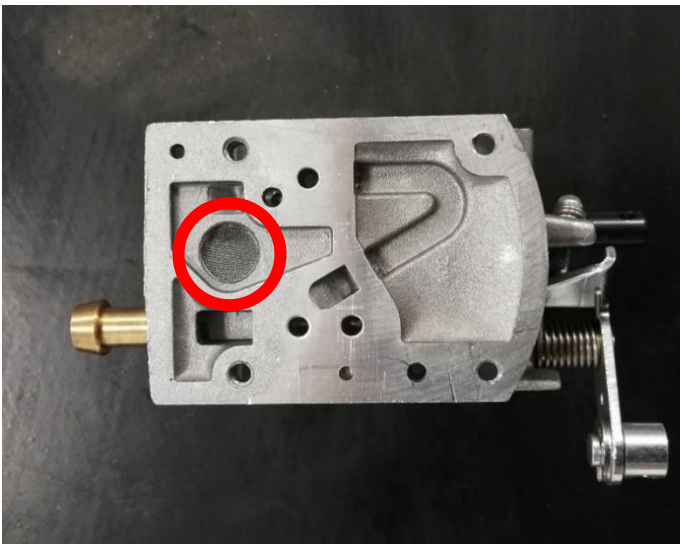


8	Screws with captive washers fuel pump cover (x4)	16	Lunette screws (x2)
9	Fuel pump cover	17	Metering lever spring
10	Fuel pump gasket	18	Metering lever
11	Fuel pump diaphragm	19	Metering lever screw
12	Carburettor case	20	Metering diaphragm gasket
13	Lunette gasket	21	Metering diaphragm
		22	Metering diaphragm cover
15	Lunette	23	Metering diaphragm cover screws (x4)

3.4.2 Carburettor check

Immerse the carburettor case in a container containing solvent for a few minutes. Carefully clean the carburettor body and covers with a brush, removing any gasket residue. Then gently blow the various parts with compressed air.

Pay particular attention to cleaning the mesh (highlighted in the photo) and the metering lever needle.



Check the condition of the diaphragms: they must be soft and free of cuts, otherwise they must be replaced. For routine maintenance, follow the table.

Check the needle: the tip must have a conical shape as shown in the figure, otherwise replace it.



3.4.3 Carburettor assembly



Replace the diaphragms and gaskets (10, 11, 13, 14, 20, 21). Take care to select from the spare parts kit the components identical to those to be replaced. For example, the photo shows two gaskets with a similar but not identical geometry, therefore not interchangeable. The incorrect choice of these components compromises the correct functioning of the carburettor.

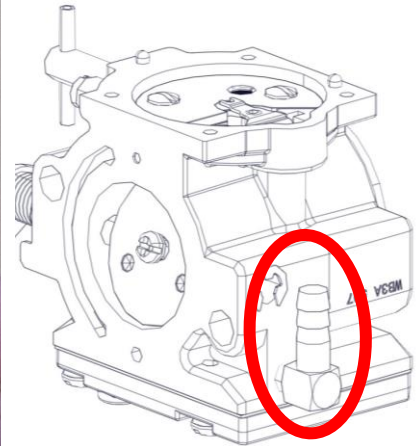


Assemble the carburettor components without temporarily inserting components 20, 21, 22, 23.

Place the Walbro tool on the metering lever to check the correct height.



Connect the carburettor's fuel inlet pipe (highlighted in the figure) to a pressure switch via a tube.



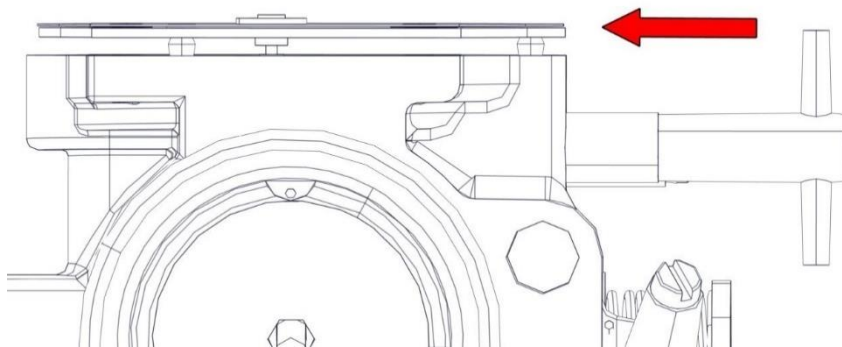
Set a pressure value lower than the values in the table and check that the needle of the metering lever does not allow air to escape. Carry out further tests by gradually increasing the pressure.

WB37
1,05-1,15 bar

Air must only escape from the metering lever needle within the pressure range indicated in the table.

In the event of a fault, measure the height of the metering lever again and replace the spring (17) if necessary.

Once the above checks have been carried out, fit components 20, 21, 22 and 23 to the carburettor.





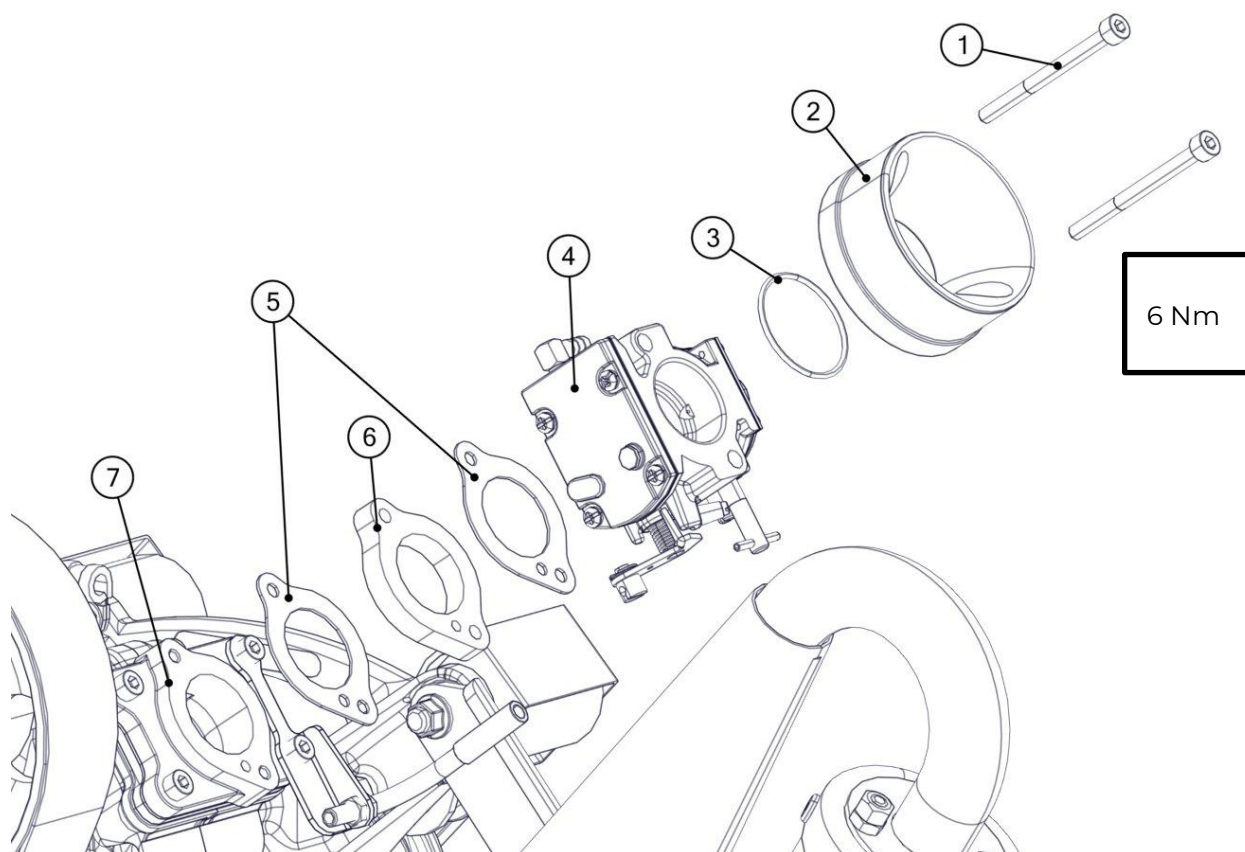
Replace the gaskets (5) and the O-ring (3).

Place the following components on the carburettor flange (7): gasket (5), spacer (6), gasket (5). Position the carburettor (4).






Insert the O-ring (3) into the Airbox connector (2), taking care not to pull it out of the housing.

Insert the 2 Allen screws M5x60 (1) with threadlocker (recommended Loxeal 55-03/Loctite 243) in the connector of the airbox (2), screw progressively, then tighten to 6 Nm.



3.5 Reed valve

 Components to replace		
		Time limit
	Petals (MFR082).	50h
	Gaskets (MFR083) *	50h
	Loxéal 55-03/Loctite 243.	50h
Paste Wurth 0893921501.	50h	
 Special tools	Not required.	
 Values	Screws M5x25: 8 Nm.	

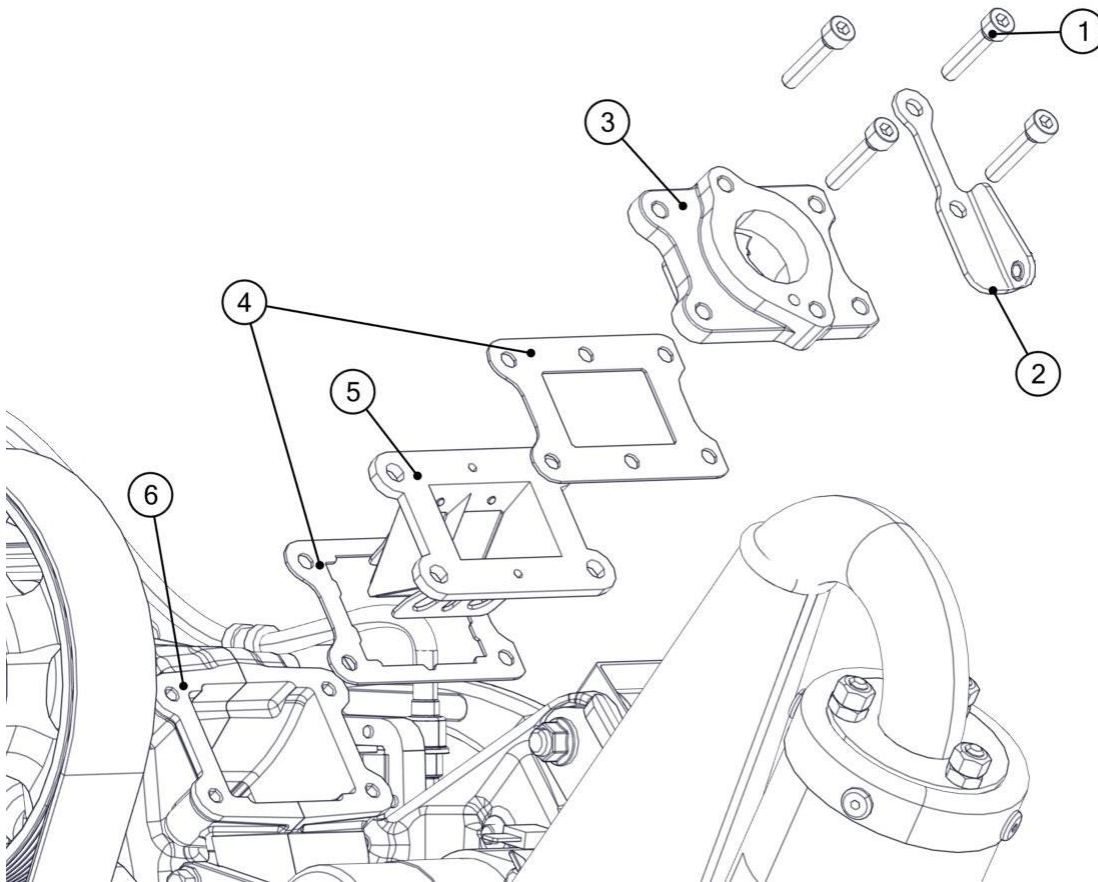
*Always replace it when disassembled.

3.5.1 Reed valve disassembly

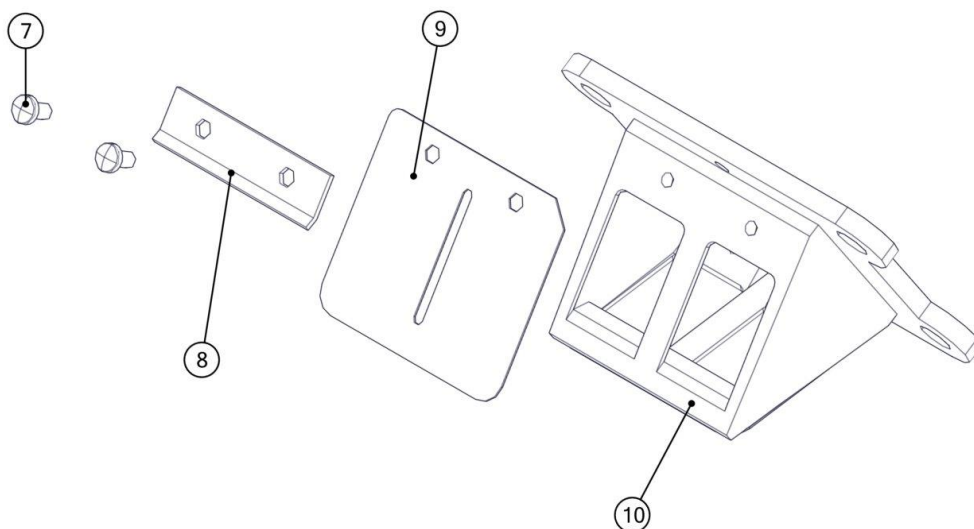


Before disassembling the reed valve, remove the airbox (3.3 Airbox) and the carburettor (3.4 Carburettor).

Remove the 4 Allen screws M5x25 (1) from the carburettor flange (3).
Remove the accelerator cable holder (2).
Remove the following components from the crankcase (6): carburettor flange (3), gasket (4), reed valve (5), gasket (4).



Remove the 2 screws (7) from one side of the reed valve.
Remove the stoppers (8) and petals (9).



Carry out the same operations on the other side of the reed valve.

3.5.2 Reed valve check

Check the petals: they must be intact (the photo on the left shows new petals and the photo on the right shows a typical break on worn petals).



Also check that the petals are not deformed: looking at the inside of the reed valve, the petals should close the opening perfectly (photo on the left). In the photo on the right, you can see deformed petals that remain slightly raised.



If the previous checks are not passed or if routine maintenance is required, replace the petals.

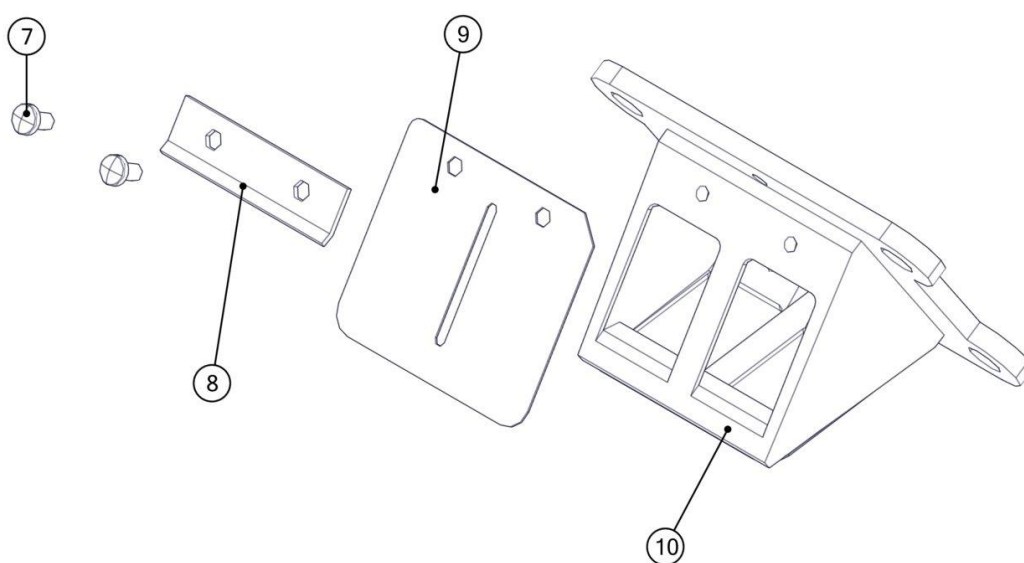
3.5.3 Reed valve assembly

Replace the petals (9) and position them against the bearing surface (10).
Position the stoppers (8) and insert the 2 screws (7).



Check that the petals rest perfectly on the surface of the reed valve (see previous photos).

Carry out the same operations on the other side of the reed valve.





Replace the gaskets (4).

Place the reed valve (5) with the gaskets (4) on the crankcase (6).

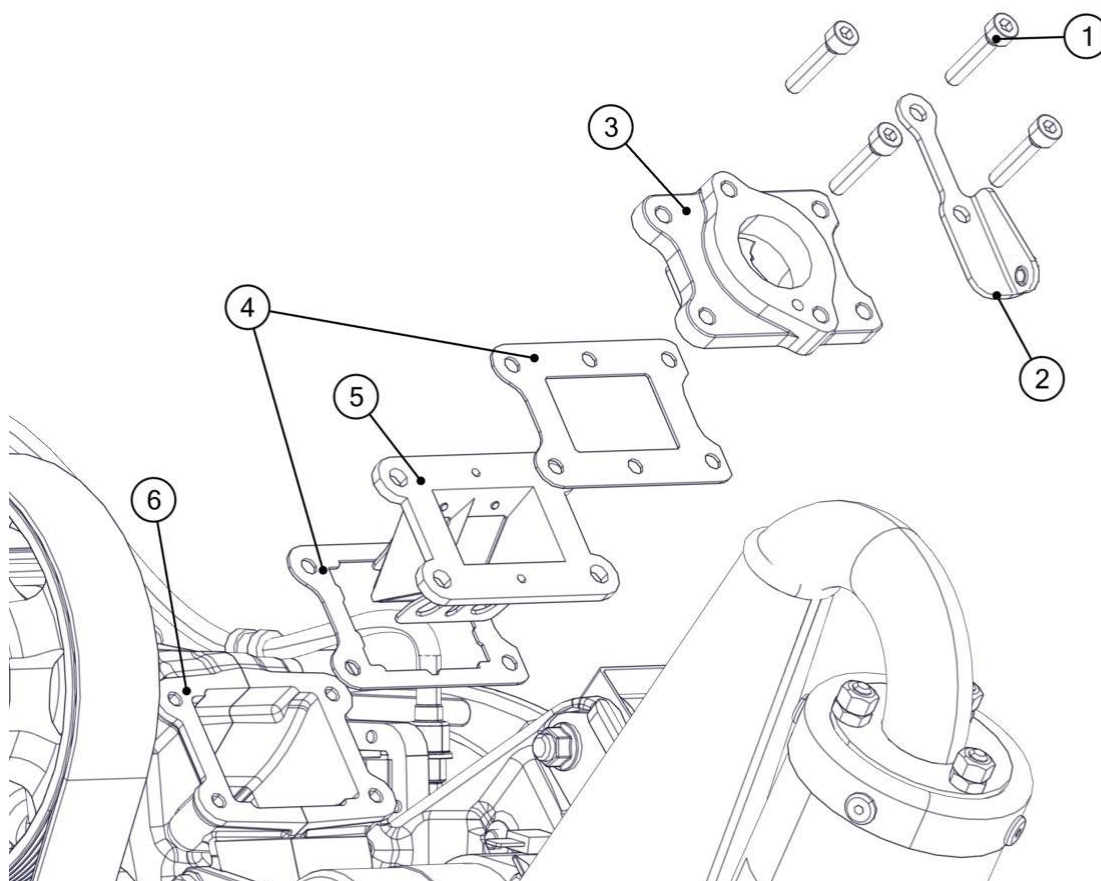
Insert the carburettor flange (3).

Position the accelerator cable holder (2) on the carburettor flange (3).

Add Wurth paste 0893921501 to the screws (1).

Insert the 4 Allen screws M5x25 (1) into the carburettor flange (3), tighten progressively, then tighten to 8 Nm.

8 Nm



3.6 Gaskets






Always replace the gaskets when removing components in contact with them or in the event of leakage. Also, if the motor is not used for a long period of time, check the condition of the gaskets.



For gasket replacement see the following chapters: 3.4 Carburettor, 3.5 Reed valve, 3.7 Exhaust system, 3.12 Piston, cylinder, head.

3.7 Exhaust system

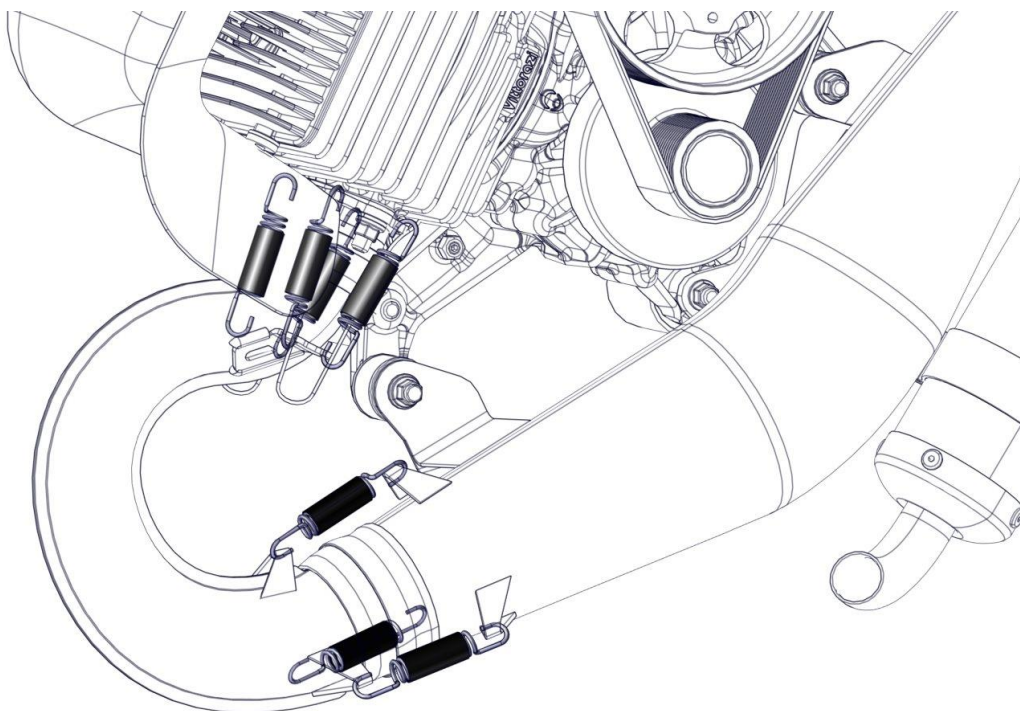
 Components to replace		Time limit
	Exhaust bushing (MY202a).	50h
	Springs (M139, M139a, MP140, MP141) *	150
	Gaskets (M137, MP155) *	100h
	Self-locking nuts M8 (M019) *	150h
	Exhaust manifold (MFR200a).	150h
	Silencer rubber (M141).	150h or 1 year
	Silencer soundproofing material (MP159).	150h
	Rivets (MP161).	150h
	Silicone (LOCTITE 5900)	150h
	Molykote grease.	
Loxal 83-55/Loctite 270.		
 Special tools	Not required.	
 Values	Self-locking nuts M8: 32 Nm. Screw M8x25: 14 Nm.	

*Always replace it when disassembled.

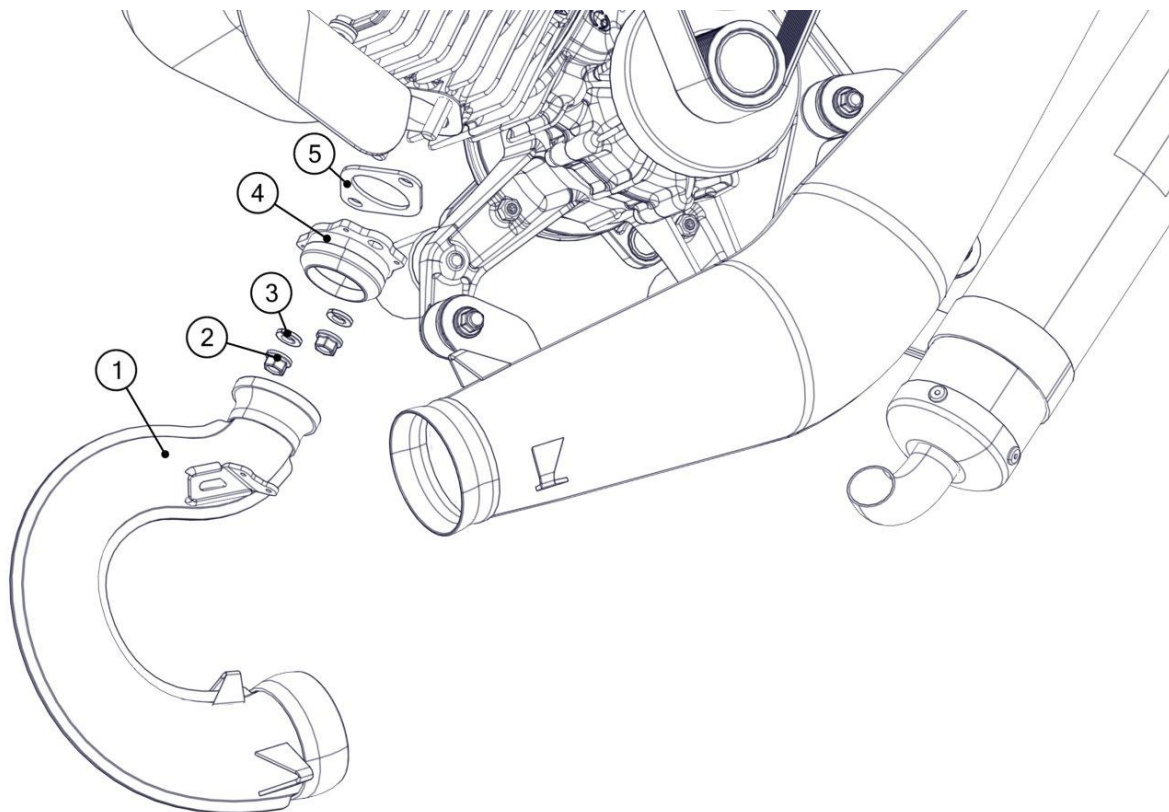
3.7.1 Manifold, exhaust bushing disassembly

Remove the safety cables around the springs.

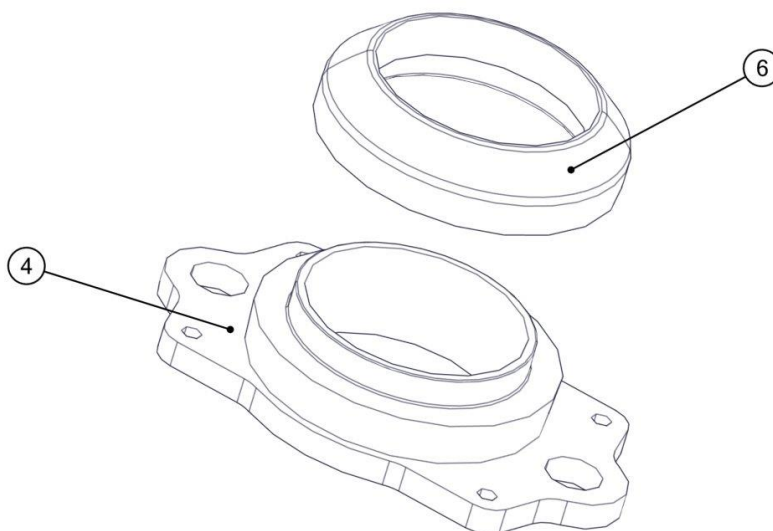
Remove the 4 bushing springs and the 3 exhaust manifold springs.



Remove the exhaust manifold (1), the 2 self-locking nuts M8 (2) with washers (3), the exhaust bushing (4) and the gasket (5).



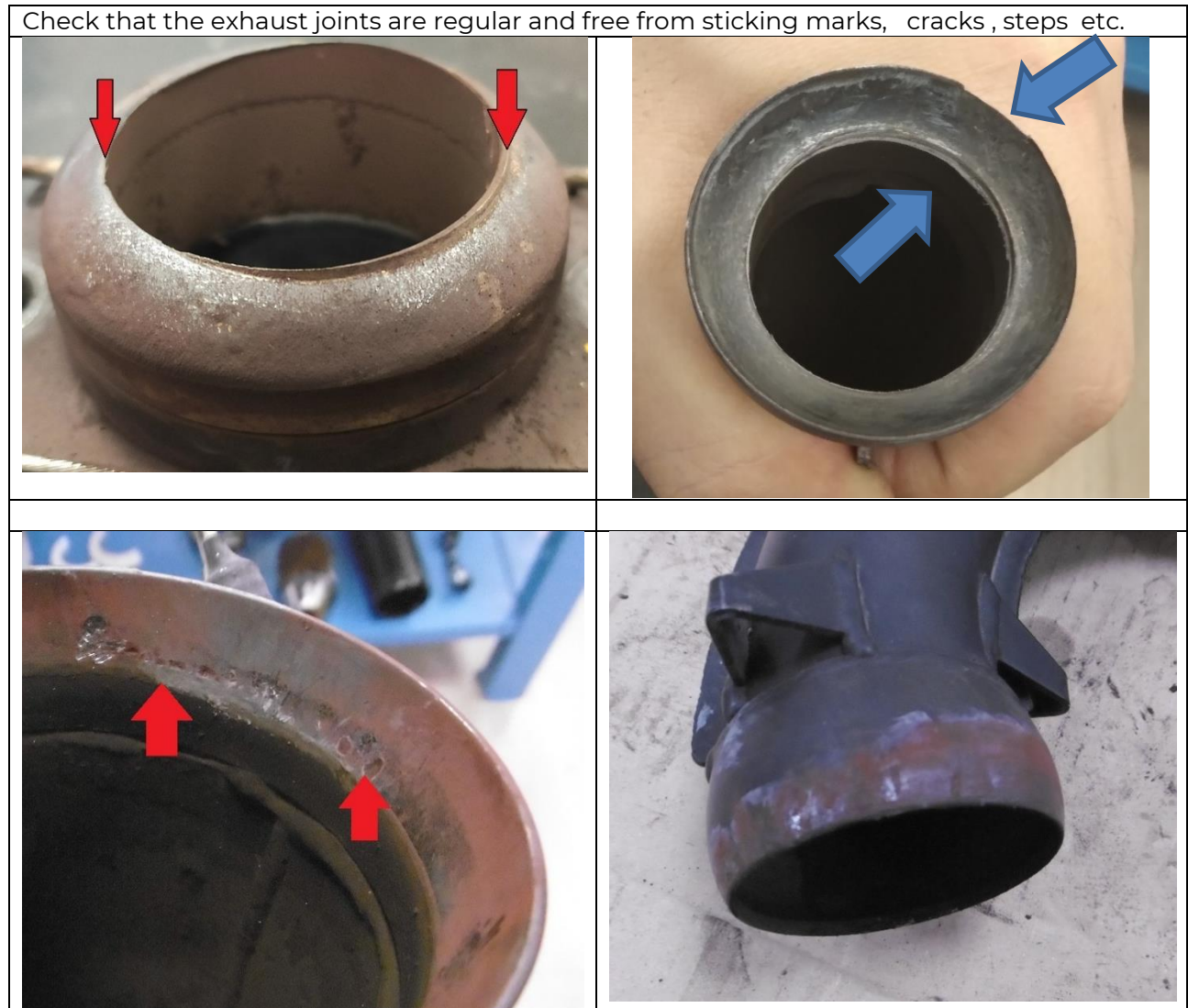
Remove the bronze ring (6) from the bushing (4).



3.7.2 Manifold, exhaust bushing check

Clean flange contact surface of any gasket or silicone residue.

Check the integrity of the exhaust manifold: there must be no cracks or damaged areas, otherwise it must be replaced. For routine maintenance, follow the table.

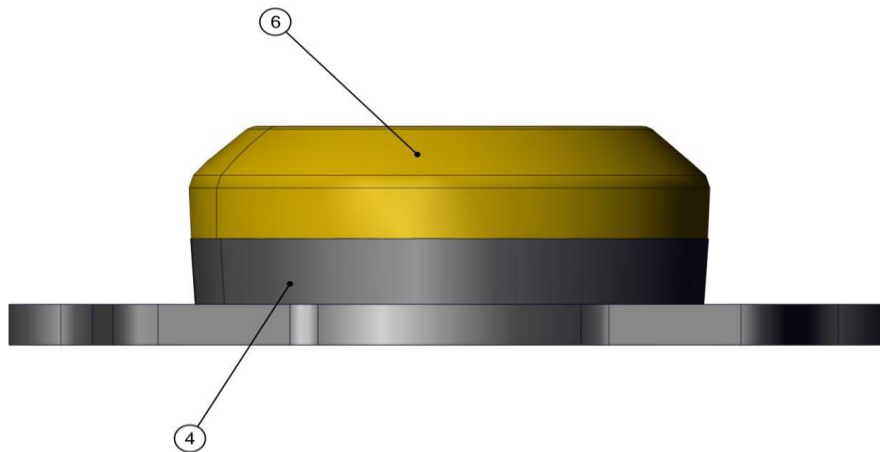


3.7.3 Manifold, exhaust bushing assembly

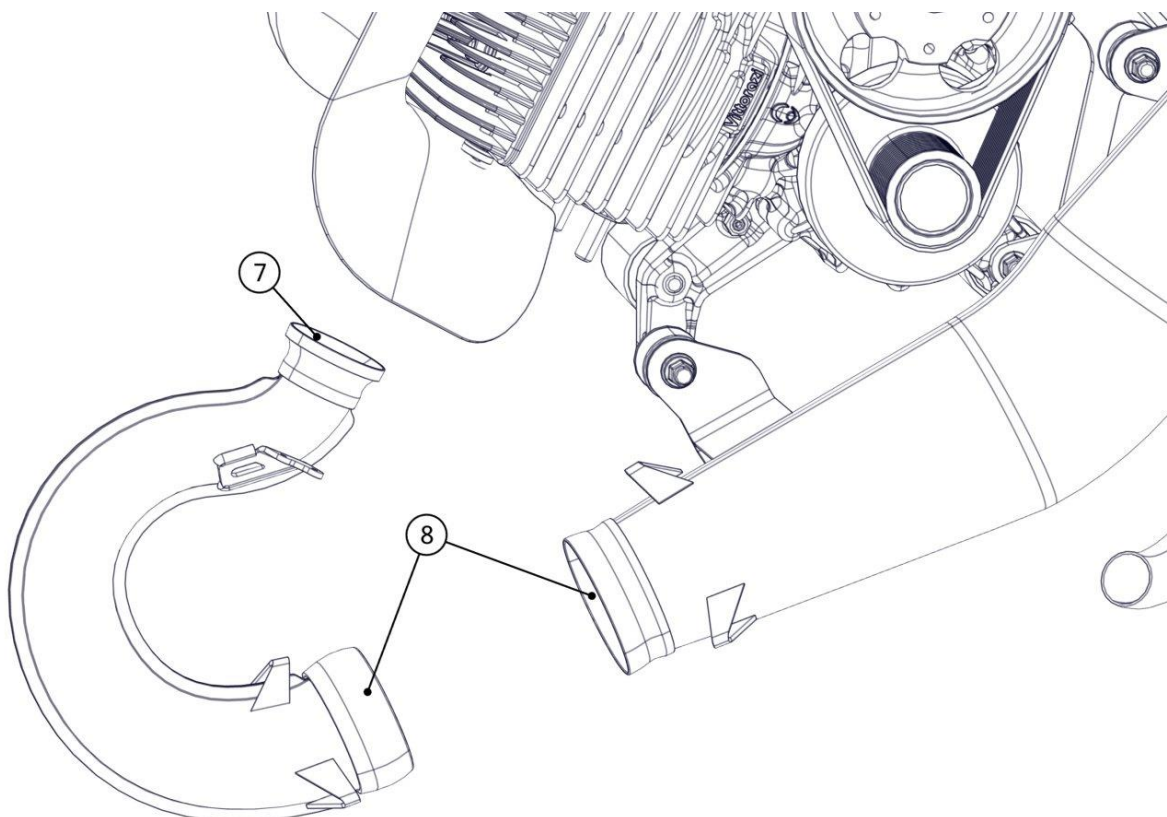
Press the bronze bushing on the flange
Replace the bronze ring (6) of the flange (4).



Check that the bronze ring (6) comes into contact with the seat of the bushing (4) to prevent leakage from the exhaust system.



Clean the bushing and cylinder from gasket residue.
Clean the end of the exhaust manifold (7), sand it with sandpaper and apply Molykote grease.
Clean the second joint (8) with an abrasive sponge (e.g. Scotch-Brite), degrease it with solvent and apply Molykote grease.





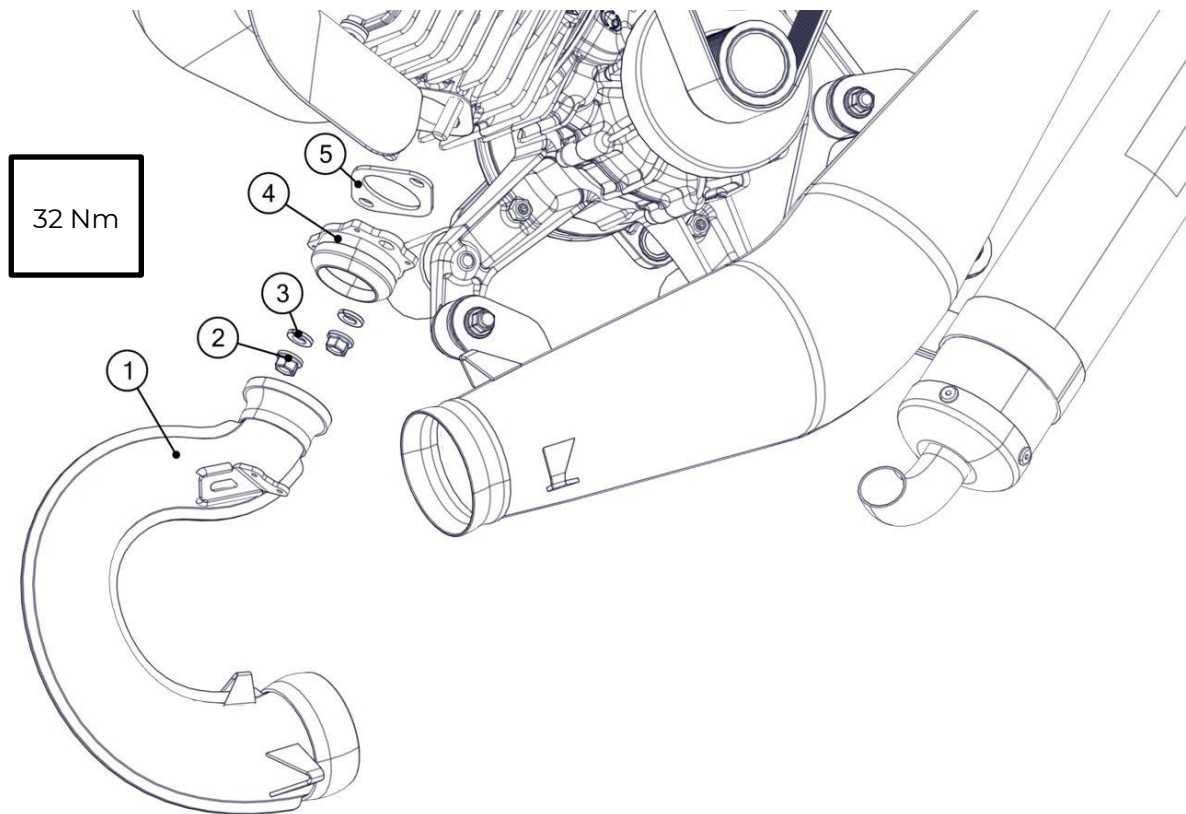
Replace the gasket (5) and the 2 self-locking nuts M8 (2) and the 2 washers (3) each time they are disassembled.

Insert the gasket (5) and the bushing (4).

Add copper paste to the nuts.

Insert the 2 self-locking nuts M8 (2) with the washers (3) and tighten to 32 Nm.

Position the exhaust manifold (1).



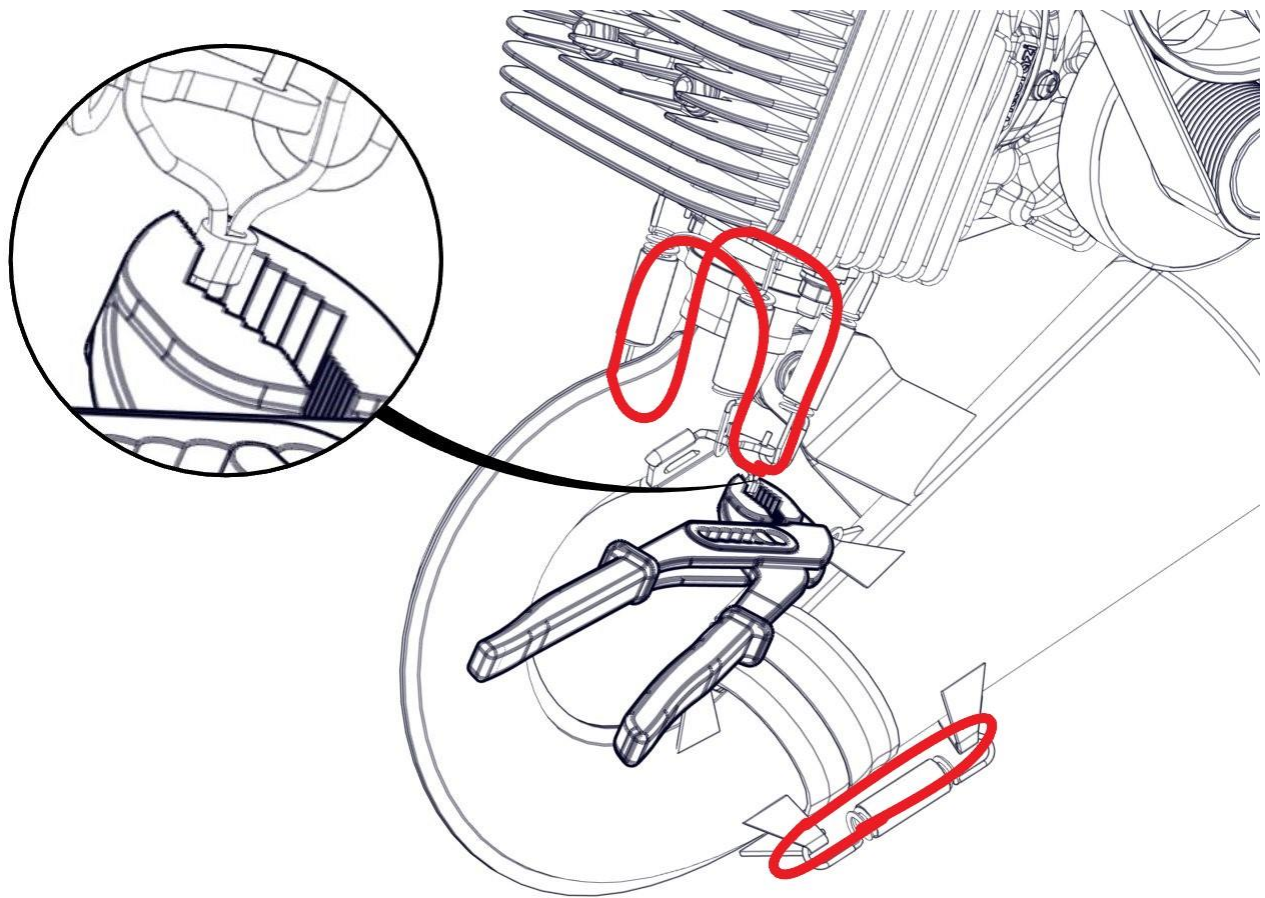
Hook the 3 springs onto the second joint.

Run 3 cables around the springs of the joint (one cable for each spring), insert a clamp on the ends and tighten with pliers.

Hook in the 4 springs of the bushing.

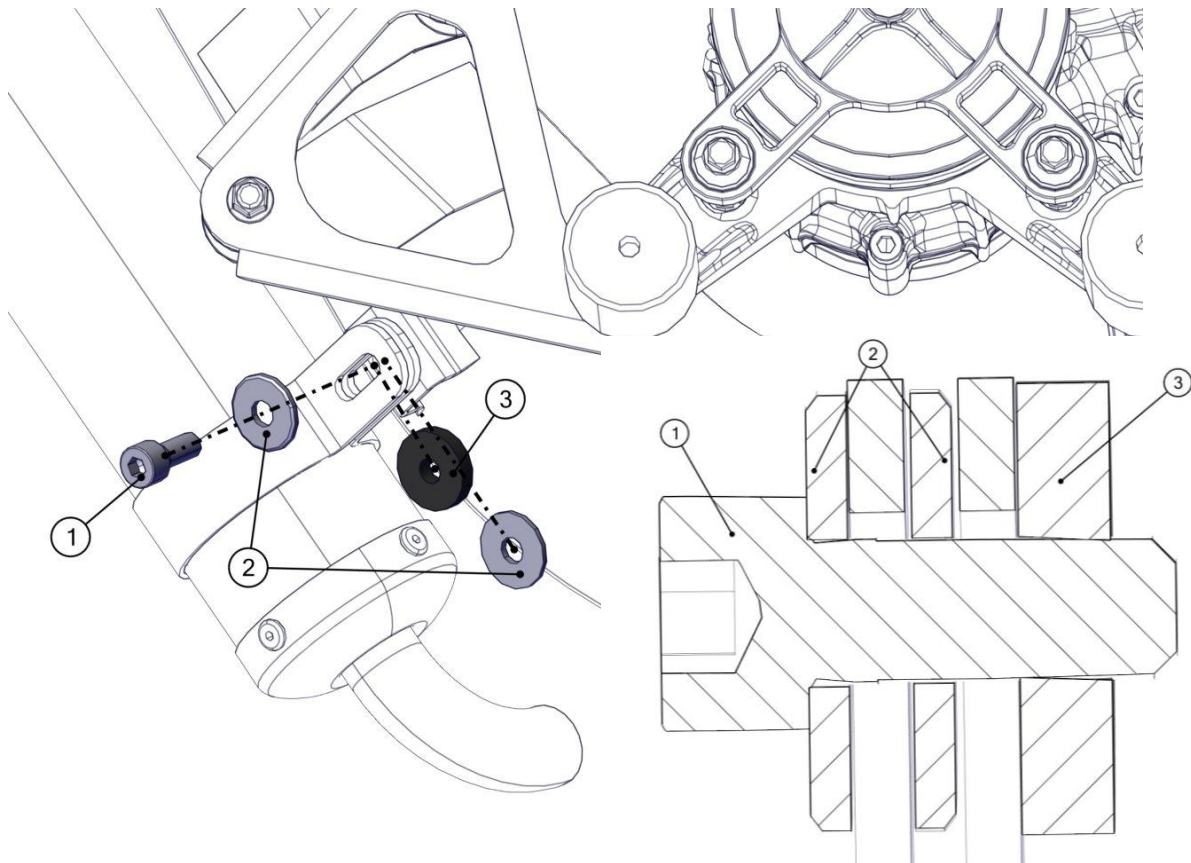
Run one cable around the 4 bush springs, insert a clamp at each end and tighten with pliers.

Apply heat shrinkable hoses.

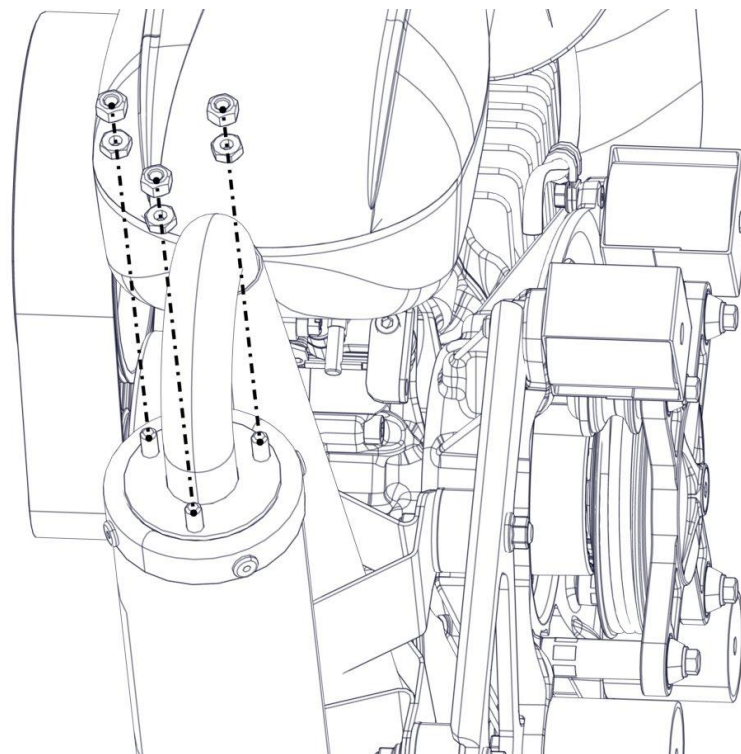


3.7.4 Silencer disassembly

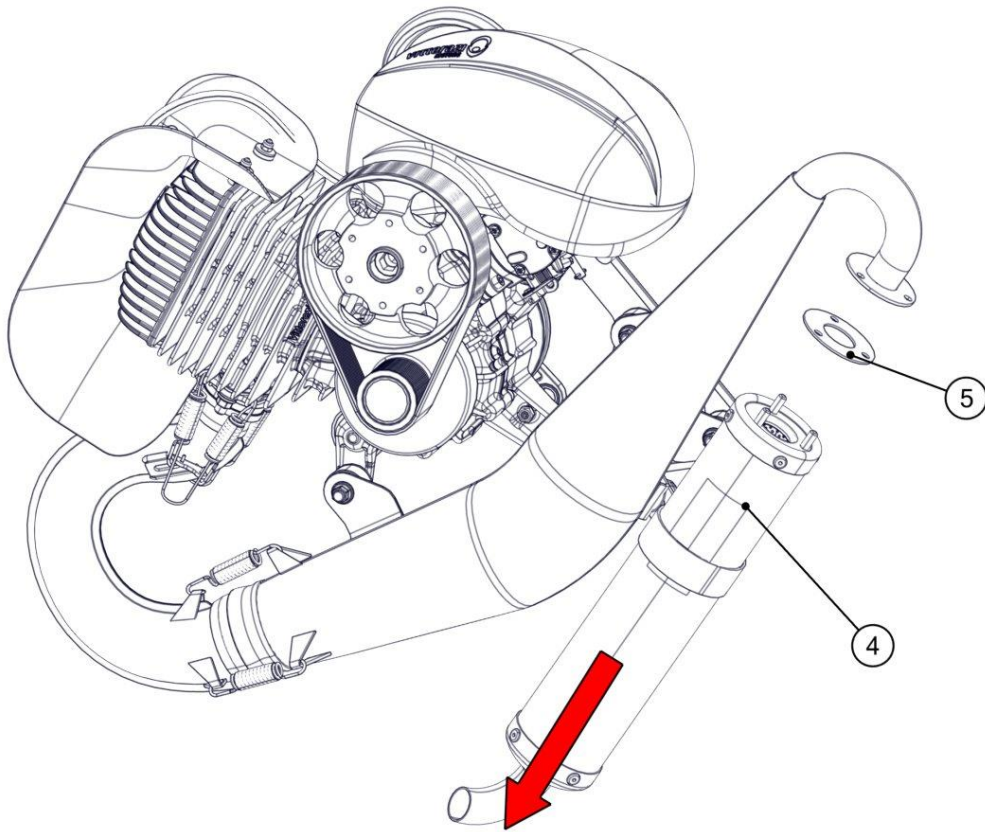
Remove the Allen screw M8 (1), the 2 washers (2) and the rubber (3) from the silencer support.



Remove the 6 nuts from the upper end of the silencer.

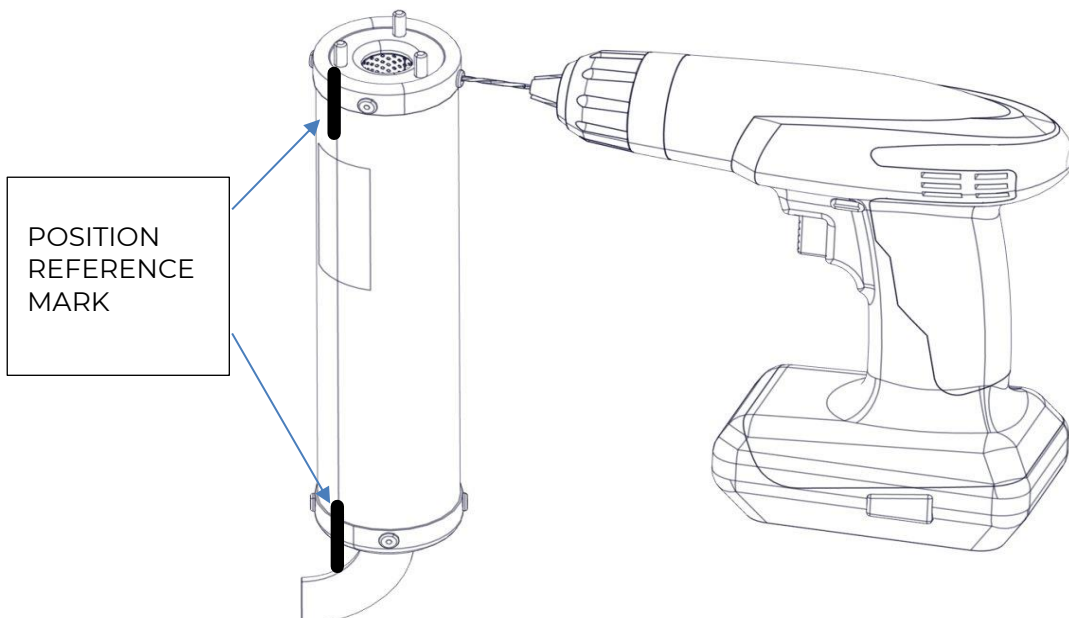


Disconnect the silencer (4) from the exhaust pipe and remove the gasket (5).

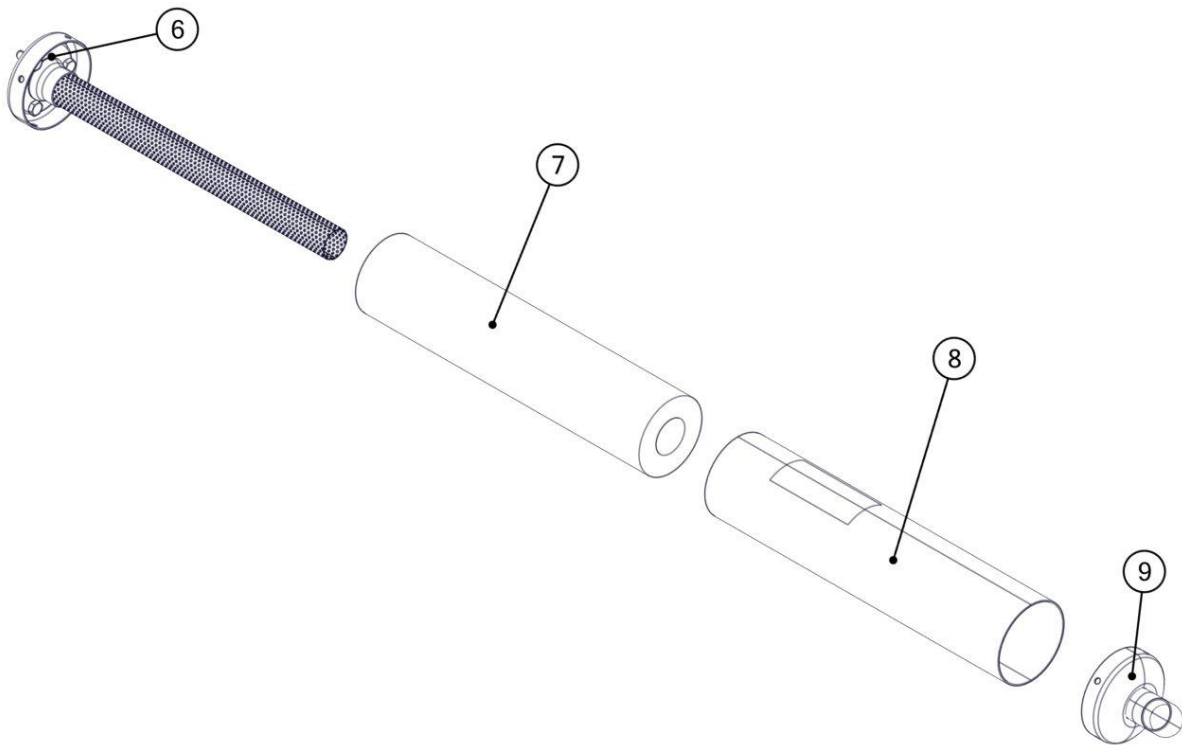


Before disassembling de silencer mark the position of the end caps with a erasable marker

Drill the 8 rivets centrally using a drill with a 5 mm diameter bit.



Use a heat gun to heat the end caps (6, 9) to facilitate the release of the silicone. Remove the following components from the silencer housing (8): the end caps (6, 9) and the sound-absorbing material (7).

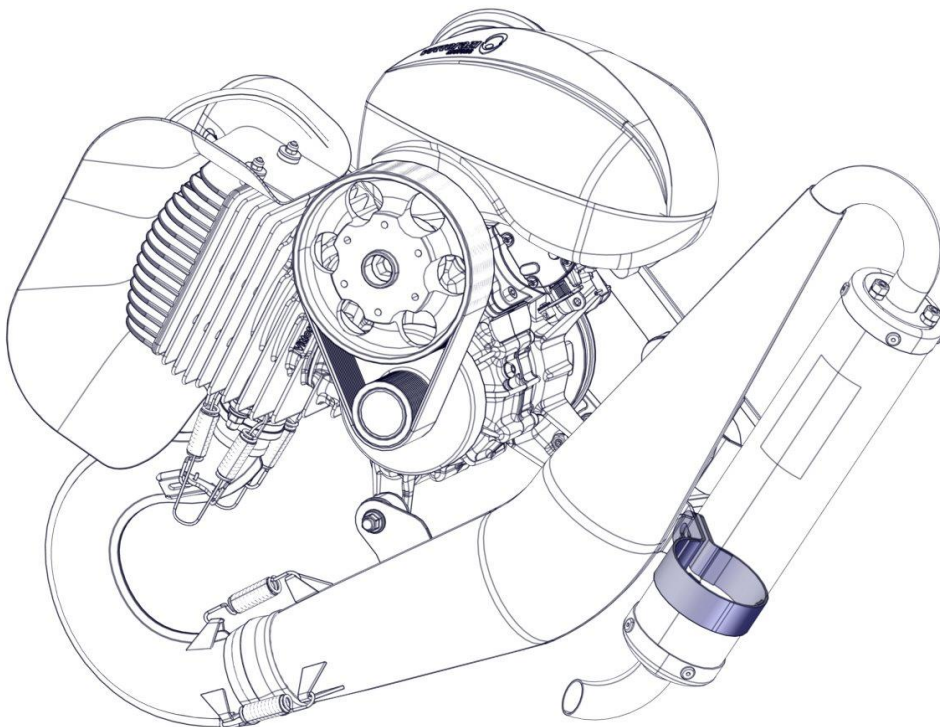


3.7.5 Silencer check

Use a cutter to remove silicone residue from inside the silencer.
Thoroughly clean the bottoms and body of the silencer with a cloth and thinner.
Check the integrity of the silencer body both internally and externally: there must be no cracks or damaged areas, otherwise replace it. For routine maintenance, follow the table.



Check the integrity of the silencer band, otherwise replace it.



3.7.6 Silencer assembly

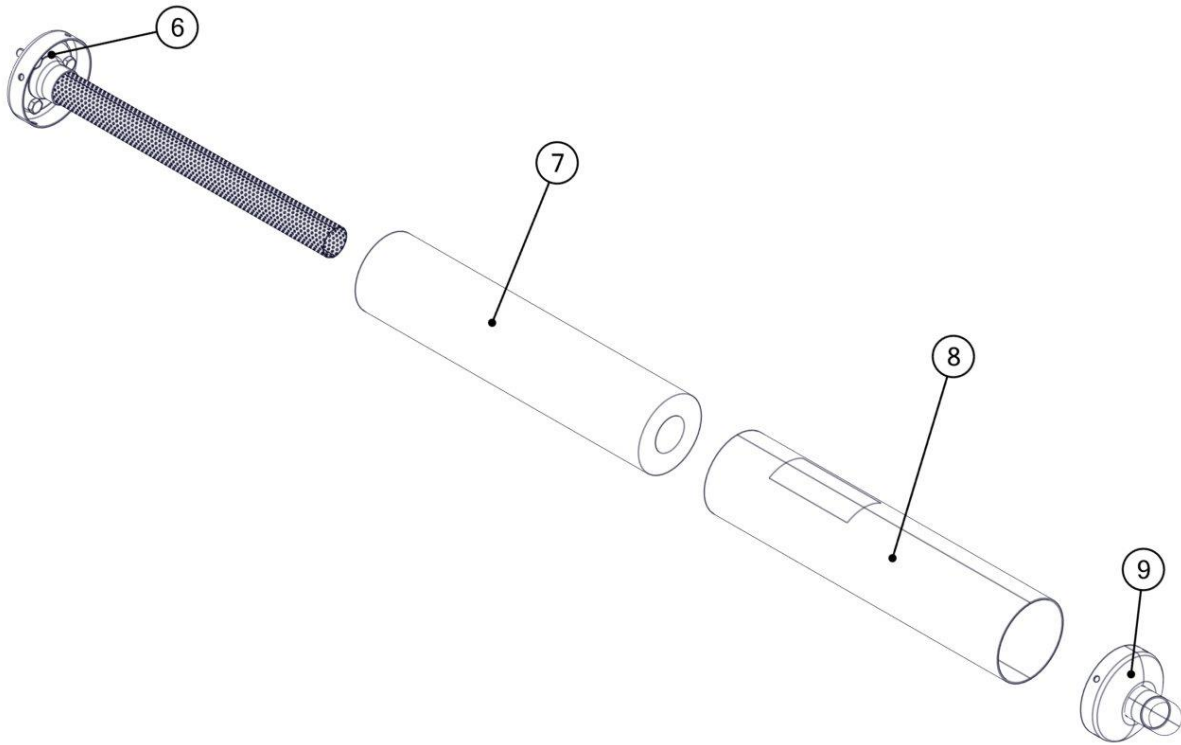
Put high-temperature silicone on the inside edge of the end caps (6, 9).

Place the sound-absorbing material (7) on the initial base (6) then position them in the silencer body (8).

Wet 4 rivets with high-temperature silicone and fix them on the initial base (6).

Position the end cap (9) on the silencer body (8).

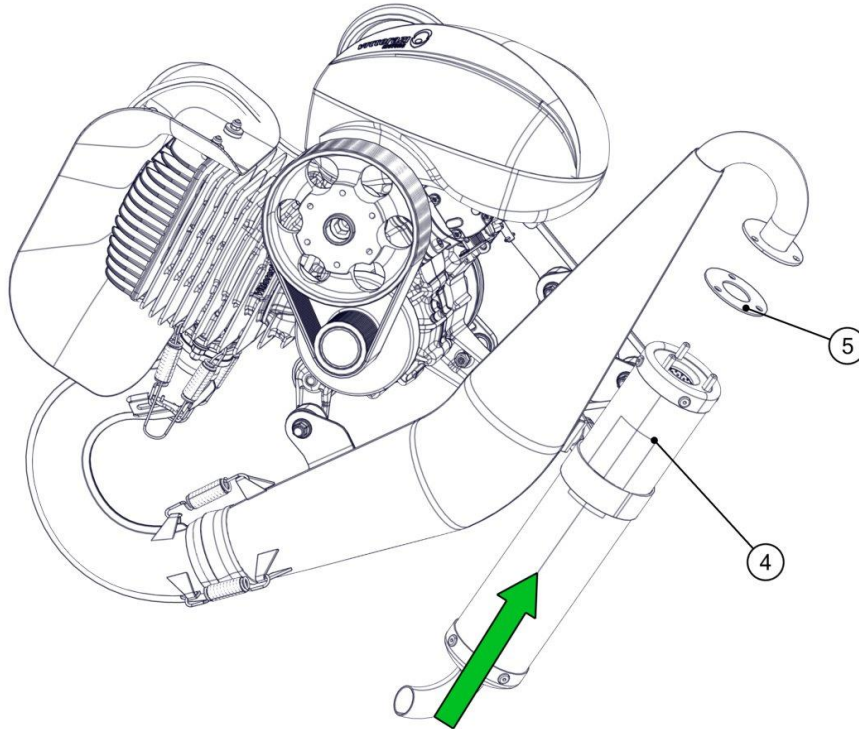
Wet 4 rivets with high-temperature silicone and fix them on the end cap (9).





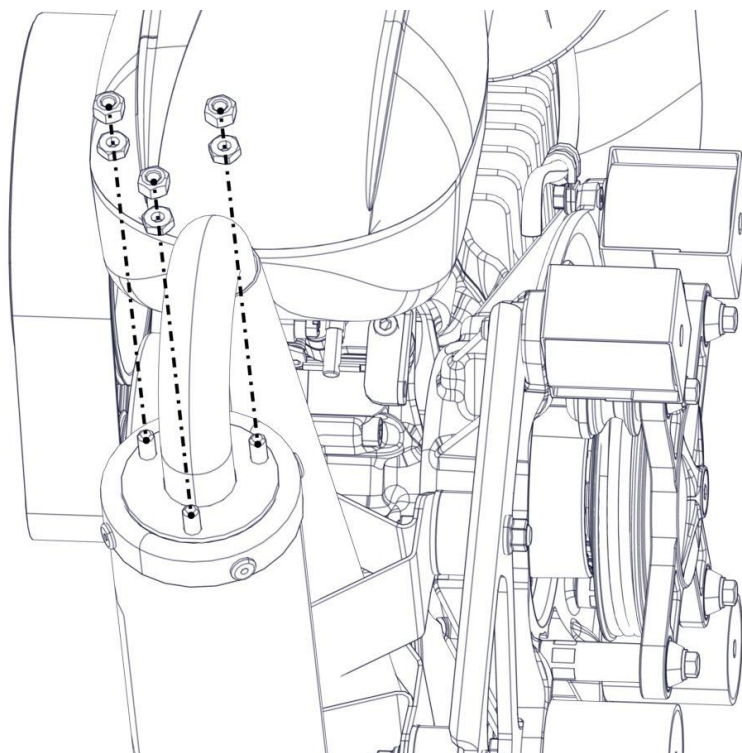
Replace the gasket (5). each time it is disassembled.

Connect the silencer (4) to the exhaust pipe, inserting the gasket (5).



Insert the 3 nuts on the silencer then the 3 self-locking nuts. Tighten up to 10 Nm. Tighten the first 3 nuts progressively to guarantee a correct alignment of the silencer

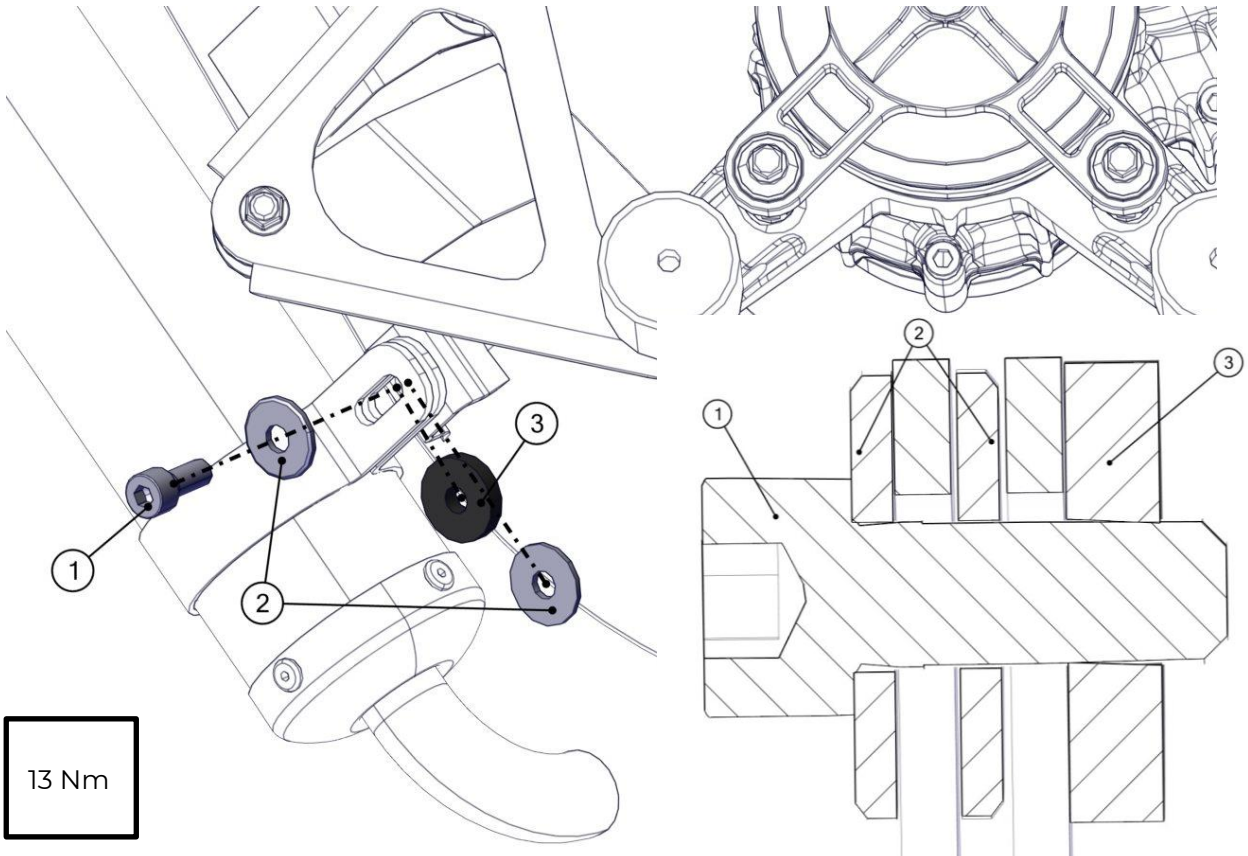
10 Nm








Replace the rubber (3). each time they are disassembled.

Insert the rubber (3), the 2 washers (2) and the Allen screw M8x25 (1) with threadlocker (recommended Loxeal 83-55/Loctite 270) and tighten to 13 Nm.



3.8 Rubber mountings

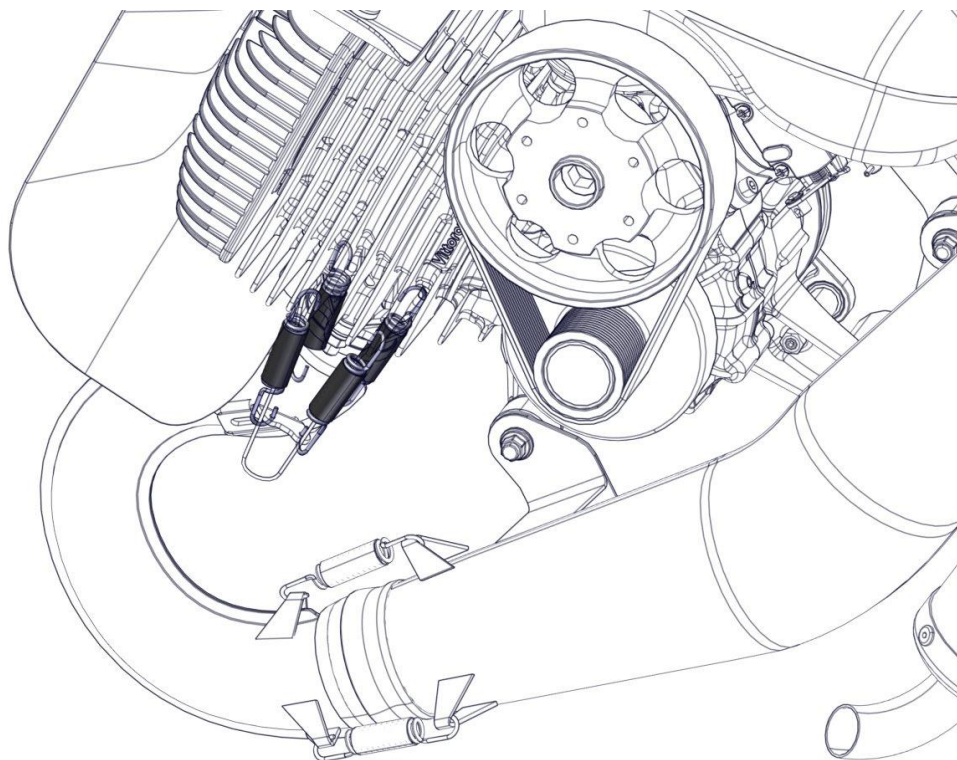
 Components to replace		Time limit
	Engine rubber mountings (MFR021a, MFR021b, MFR021xx).	150h or 1 year
	Exhaust system rubber mountings (M151a, M151c).	150h or 1 year
 Special tools	Not required.	
 Values	Self-locking nuts M8 (rubber mountings MFR021b, M151b): 18 Nm. Self-locking nuts M8 (rubber mountings M151a): 15 Nm.	

3.8.1 Rubber mountings disassembly

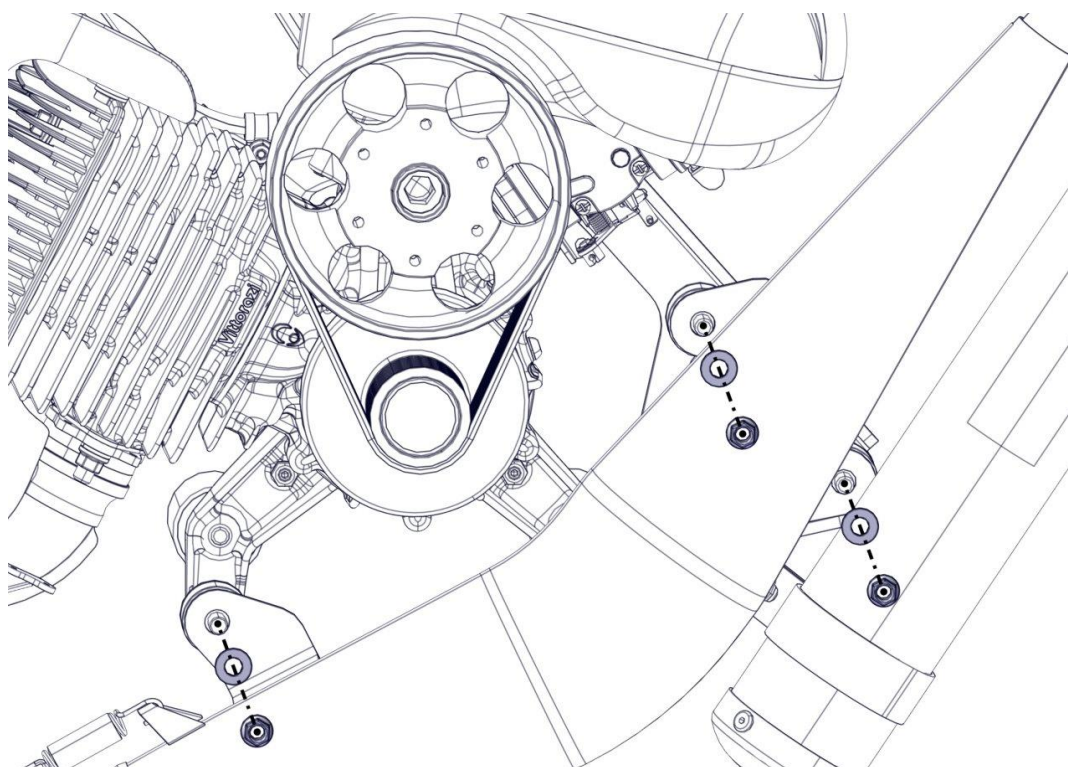


When locking the rubber mountings during maintenance, take care not to damage them.

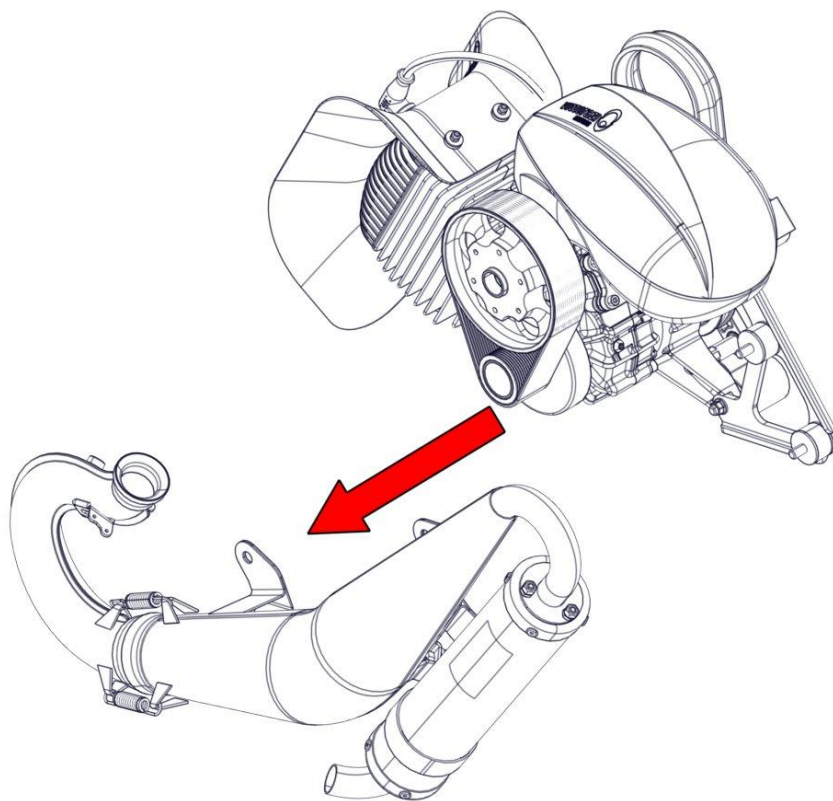
Remove the safety cable around the springs.
Remove the 4 bushing springs.



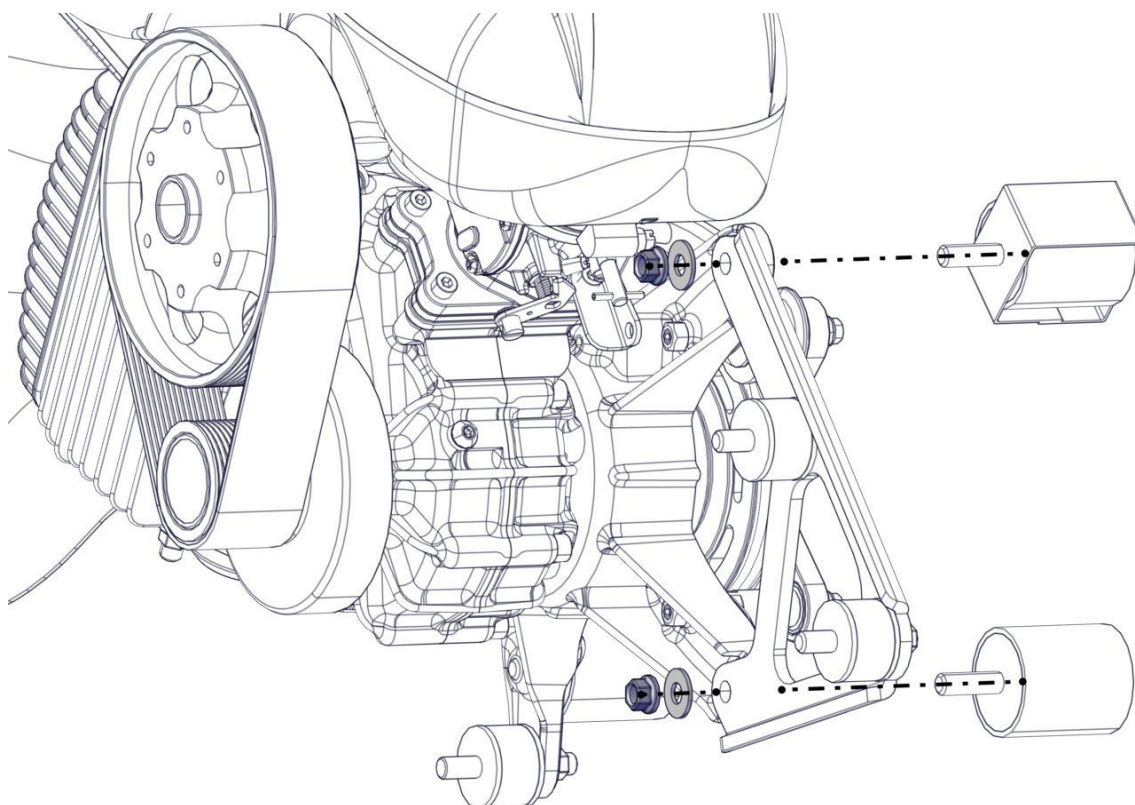
Remove the 3 self-locking nuts M8 with washers.



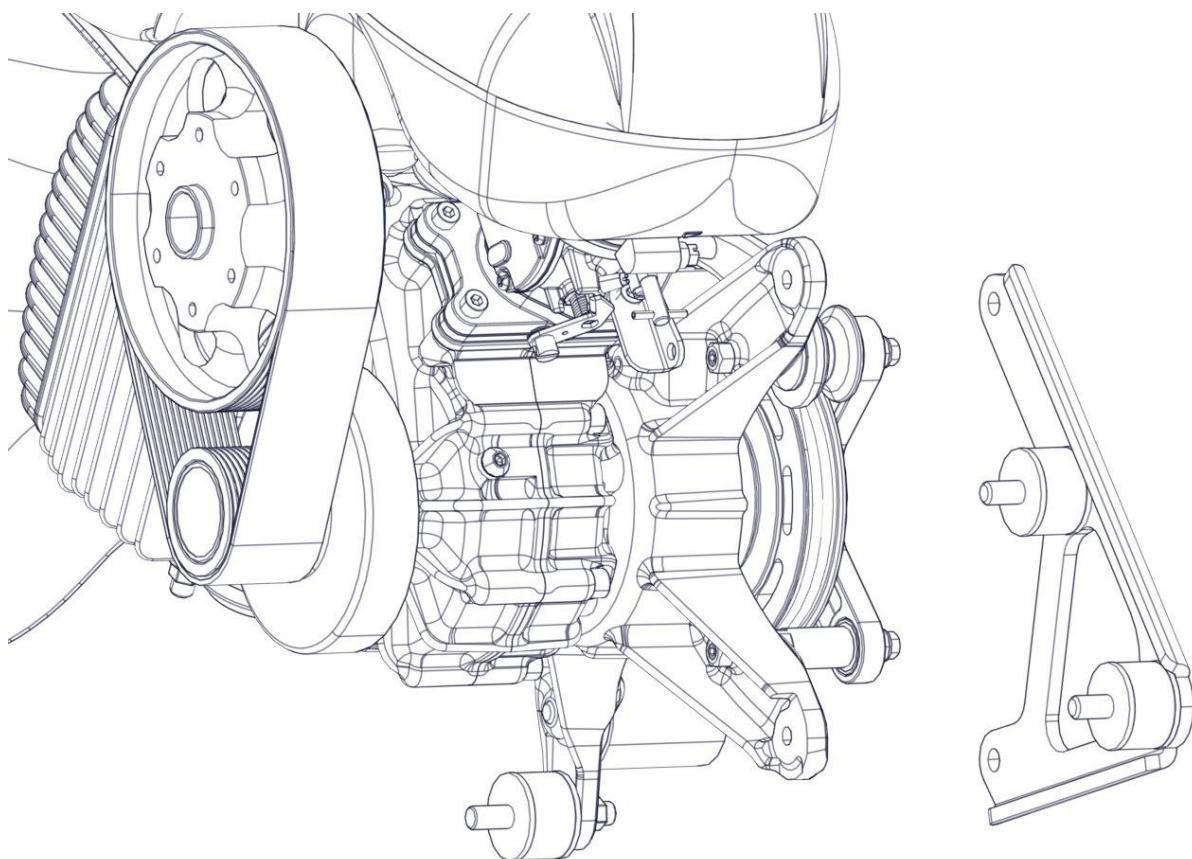
Remove the exhaust system.



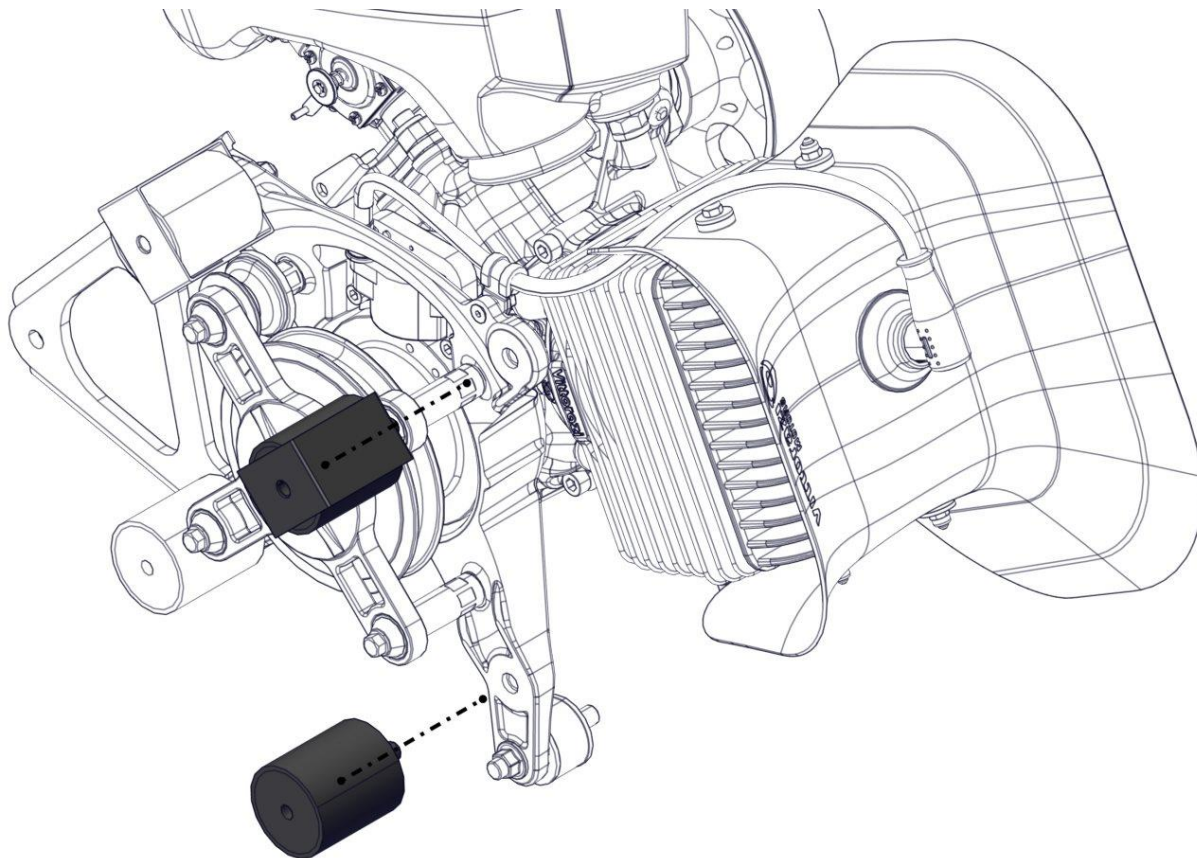
Remove the 2 self-locking nuts M8 with washers and the 2 rubber mountings from the motor mount.



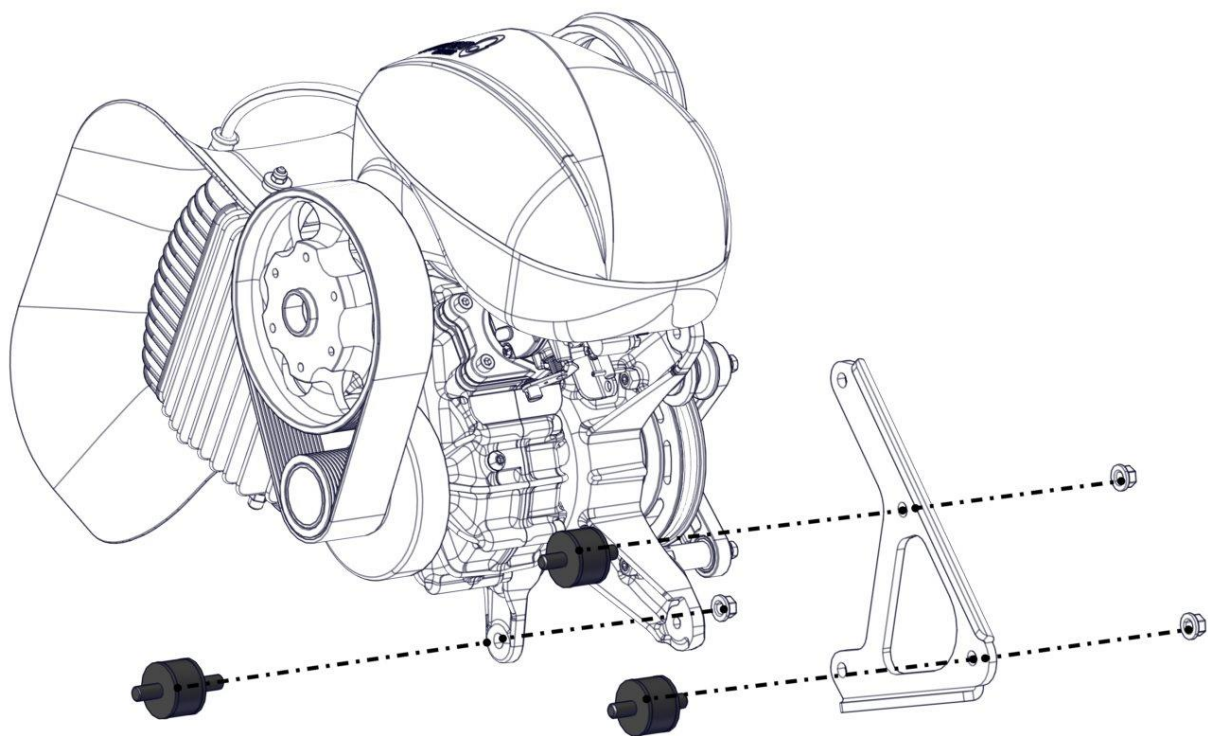
Remove the exhaust support.



Remove the 2 remaining engine rubber mountings.



Remove 3 self-locking nuts M8 and 3 rubber mountings of the exhaust system.



3.8.2 Rubber mountings check

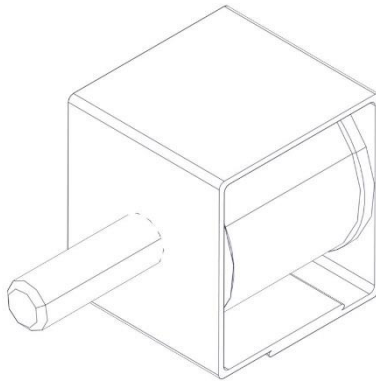


Check the integrity of the rubber mountings: there must be no cracks or detachment of material, otherwise they must be replaced. For routine maintenance, follow the table.

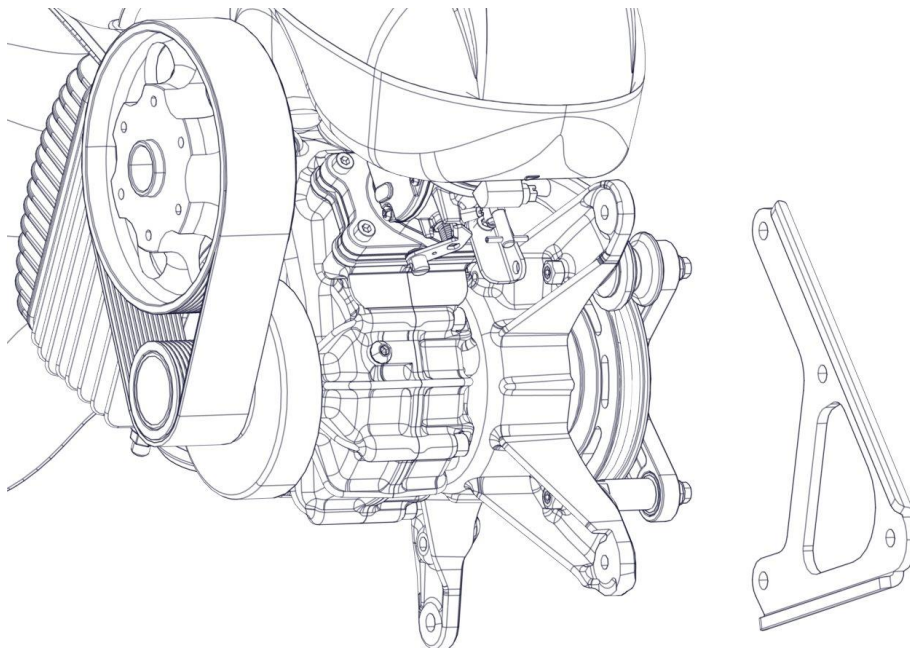
3.8.3 Rubber mountings assembly



Replace the safety belts, the 4 rubber mountings of the engine mount and the 3 rubber mountings of the exhaust system.



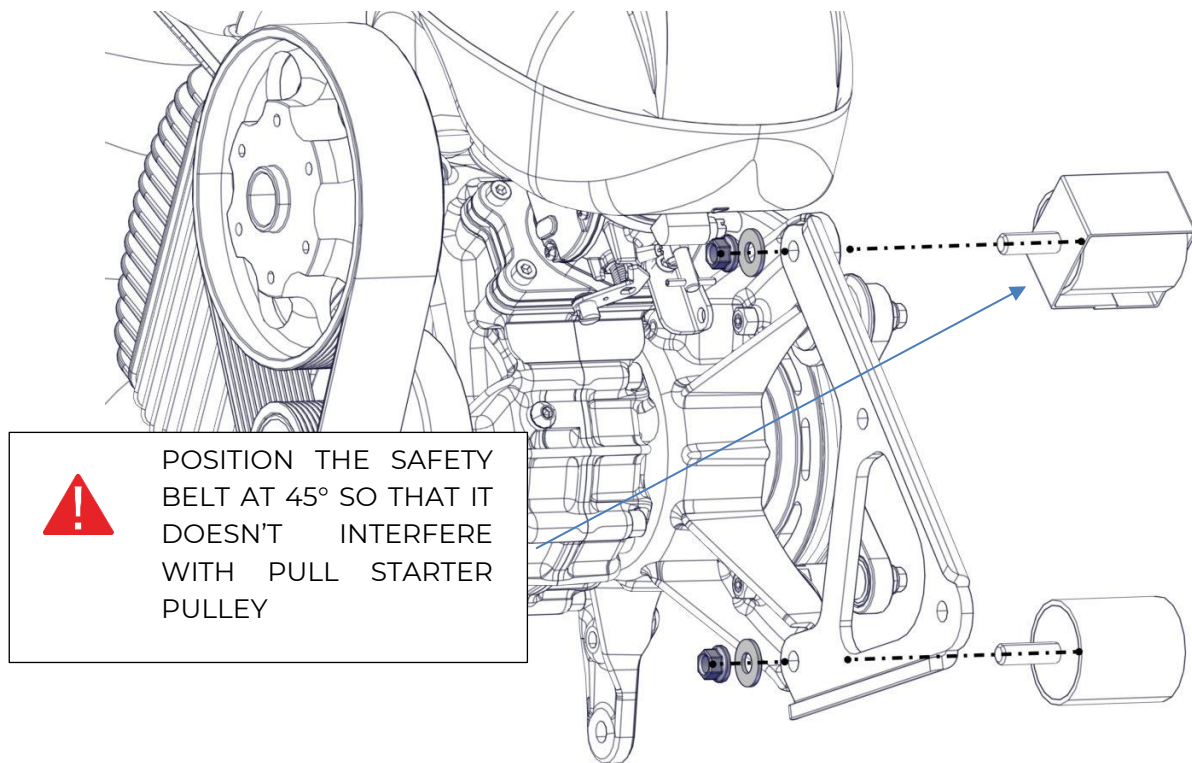
Position the exhaust support.



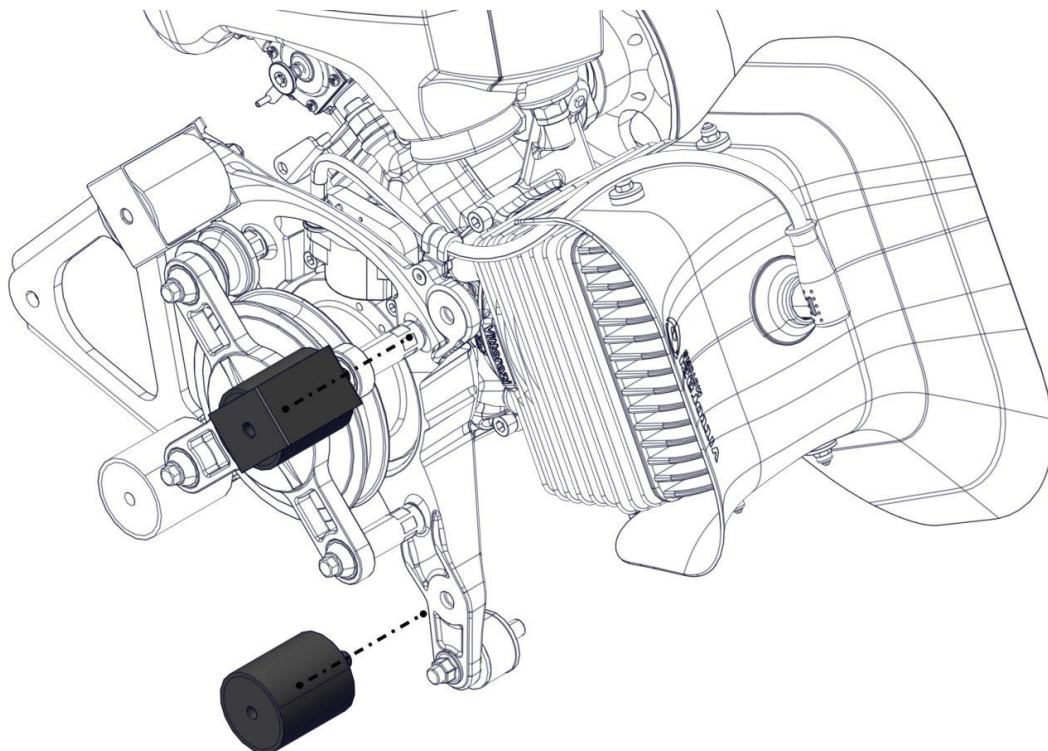


Replace the 2 self-locking nuts M8.

Insert the 2 engine rubber mountings and the 2 self-locking nuts M8 with washers and tighten to 18 Nm.



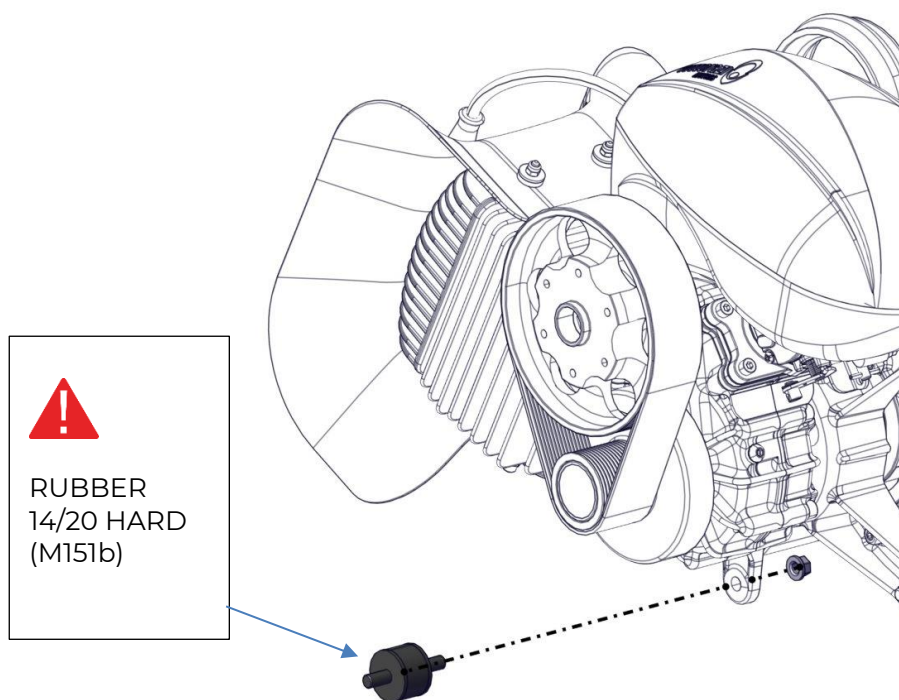
Insert the 2 remaining engine rubber mountings and tighten by hand.



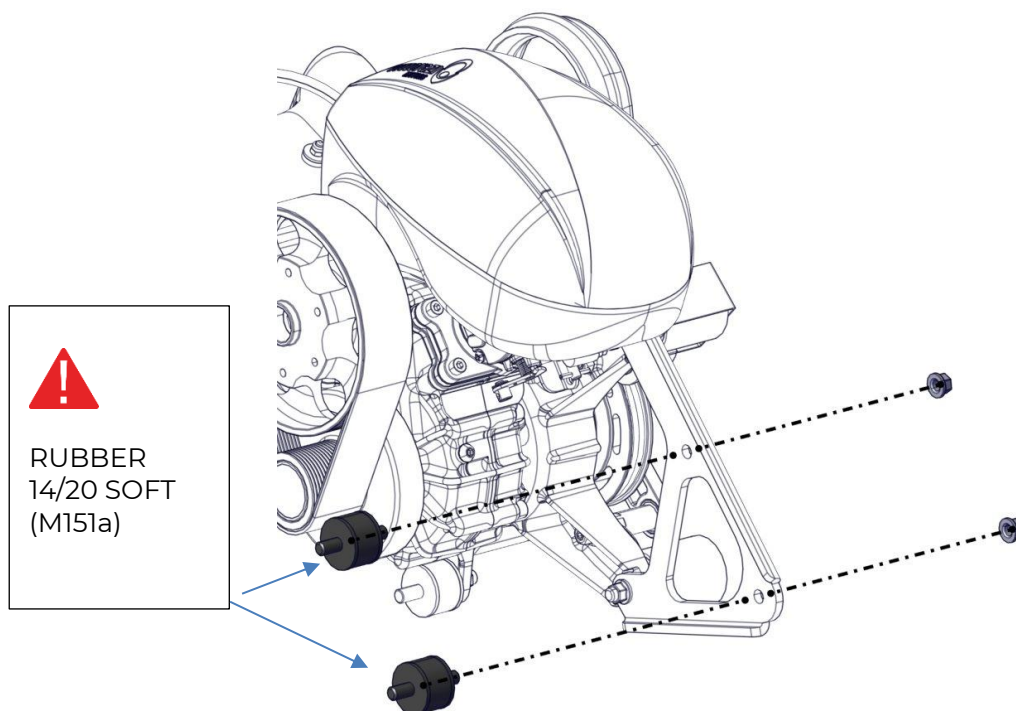


Replace the 3 self-locking nuts M8.

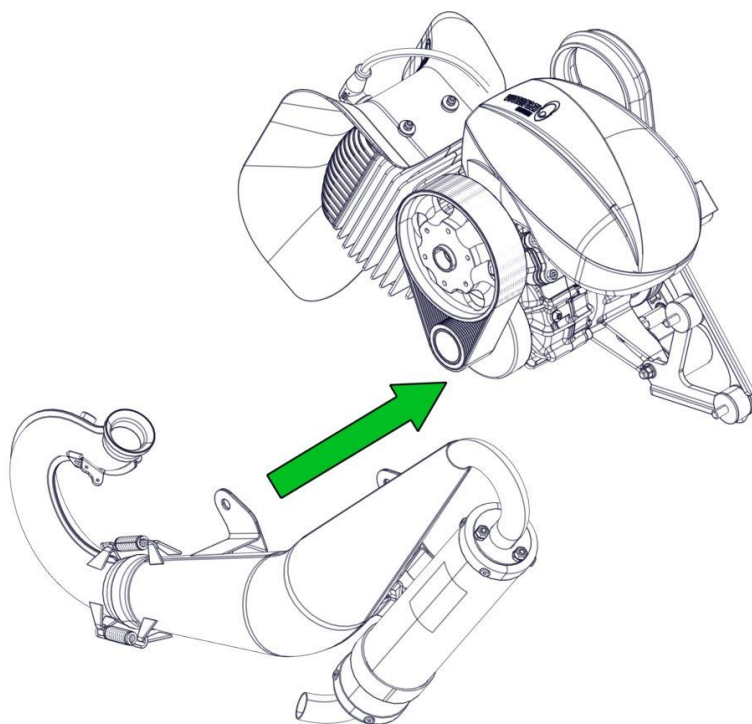
Insert the rubber mounting of the exhaust system shown in the figure, the self-locking nut M8 and tighten to 18 Nm.



Insert the 2 exhaust system rubber mounting shown in the figure, the 2 self-locking nuts M8 and tighten to 15 Nm.

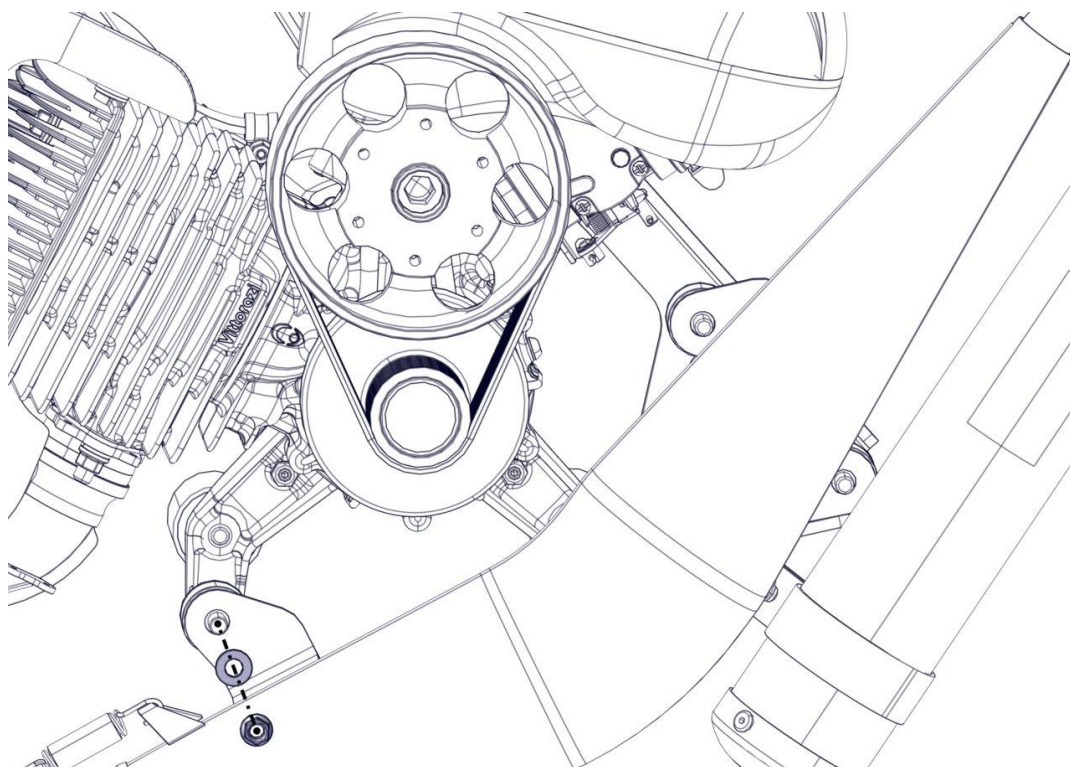


Insert the exhaust system.

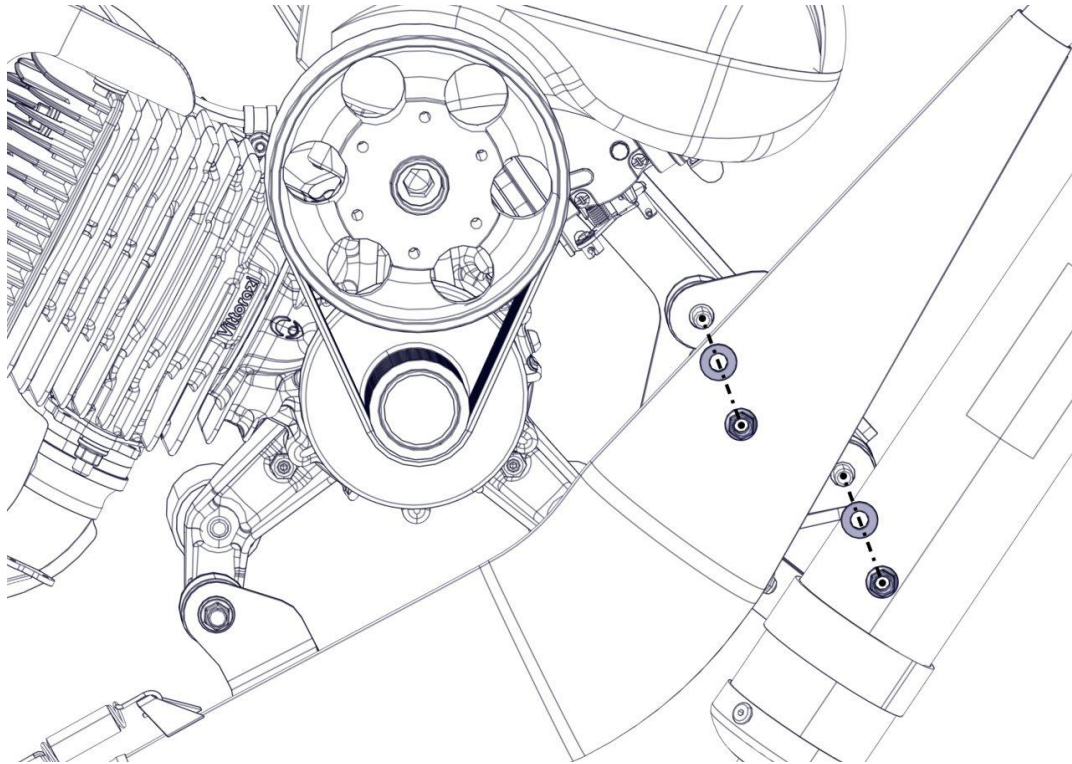


Replace the 3 self-locking nuts M8.

Insert the self-locking nut M8 with washer on the rubber mounting shown in the figure and tighten to 18 Nm.






Insert the 2 self-locking nuts M8 with washers on the rubber mountings shown in the figure and tighten to 15 Nm.



Hook in the 4 bushing springs.
Run a cable around the four bushing springs, insert a clamp on the ends and tighten with pliers.
(Check chapter 3.7 for spring assembling operations)

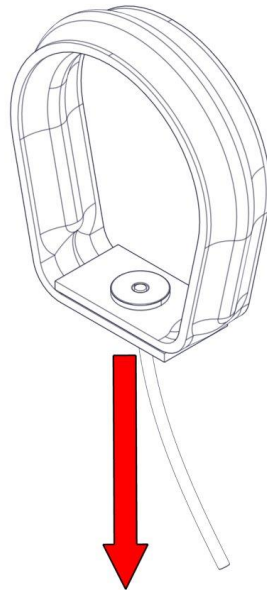
3.9 Pull starter system

 Components to replace		Time limit
	Rope (MFR043).	100h
	Hooks spring (MP057).	100h
	Hooks (MP055).	100h
	Loxéal 24-18/Loctite 222*	100h
	Loxéal 83-55/Loctite 270*	100h
	HHS grease*	100h
	Nanotech lubricant*	100h
 Special tools	Not required.	
 Values	Screw M6x63: 10 Nm.	

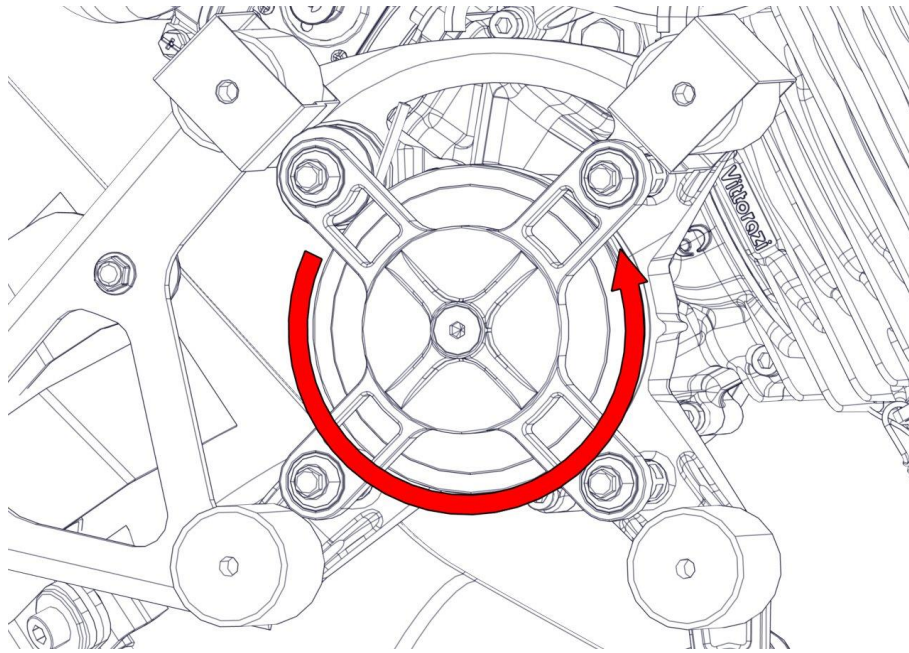
*Always replace it when disassembled.

3.9.1 Pull starter system disassembly

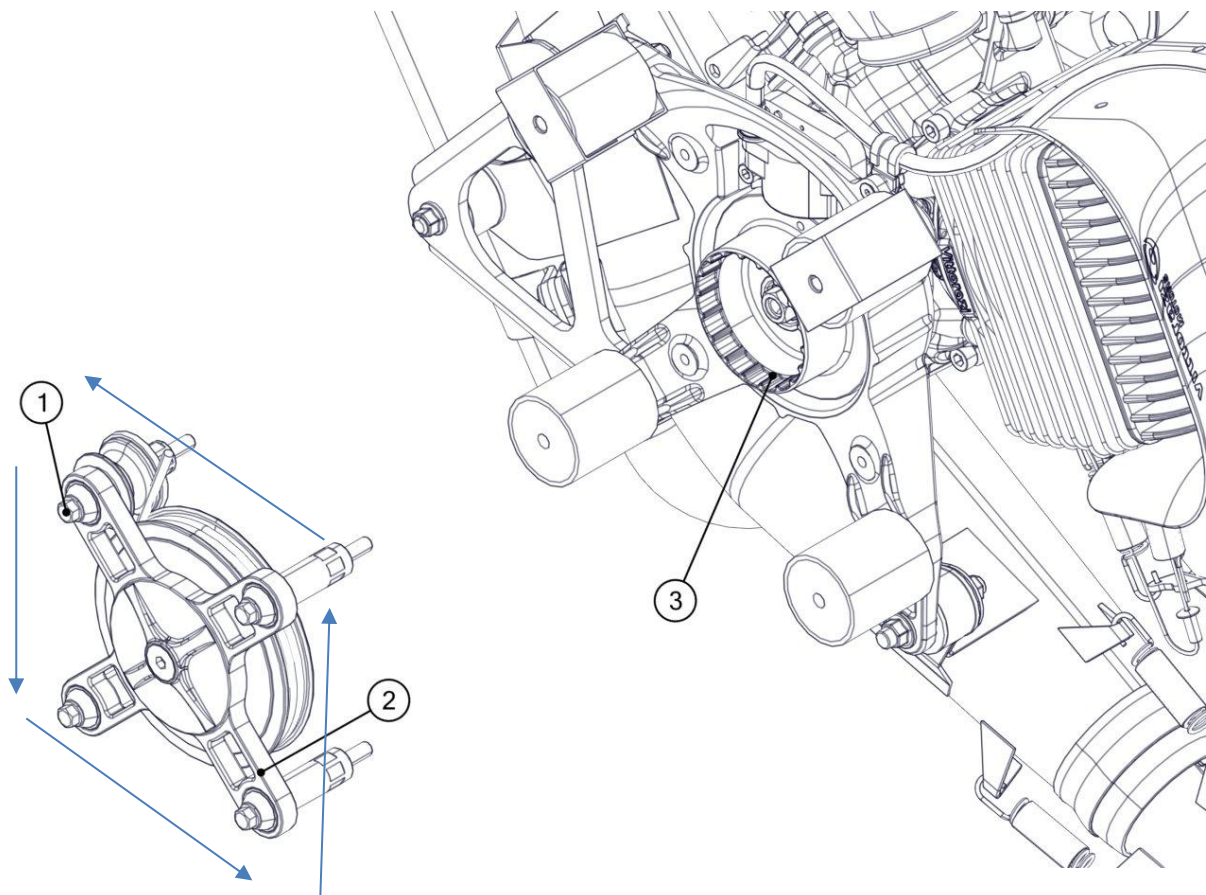
Untie the knot securing the starter handle and pull the rope out of the guide eyelet.



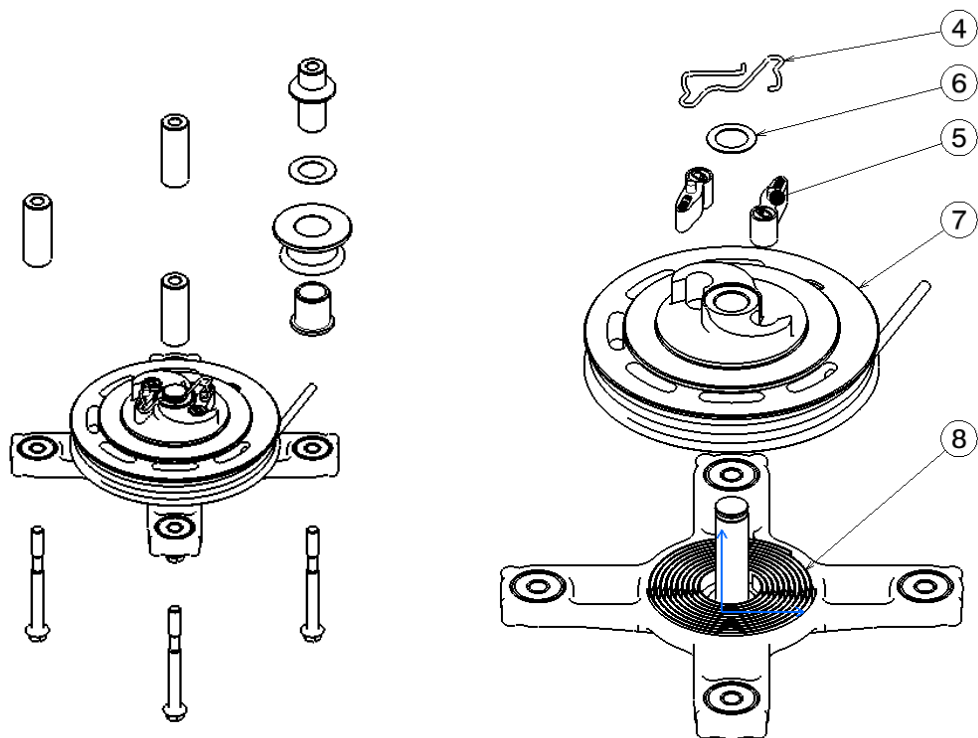
Allow the winding pulley to rotate so that the tension given by the recovery spring is lost.



Gradually unscrew the 4 flange head screws M6x63 (1) on the manual starter bracket (2). Follow the sequence highlighted by the blue arrows. Maximum two complete turns per screw. After removing the manual starter, the cup (3) mounted on the flywheel is visible.



Remove the spring of the hooks (4), the 2 hooks (5), the washers (6) and the pulley (7) taking care to leave the recovery spring (8) in its place.

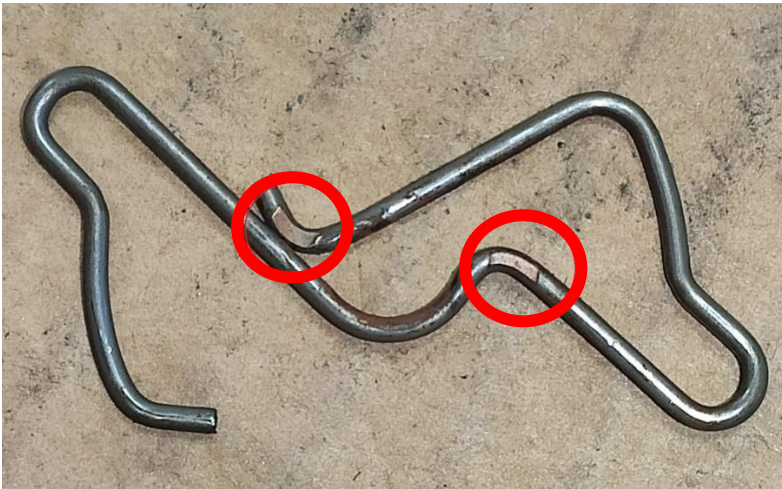


Remove the rope by untying the knot and pulling it off the pulley

3.9.2 Pull starter system maintenance

Check the rope: replace it if it shows signs of wear. For routine maintenance, follow the table.

Check the spring of the hooks: if it shows signs of wear as in the picture, replace it. For routine maintenance, follow the table.

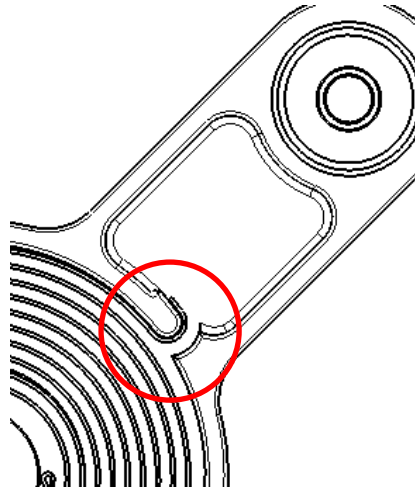


Check the hooks, in particular the tips must not be damaged, otherwise they must be replaced. For routine maintenance, follow the table.

Check the washers: if they show signs of wear as in the picture, replace them with new washers of the same thickness.



Check that the return spring is intact and not deformed, otherwise replace it.



Insert the spring of the hooks on the central pin and turn it, if any blockage or jamming occurs the pin and structure must be replaced.



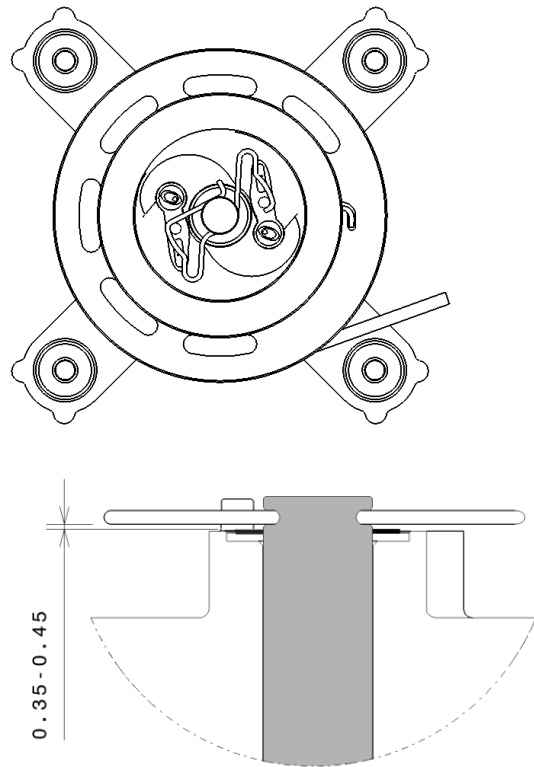
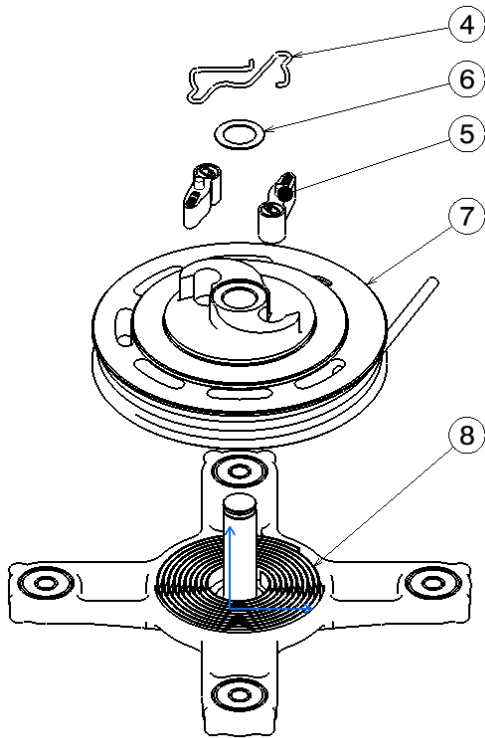
Failure to replace a worn pin can block the movement of the pulley and thus prevent the manual starter rope from being rewound correctly.

3.9.3 Pull starter system assembly

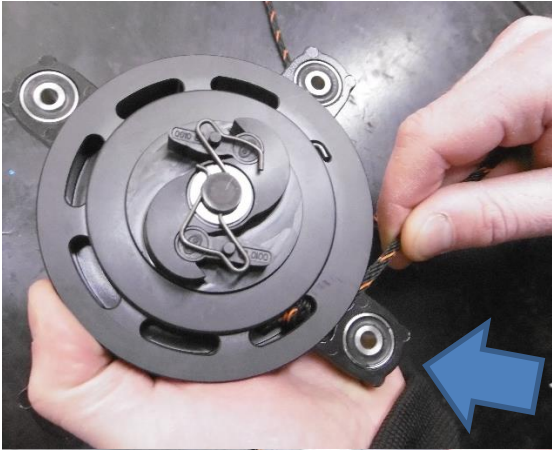


If the washers are different, place the thinner ones first and then the thicker ones.

Insert the washers (6), the 2 hooks (5) and the spring of the hooks (4).



Preload the pulley



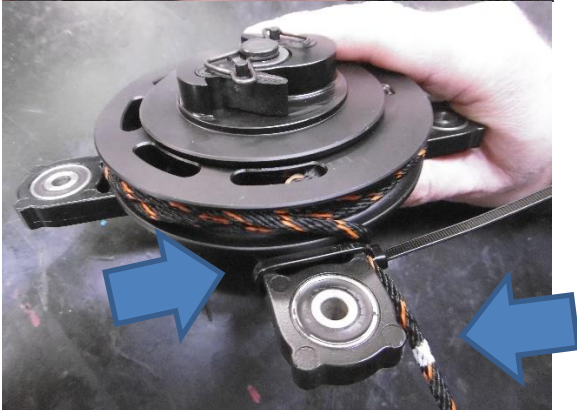
Turn the pulley until you find the origin of the spring tension.

Identify the hole for the pull starter pulley pulley



Hold the pulley in place and wind 3 turns of rope counterclockwise.

Turn the pulley 3 turns anticlockwise to get the correct preload of the recovery spring.



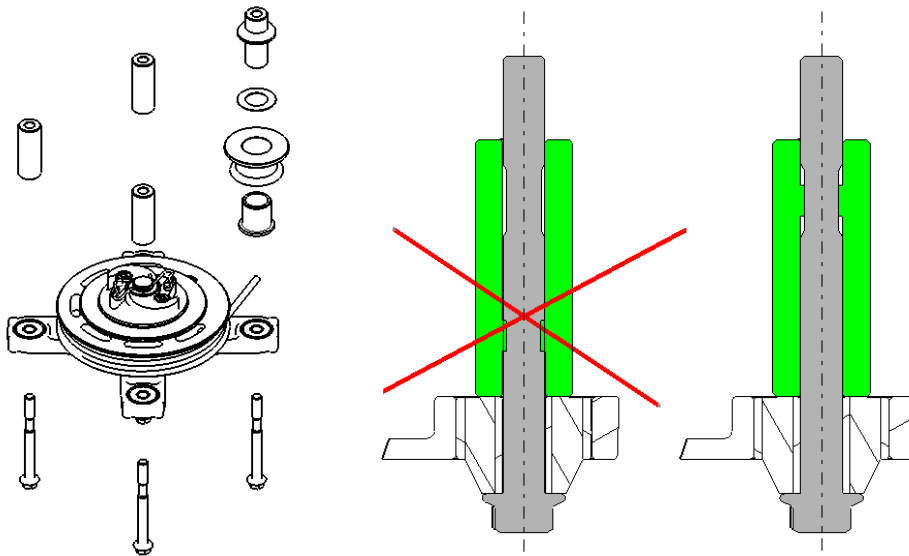
Secure the rope with a cable tie and make a white mark on the rope.

When the engine will be installed on the paramotor:

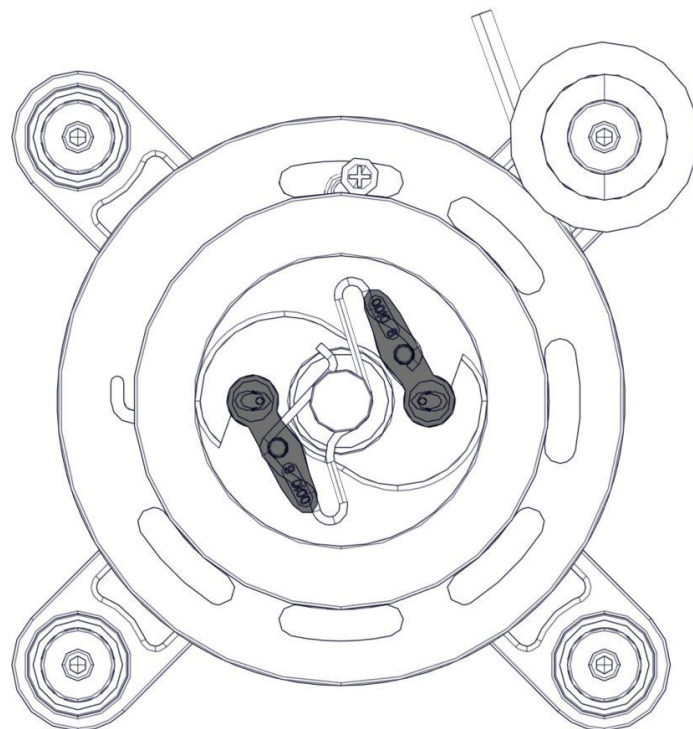
- check the position of the white mark
- remove the cable tie

(see the installation manual for more information)

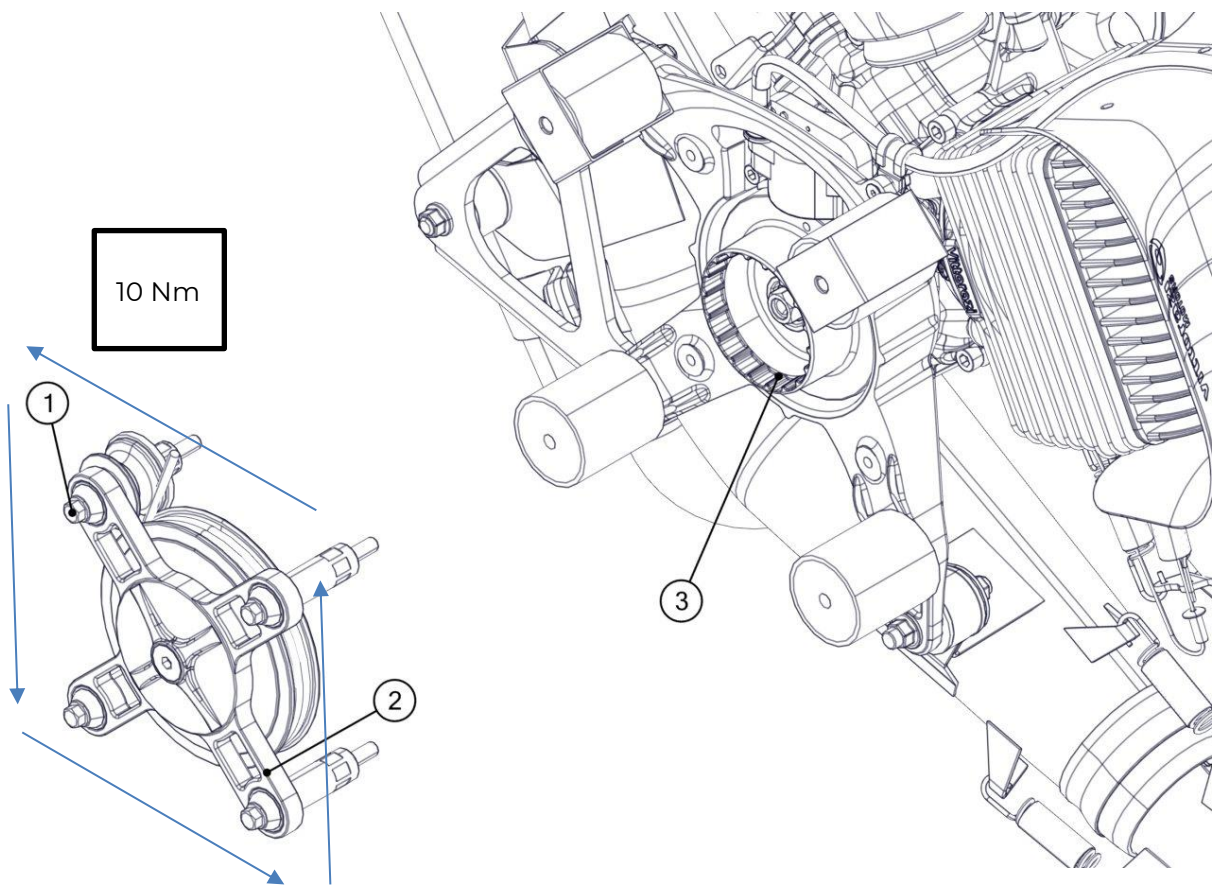
Screw the captive screw to the turrets



Before final assembly of the manual starter on the engine, check that the hooks are in the closed position, otherwise they may be damaged.






Insert the 4 flange head screws M6x63 (1) with threadlocker (Loxreal 24-18/Loctite 222 recommended) into the manual starter bracket (2). Tighten the 4 screws progressively and tighten to 10 Nm according to the pattern identified by the blue arrows. Maximum 2 turns per screw.



Check the installation manual for more installation operations.

3.10 Flywheel, coil

 Components to replace		Time limit
	Flywheel (M034s).	on condition
	Nut M10x1,25 (M037) *	200 h
	Washer (M037) *	200 h
	Paste Wurth 0893921501.	200 h
 Special tools	Piston lock. (ACC104) Flywheel puller (ACC102)	
 Values	Nut M10x1,25: 52 Nm. Ignition coil to flywheel distance: 0,3 mm.	

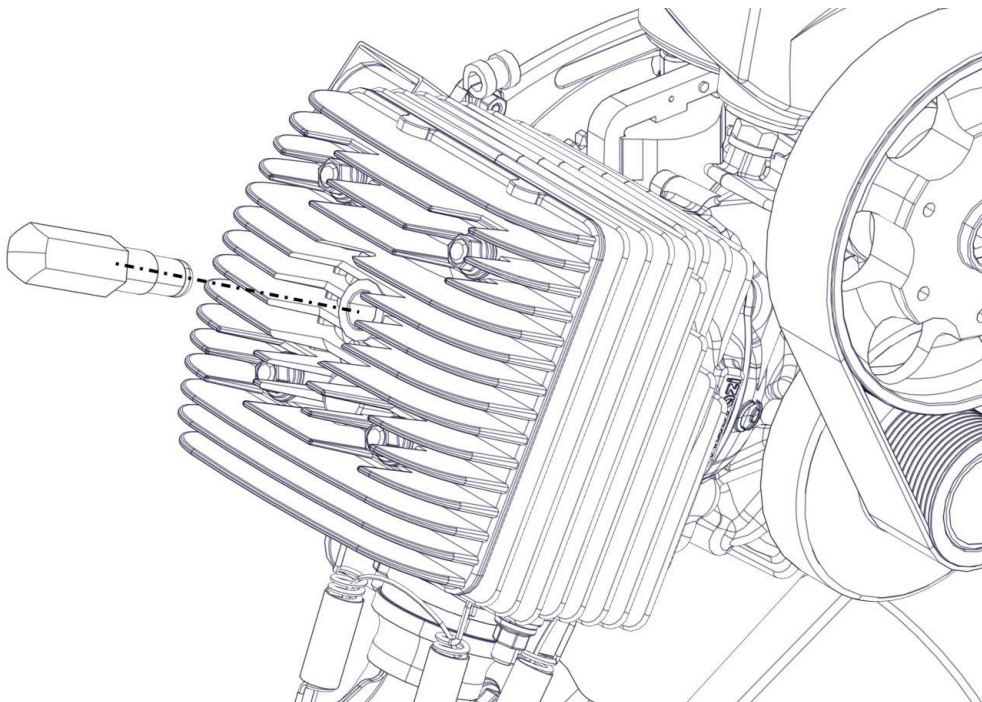
*Always replace it when disassembled.

3.10.1 Flywheel, coil disassembly



Before dismantling the flywheel, remove the spark plug (3.2 Spark plug) and pull starter system (3.9 Pull starter system).

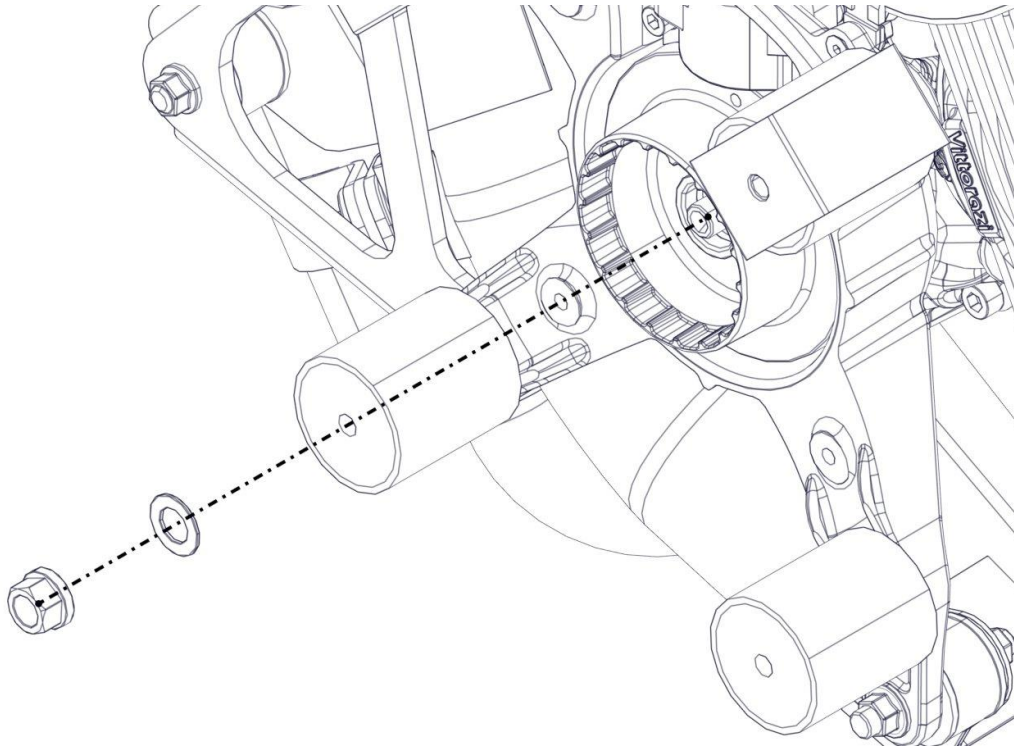
Screw the piston lock into the spark plug hole.



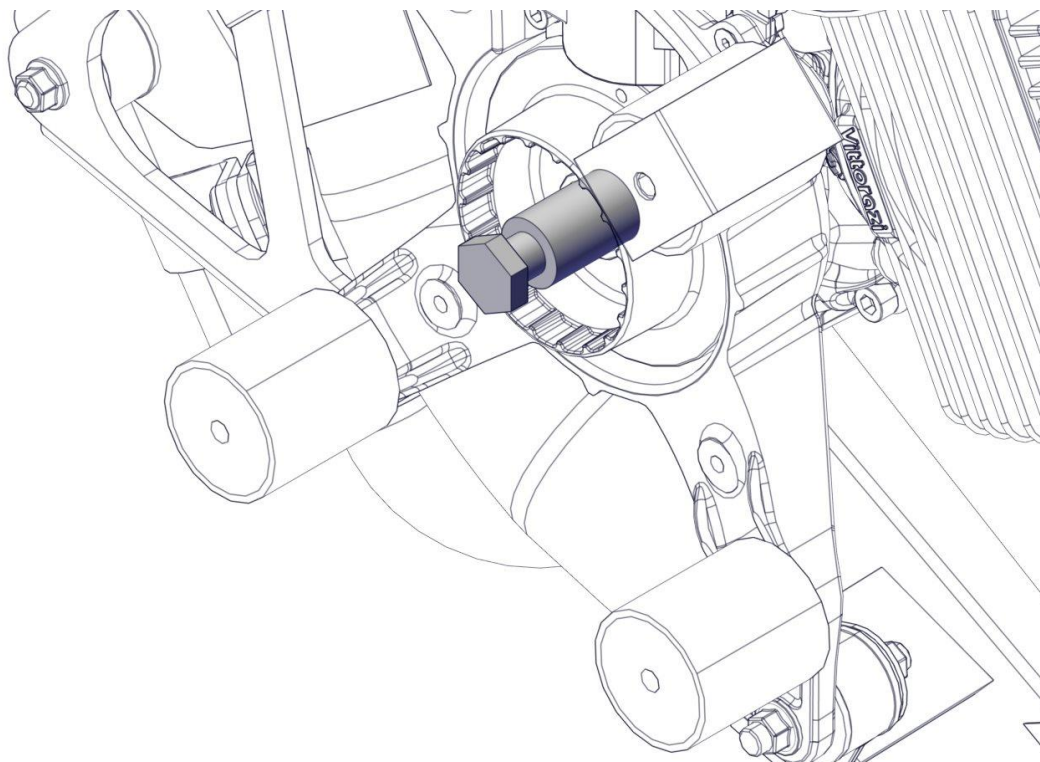


Unscrew the nut M10x1,25. Do not use a pneumatic gun, otherwise the piston may be damaged.

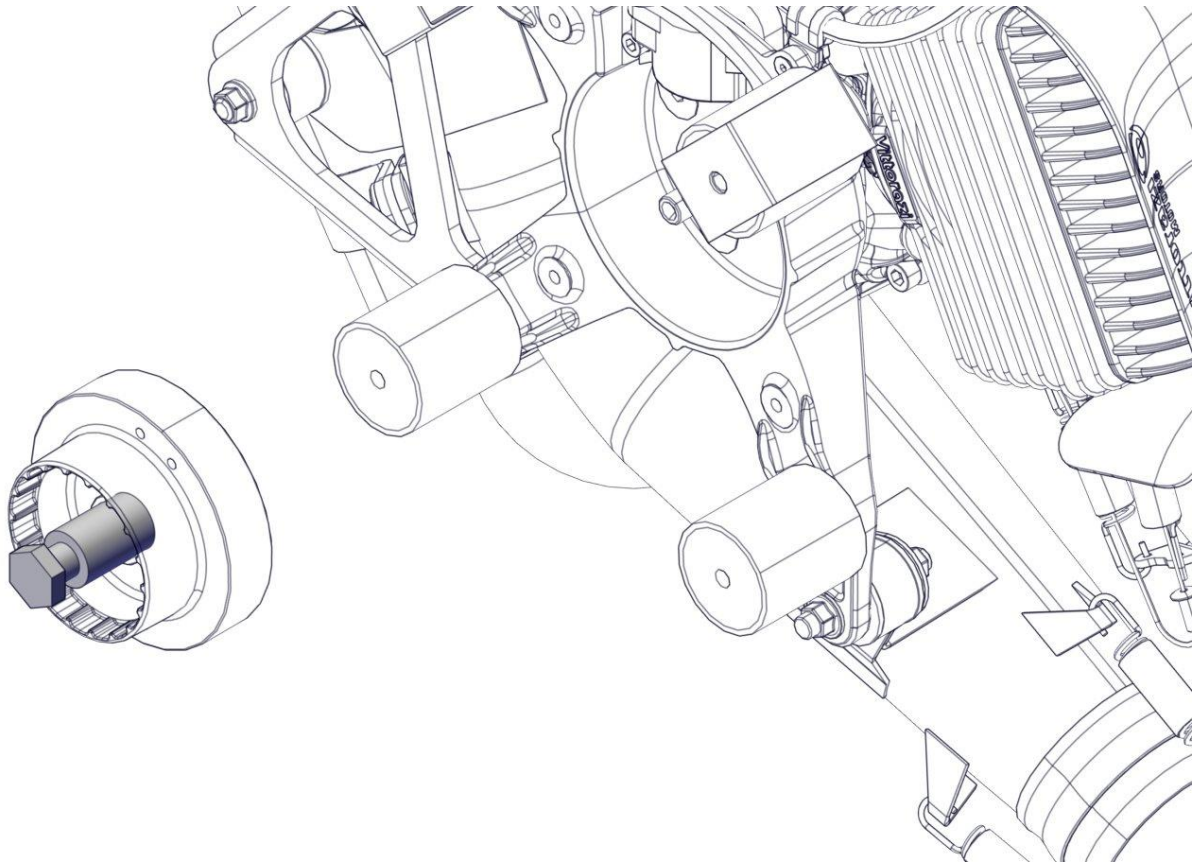
Remove the nut M10x1,25 with the washer 10,5x18.



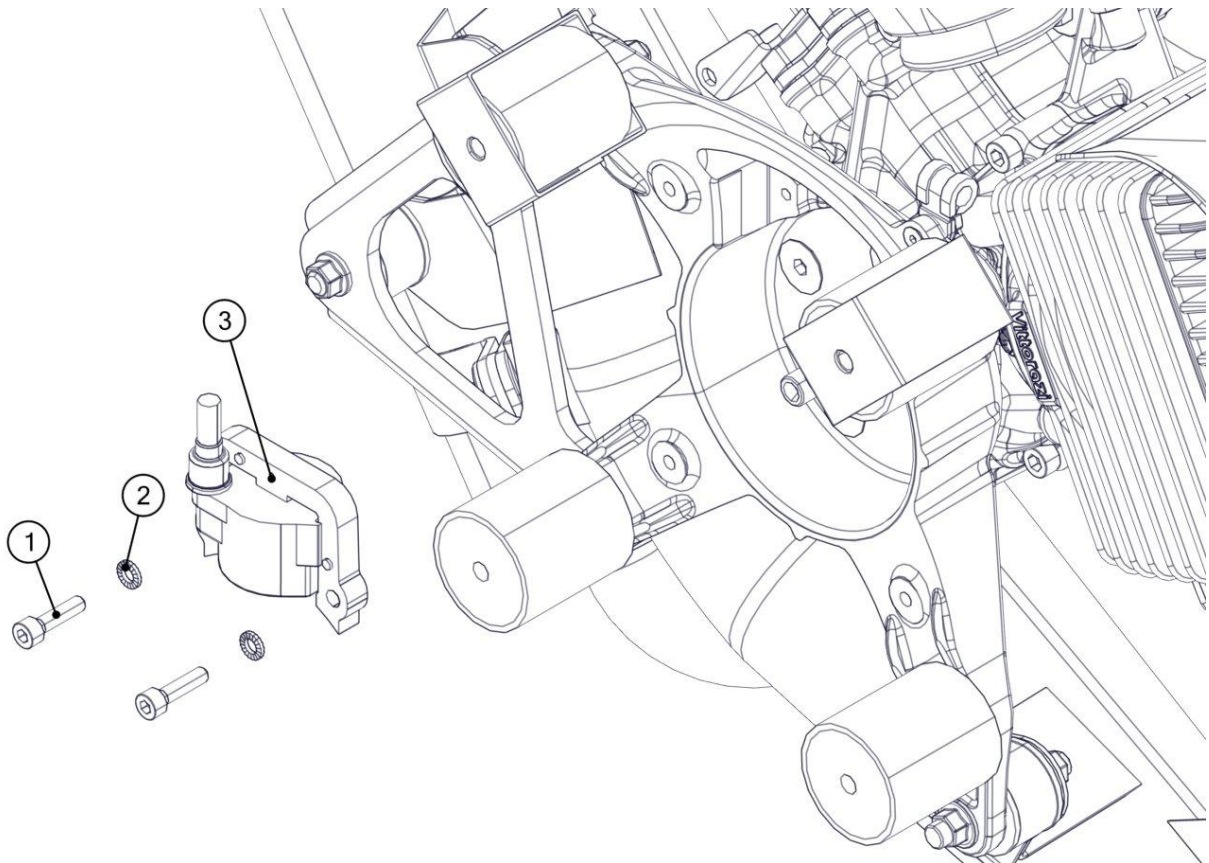
Screw the flywheel extractor into the starter cup.



Turn the central pin of the extractor until the flywheel is removed from the crankshaft.



Remove the 2 Allen screws M5x20 (1) with washers (2) from the coil (3).
Remove the coil (3).



3.13.2 Flywheel, coil maintenance

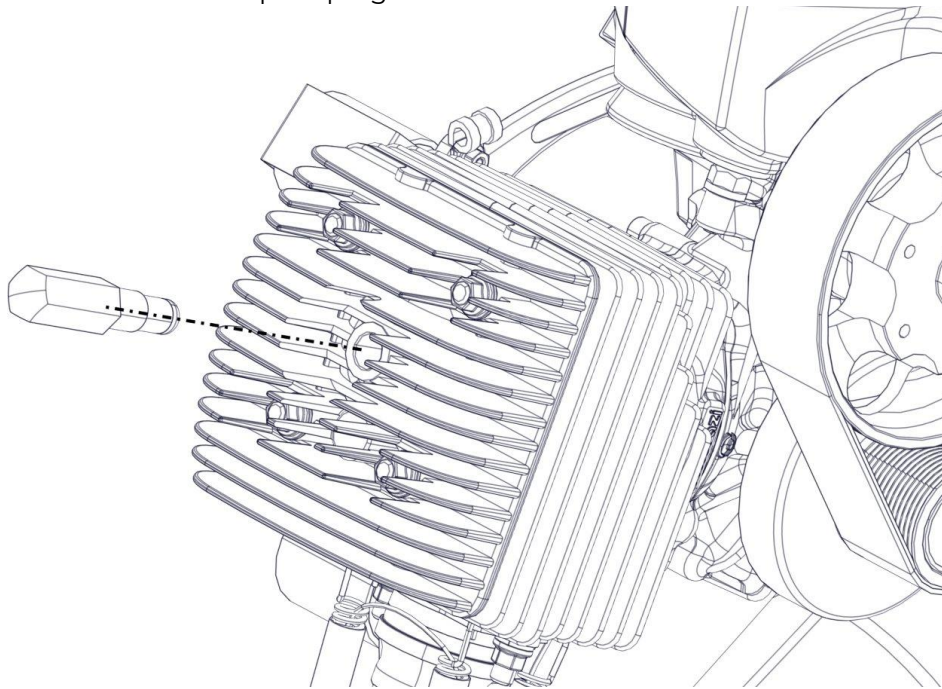
Check the integrity of the flywheel: there must be no cracks or damaged areas, otherwise replace it.

Measure the resistance of the coil if out of tolerance replace it.

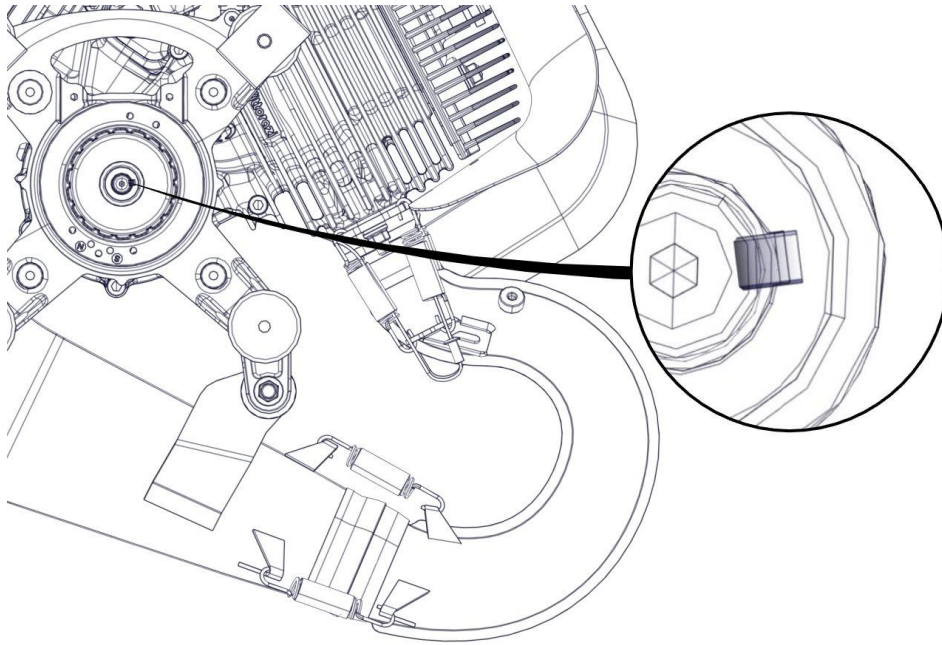
COIL	POSITION	RESISTANCE
IGNITION COIL	HV.CABLE-EARTH	4,8 kOhm +/- 10%, (@25°C)
IGNITION COIL	FASTON-EARTH	CONTNUITY OR CLOSE TO 1 OHM

3.13.3 Flywheel, coil assembly

Screw the piston block into the spark plug hole.

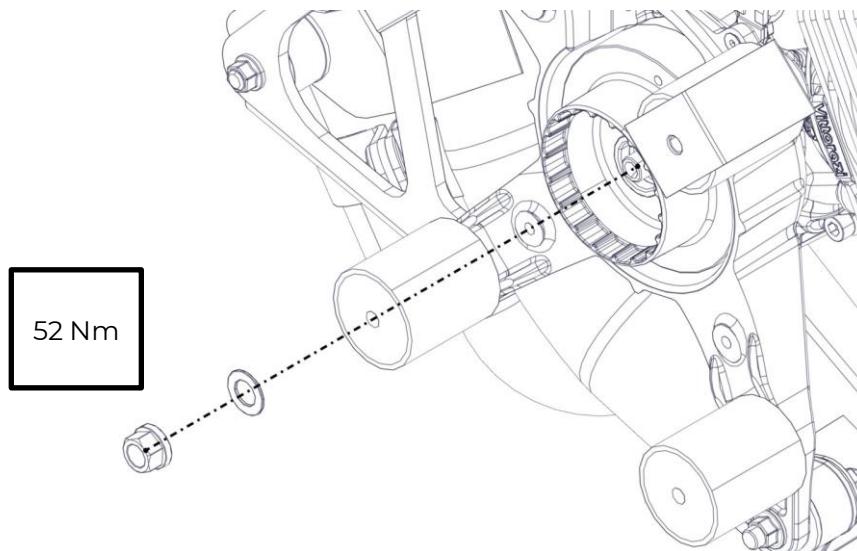


Position the flywheel on the crankshaft by aligning the key with the flywheel groove. The position of the key and therefore of the flywheel determines the timing of the engine.

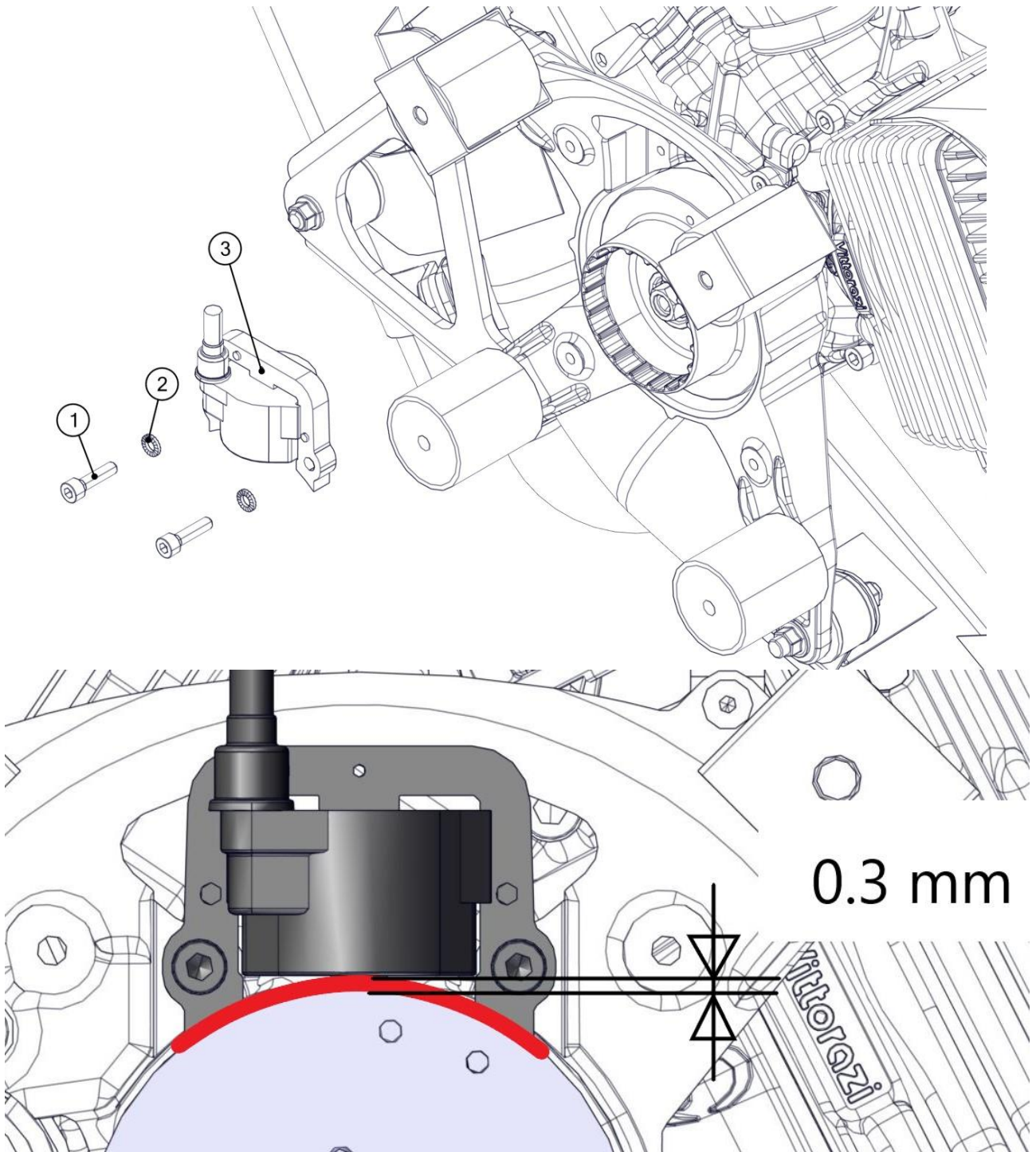


Replace the nut M10x1,25 and the washer 10,5x18.




Insert the nut M10x1,25 with the washer 10,5x18 and tighten with the torque shown in the figure.



Add Wurth paste 0893921501 to the screws M5x20.
Insert the coil (3) and the 2 Allen screws M5x20 (1) with washers (2) without tightening.
Place 0,3 mm shims between the coil and the flywheel.
Tighten the coil screws by hand.
Remove the shims.



3.11 Transmission

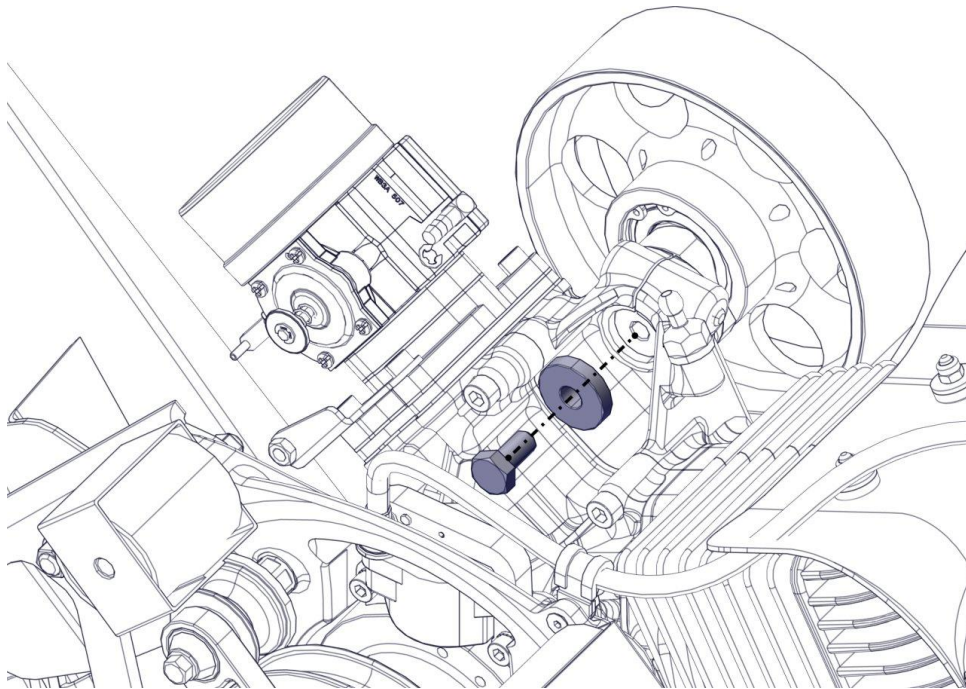
 Components to replace		Time limit	
		Transmission bearings (MP106, M114)	150 h
		Centrifugal clutch (MP102).	150 h
		Belt (M117).	100 h
		Clutch bell (MFR104)	on condition
	Transmission bearings (MP106, M114). Centrifugal clutch (MP102, MP103). Belt (M117). Clutch bell (MFR104). Paste Wurth 0893921502.		
 Special tools	Clutch bell puller. Piston lock.		
 Values	Screw M8x16: 25 Nm. Screw M6x35: 12 Nm. Belt: first installation 500-520 Hz; Retensioning 470-490 Hz.		



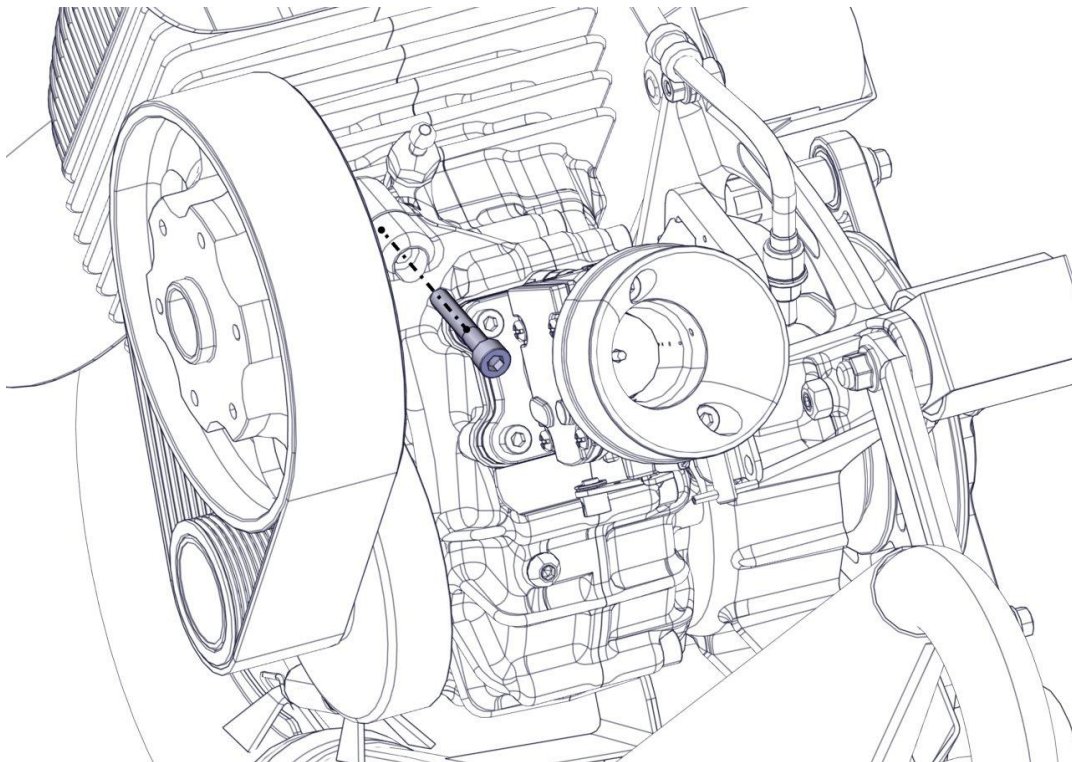
Before proceeding with the next operations on the transmission, remove the airbox (3.3 Airbox).

3.11.1 Belt removal

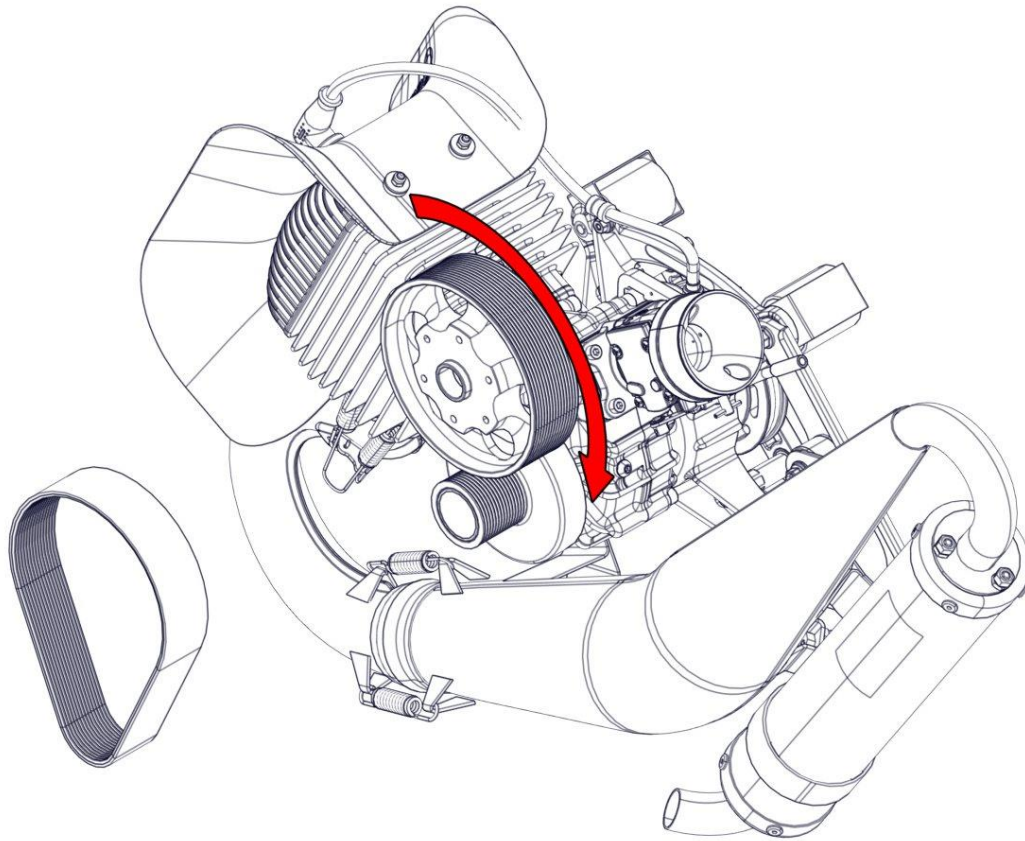
Remove the hexagonal screw M8x16 with washer from the pulley eccentric.



Remove the Allen screw M6x35 on the eccentric side.

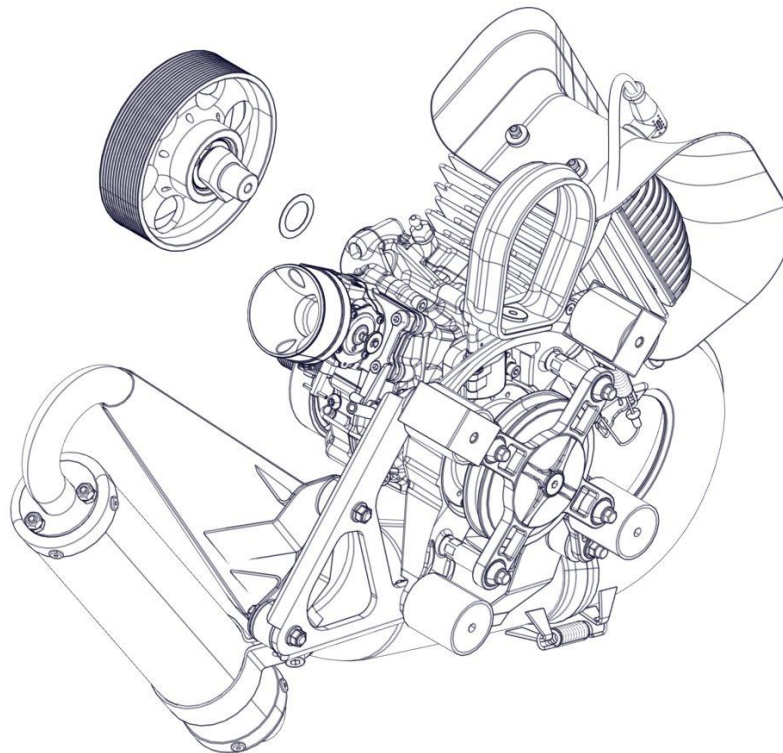


Turn the eccentric clockwise to release the belt tension.
Remove the belt from the pulley.

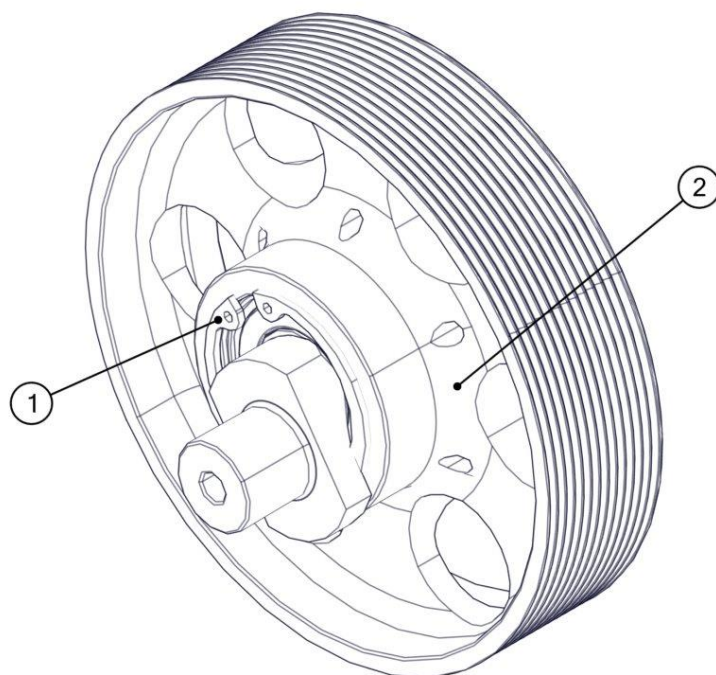


3.11.2 Belt disassembly

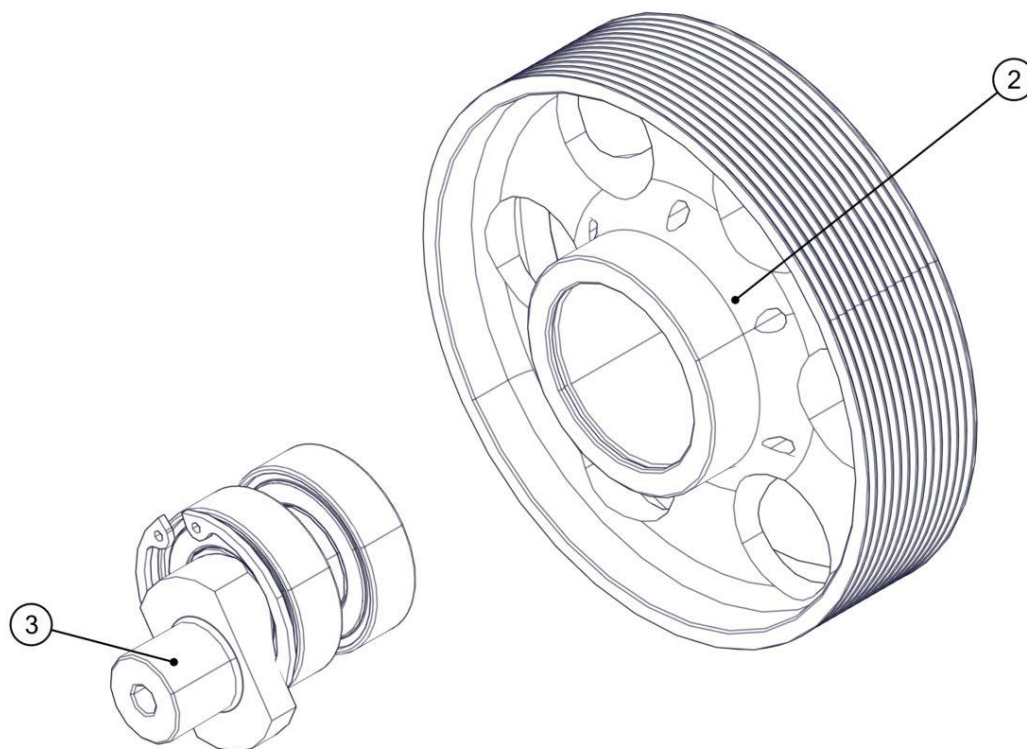
Remove the pulley and washer.



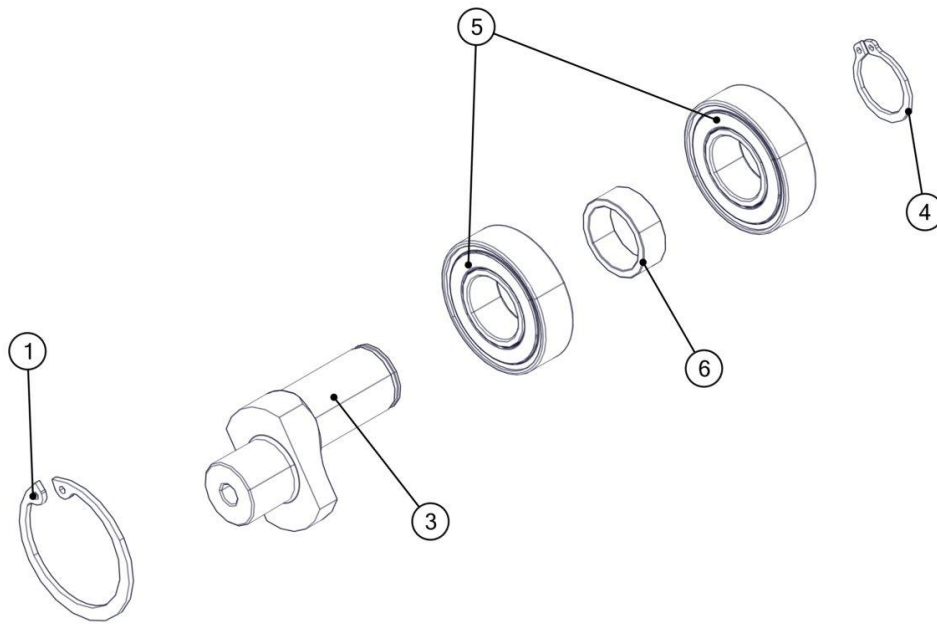
Remove Seeger ring (1) from the seat on the pulley (2).



Heat the central part of the pulley to 120 °C.
Remove the eccentric (3) with the 2 bearings from the pulley (2).

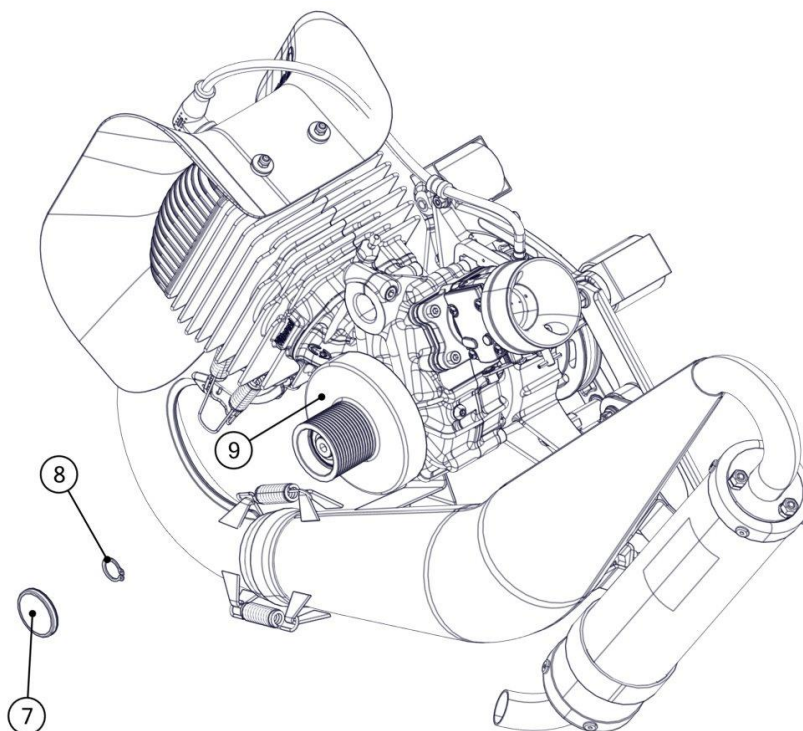


Remove the 2 Seeger rings (1, 4), the 2 bearings (5) with a bearing extractor and the spacer (6) from the eccentric (3).



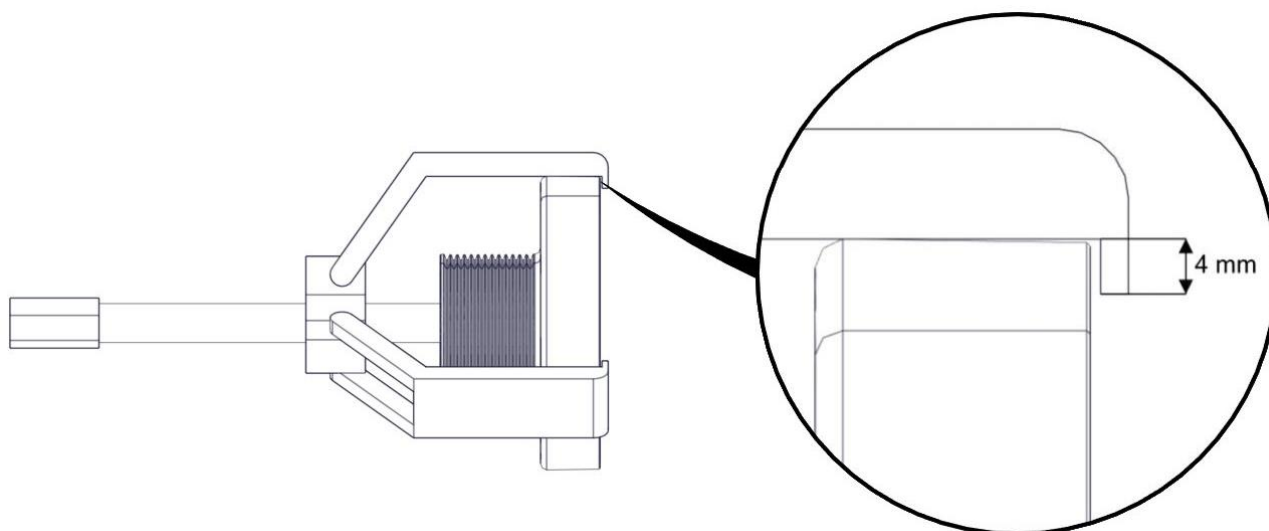
3.11.3 Bell, clutch disassembly

Remove the cover (7) from the clutch bell (9): for removal, insert a self-tapping screw M4x35 in the centre of the cover (7).
Remove the Seeger ring (8).

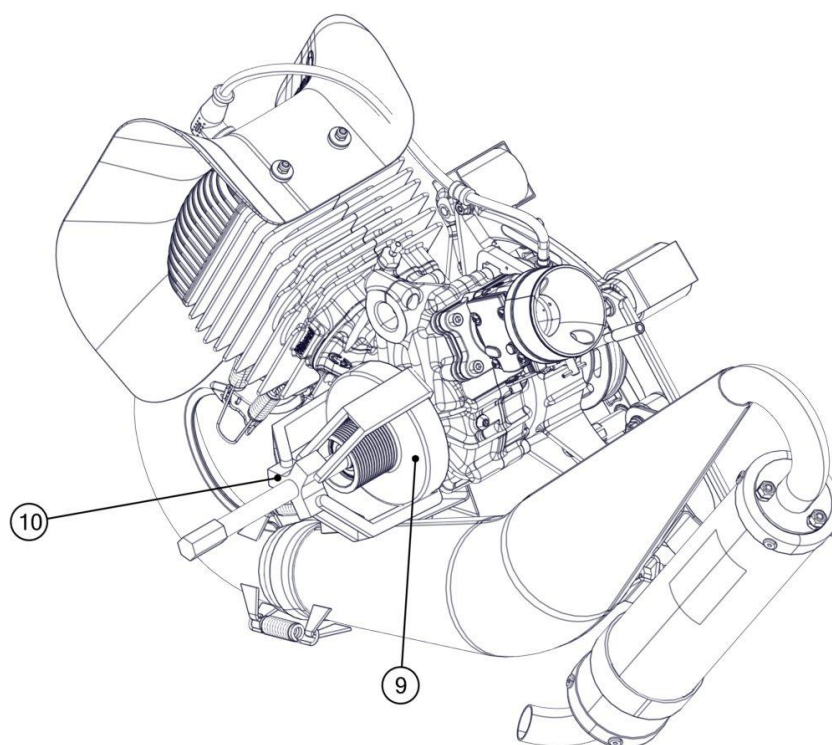




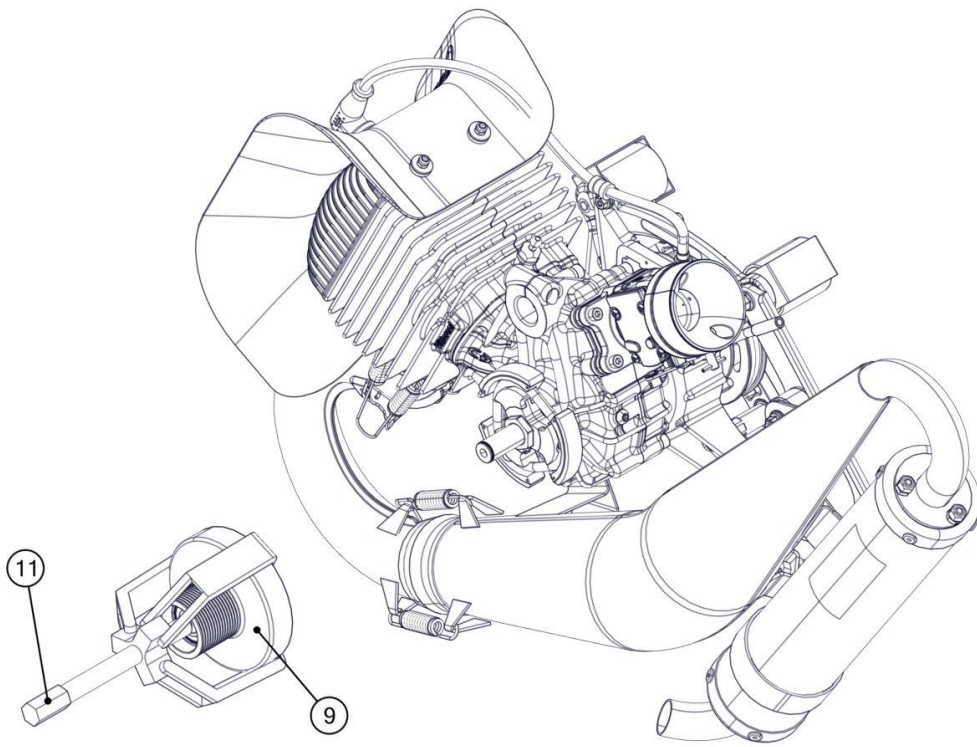
Use an extractor with a maximum hook length of 4 mm.



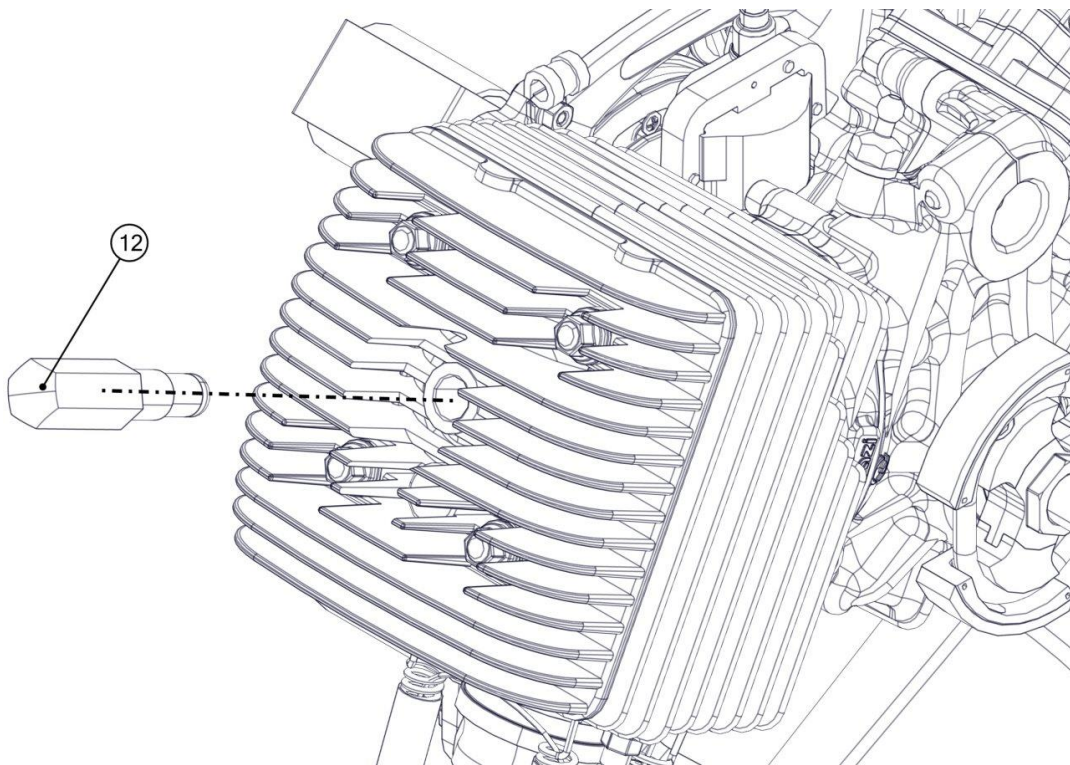
Position the extractor (10) on the clutch bell (9).



Turn the central pin (11) until the clutch bell (9) is removed.



Screw the piston lock (12) into the spark plug hole.

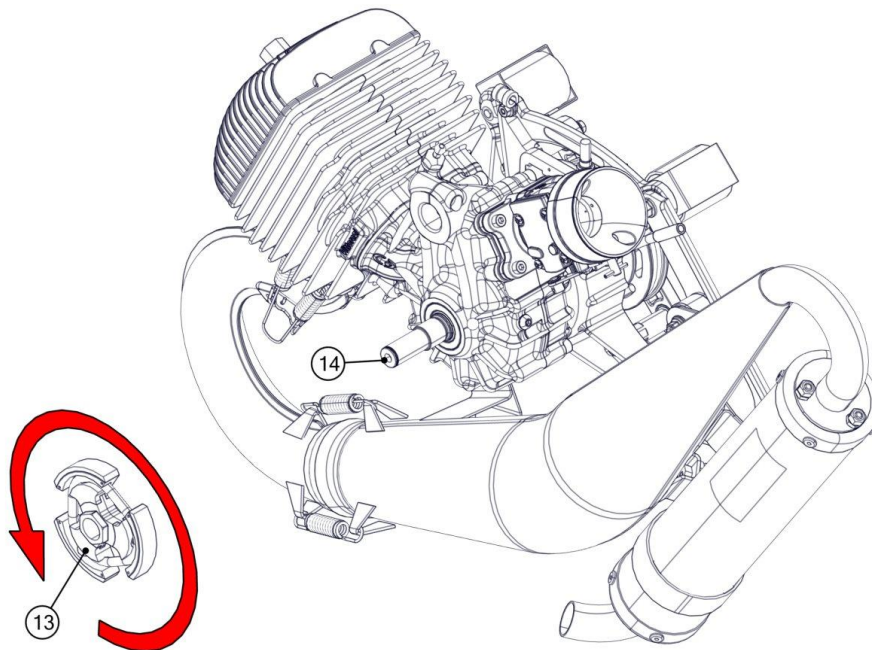


Turn the crankshaft anti-clockwise until the piston is in contact with the piston lock.



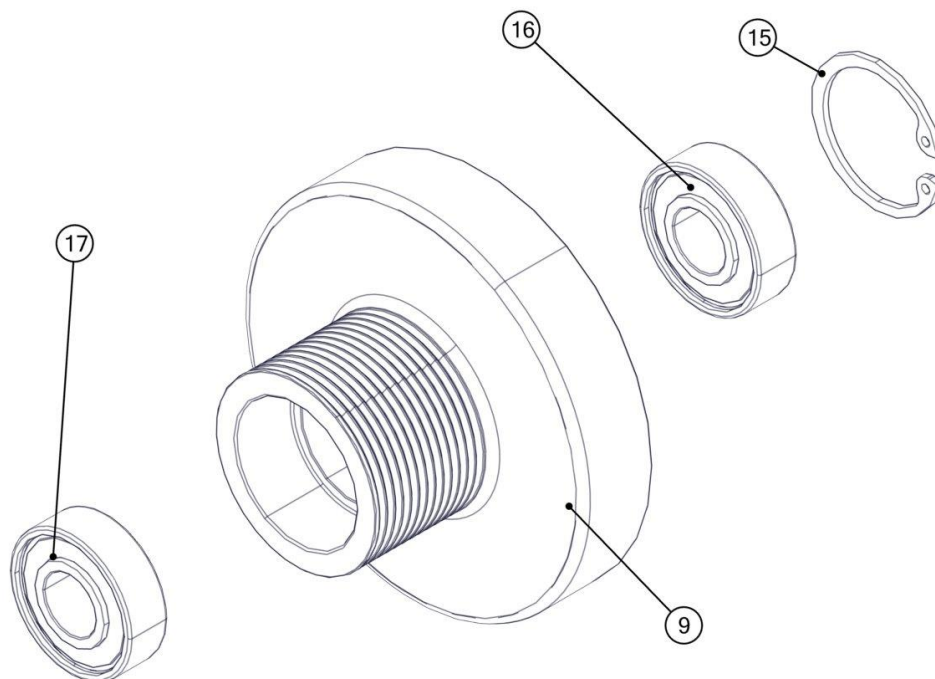
Heat the clutch to facilitate disassembly.

Unscrew the clutch (13) until it is removed from the crankshaft (14). Do not use a pneumatic impact screwdriver, otherwise the piston may be damaged.



Heat the clutch bell to 120 °C.

Remove the Seeger ring (15) and the 2 bearings (16, 17) from the clutch bell (9).



3.11.4 Transmission maintenance

Thoroughly clean the clutch bell, the pulley and remove belt residues from the grooves with solvent.

In the photo there are rubber residues on the clutch bell.



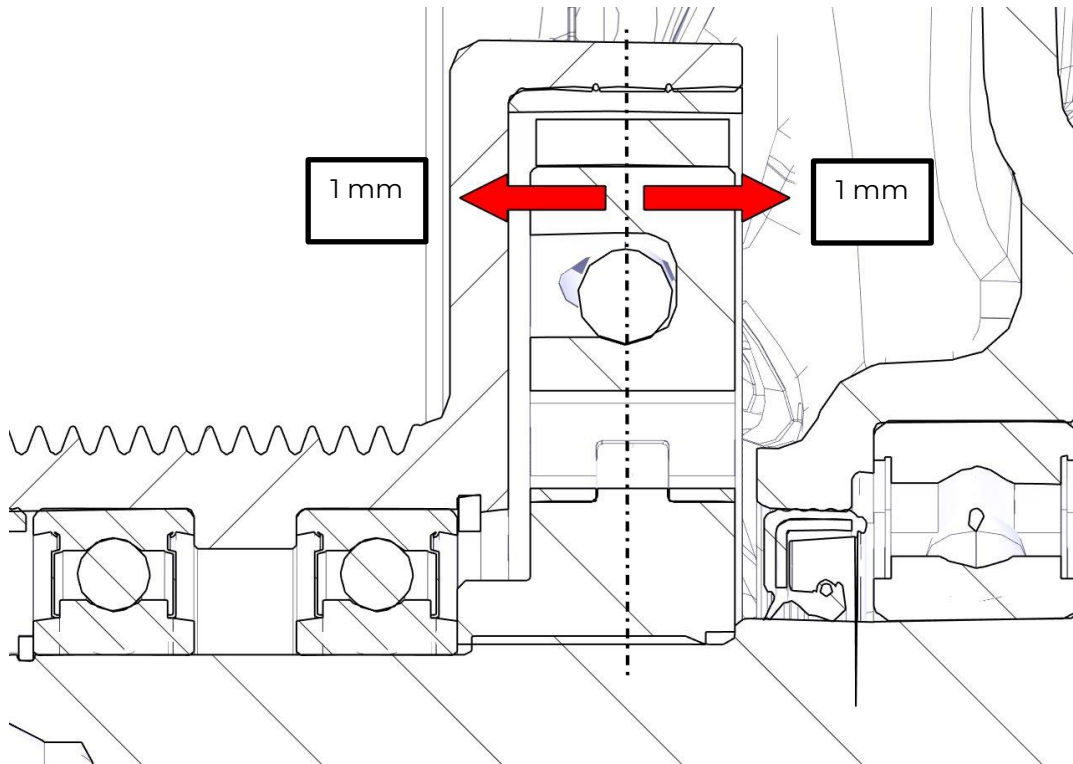
Check that the belt does not show signs of wear or damage, otherwise (as in photo) it must be replaced. If the belt has not been used for a long time, check that it is soft, otherwise it must be replaced. For routine maintenance, follow the table.



Check the clutch bell, in particular the inner surface in contact with the friction material must not show any scratches or different colouring due to overheating, otherwise it must be replaced. For routine maintenance, follow the table.

Check the clutch: the friction material on the pads must be intact and not show any scoring or burn marks, otherwise it must be replaced. For routine maintenance, follow the table.

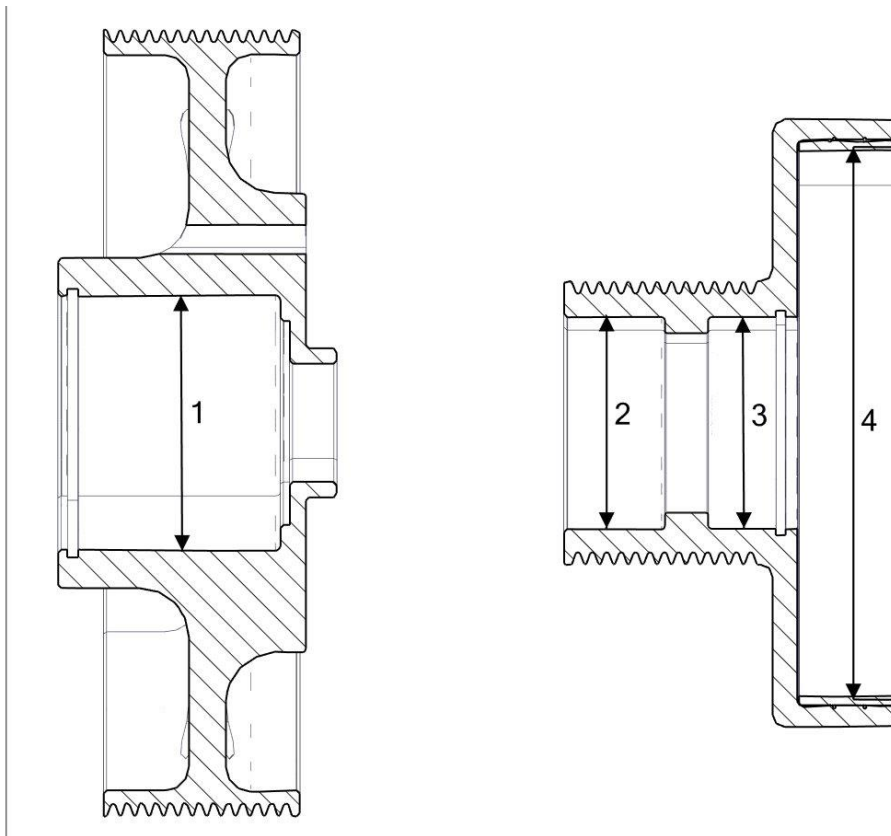
Check the axial play of the clutch pads, it must not exceed 1 mm, otherwise the clutch will damage the clutch bell.



The photo shows a damaged clutch bell due to excessive axial play in the clutch pads.

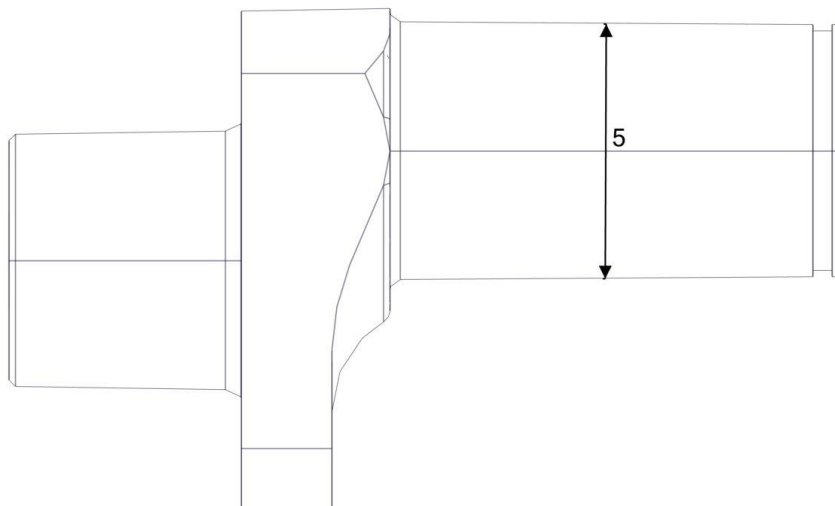


Check the 3 bearing seats: there must be no polished areas. Also measure the diameter of the 3 seats and the internal diameter of the clutch bell, the table shows the factory settings.



Dimension	Factory settings at 20° C (mm)
1	41,970-41,980
2	34,980-34,990
3	34,980-34,990
4	89,45-89,55

Measure the diameter of the bearing seat on the eccentric, the table shows the factory settings.



Dimension	Factory settings at 20° C (mm)
5	20,005-20,015

3.11.5 Bell, clutch assembly

Heat the central part of the clutch bell to 120 °C.

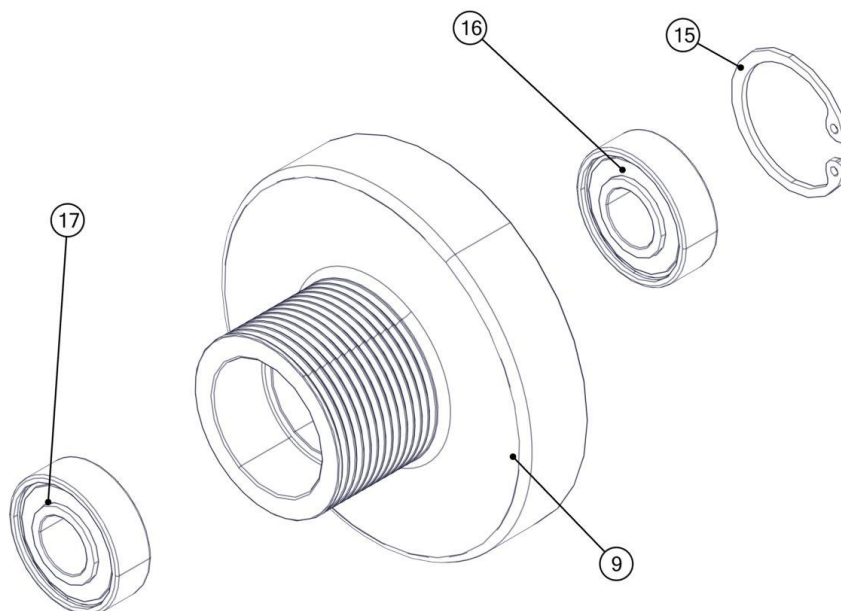


Insert bearing 6202-C-2HRS (16) into the clutch bell in the position shown in the figure.

Insert the Seeger ring (15).

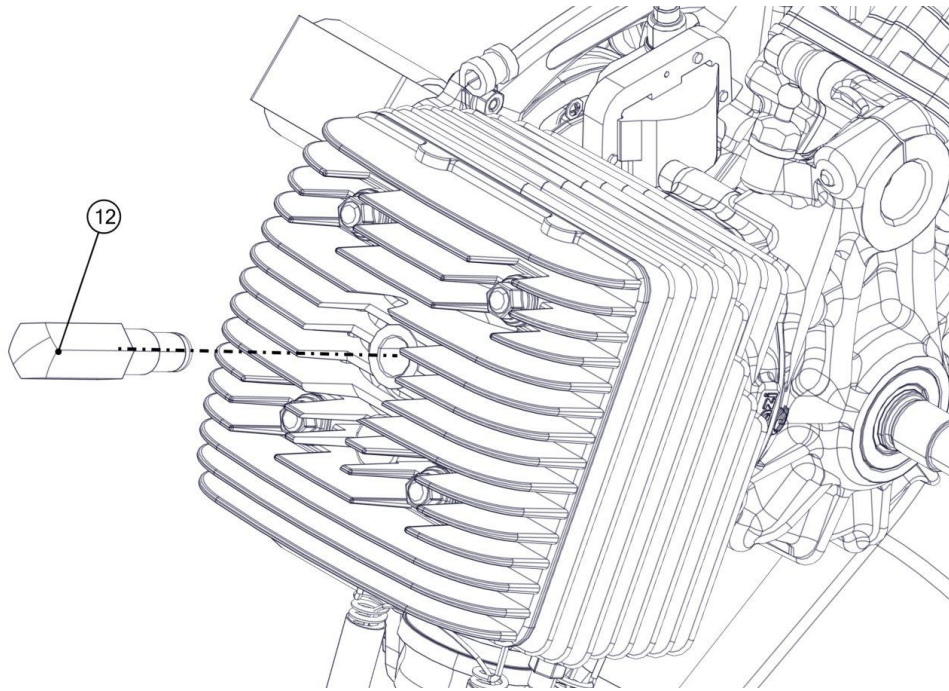


Insert bearing 6202-C-2Z (17) into the clutch bell in the positions shown in the figure.

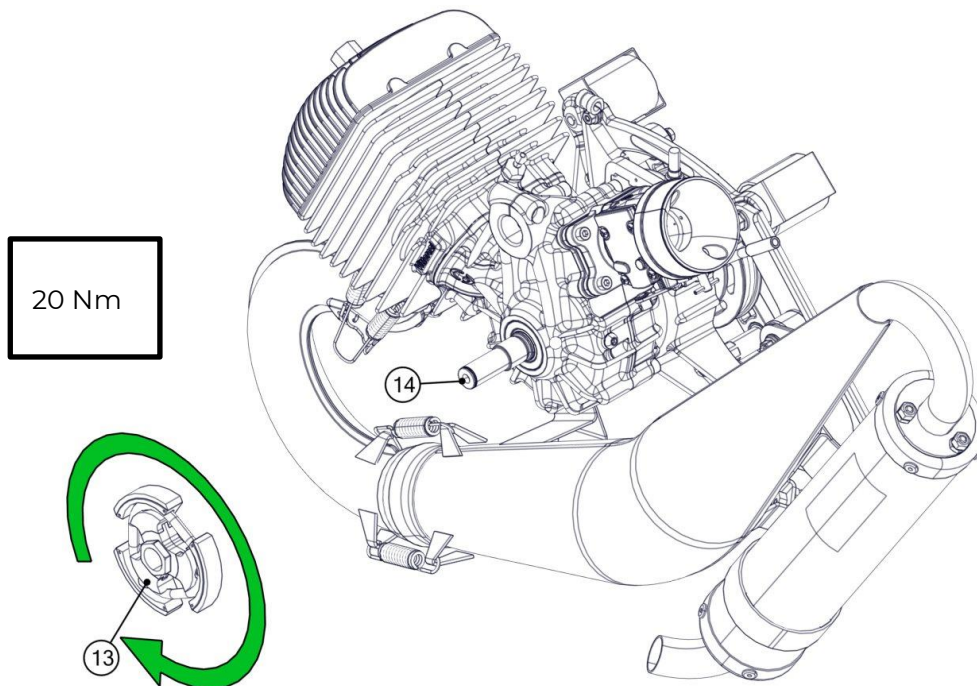


Wait for the clutch bell to cool down.

Screw the piston lock (12) into the spark plug hole.



Screw the clutch (13) onto the shaft (14) and tighten with the torque shown in the figure.

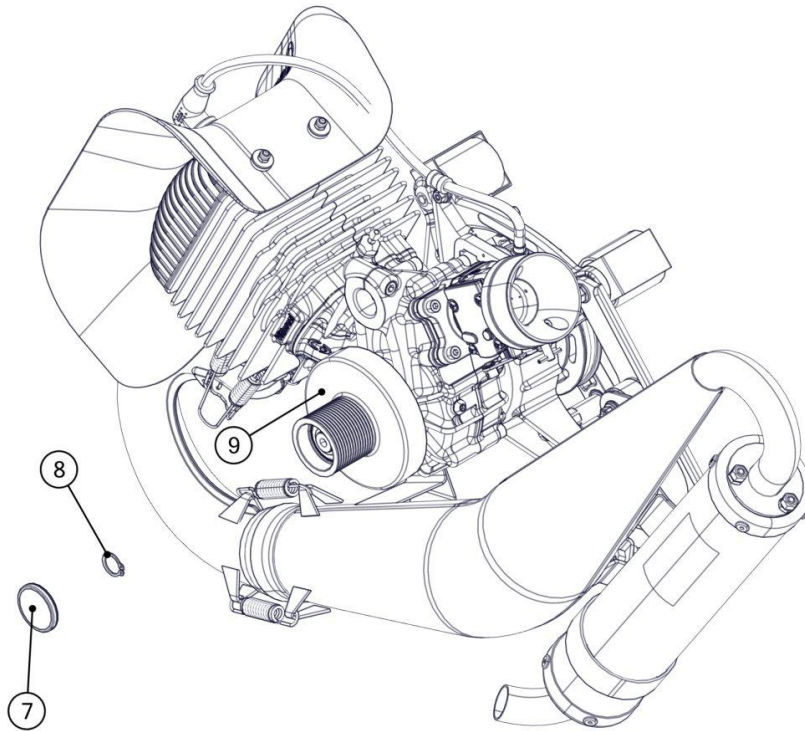


Heat both inner rings of the bearings (16, 17 of the previous image) simultaneously up to 80 °C.

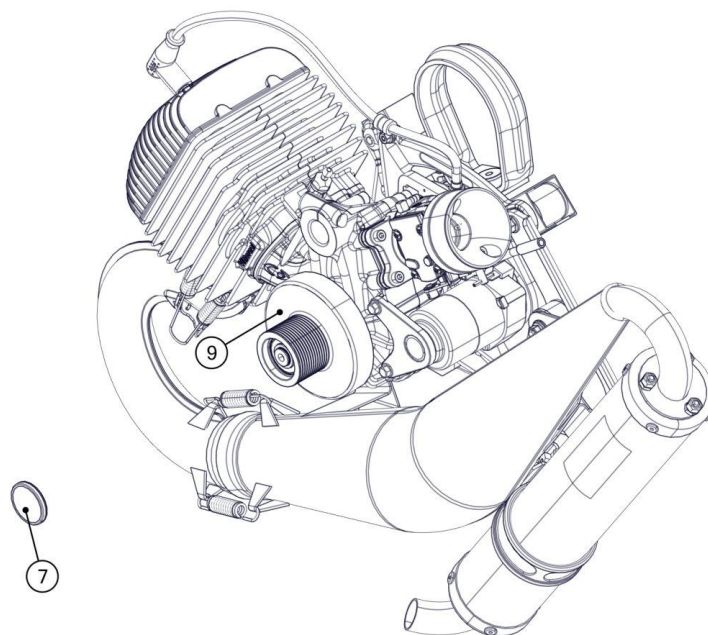


Pay the utmost attention when heating the rear bearing (16) because it has a rubber shield.

Place the clutch bell (9) and the Seeger ring (8) on the shaft.

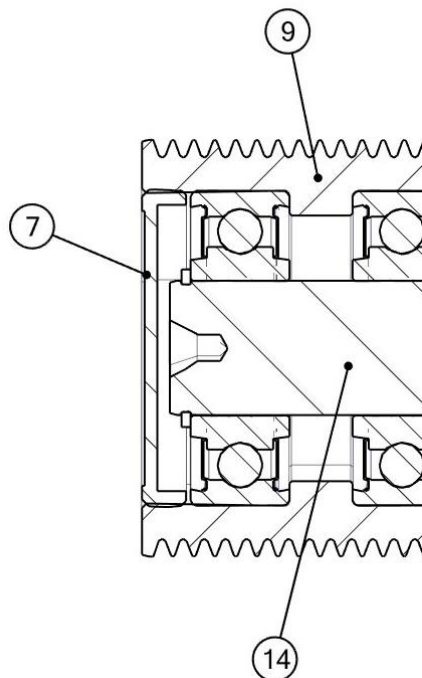


Degrease the seat of the cover on the clutch bell.
Insert the cover (7) into the clutch bell (9).





Check that the cover (7) is positioned on the clutch bell (9) as shown in the figure: the cover (7) must not be in contact with the shaft (14).



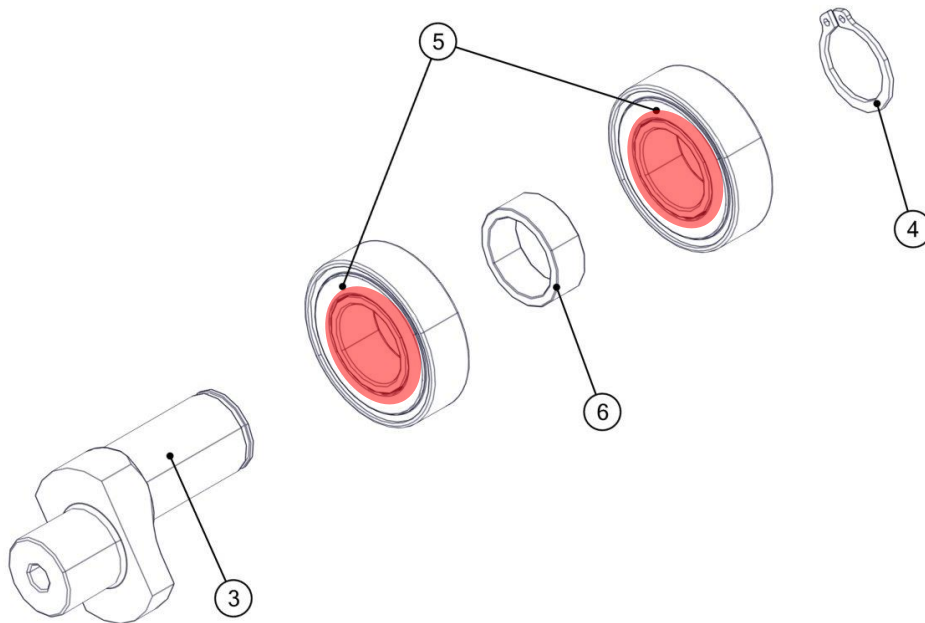
3.11.6 Pulley assembly

Heat both inner rings of the bearings (5) simultaneously up to 120 °C.

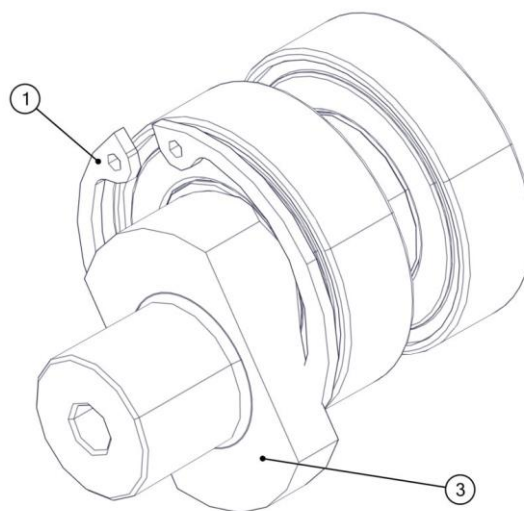


Pay the utmost attention when heating the bearings (5) because they have a rubber shield.

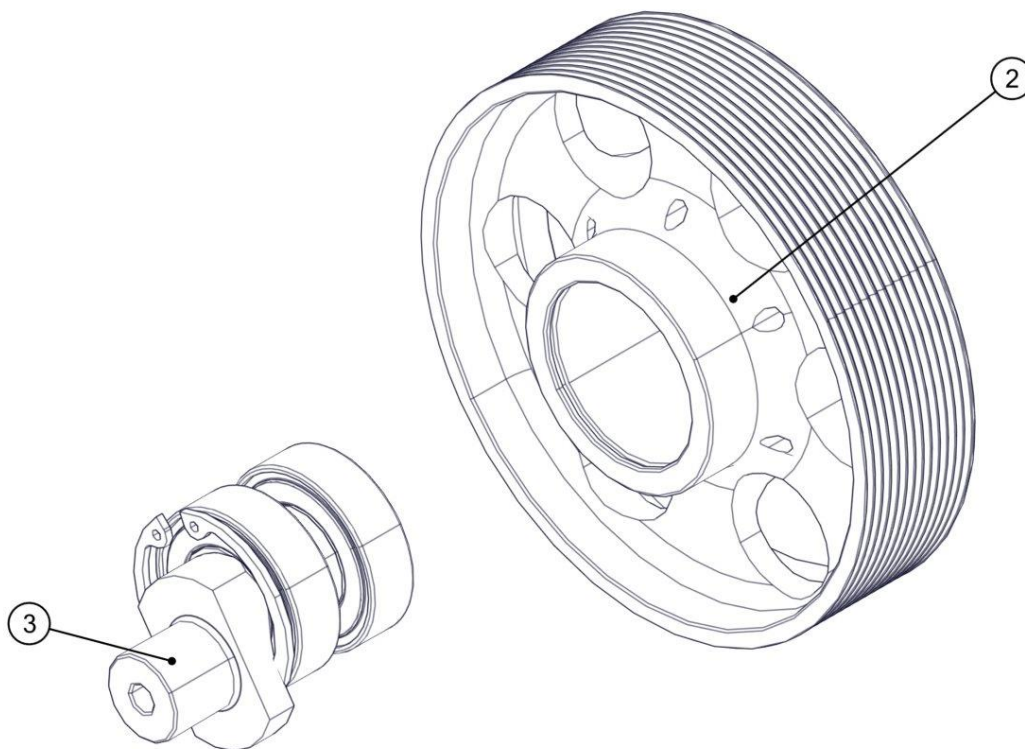
Place the bearing (5), spacer (6), bearing (5) and Seeger ring (4) on the eccentric (3).



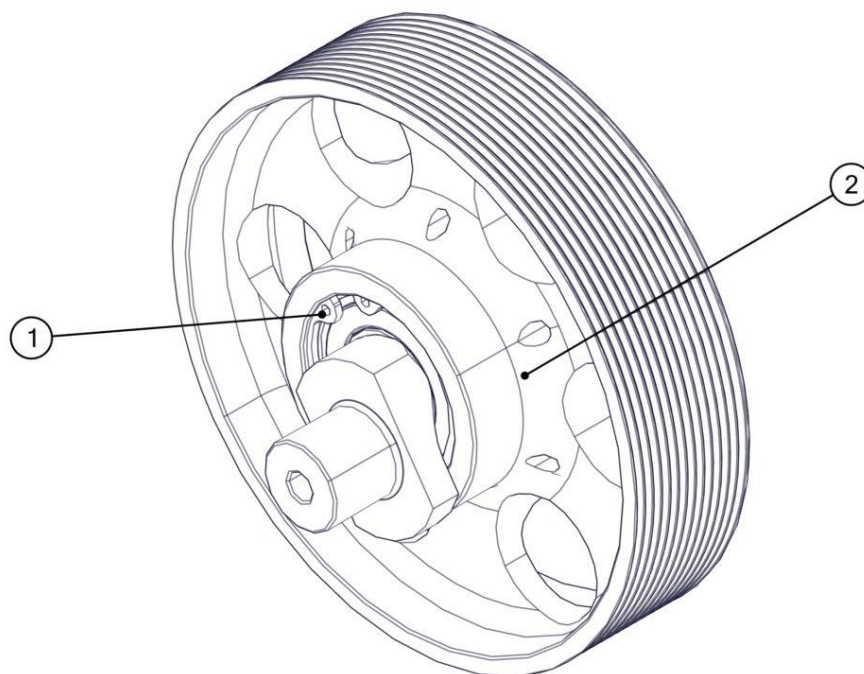
Position the Seeger ring (1) on the eccentric (3).



Heat the central part of the pulley to 120 °C.
Insert the eccentric (3) with the 2 bearings in the pulley (2).



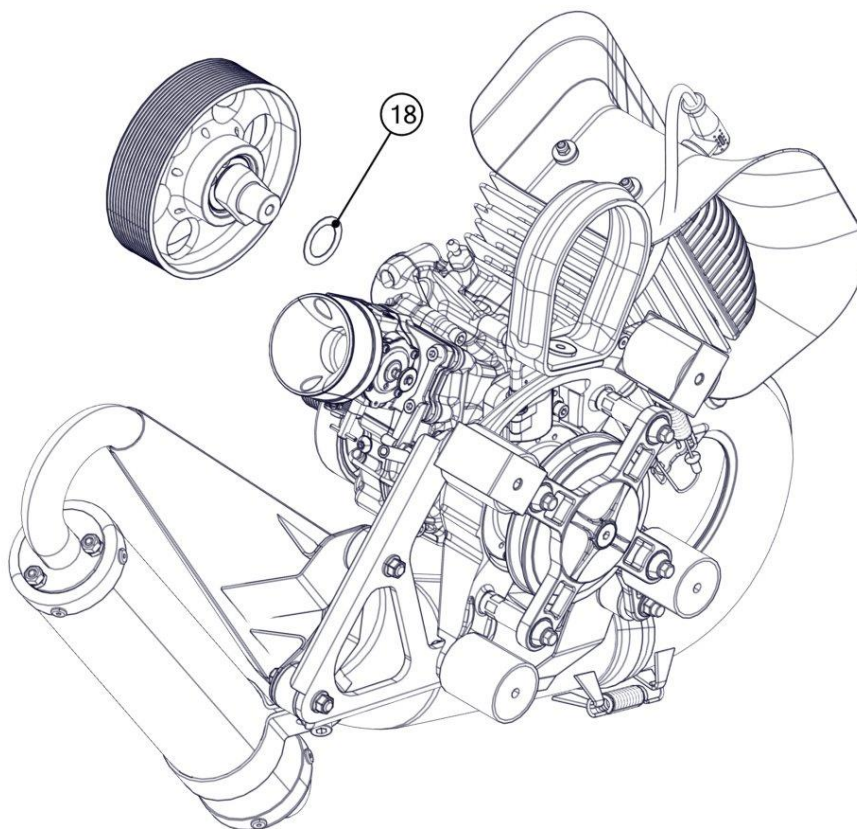
Position the Seeger ring (1) in the seat inside the pulley (2).





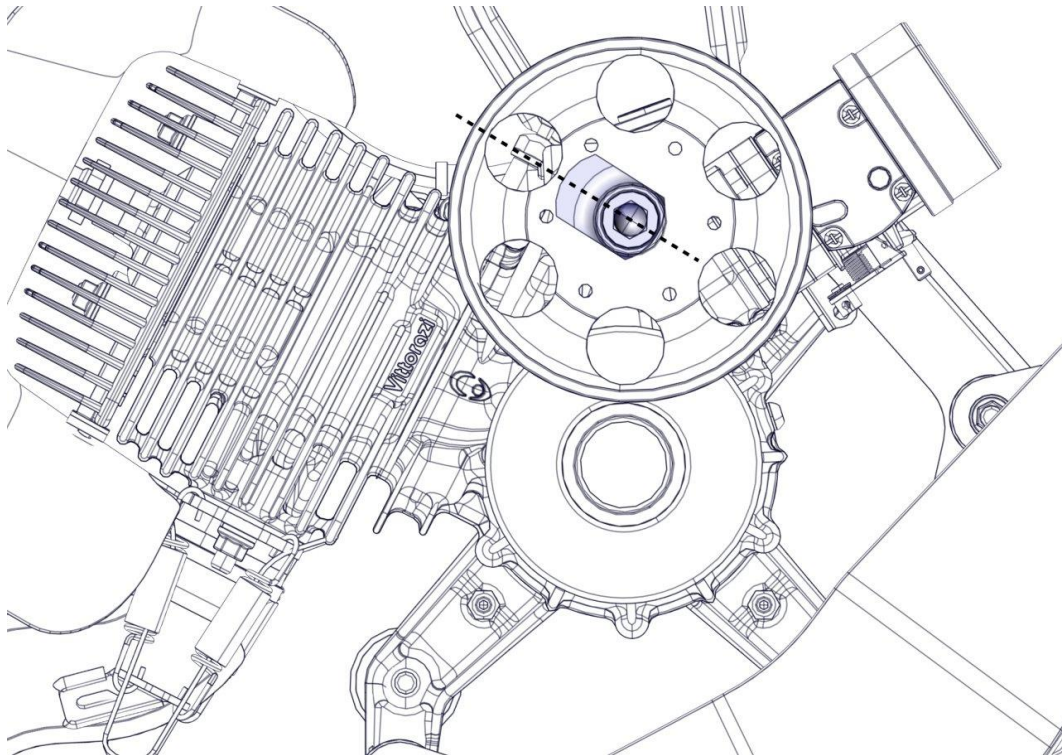
Replace the washer (18) with the same thickness as the ones replaced.
Possible sizes range from 0 mm (no washer) to 0,6 mm.

Insert eccentric with pulley and washer (18).

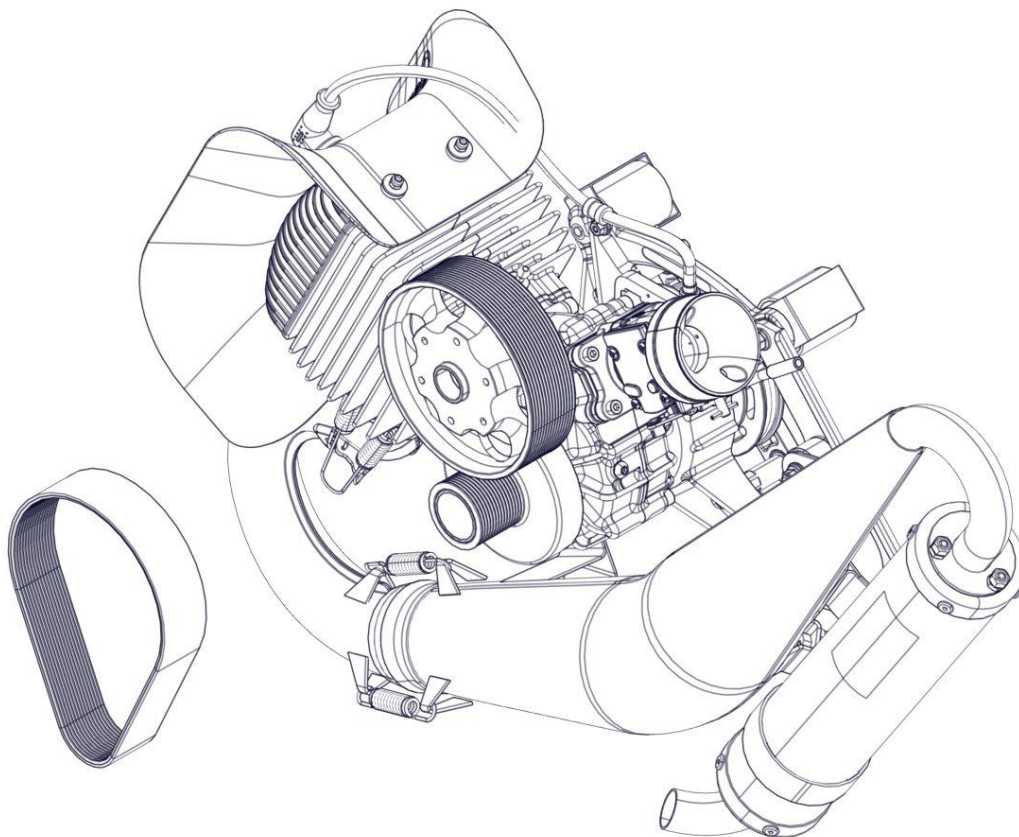


3.11.7 Belt insertion

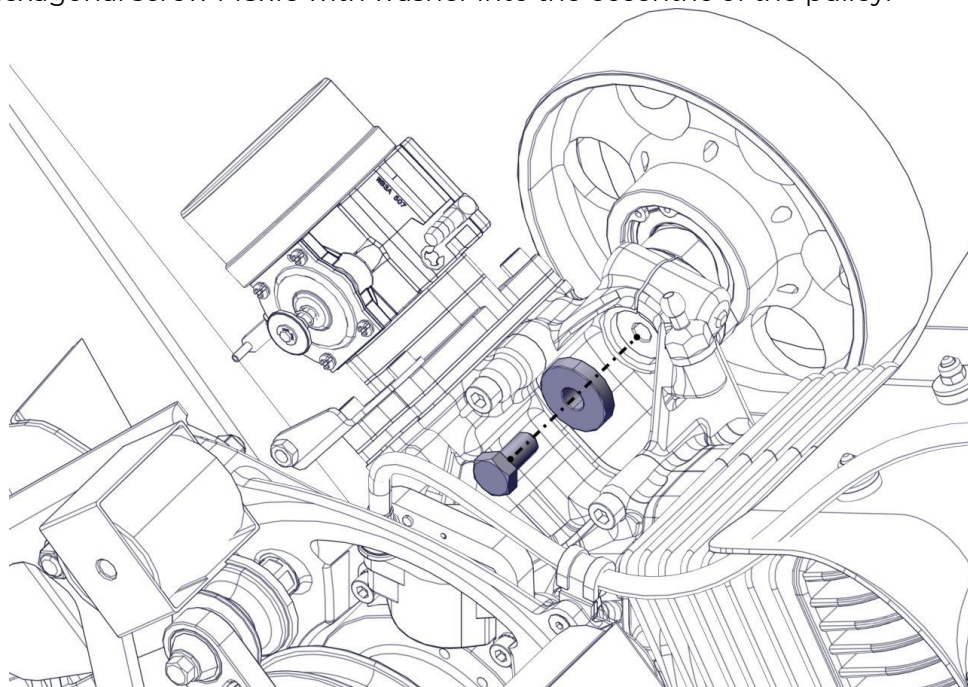
Turn the eccentric to position it as in the figure. This position facilitates the insertion of the belt.



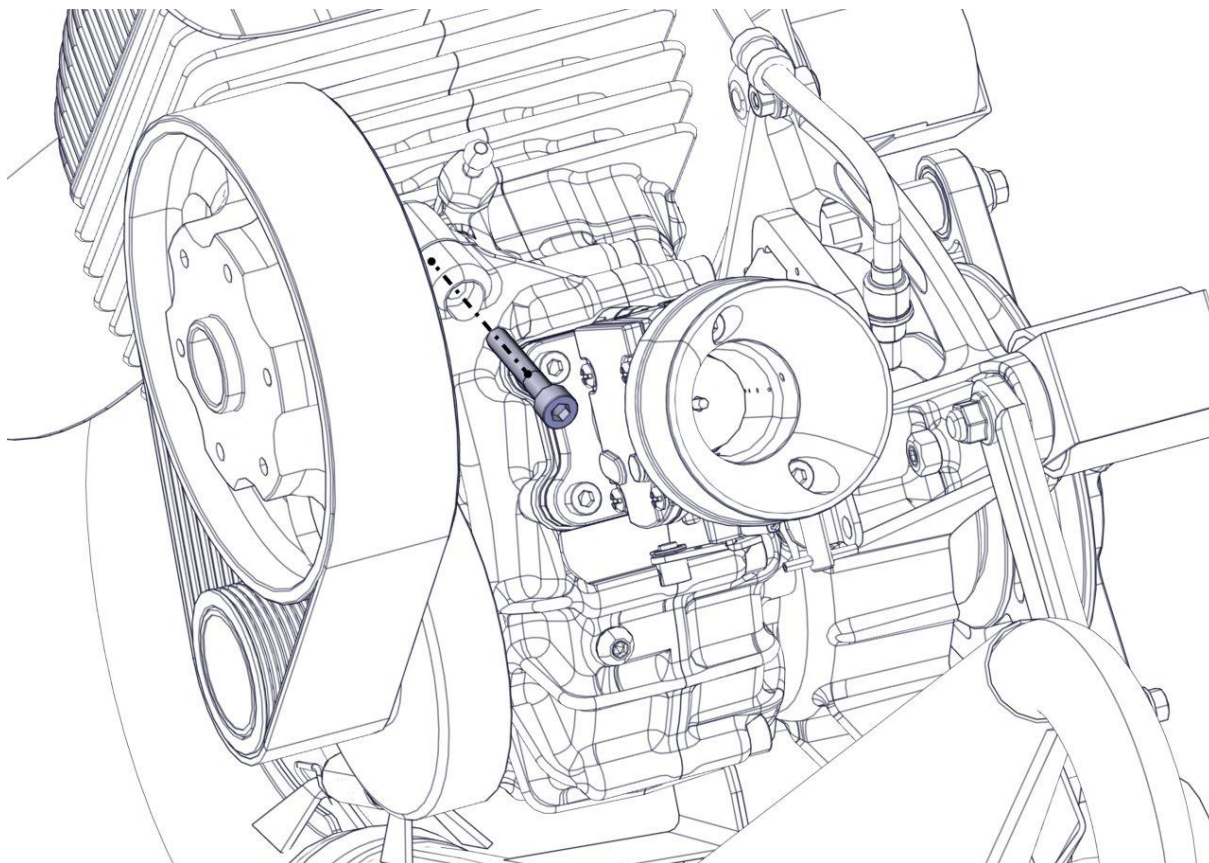
Place the belt on the pulley and clutch bell.



Insert the hexagonal screw M8x16 with washer into the eccentric of the pulley.



Add Wurth paste 0893921502 to the screw M6x35.
Insert the Allen screw M6x35 on the side of the eccentric.



3.11.8 Belt tensioning

Loosen the hexagonal screw M8x16 on the eccentric.

Loosen the Allen screw M6x35 on the side of the eccentric.

Turn the eccentric to tension the belt until the oscillation frequencies indicated in the table are achieved (use a frequency meter or mobile phone application).

Version	First installation	Retensioning
Factory-R (15 grooves belt)	500-520 Hz	470-490 Hz

Tighten the screw M8x16 to 25 Nm.



Replace the screw M6x35 every 3 belt retightenings. Only replace with original Vittorazi components.




Add Wurth paste 0893921502 to the screw M6x35.

Tighten the screw M6x35 to 12 Nm.

Manually turn the pulley a few turns.

Check the belt tension again, retighten if necessary.

3.12 Piston, cylinder, head

 Components to replace		Time limit
	Self-locking nuts M8* (M019)	100 h
	O-ring head* (M016)	100 h
	Gaskets* (M014)	100 h
	Piston (M010) includes: pin (M011), circle clips (M012), piston rings (M013)	150 h
	Roller bearing (M009)	150 h
	Cylinder (MFR015)	on condition
	Copper paste*	100 h
 Special tools	Not required.	
 Values	Self-locking nuts M8: 16 Nm.	

*Always replace it when disassembled.

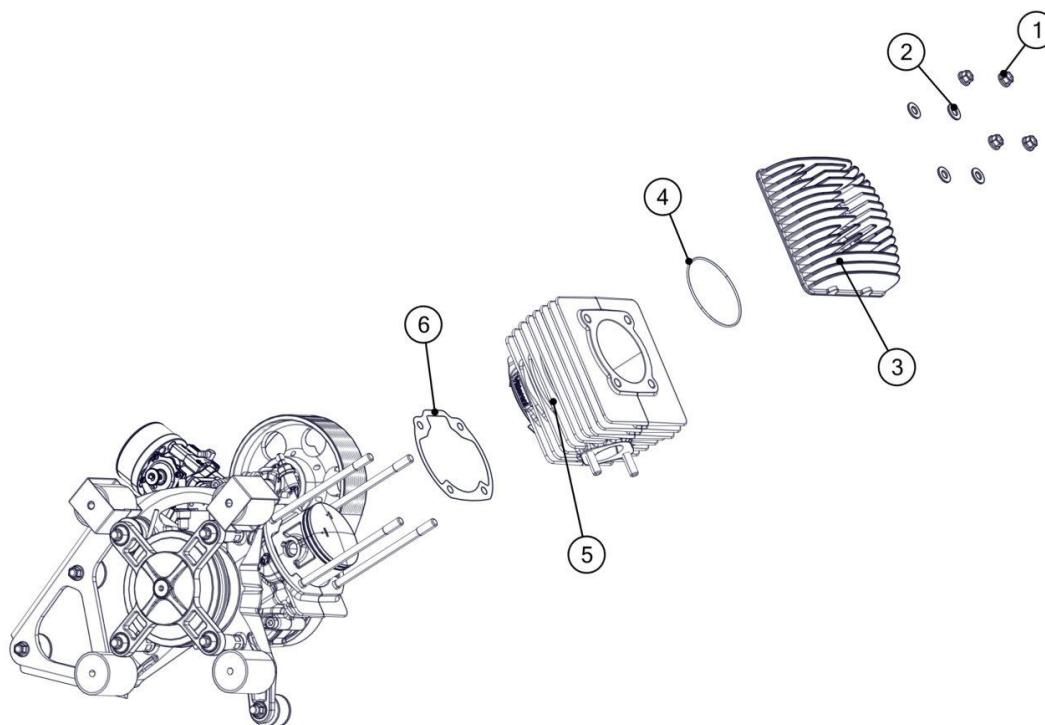
3.13.1 Piston, cylinder, head disassembly



Before disassembling the thermal unit, remove the spark plug (3.2 Spark plug), the airbox (3.3 Airbox) and the exhaust system (3.7 Exhaust system).

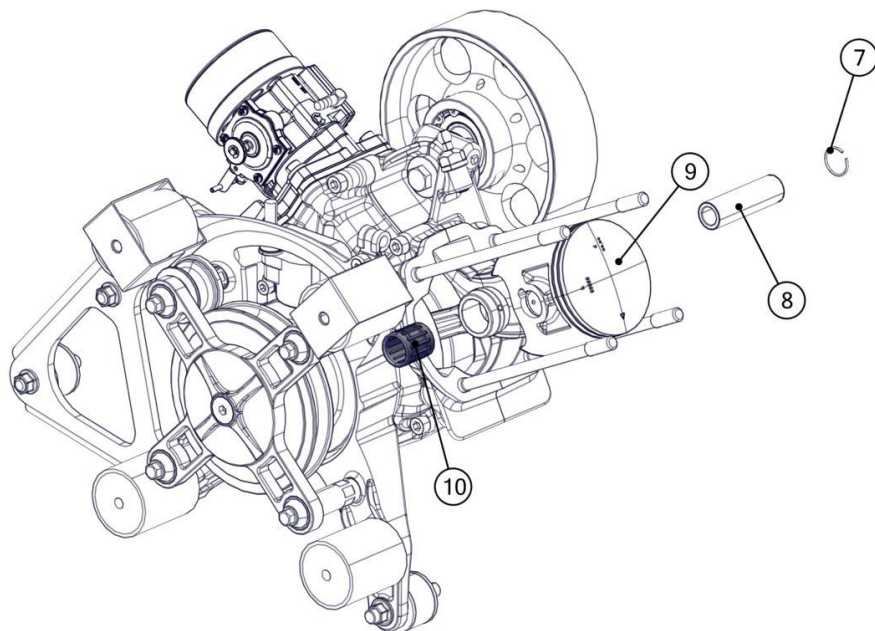
3.12.1 Piston, cylinder, head disassembly

Remove the 4 self-locking nuts M8 (1) with washers (2) from the engine head (3).
Remove the head (3), the O-ring (4), the cylinder (5) and the gasket (6).

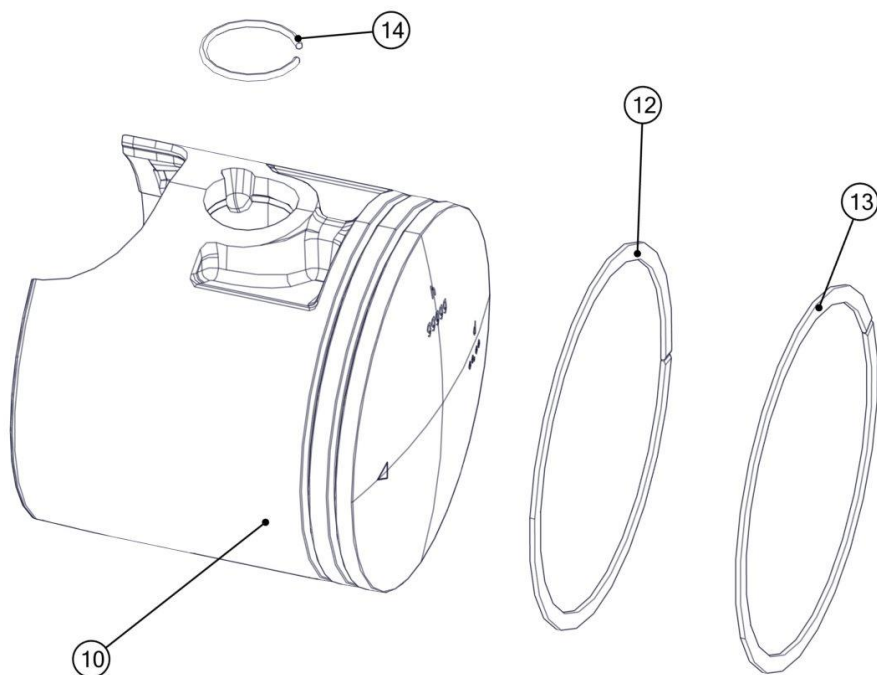


Close the inside of the crankcase with paper to prevent foreign bodies from accidentally falling into the engine.

Remove the circle clip (7), the pin (8), the piston (9) and the roller bearing (10).



Remove the 2 piston rings (11) and the side stop (12) from the piston (9).



3.12.2 Piston, cylinder, head maintenance



Do not use abrasive tools and corrosive liquids that may damage the surface.

Carefully remove gasket residues from the cylinder and the crankcase.

Thoroughly clean the piston crown, the piston grooves, the exhaust port on the cylinder and internal surface of head.

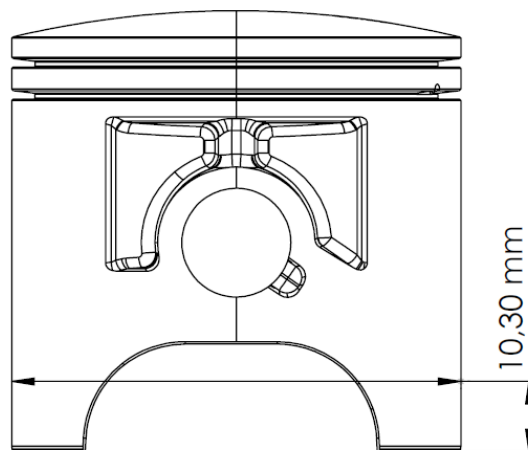
Clean only the decompression hole on the cylinder with a 3 mm drill bit, taking great care.

Immerse the piston, cylinder and head in an ultrasonic bath containing cleaning liquid for aluminum.

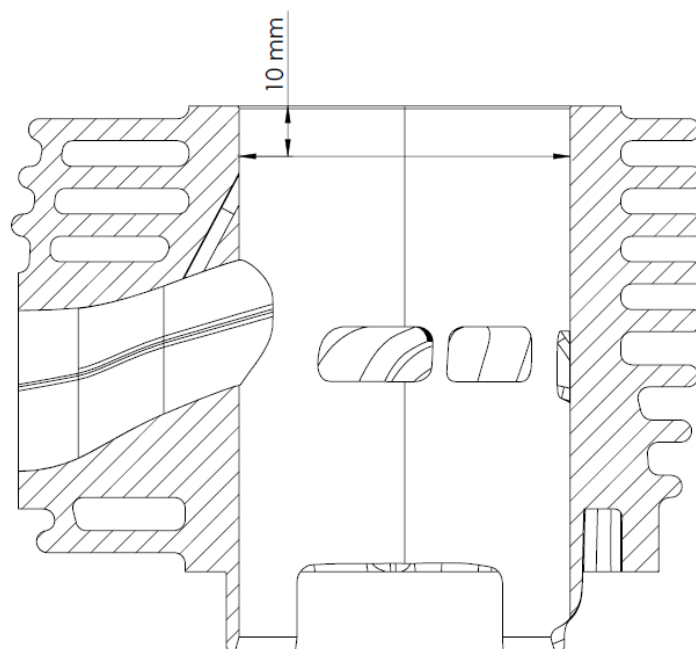
The cylinder and piston belong to different selection classes according to tolerance.

Check the selection class engraved on the piston.

Measure the diameter of the piston at 10,30 mm from the base of the shell.



Measure the diameter of the cylinder 10 mm from the top.



The table shows the cylinder, the piston sizes and the factory nominal clearance for new components.

Maximum clearance refers to worn components.

Selection	Cylinder ϕ^* (mm)	Piston ϕ^* (mm)	Factory nominal clearance* (mm)	Maximum clearance* (mm)
A	65,990-66,000	65,945-65,955	0,035-0,055	0,15
B	66,000-66,010	65,955-65,965		
C	66,010-66,020	65,965-65,975		
D	66,020-66,030	65,975-65,985		
E	66,030-66,040	65,985-65,995		

* at 20 °C



Determine the maximum clearance, if equal to or greater than the indicated value replace the piston and/or cylinder.

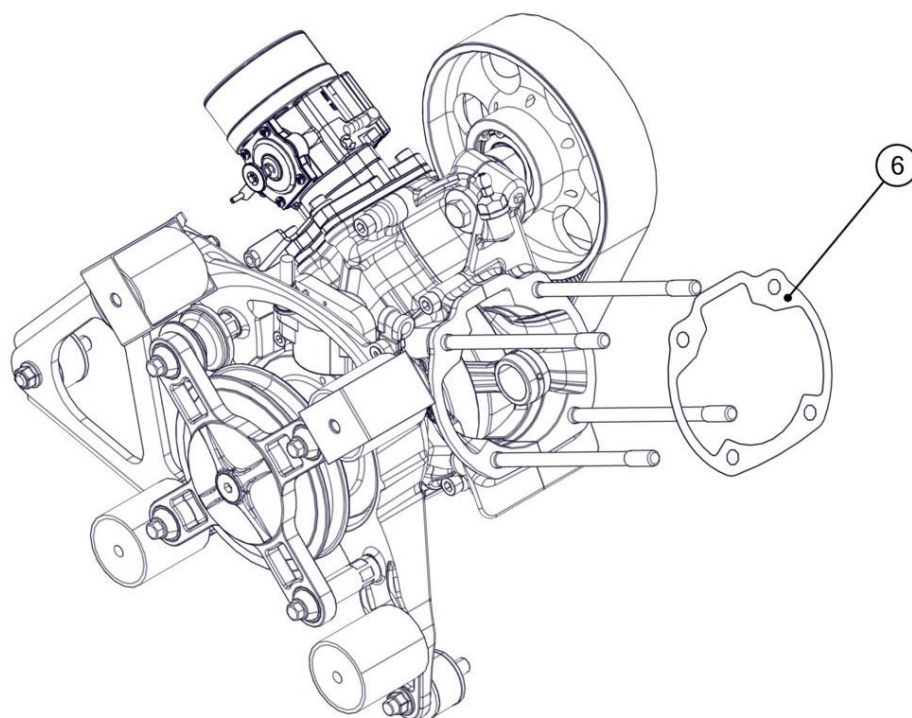
Check the piston and cylinder for signs of seizure, otherwise replace them. For routine maintenance, follow the table.

3.12.3 Piston, cylinder, head assembly



Replace the same thickness with one or more gaskets (possible sizes: 0,2-0,3-0,5 mm).

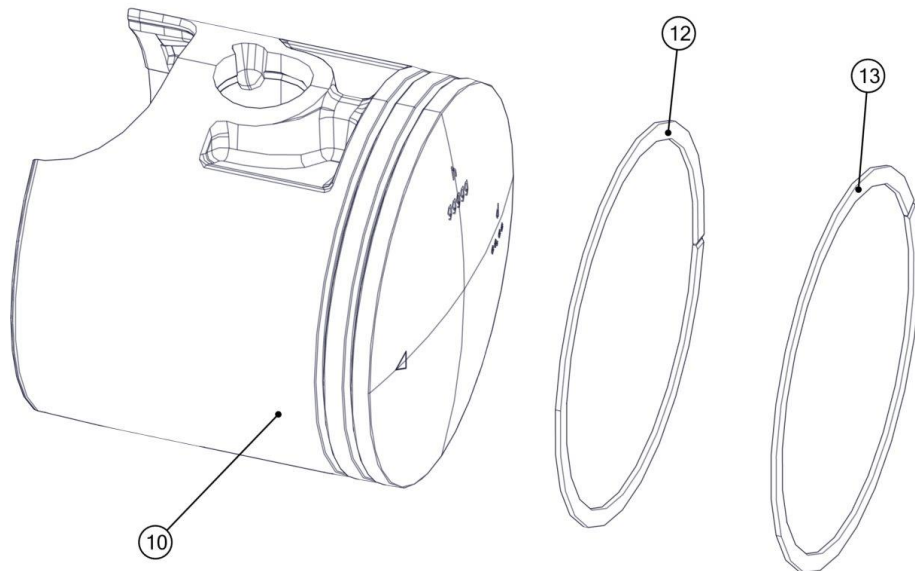
Insert the gasket (6).



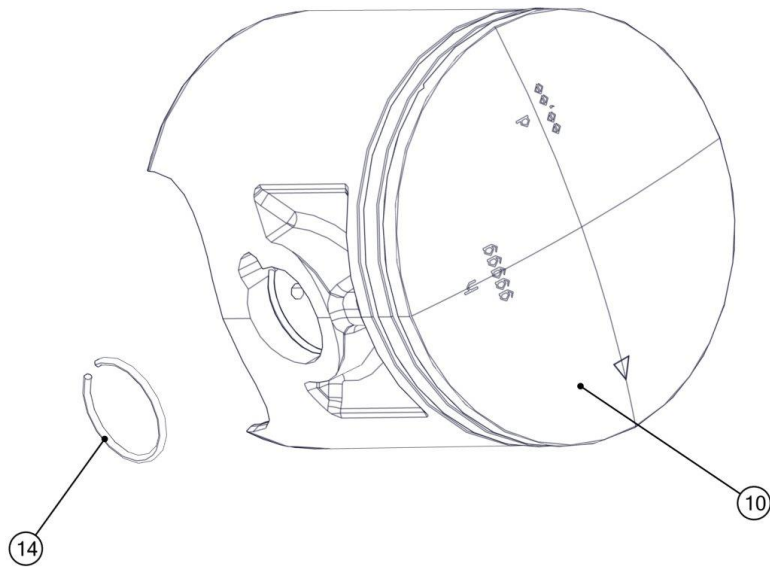
Oil the following components with the oil used for the mixture: the roller bearing (10), the pin (8), the piston rings (11) and the piston (9).



Insert the 2 piston rings (11) into the piston grooves (9), paying attention to the position of the 2 piston ring retainers.



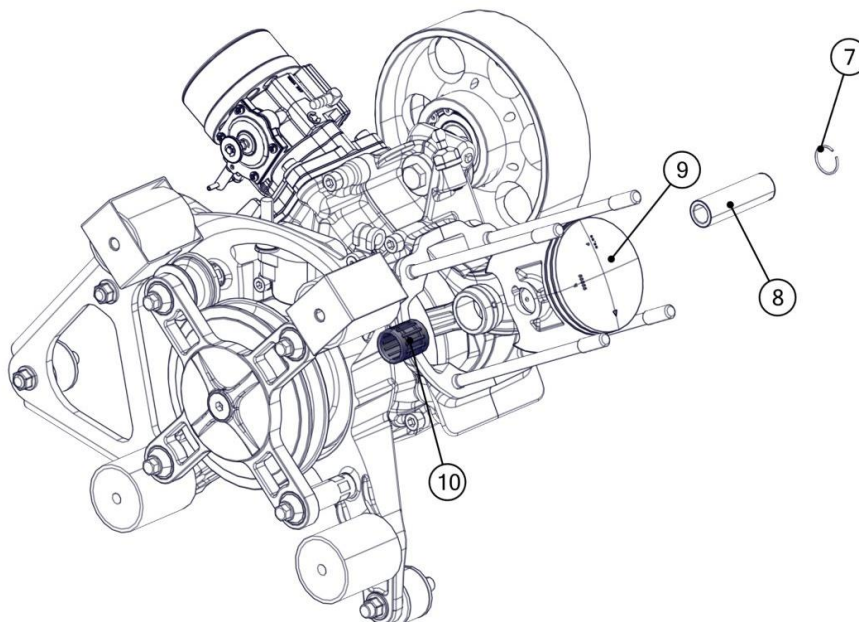
Insert the circle clip (14) on the piston (10) respecting the position shown in the photo.





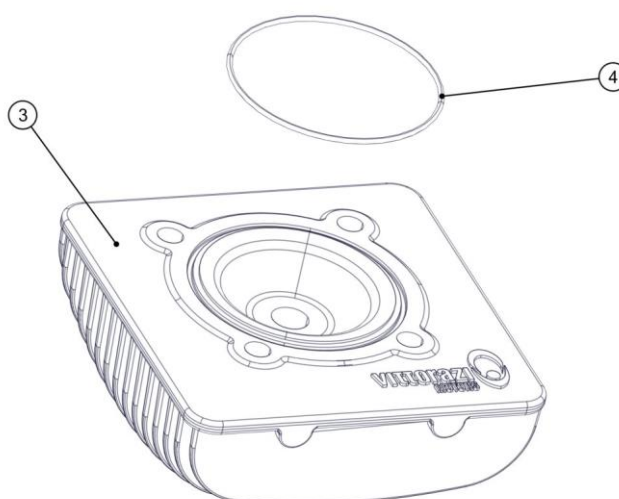
The triangle on the top of the piston indicates the exhaust side.

Insert the roller bearing (10), the piston (9), the pin (8) and the circle clip (7).



Replace the O-ring (4) and the 4 self-locking nuts M8 (1) each time they are disassembled.

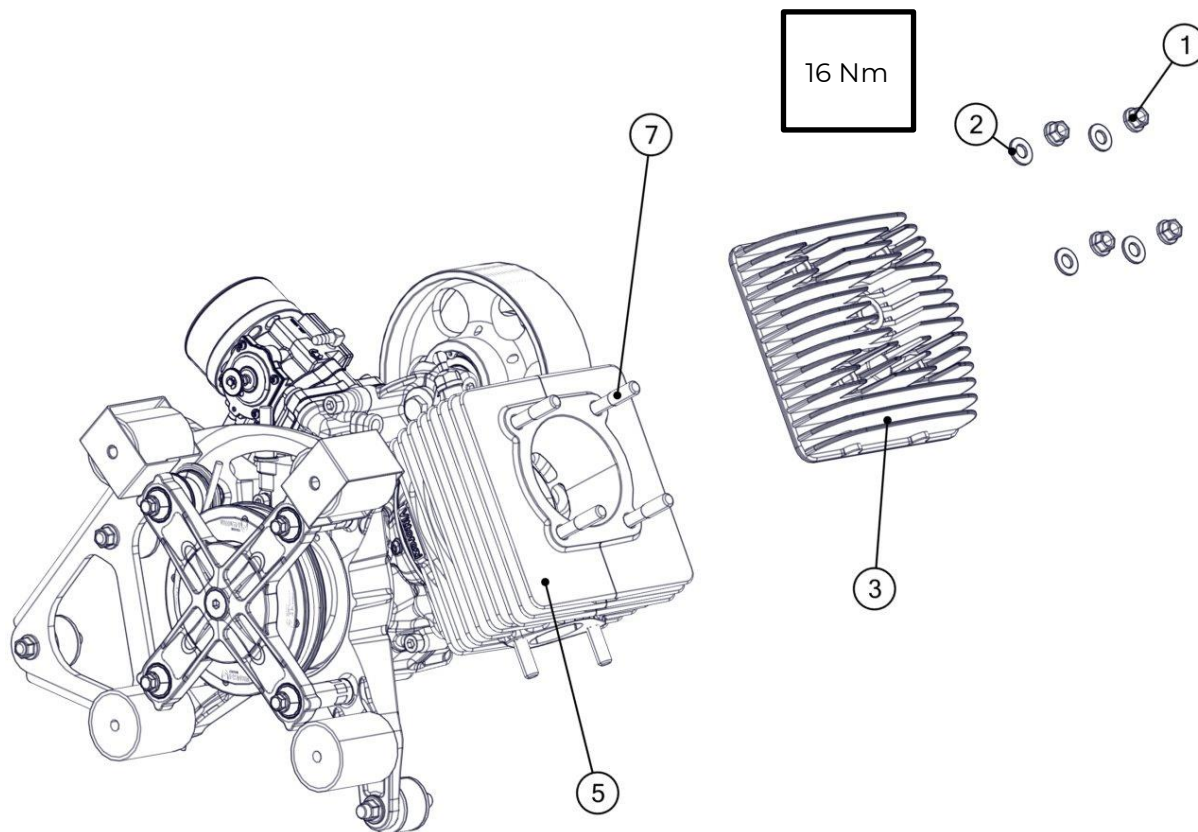
Fit the O-ring (4) on the head (3).



Insert the cylinder (5).

Add copper paste to the nuts.

Place the head (3) on the cylinder (5) and the 4 self-locking nuts M8 (1) with washers (2).






Tighten the nuts progressively, then cross-tighten with the torque shown in the figure.



Check the squish measurement on the pin axis: acceptable values range **from 1,1 mm to 1,2 mm.**

If the squish is out of tolerance, increase or decrease the thickness of the cylinder base gasket until the required result is obtained.

3.13 Crankcase

 Components to replace		Time limit
	Bearings (M005)	150 h
	Crankshaft (MFR001) includes: nut M10x1,25 (M037)	on condition
	Oil seals* (M006)	150 h
	Crankcase (MF02/MFR002)	on condition
	Three Bond 1215 silicone paste*	150 h
 Special tools	Extractor (ACC113). Specific tool (ACC127). Specific tool (ACC128).	
 Values	Screws M6x35-40: 10 Nm. Screws M8x16: 20 Nm.	

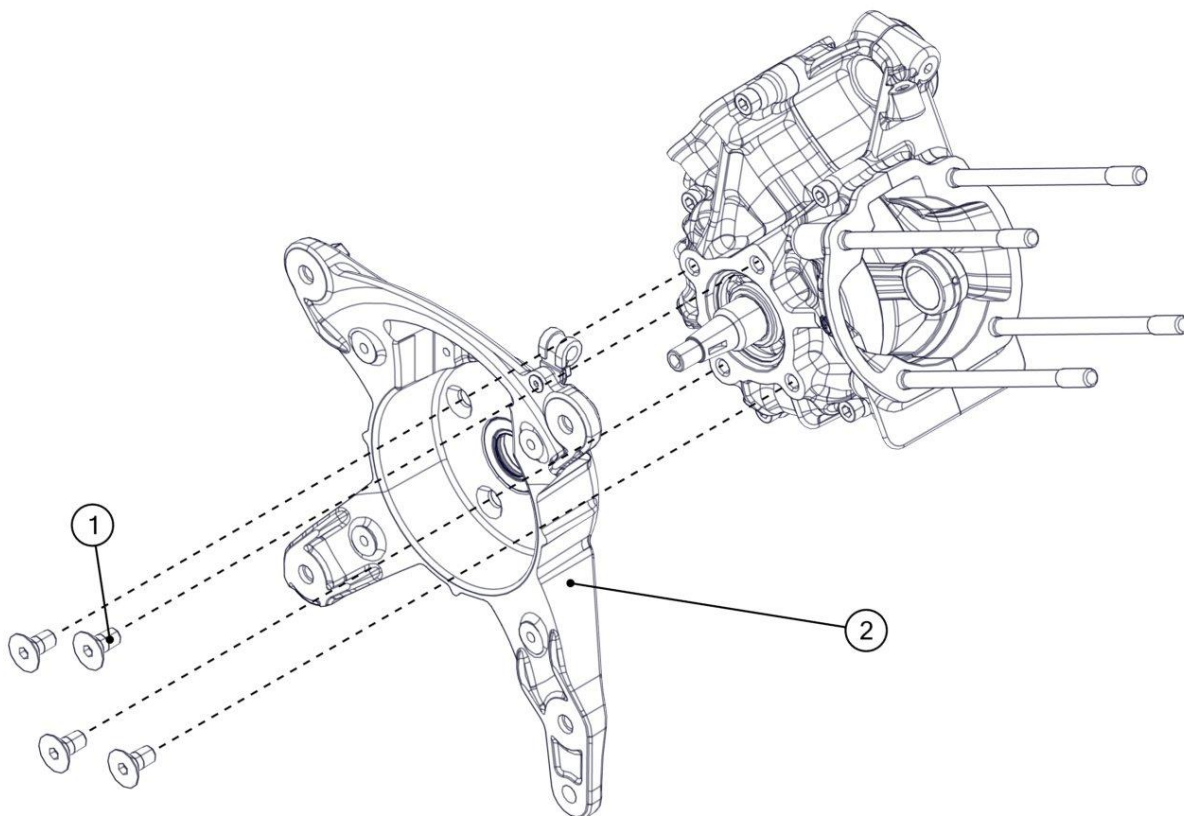
*Always replace it when disassembled.

3.13.1 Crankcase disassembly

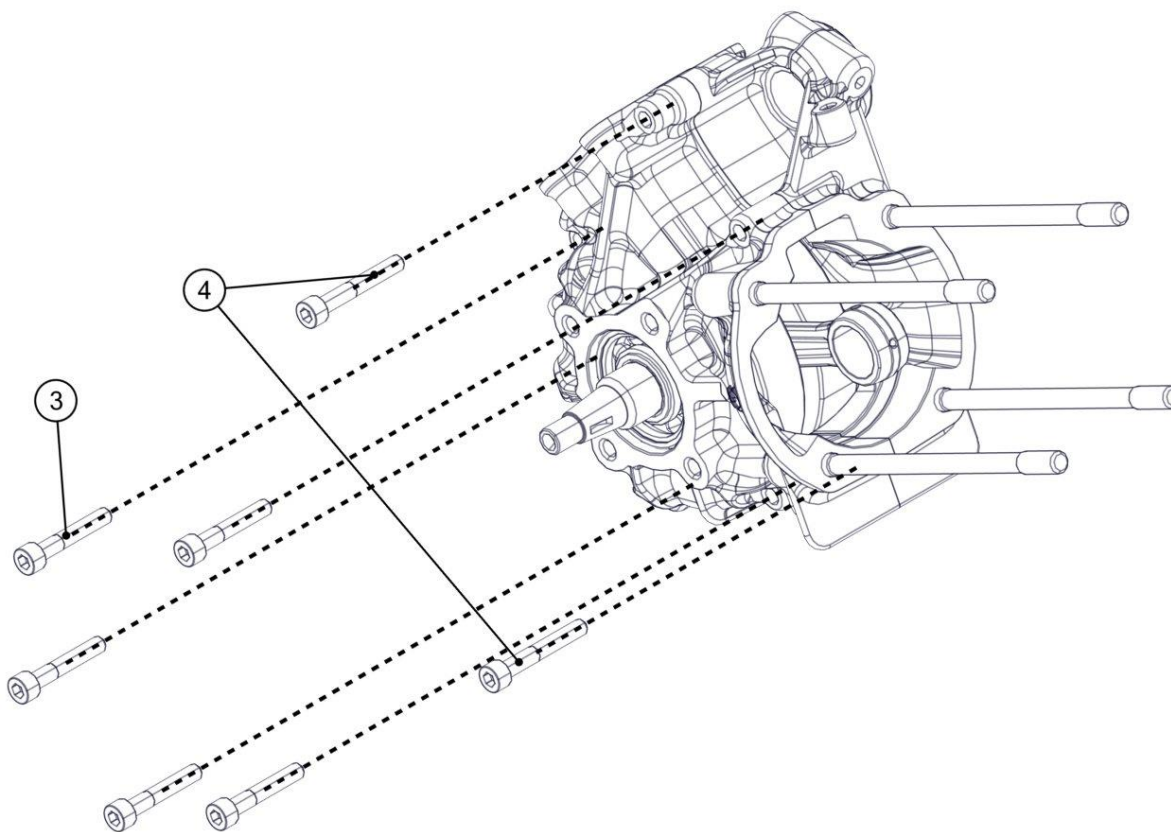


Before disassembling the crankcase, remove the airbox (3.3 Airbox), the carburettor (3.4 Carburettor), the reed valve (3.5 Reed valve), the exhaust system (3.7 Exhaust system), the rubber mountings (3.8 Rubber mountings), the pull starter system (3.9 Pull starter system), the flywheel, the coils (3.10 Flywheel, coil), the transmission (3.11 Transmission) and the cylinder unit (3.12 Piston, cylinder, head).

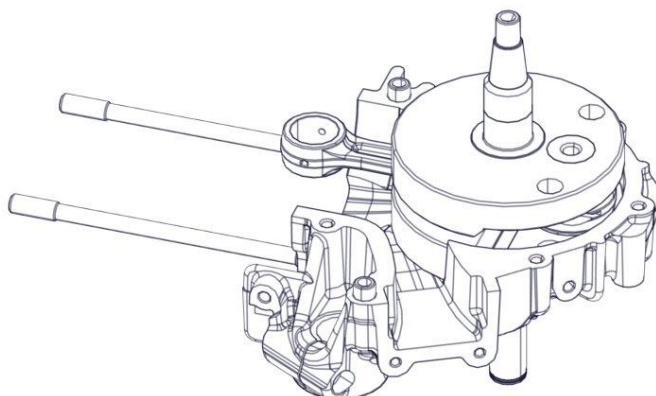
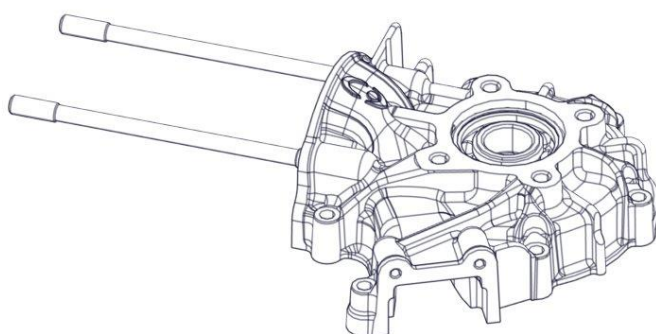
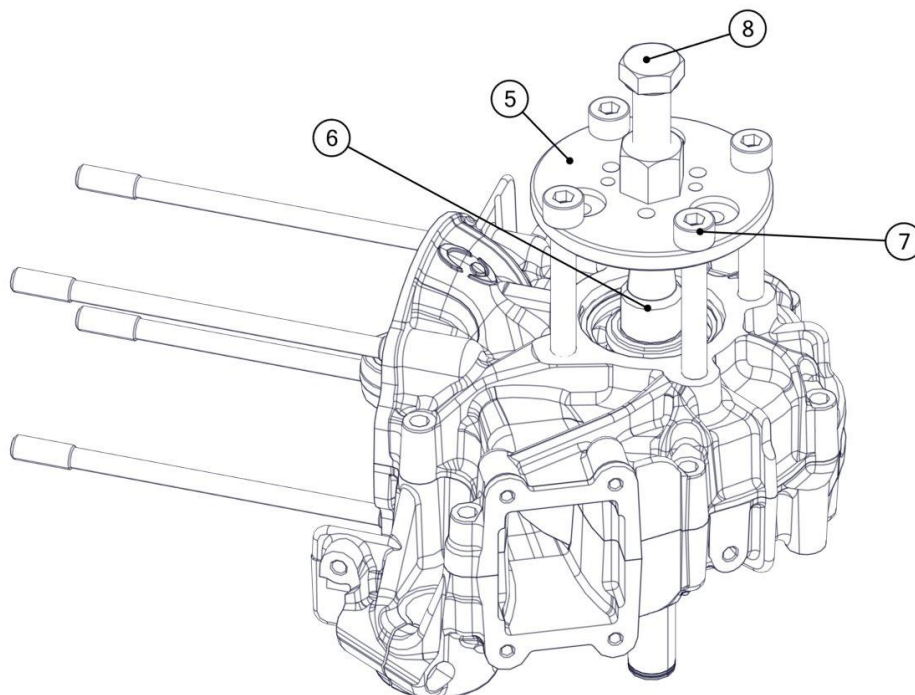
Remove the 4 countersunk head screws M8x16 (1) and the crankcase support (2).



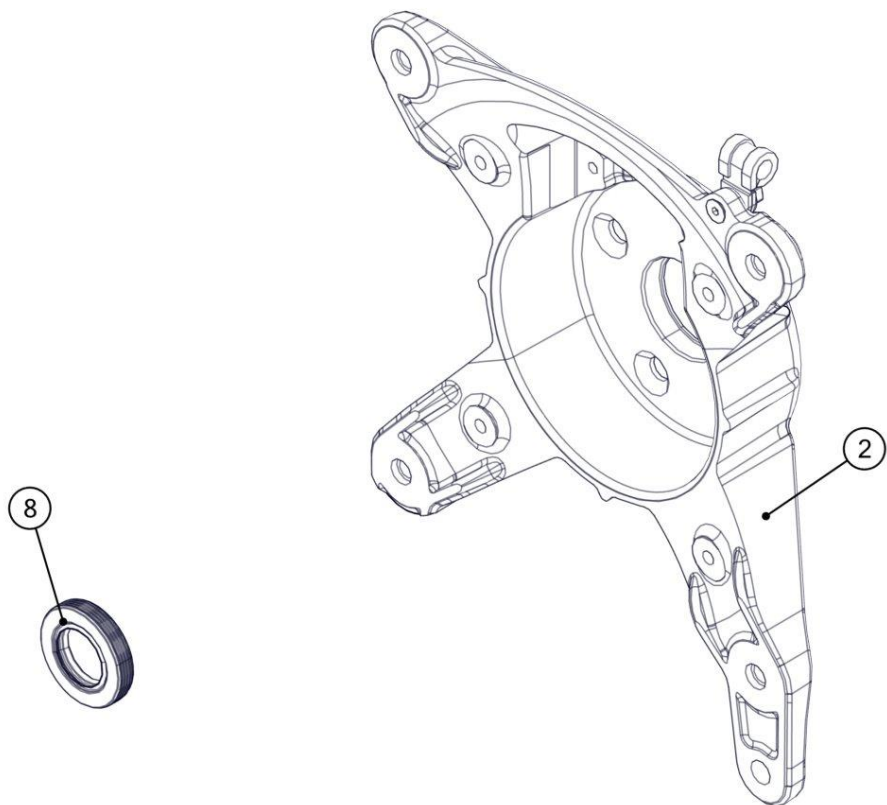
Remove the 5 Allen screws M6x35 (3) and 2 Allen screws M6x40 (4).



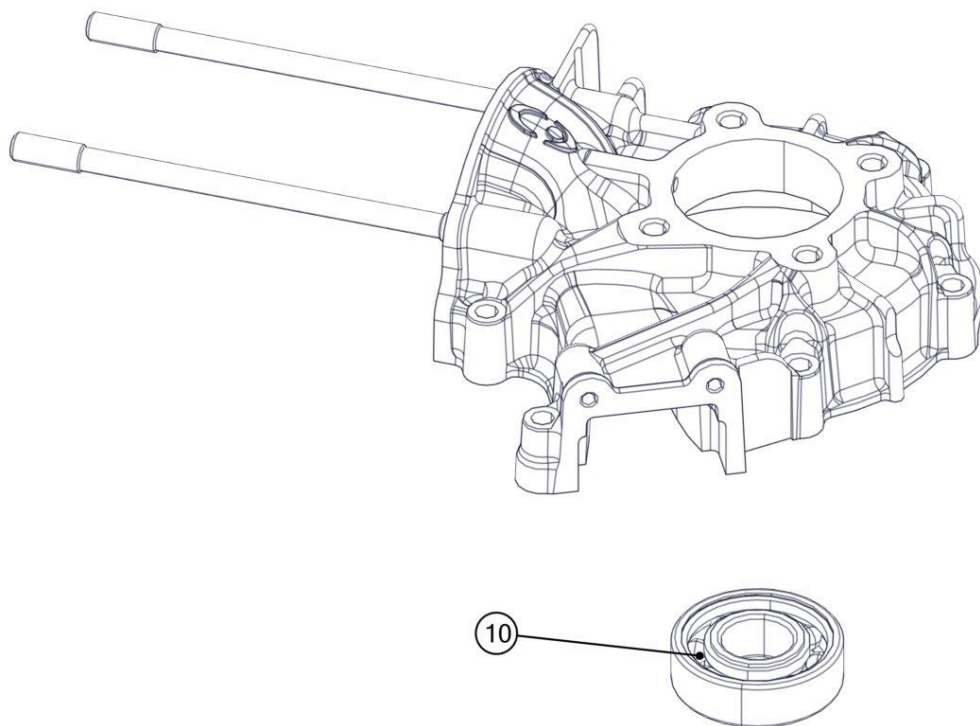
Position the extractor (5) on the crankshaft (6), tighten the 4 screws M8 (7) and turn the central pin (8) until the 2 case-half are separated.



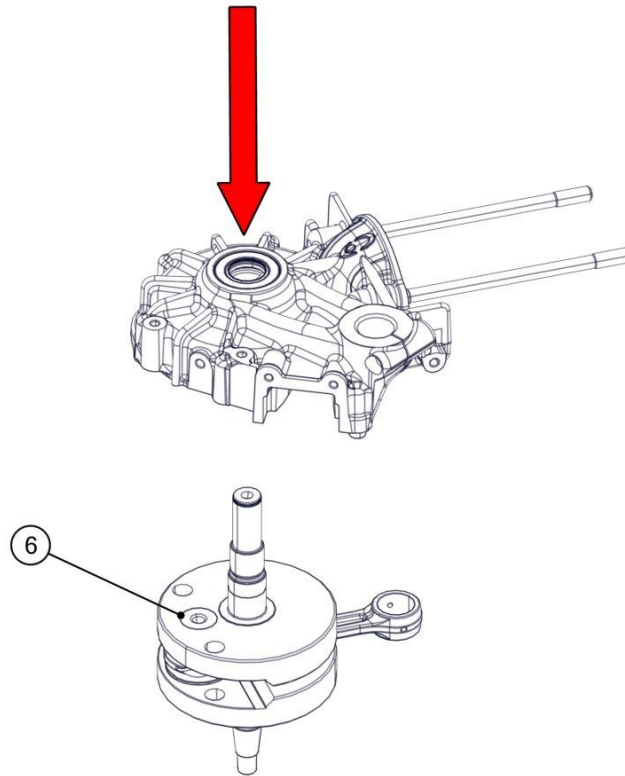
Remove the oil seal (9) from the crankcase support (2) on the side shown in the figure.



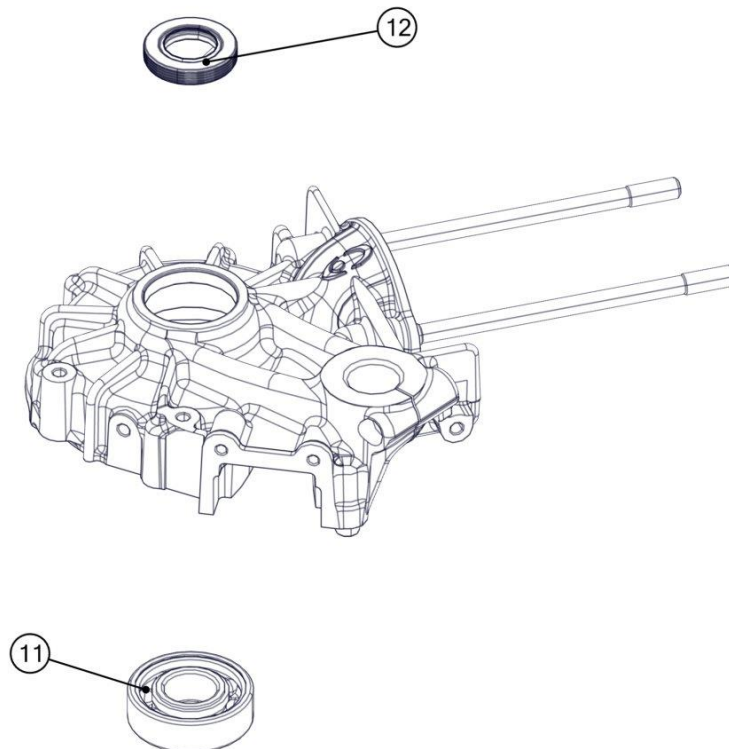
Heat the manual starter side crankcase to 120 °C.
Remove the bearing (10).



Remove the crankshaft (6) using a press in the direction shown in the figure.



Heat the transmission side crankcase to 120 °C.
Remove the bearing (11) and the oil seal (12).

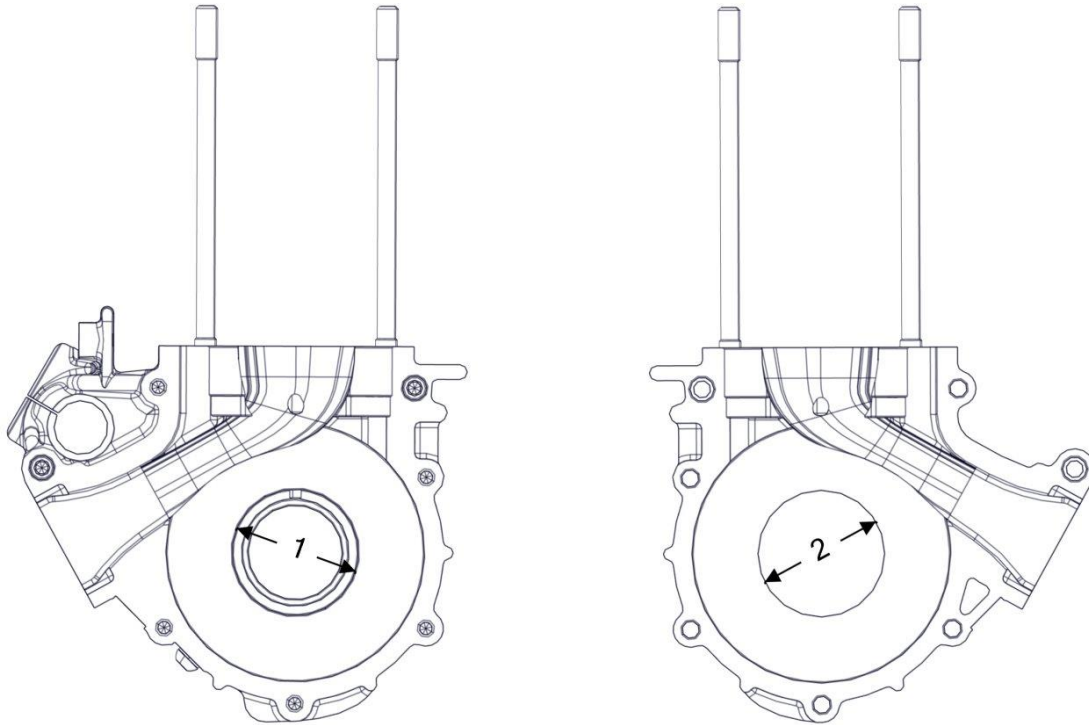


3.13.2 Crankcase maintenance

Degrease the bearing seats, the profile of the case-half and the crankcase support with specific products for aluminium.

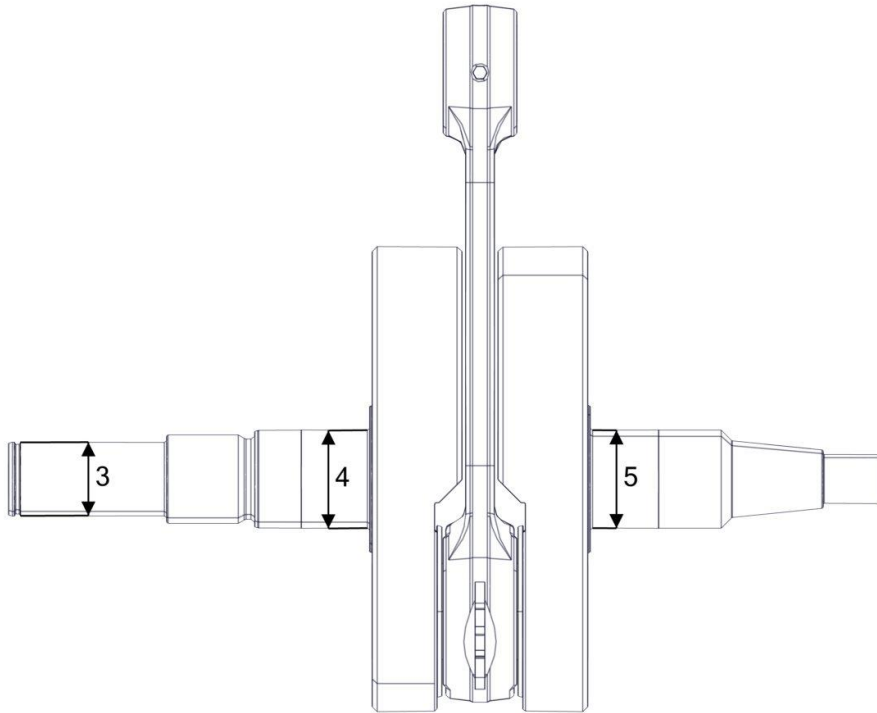
Check the case-half: check for integrity and abnormal marks.

Check the 2 bearing seats: there must be no polished areas. Also measure the diameter of the 2 seats, the table shows the factory settings.



Dimension	Factory settings at 20° C (mm)
1	46,960-46,980
2	46,960-46,980

Measure the diameter of the 2 bearing seats on the crankshaft, the table shows the factory settings.



Dimension	Factory settings at 20° C (mm)
3	15,000-15,005
4	20,001-20,007
5	20,001-20,007

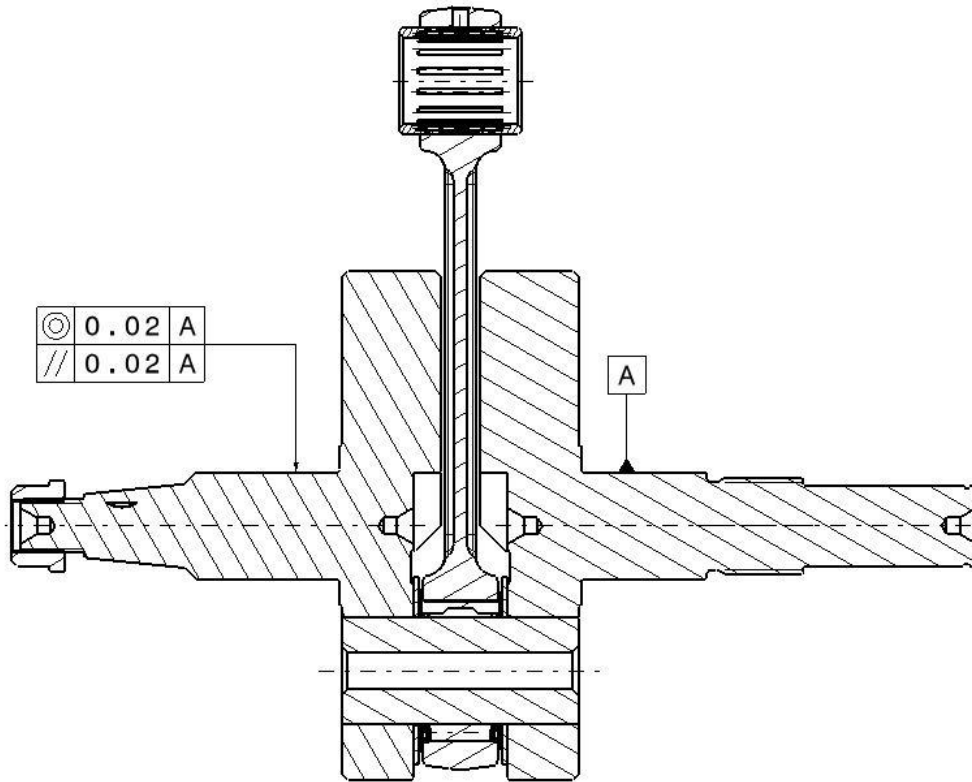
Measure the clearance at the small end and big end of the connecting rod.

	Factory nominal clearance* (mm)
Small end	0,008-0,017
Big end	0,022-0,031

* at 20 °C

Check on the connecting rod that there are no areas of different colour due to overheating.

Measure the eccentricity of the crankshaft, the factory settings are shown in the figure.

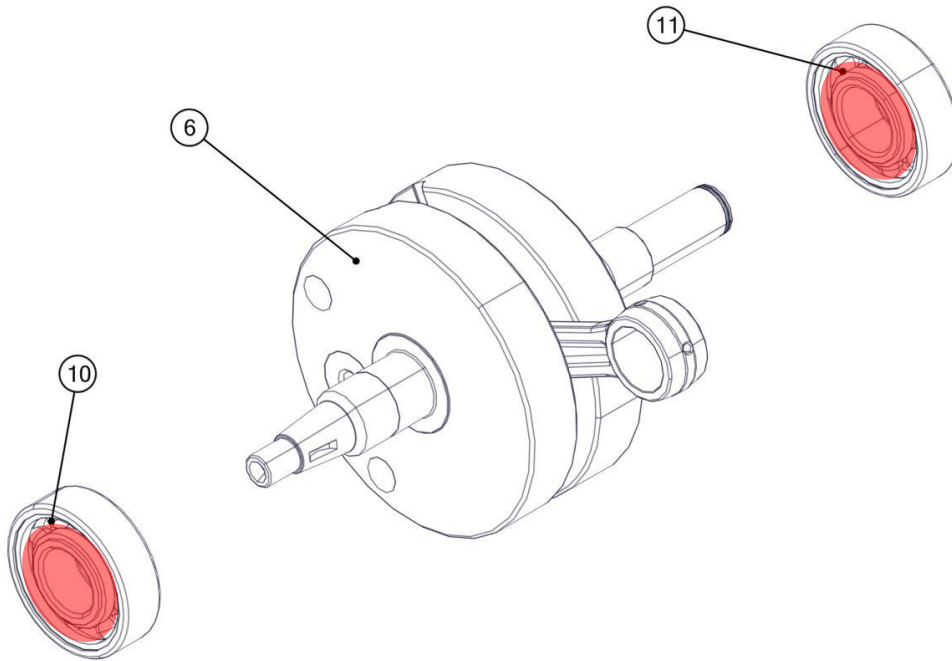


Check that the seat of the key is undamaged.

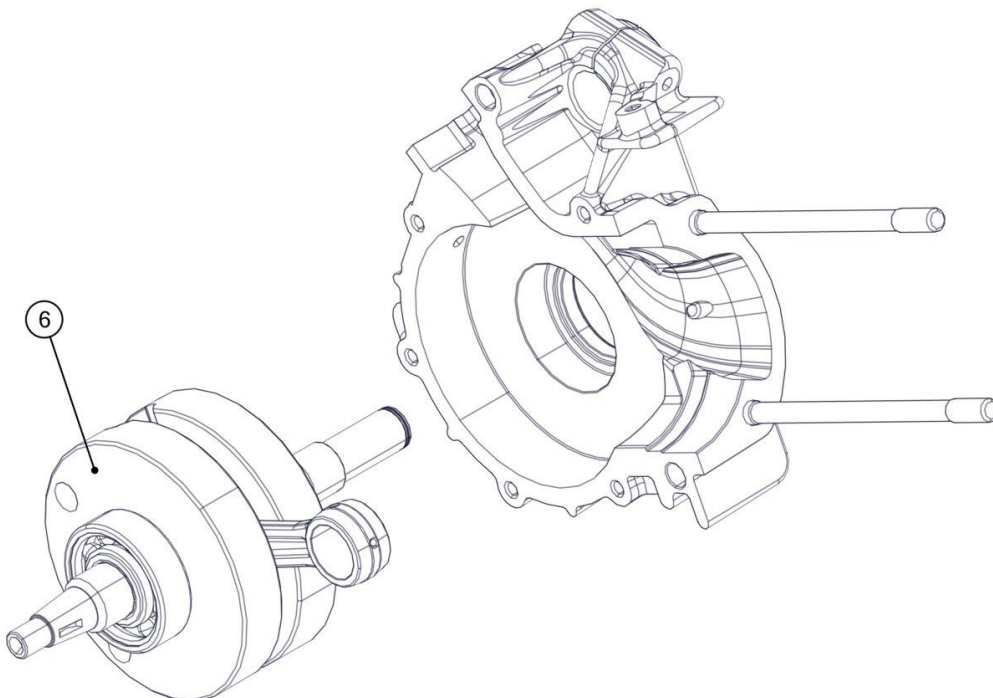
If the above checks are not passed, replace the crankshaft.

3.13.3 Crankcase assembly

Heat the inner rings of the 2 bearings (10, 11) and fit it on the crankshaft (6).



Heat the transmission side crankcase to 120 °C.
Insert the crankshaft (6) with the bearings.

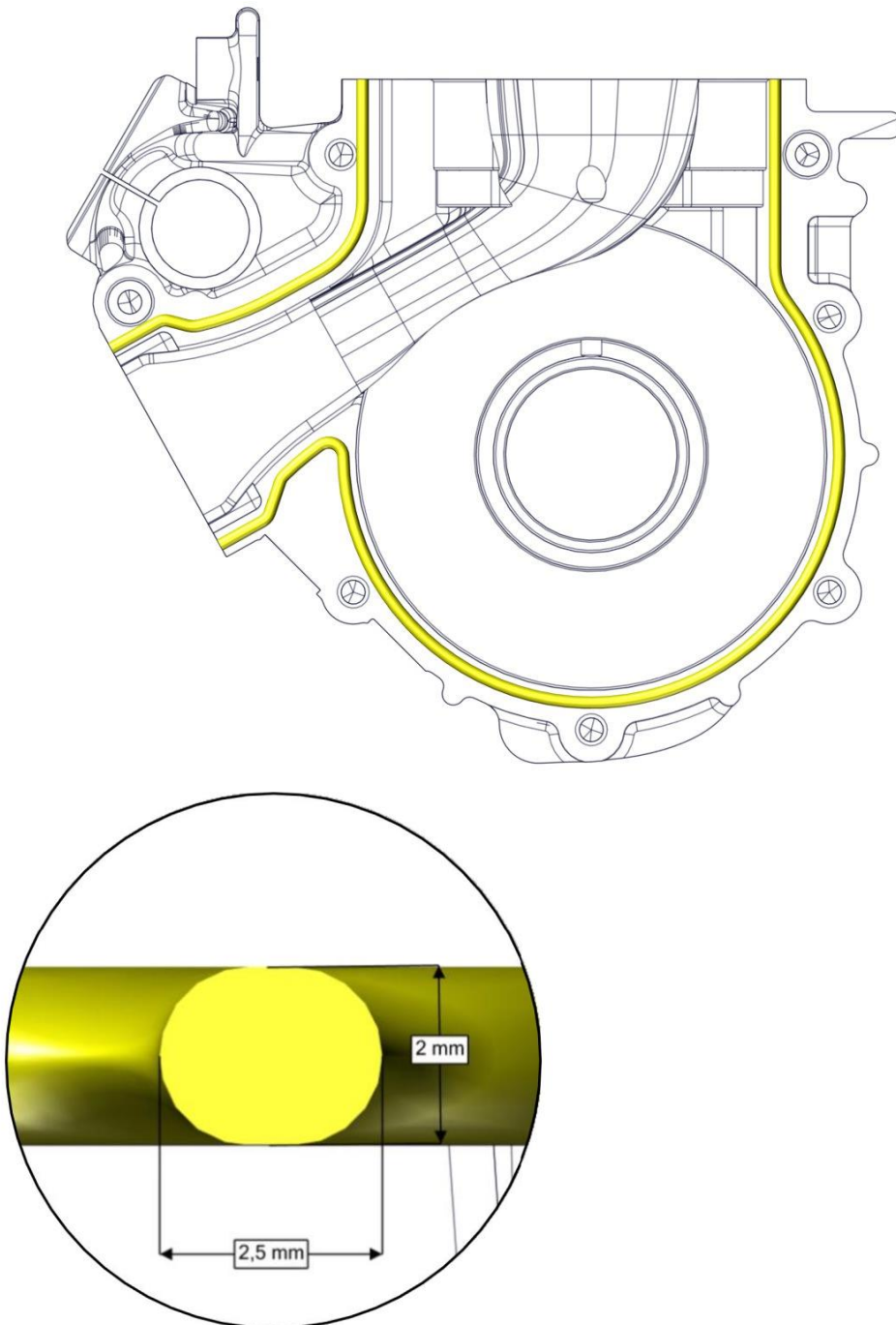


Heat the manual starter side crankcase to 120 °C.



Carry out subsequent operations within a maximum of 5 minutes (application of silicone and closing of the crankcase).

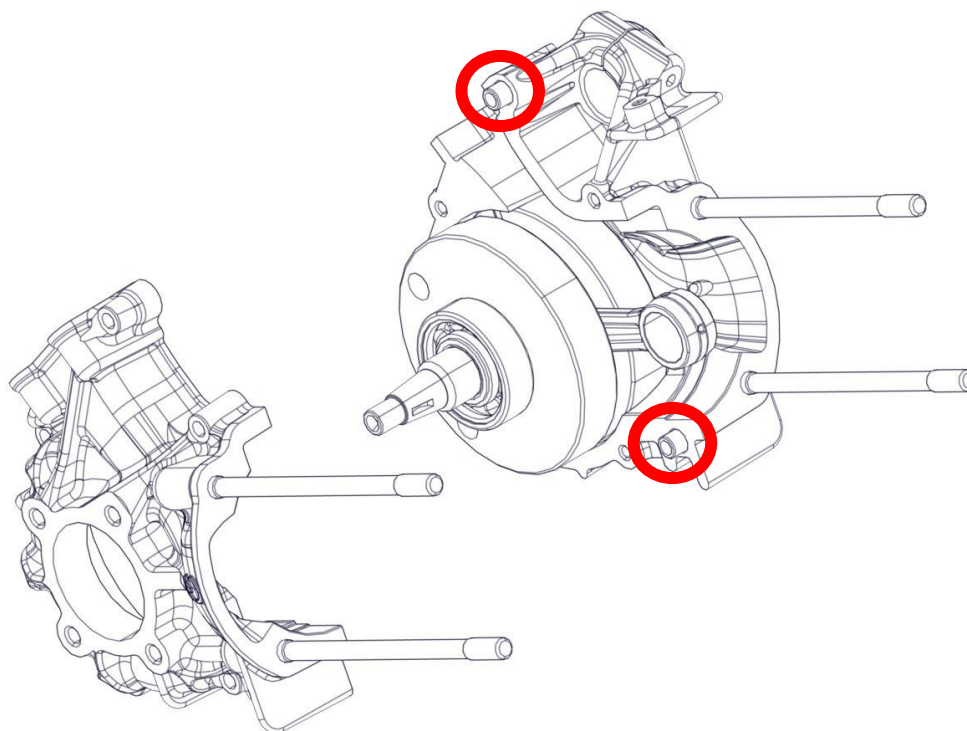
Carefully add silicone paste (Three Bond 1215) to the crankcase profile as shown in the figure. Height, width silicone profile: 2 mm x 2,5 mm.



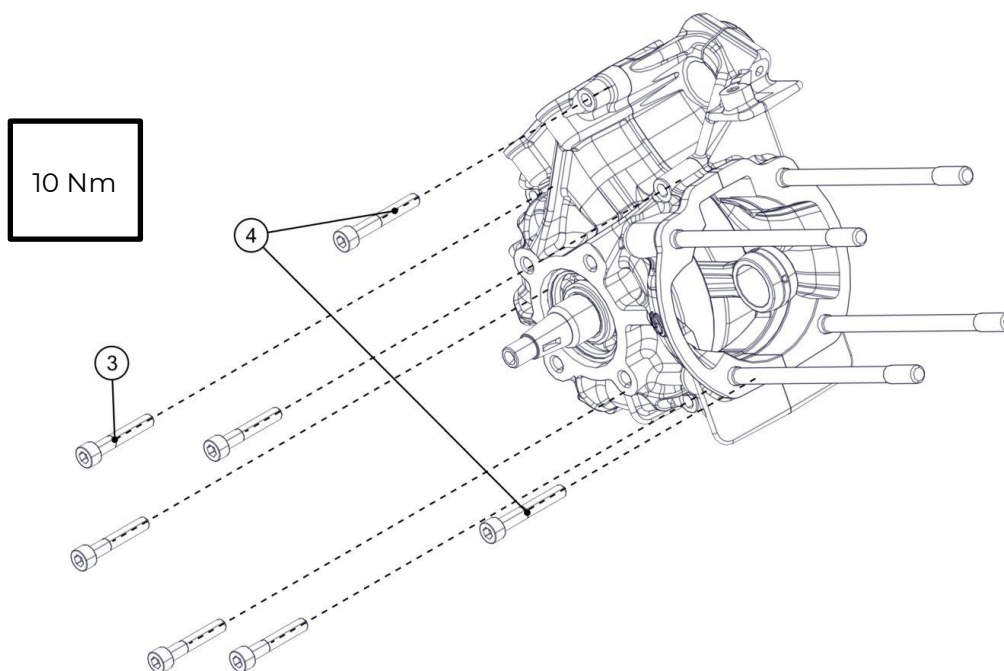


Check that the 2 bushings are in their respective seats (highlighted in the figure).

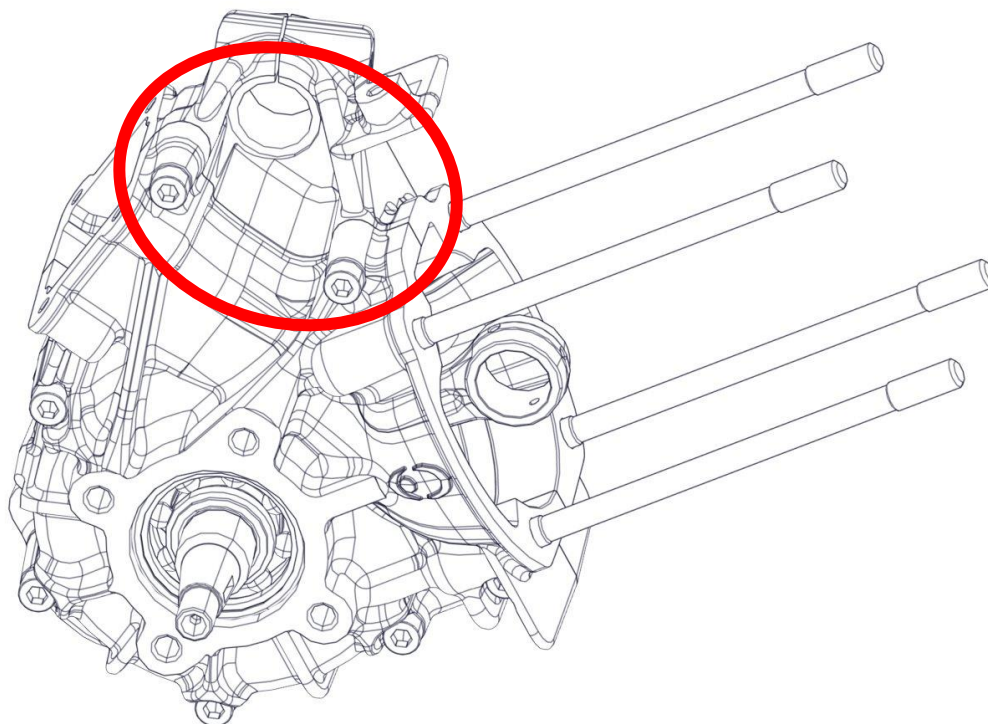
Close with the manual starter side crankcase still warm at 120 °C.



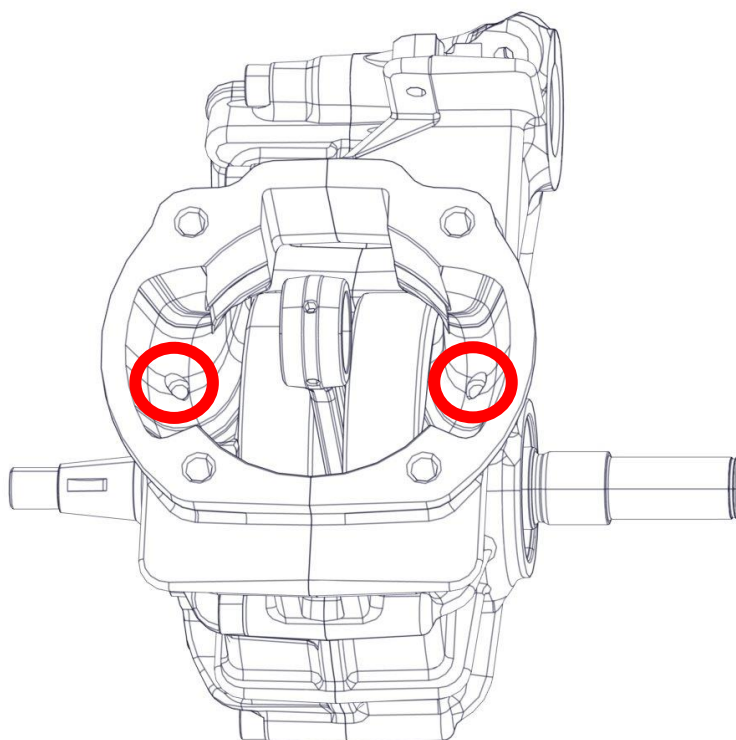
Add Wurth paste 0893921501 to the screws M8x16.
Insert the 5 Allen screws M6x35 (3), the 2 Allen screws M6x40 (4) and tighten with the torque shown in the figure.



Clean the excess silicone from the crankcase perimeter with a cloth, except in the area shown in the figure (between the plane of the reed valve and the cylinder base plane).



Wait for the crankcase to cool down.
Check the tightening of screws.
Insert oil into the 2 lubrication holes (highlighted in the figure).

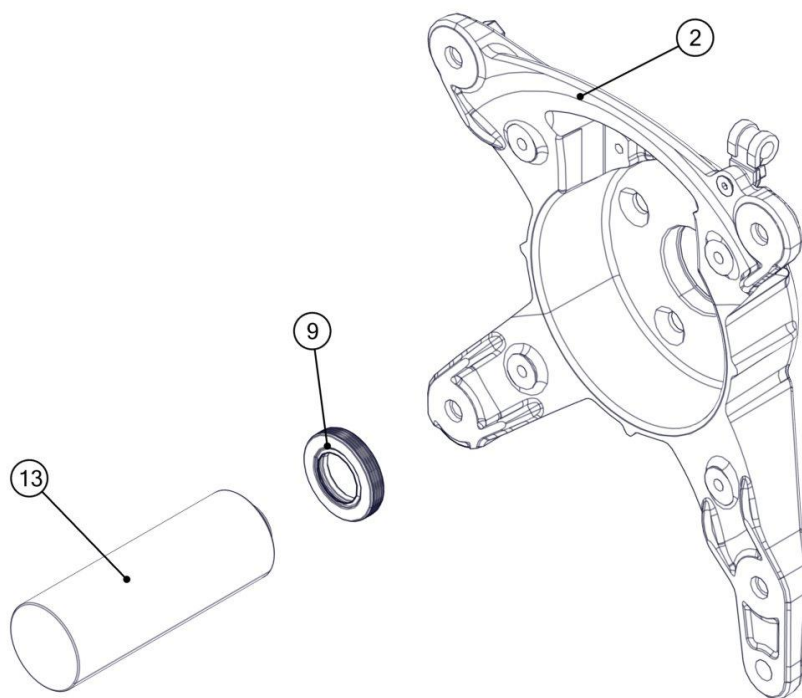


Check the sliding of crankshaft on the bearings.

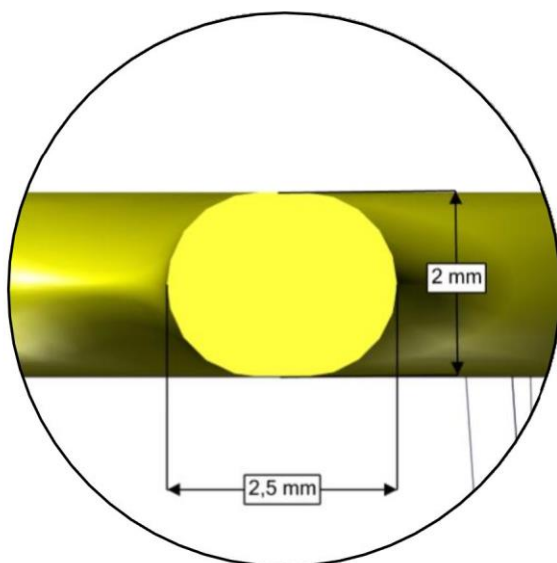
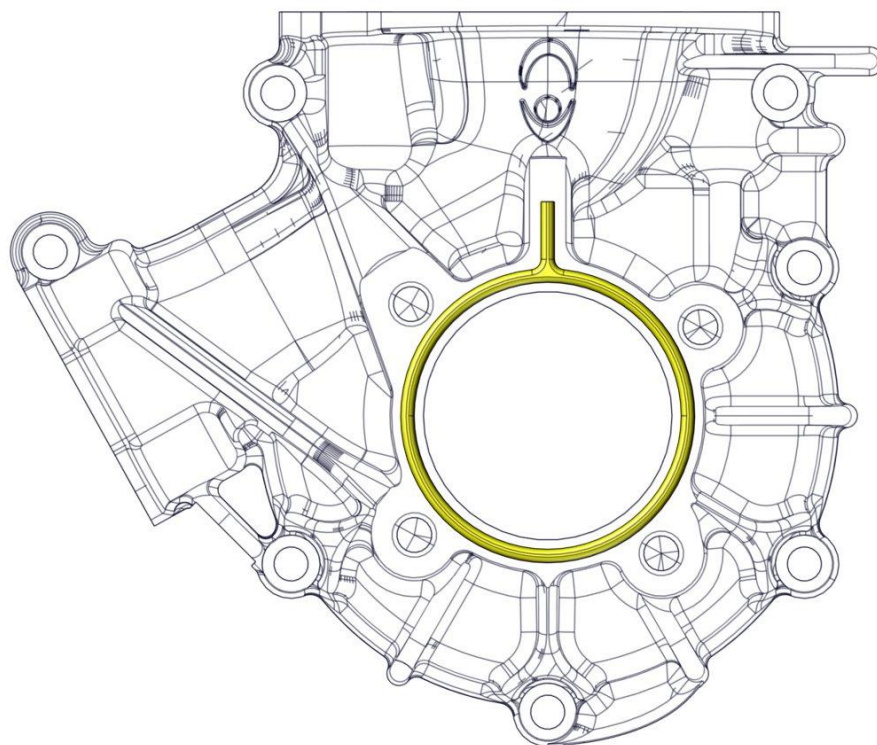


Replace the oil seal (9) each time it is disassembled.

Grease the oil seal (9) with FP Silicompond 225 and place it on the crankcase support (2) using the specific tool (13) to insert it.

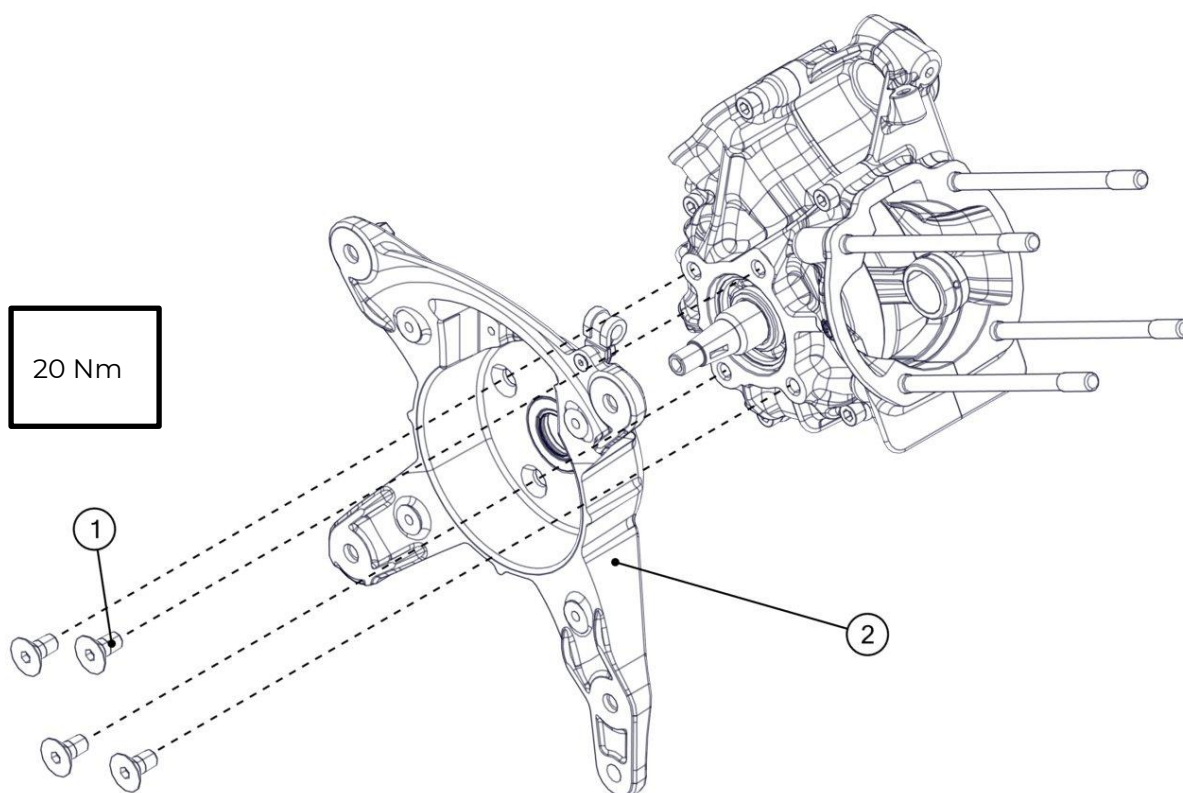


Carefully add silicone paste (Three Bond 1215) to the crankcase profile as shown in the figure. Height, width silicone profile: 2 mm x 2,5 mm.

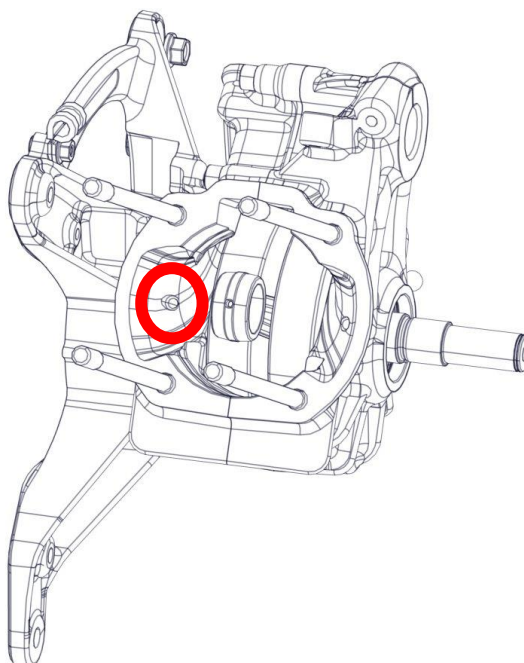


Add Wurth paste 0893921500 to the screws M8x16.

Insert the 4 countersunk screws M8x16 (1) on the crankcase support (2) and then cross-tighten with the torque shown in the figure.



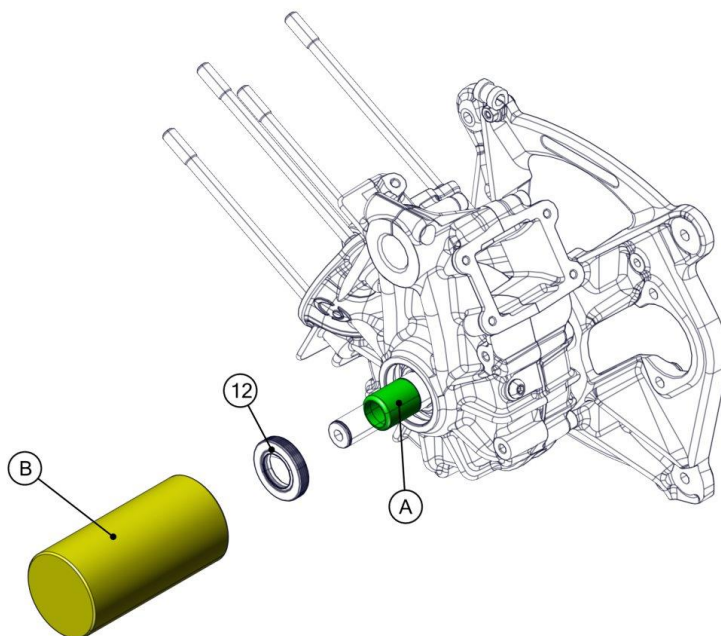
Check that the hole shown in the figure is not blocked by silicone.





Replace the oil seal (12) each time it is disassembled.

Insert the part A of the specific tool [] on the crankshaft.
Grease the oil seal (12) with FP Silicomound 225 and place it on the on the crankshaft using the part B to insert it.



Remove the part B and A.

3.14 Tightening values

Component	Torque value	Thread size	Specification for titanium bolts
Engine carter screws	10 Nm	M6x35/40	Paste Wurth 0893 921 501
Carter support screws	20 Nm	M8x16	Paste Wurth 0893 921 500
Cylinder studs	20 Nm	M8	Paste Wurth 0893 921 500
Cylinder head nuts	16 Nm	M8	Copper paste
Spark plug	25 Nm	M14x1,25	
Exhaust studs	25 Nm	M8	Loxal 83-55/ Loctite 270
Exhaust nuts	32 Nm	M8	Copper paste
Exhaust support plate's nuts	18 Nm	M8	
Rubber mounting nuts (MFR021b, M151b)	18 Nm	M8	
Rubber mounting nuts (M151a)	15 Nm	M8	
Carburettor flange screws	8 Nm	M5x25	Paste Wurth 0893 921 501
Carburettor screws	6 Nm	M6x60	Loxal 55-03/ Loctite 243
Pulse line inlet (brass)	hand tightening	M6	Loxal 53-14/ Loctite 542
Snaplock airbox pivots	10 Nm	M6	Loxal 55-03/ Loctite 243
Airbox fixing clamp	2,5 Nm	50-70 mm (clamp size)	
Flywheel nut	52 Nm	M10x1,25	
Electronic ignition coil bolts	hand tightening	M5x20	Paste Wurth 0893 921 501

The table follows in the next page

Aluminium toothed pulley's screws	8 Nm	M5x20	
Manual starter screw	10 Nm	M6x63	Loxal 24-18/ Loctite 222
Starter central pin screw	17 Nm	M8x25	Loxal 83-55/ Loctite 270
Eccentric rear screw	25 Nm	M8x16	
Eccentric side screw	12 Nm	M6x35	Paste Wurth 0893 921 502
Carbon propeller screws	10-12 Nm	M6	

