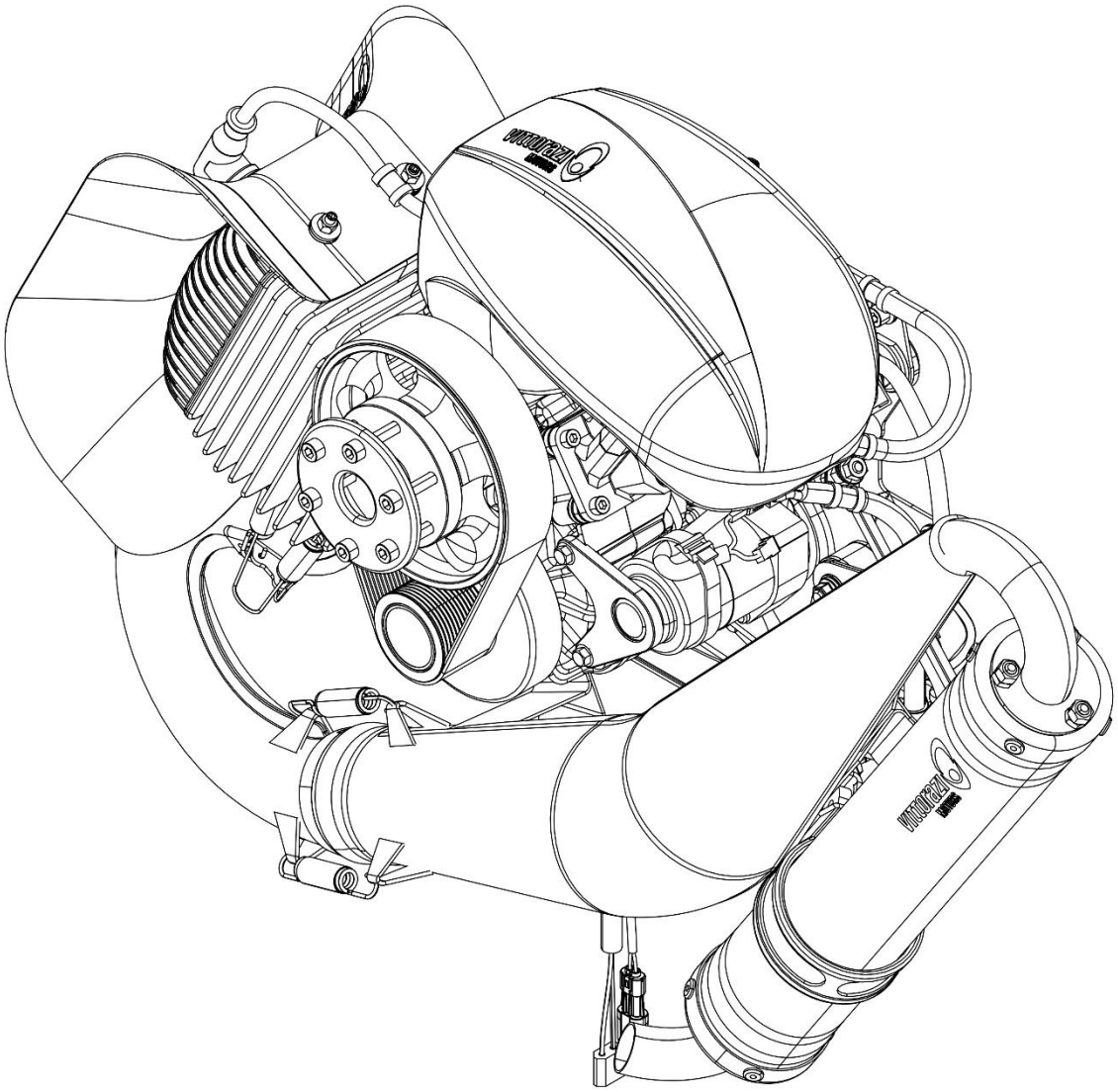
MOSTER 185 EFI

Maintenance manual

Release V1/2024.
Valid for MY24 version.



vittorazi MOTORS

Contents

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 held 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 208° Celsius. Do not persist above this temperature threshold, engine overheating and irreversible damage could occur.

When the CHT exceeds 208°C, the ECU system generates a small engine speed reductions that last a fraction of a second, without compromising the flight dynamics, just to call the pilot's attention. This safety function disappears when the speed is reduced below 7400 rpm.

Exceeding the EGT limit is shown on the display with the word "Temp" flashing in the top left-hand corner. Proceed at reduced power and once on the ground contact your dealer

LiPo batteries are high-tech products but potentially dangerous to property, animals or people, especially if used improperly or without experience.

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 is already integrated in the EFI system. It records all engine operating hours.
The number of hours the engine has been running can be consulted via the Info menu.

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, whichever comes first.

2) or after 500 cycles, whichever comes first.

3) or after 300 charging cycles or 3 years, whichever comes first.

Flight hours	Before each flight	Every 10 h	Every 25 h	Every 50 h	Every 100 h	Every 150 h	Every 200 h	Every 400 h
Pre-flight checklist								
Screws and nuts (tightening)								
Spark plug								
Spark plug cap								
Airbox Snaplock								
Airbox			 					
Airbox sponge and sleeve			 		 1)			
Fuel injector								
Fuel injector connector					 			
Fuel injector test								
Pump value min test								

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	Every 400 h
Microfilter with O-ring								
Vittorazi paper filter								
Fuel injector pipes								
Fuel tank pipes								
FIU								
Rubber mountings (FIU, engine, exhaust)						 1)		
ECU signal wiring								
ECU supply wiring								
Electric starter wiring								
RJ-45 cable								
CHT sensor								
EGT sensor								
Battery							 3)	

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	Every 400 h
Air rotary valve lever								
Reed valve petals								
Electric starter					 2)			
Kit exhaust bushing (1^{st} joint)	 			 				
Kit exhaust bushing (2^{nd} joint)	 							
Exhaust manifold with springs								
Soundproofing material silencer								
Rubber silencer fixing washers						 1)		
Gaskets (cylinder, Air Rotary Valve, reed valve, exhaust, silencer)								
Piston					 			
Piston roller bearing								

The table follows in the next page

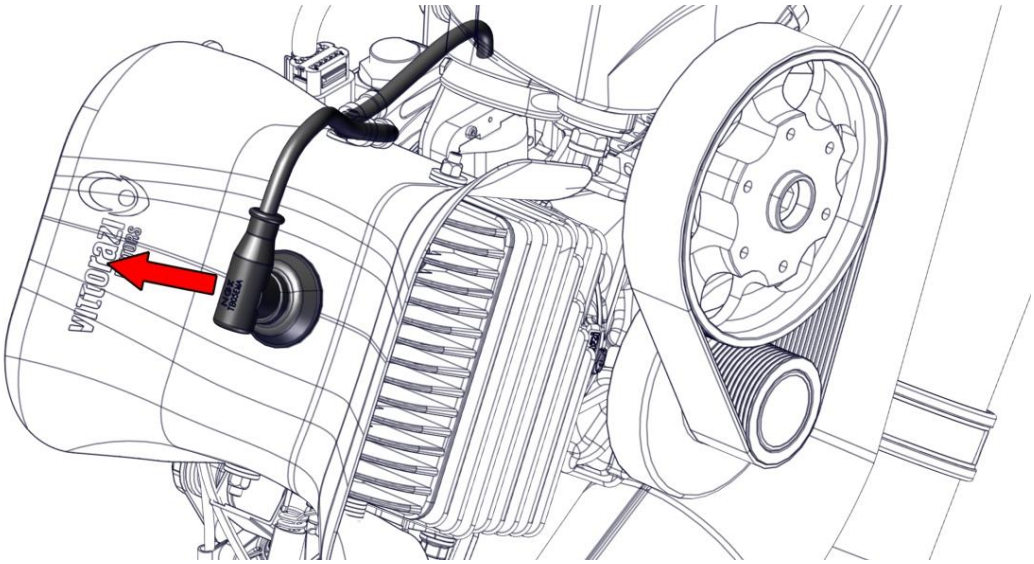
Flight hours	Before each flight	Every 10 h	Every 25 h	Every 50 h	Every 100 h	Every 150 h	Every 200 h	Every 400 h
Head and cylinder								
O-ring head								
Oil seal carter case								
Crankshaft bearings								
Crankshaft								
Belt								
Reduction bearings								
Centrifugal clutch								
Clutch bell								

3.2 Spark plug

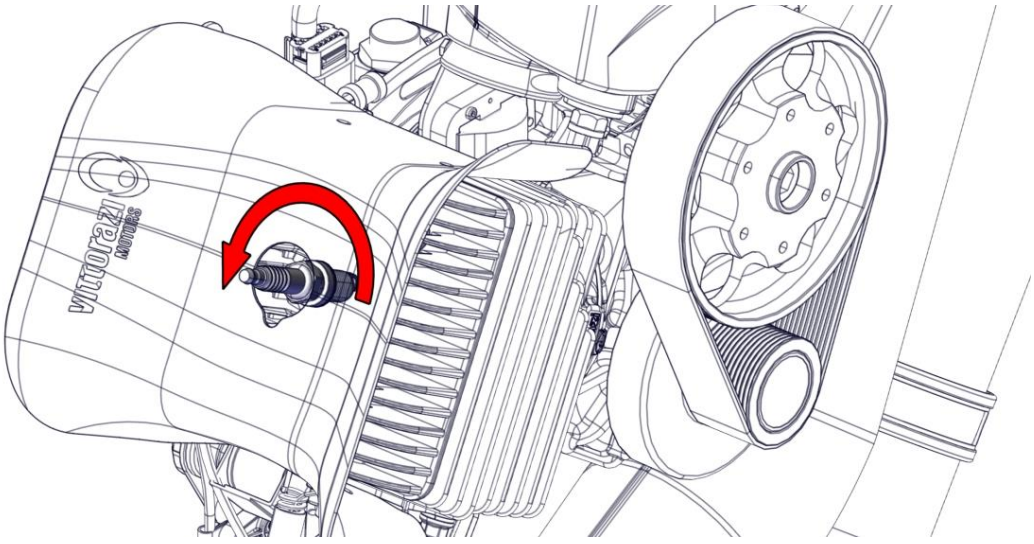
Components to replace	<table><tr><th></th><th>Time limit</th></tr><tr><td>Spark plug (ACC090).</td><td>25 h</td></tr><tr><td>Spark plug cap (MI031a).</td><td>100 h</td></tr></table>
Special tools	Not required.
Values	Distance between the spark plug electrodes: - 0,7 mm (new spark plug) - 0,9 mm (worn spark plug limit). Spark plug: 25 Nm.

3.2.1 Spark plug disassembly

Disconnect the spark plug cap.



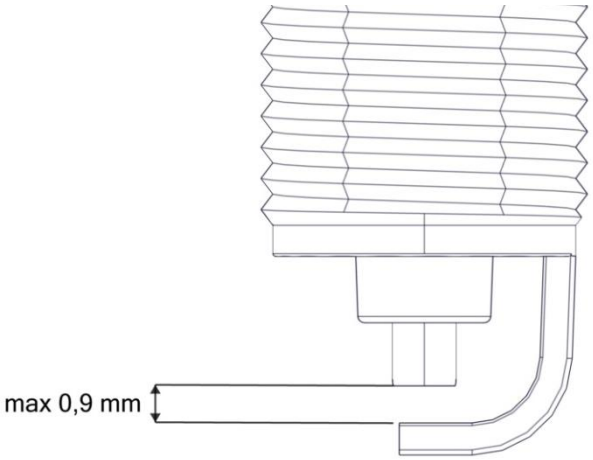
Unscrew the spark plug.



3.2.2 Spark plug maintenance

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.

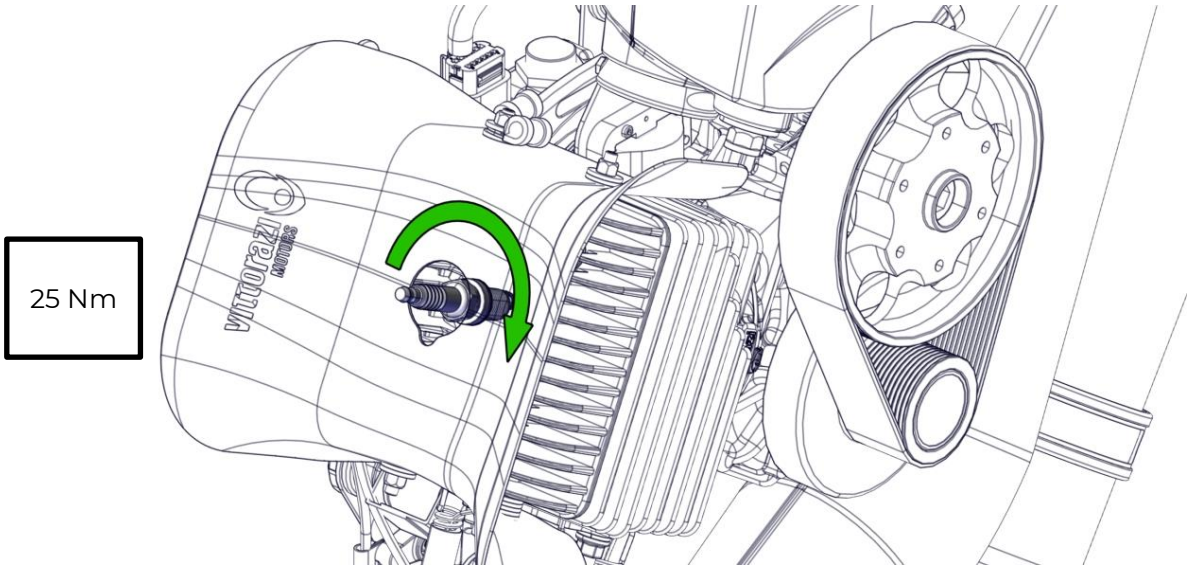
The new spark plug for the engine must be of the same type and rating as the one to be replaced (ACC090).

Check the ignition cable: there must be no cuts or cracks, otherwise replace the ignition coil (including ignition cable).

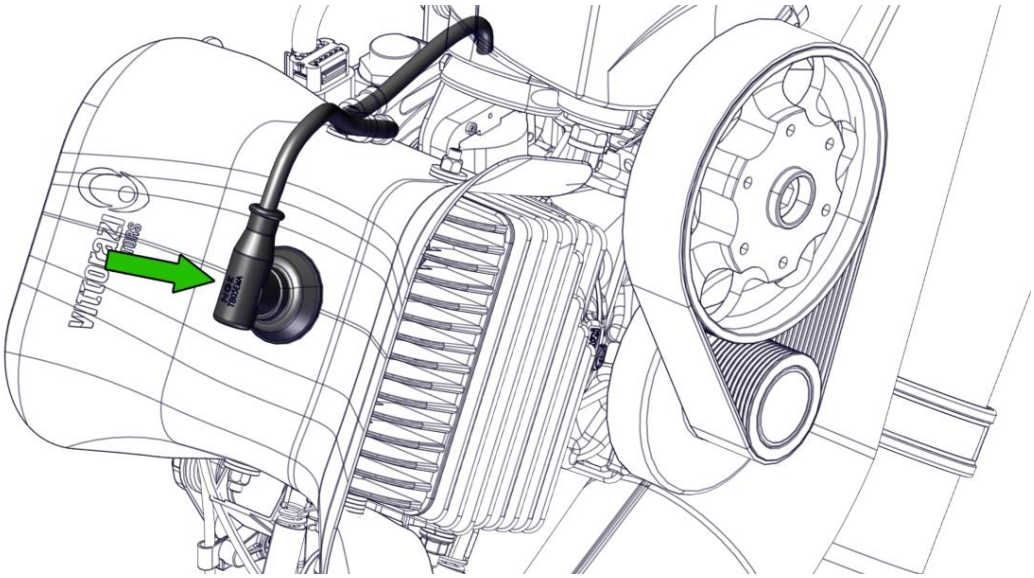
3.2.3 Spark plug assembly

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

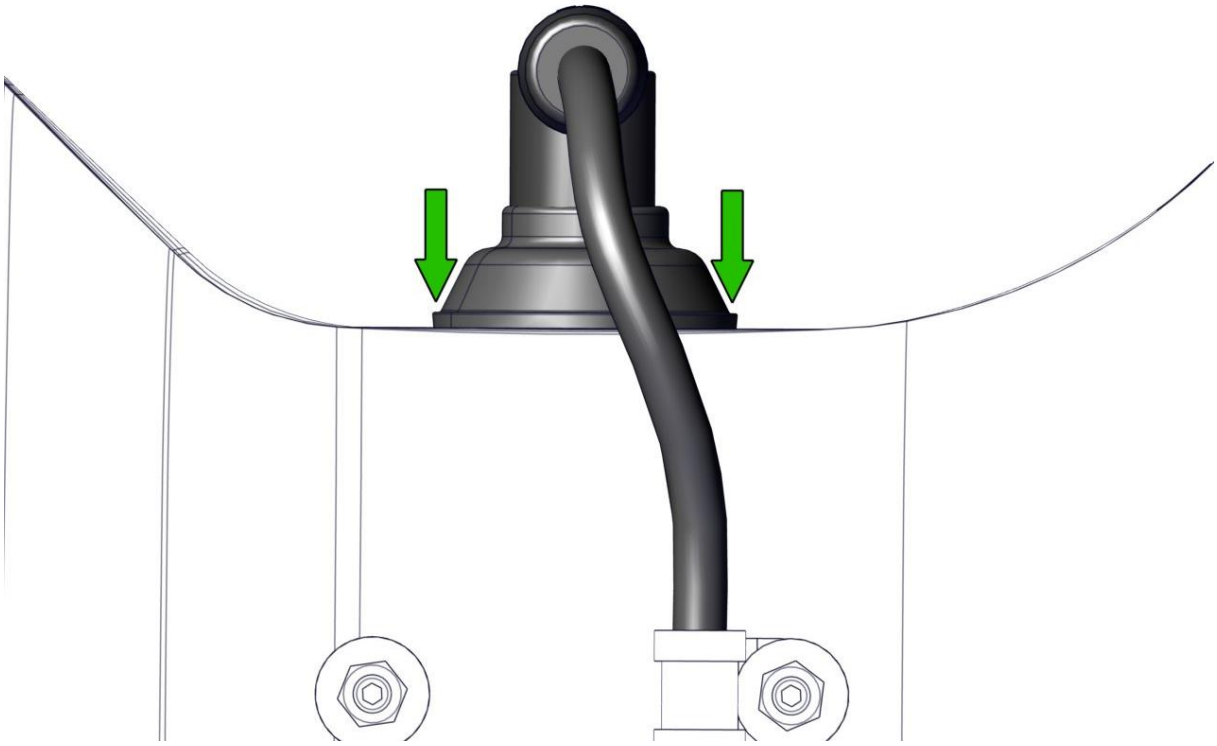
Insert the spark plug into the head and tighten with the torque shown in the figure.



Connect the spark plug cap.

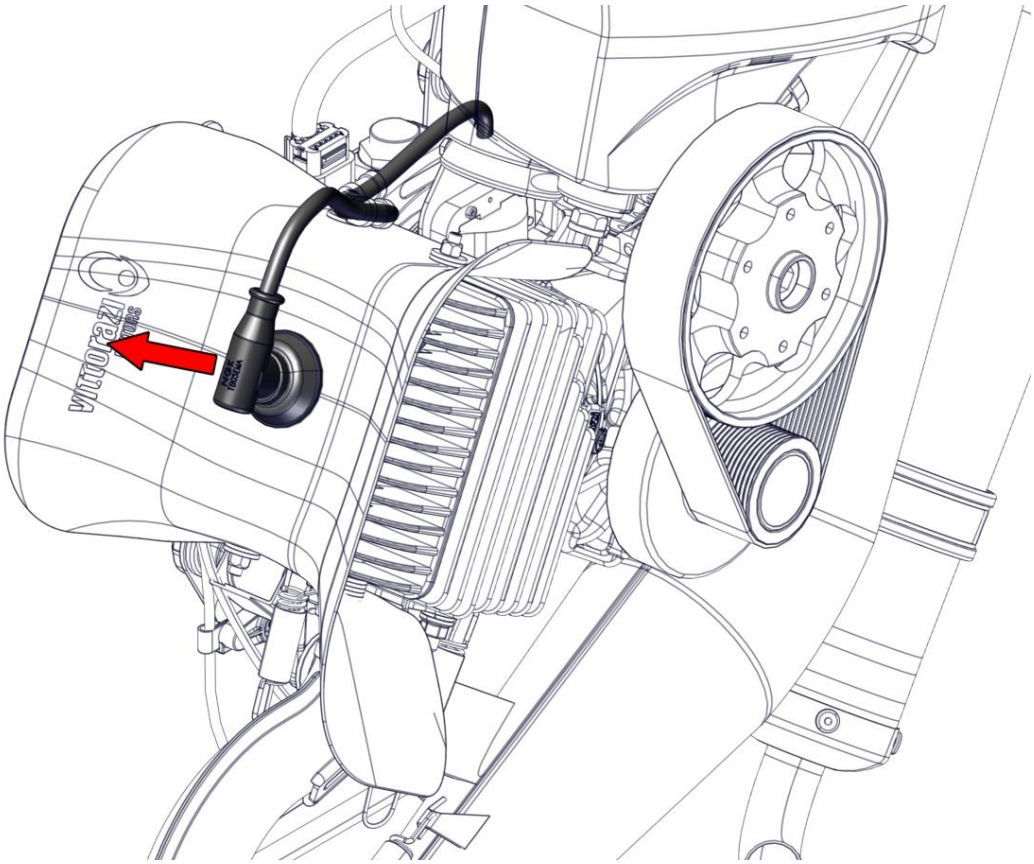


Once the spark plug cap is inserted check that the rubber cap is in contact with the cooling shroud.



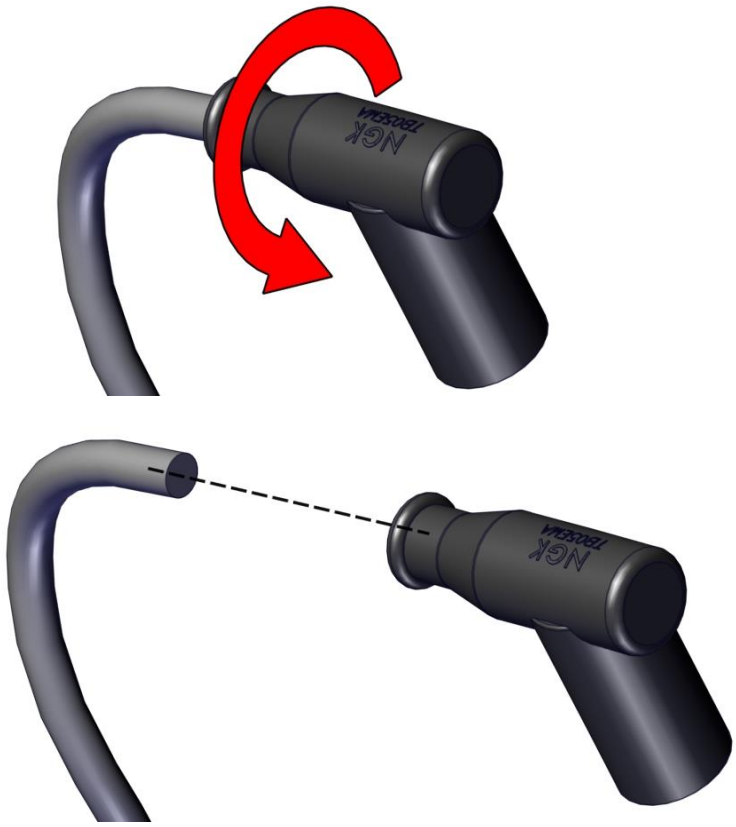
3.2.4 Spark plug cap disassembly

Disconnect the spark plug cap.



Remove the rubber cap from the spark plug cap.

Remove the spark plug cap by unscrewing it from the cable.



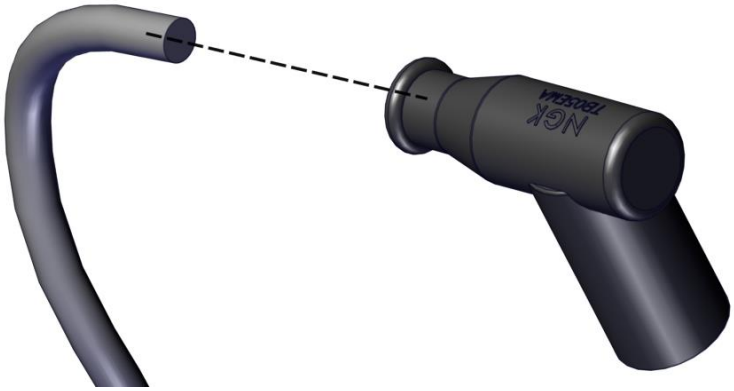
3.2.5 Spark plug cap maintenance

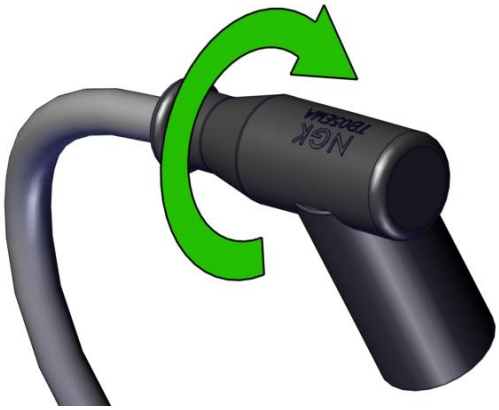
Check the spark plug cap: if it is damaged or the connection to the spark plug is not stable or if scheduled maintenance is required, replace it.

3.2.6 Spark plug cap assembly

Check that the spark plug cap is an NGK spark plug cap (cod. MI031a).
The Moster 185 EFI uses a different spark plug cap than other Vittorazi engines.

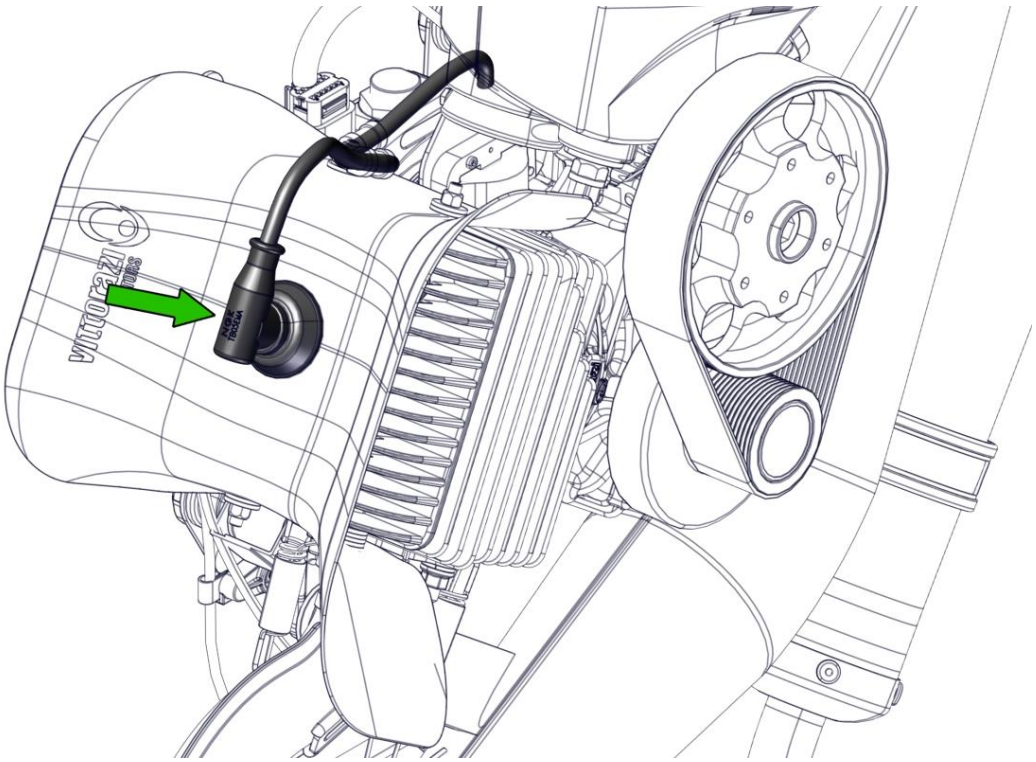
Apply a small amount of silicone spray (recommended LOCTITE LB 8021) to the tip of the cable to facilitate the insertion of the spark plug cap.
Insert the spark plug cap in the cable and screw it by hand.



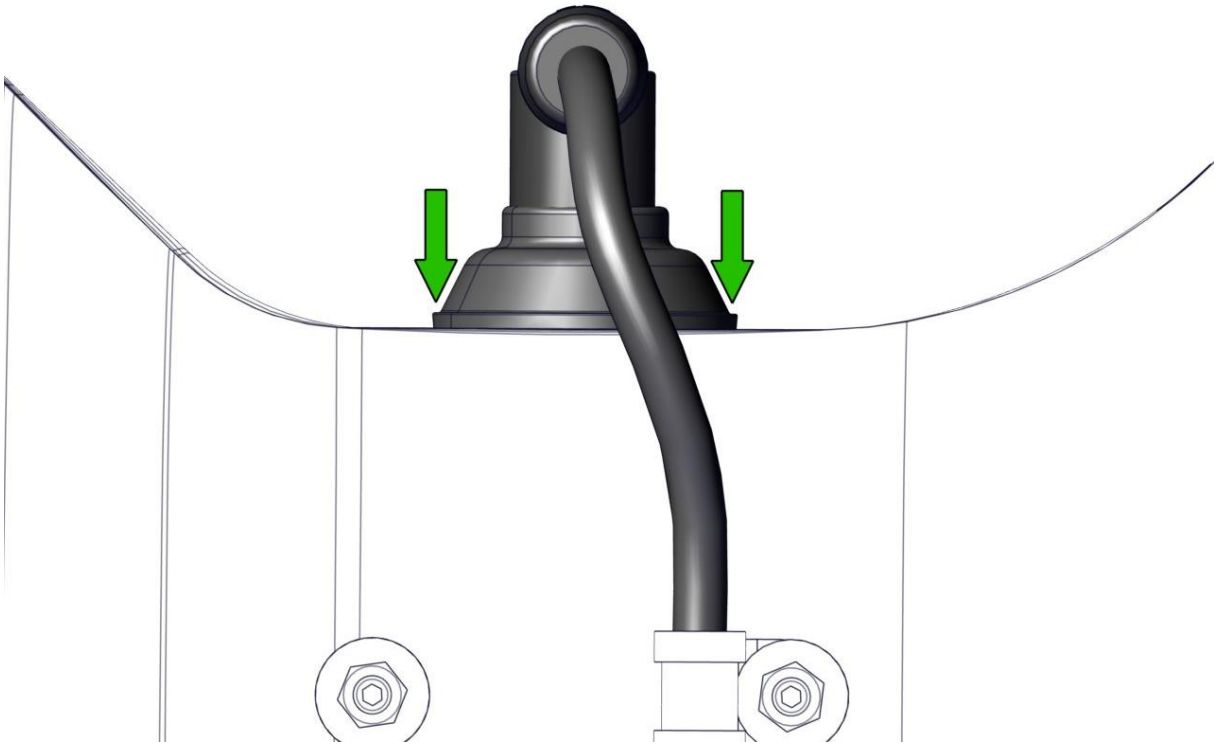


Once screwed in all the way, check that the two bodies are firmly joined by pulling the cable and spark plug cap.
Insert the rubber cap on the spark plug cap.

Connect the spark plug cap on the spark plug.



Once the spark plug cap is inserted check that the rubber cap is in contact with the cooling shroud.

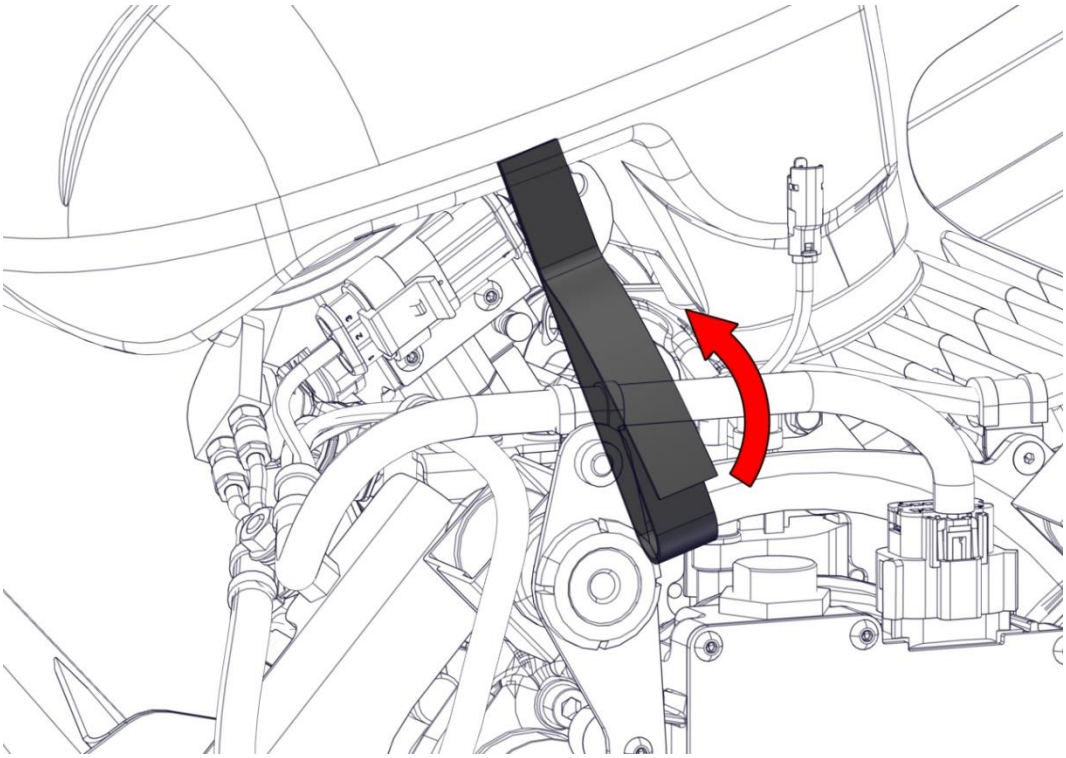


3.3 Airbox

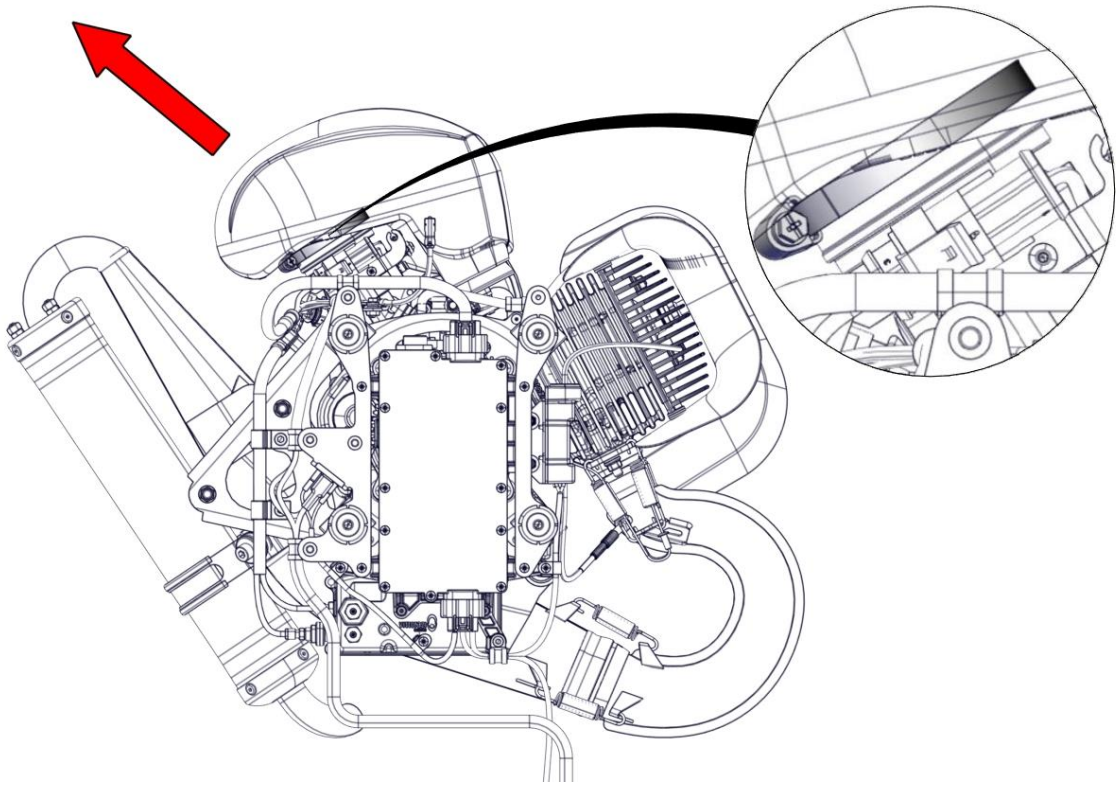
Components to replace	<table><tr><th></th><th>Time limit</th></tr><tr><td>Snaplock (MP093d).</td><td>25 h</td></tr><tr><td>Sleeve with filter (AT093a).</td><td>100 h or 1 year</td></tr></table>
Special tools	Not required.
Values	Clamp screw: 2,5 Nm.

3.3.1 Airbox disassembly

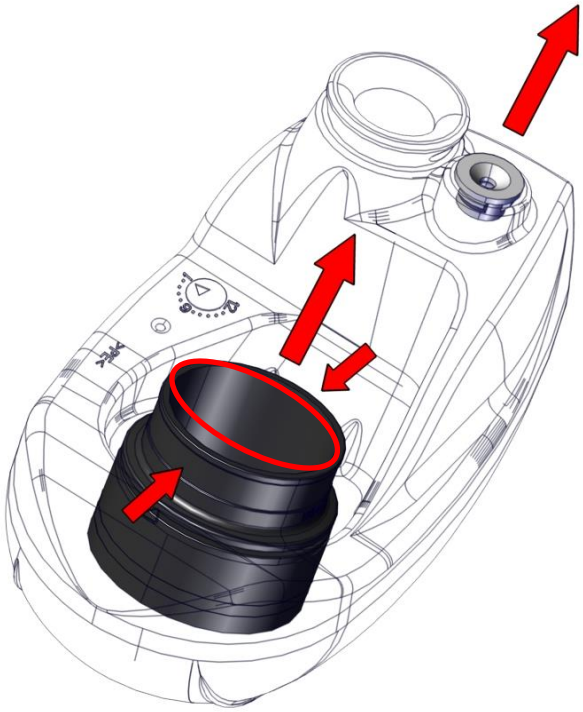
Unhook the safety strap.



Loosen the screw of the clamp securing the sleeve to the air rotary valve and remove the airbox.

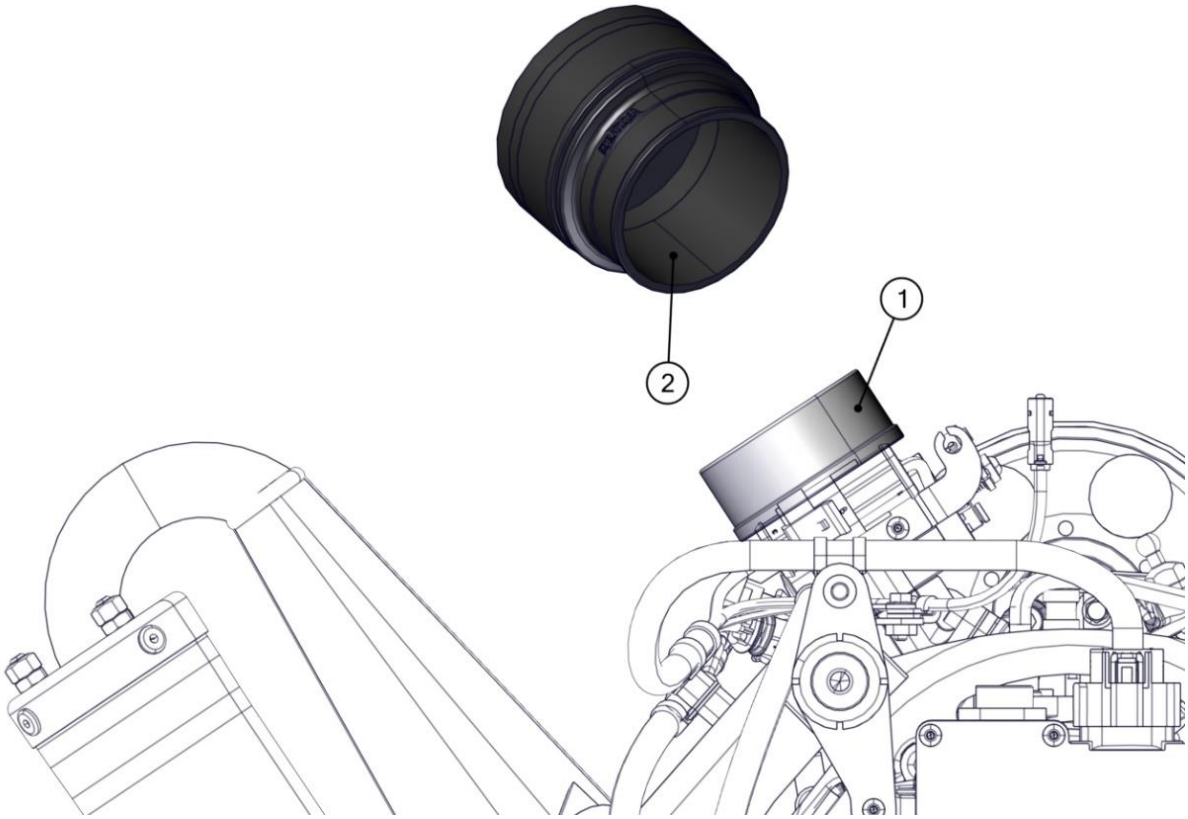


Fold the sleeve inwards and remove it from the airbox.
Remove the Snaplock.



3.3.2 Airbox maintenance

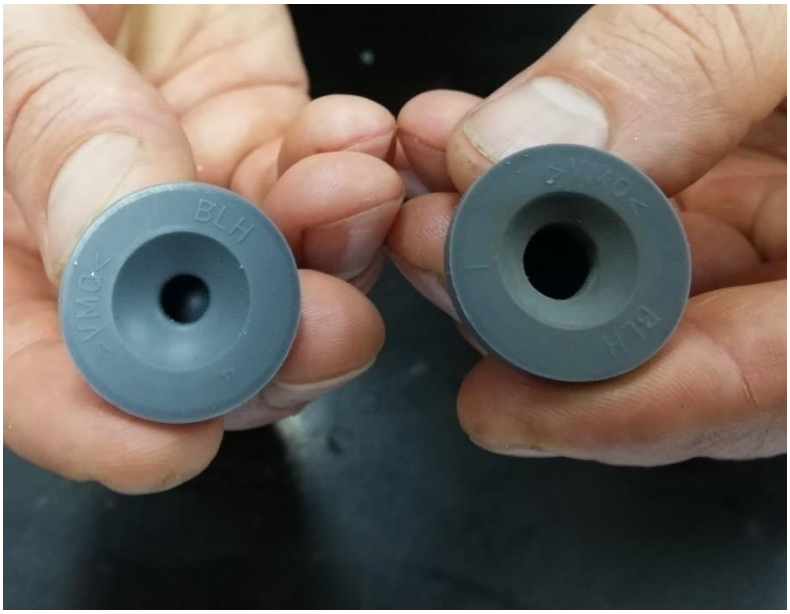
Clean the sponge with specific filter chemicals.
Clean the airbox cavity with compressed air.
To obtain a good seal between the components, degrease the air rotary valve connector (1) and the internal part of the sleeve (2) with a product suitable for cleaning rubber (the sleeve is made up of a mixture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



Check the integrity of the airbox.
Check the sleeve groove (the photo shows a damaged groove).

Check the filter, in particular the bonding with the sleeve and the various parts of the sponge (the photo shows a damaged filter).

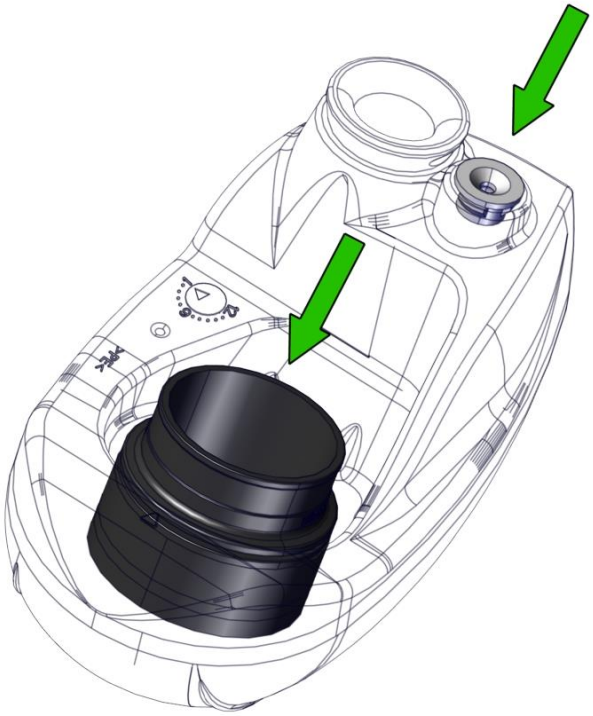
Check the Snaplock, in particular the central hole (the photo shows a comparison between a new component on the left and a worn one on the right).
Connect the Snaplock to the pin on the motor to check that the engagement is stable.



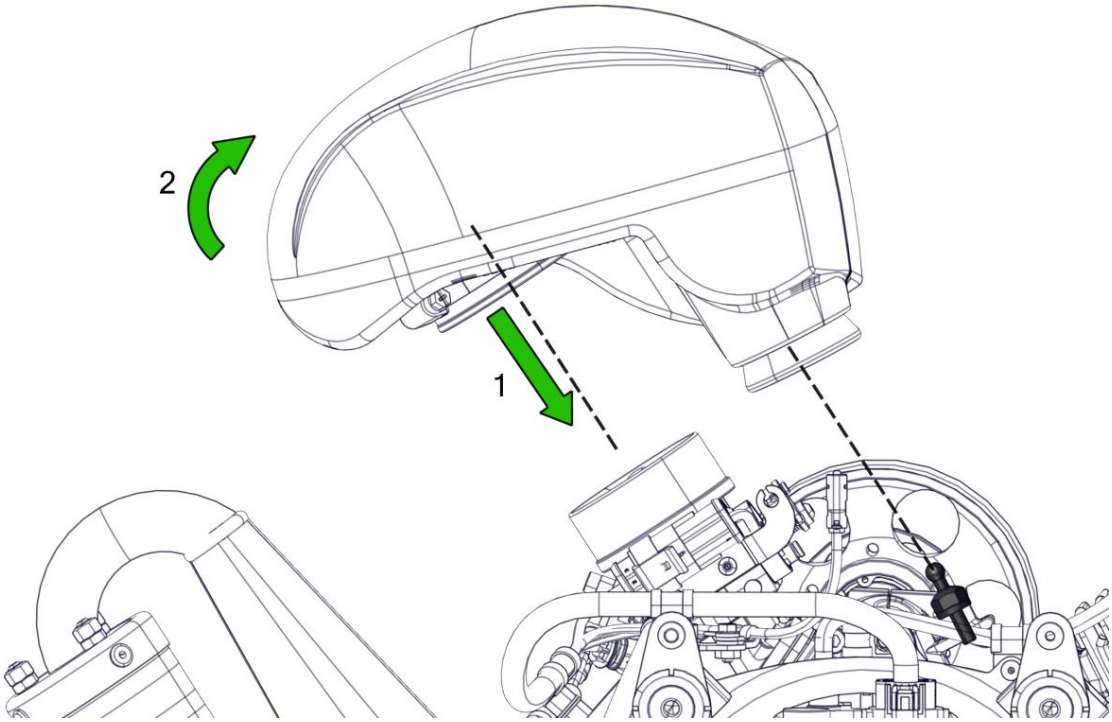
If the above components are damaged, replace them immediately. For routine maintenance, follow the table.
Use extreme caution when checking, as failure to replace damaged components can lead to detachment of the airbox and impact with the propeller.

3.3.3 Airbox assembly

Insert the sleeve into the airbox.
Insert the Snaplock.

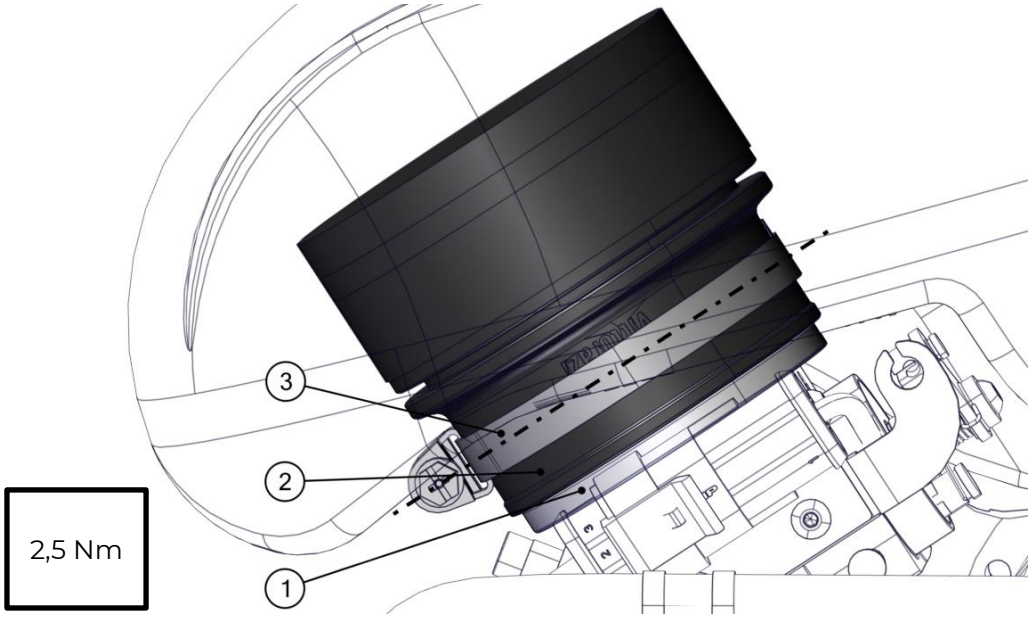


Connect the sleeve of the airbox to the air rotary valve (1), after having inserted it rotate the airbox to fix the Snaplock (2).

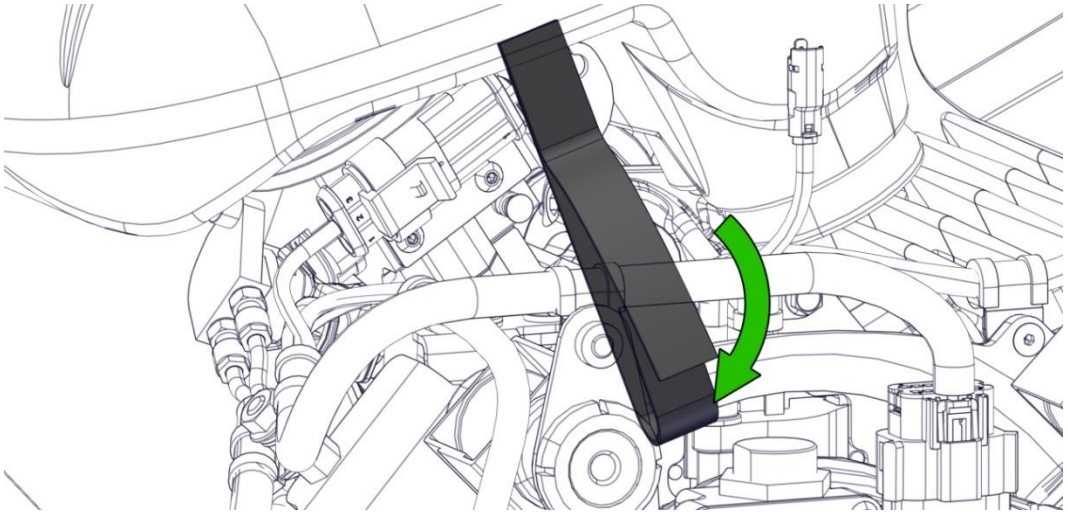


The airbox sleeve (2) must be completely inserted into the air rotary valve connector (1), the fixing clamp (3) correctly inserted on the seat and aligned as shown in the figure.

Tighten the fixing clamp with the torque shown in the figure.



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 Fuel injection line

<table>
<tr><td> 
Components to replace</td><td>
<table>
<tr><th></th><th>Time limit</th></tr>
<tr><td>Fuel microfilter with O-ring (MI404)</td><td>25 h</td></tr>
<tr><td>Vittorazi paper filter (MI561)</td><td>100 h</td></tr>
<tr><td>Fuel injector pipes (MI563)</td><td>100 h</td></tr>
<tr><td>Fuel tank pipes</td><td>200 h</td></tr>
<tr><td>Fuel Injector (MI505)</td><td>200 h</td></tr>
<tr><td>Loxeal 55-03/Loctite 243 *</td><td></td></tr>
<tr><td>FP Silicompound 225 *</td><td></td></tr>
</table>
</td></tr>
<tr><td> 
Special tools</td><td>Not required.</td></tr>
<tr><td> 
Values</td><td>Screw M5x12: 6,5 Nm.
Nut M6: 10 Nm
Microfilter cap: 0.3 Nm</td></tr>
</table>

*Always replace it when disassembled.

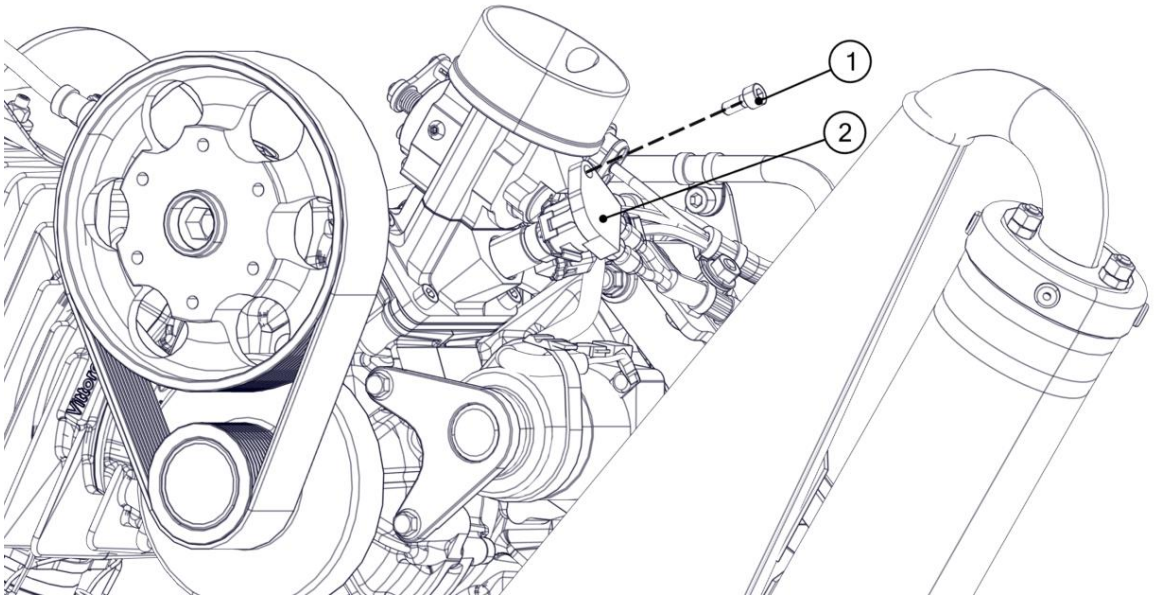
The entire fuel circuit that will be described in the following paragraphs can become very dangerous in case of improper maintenance. In fact, all the components that make up the system can pose a hazard in the event of a pressurized fuel leak. Extreme care is recommended in operations and to follow instructions scrupulously.
Always keep the fuel hoses and their connections protected with a cap when they are disconnected. Insert the caps as soon as the components get exposed and remove them only when connecting the components.
The entry of impurities into the fuel system can impair the functioning of the circuit components and lead to serious hazards.
The use of non-original Vittorazi components can lead to very serious hazards.

In case of occlusion of a component inside the Fuel Box Unit (FBU), it will be necessary to replace the entire Full Integrated Unit (FIU) and ship the defective one to the Vittorazi headquarters.

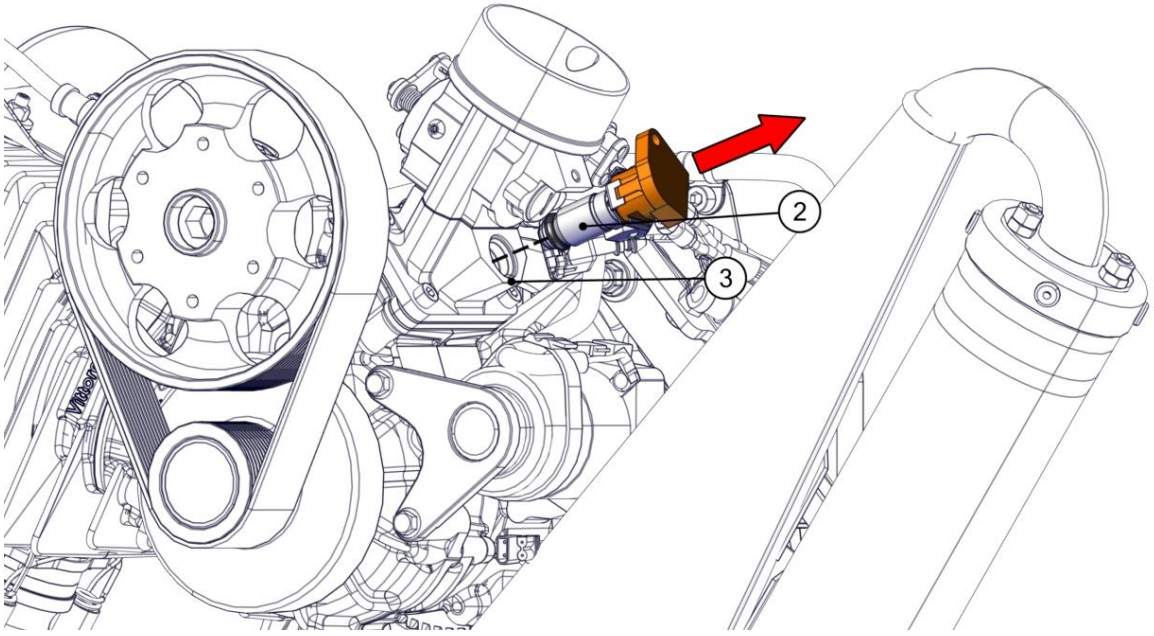
3.4.1 Fuel Injector test

Before disassembling the injector, remove the airbox (see chapter 3.3 Airbox).

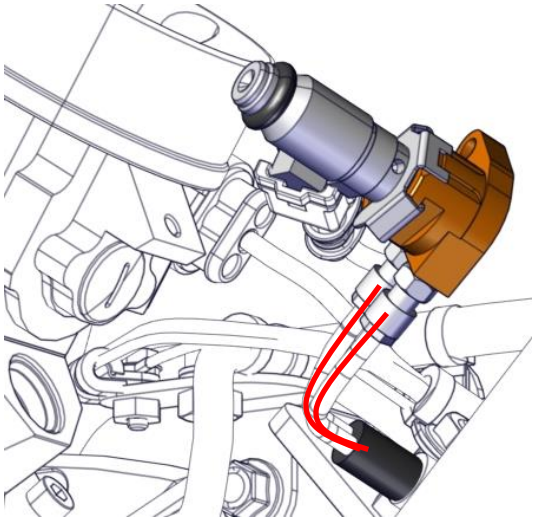
Unscrew the injector flange screw M5x12 (1).

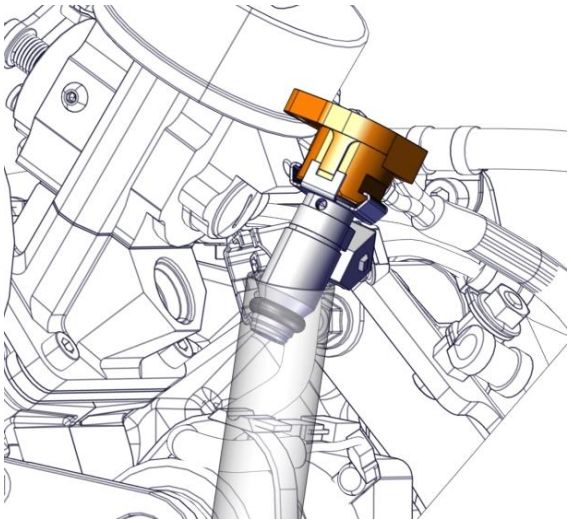


Gently extract the injector (2) from its seat on the air rotary valve (3).



When removing the injector from its seat, be careful not to bend or pull the fuel hoses.





Gasoline is extremely flammable and explosive. Take special care during the injector test phase because fuel is vaporized by the injector. Do not perform this test when near possible ignition sources.

“Injector test min” procedure:

- Select the “test injector min” screen on the Data menu.
- Place the injector inside a glass precision measuring graduated cylinder (at least of 50cc).
- Simultaneously bring the throttle stick to the maximum and press the "Enter" button.
- Release both stick and “Enter” button.
- The test stops by itself after about 50 s.
- Read the quantity of fuel injected at the end of the test.

Test results:

< 40 cc	1. Check the Vittorazi paper filter inside the fuel tank, the micro-filter and the injector. Replace one at a time, if necessary, and repeat the test. If they are in good condition proceed with the following point. 2. Increase the “Pump Value Min” by pressing the “Enter” and “+” keys simultaneously. Raise it by 0.1 to obtain an increase of about 2 cc in the result of the “Injector test min”.
40 ÷ 48 cc	OK
> 48 cc	1. Check the injector. Replace if necessary and repeat the test. If it is in good condition proceed with the following point. 2. Decrease the “Pump Value Min” by pressing the “Enter” and “-” keys simultaneously. Reduce it by 0.1 to obtain a decrease of about 2 cc in the result of the “Injector test min”.

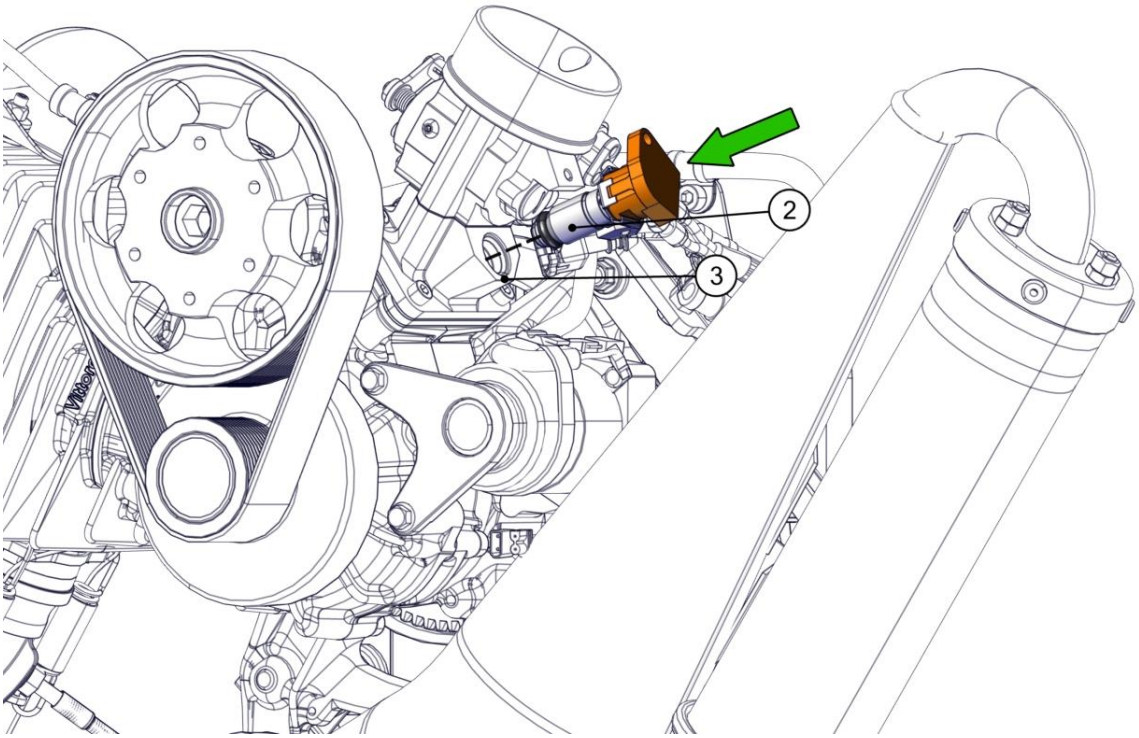
“Injector test max” procedure:

- Select the “test injector max” screen on the Data menu.
- Place the injector inside a glass precision measuring graduated cylinder (at least of 50cc).
- Simultaneously bring the throttle stick to the maximum and press the "Enter" button.
- Release both stick and “Enter” button.
- The test stops by itself after about 15 s.
- Read the quantity of fuel injected at the end of the test.

Test results:

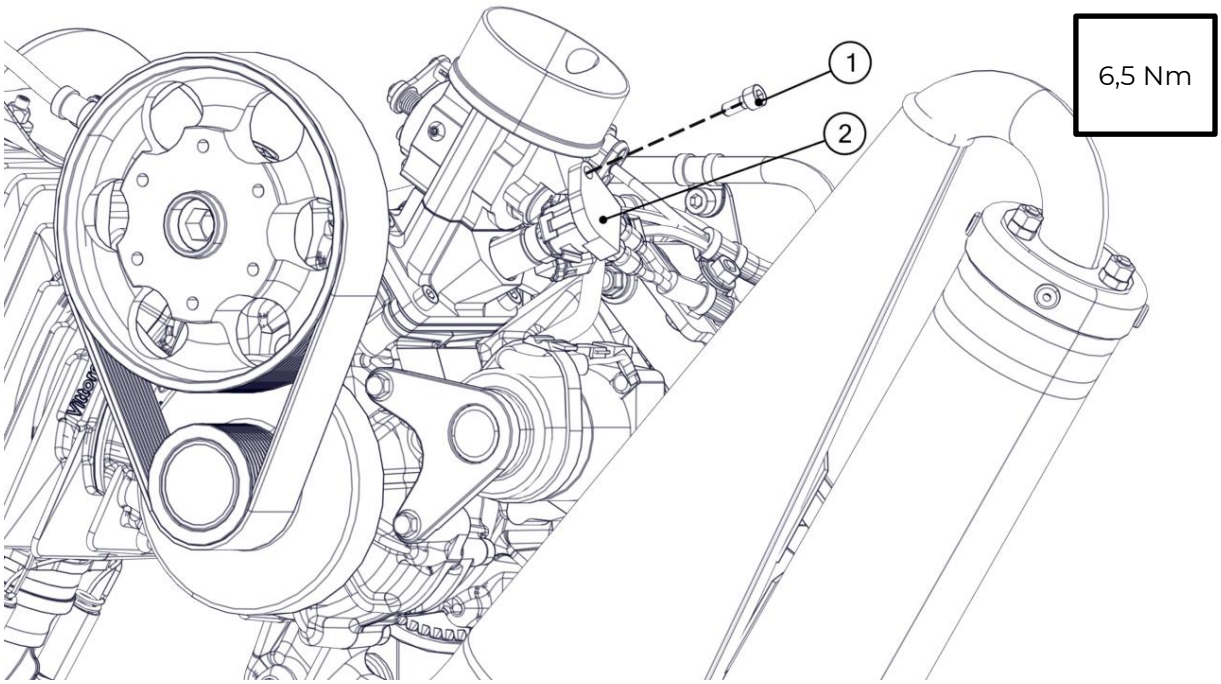
< 38 cc	1. Check the Vittorazi paper filter, the micro-filter and the injector. Replace one at a time, if necessary, and repeat the test. If they are in good condition proceed with the following point. 2.1. For dealers: Increase the “Pump Value Max” by pressing the “Enter” and “+” keys simultaneously. Raise it by 0.1 to obtain an increase of about 2 cc in the result of the “Injector test max”. 2.2. For customers: Contact Vittorazi.
38 ÷ 42 cc	OK
> 42 cc	1.1. For dealers: Decrease the “Pump Value Max” by pressing the “Enter” and “-” keys simultaneously. Reduce it by 0.1 to obtain a decrease of about 2 cc in the result of the “Injector Test Max”. 1.2. For customers: Contact Vittorazi.

Insert the injector (2) in its seat on the air rotary valve (3).



Insert the flange screw M5x12 (1), with threadlocker (recommended Loxeal 55-03/Loctite 243), screw progressively, then tighten with the torque shown in the figure.

While tightening the screw M5x12 (1), control that the injector remains coaxial with its seat to avoid any bend on the fuel pipes.

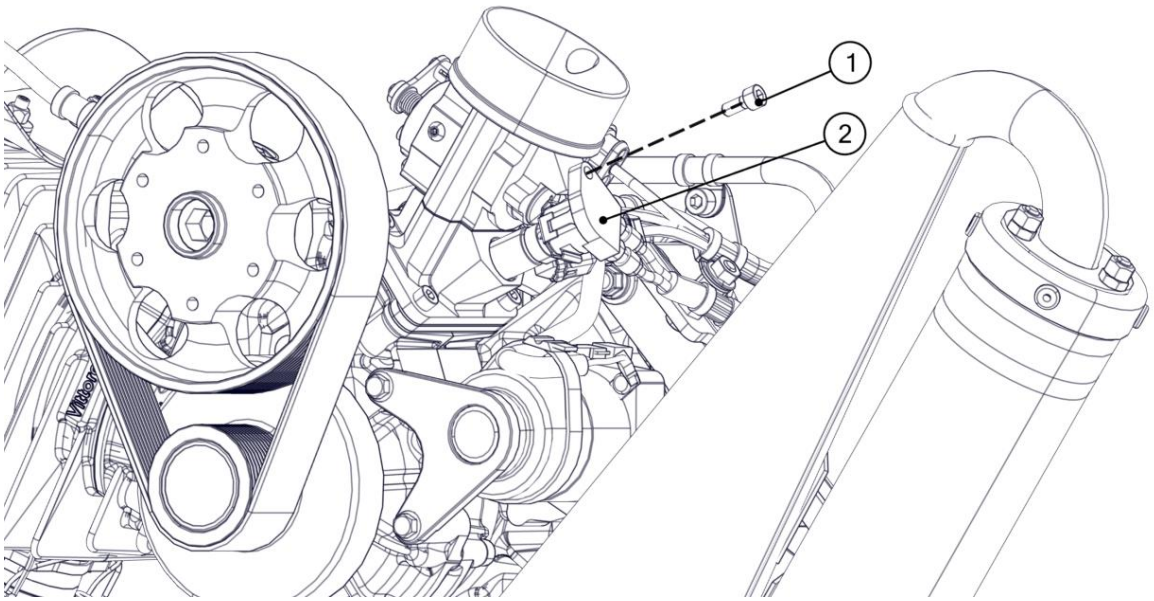


Insert the airbox (see chapter 3.3 Airbox).

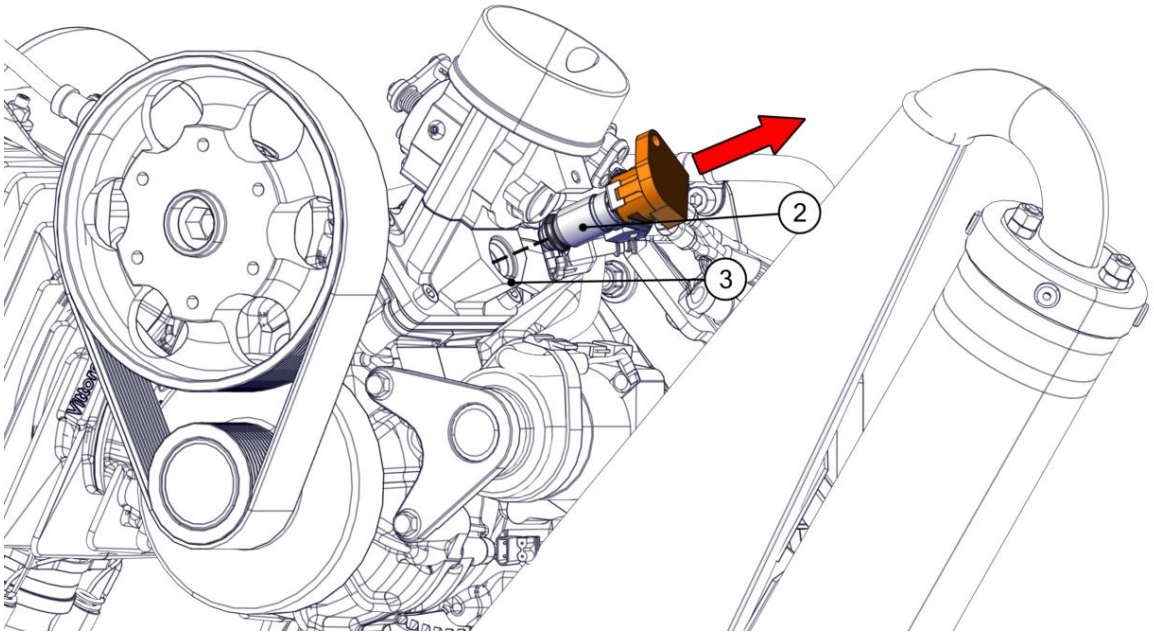
3.4.2 Fuel injector disassembly

Before disassembling the injector, remove the airbox (see chapter 3.3 Airbox) and switch off the battery.

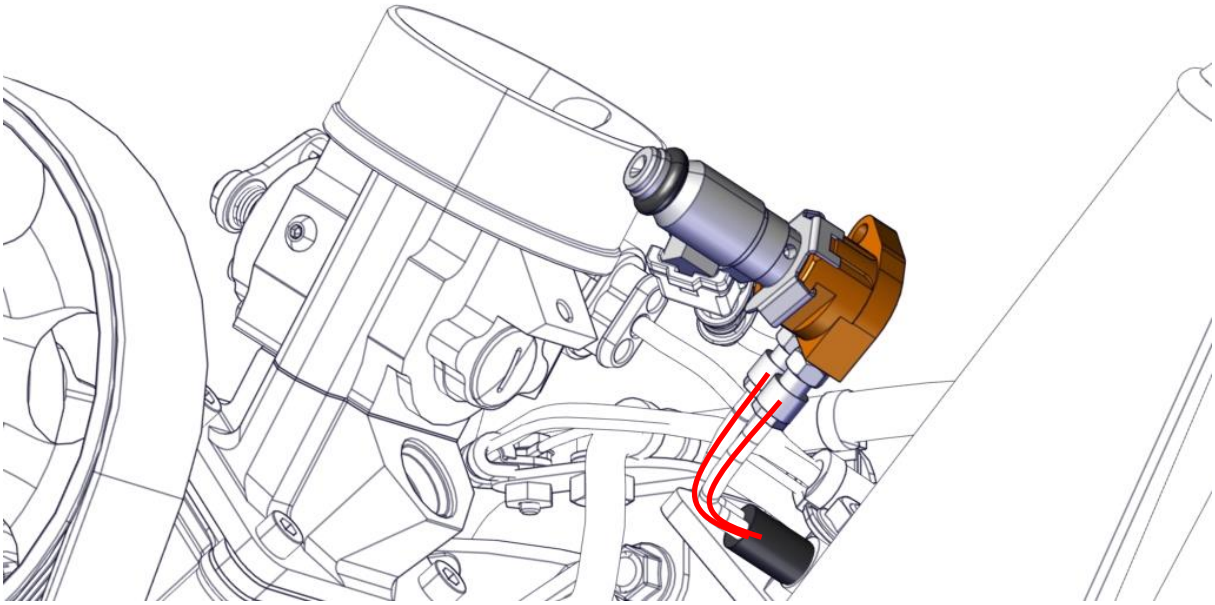
Unscrew the injector flange screw M5x12 (1).



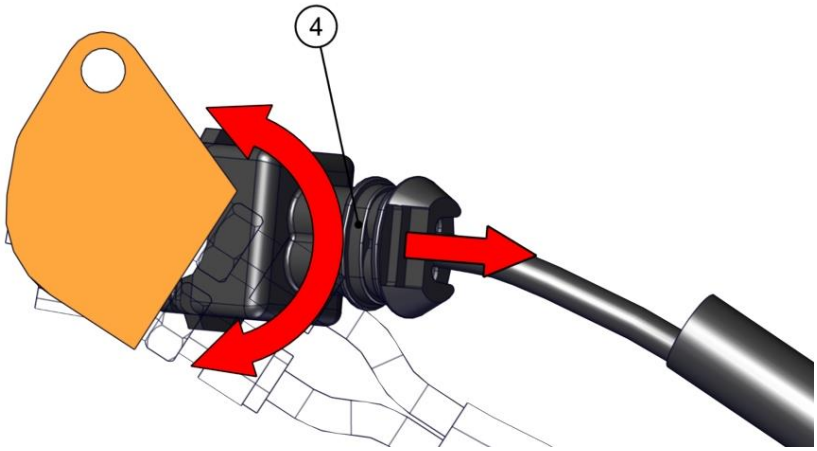
Gently extract the injector (2) from its seat on the air rotary valve (3).

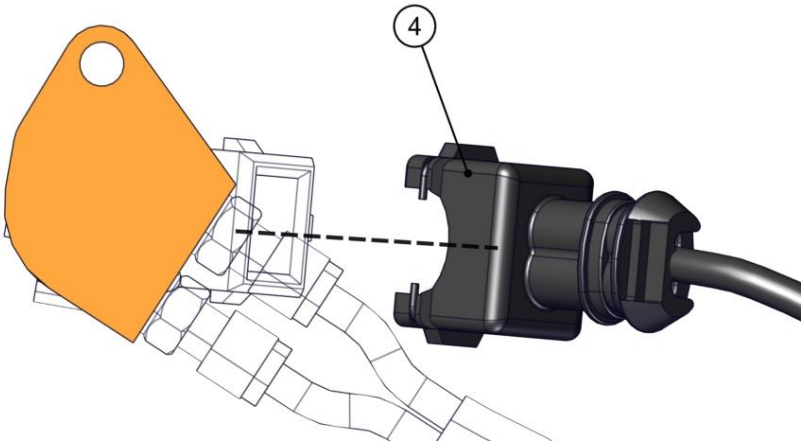


When disassembling the injector, it is not advisable to extract the fuel hoses from the flange fittings. However, when removing the injector from its seat, be careful not to bend and pull the fuel hoses.

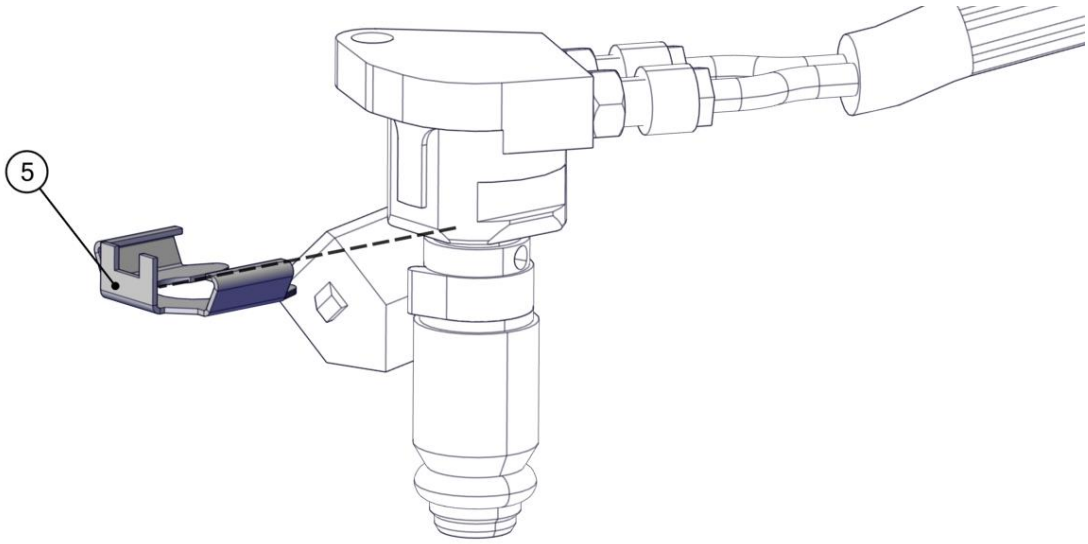


Extract the connector (4) by carefully turning it left and right while pulling.



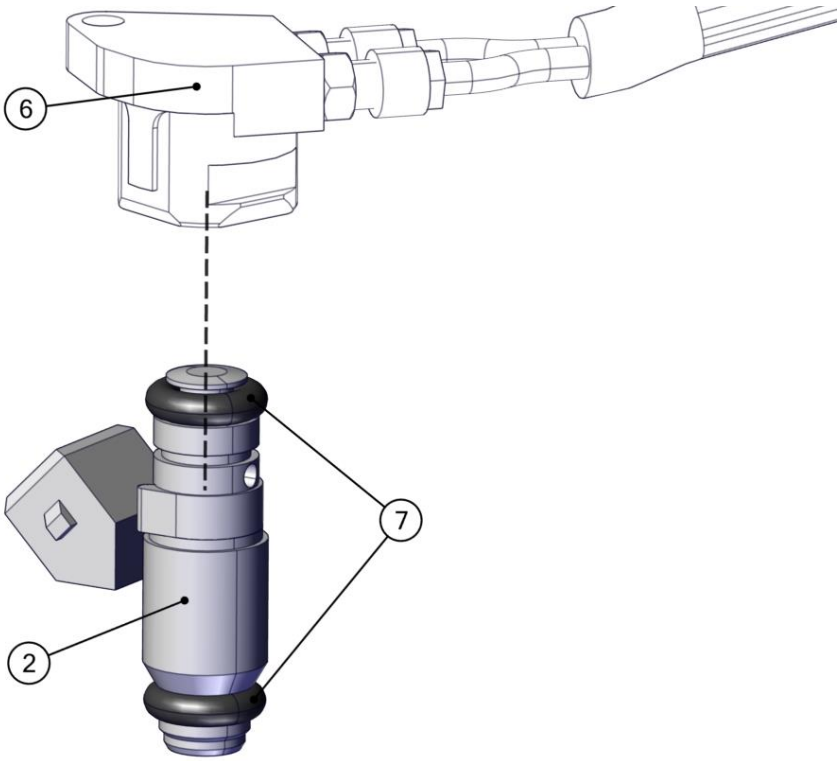


Extract the injector clip (5).



Extract the injector (2) from the flange (6).

Injector flange may be full of fuel, place a bowl underneath to catch leaking fuel.

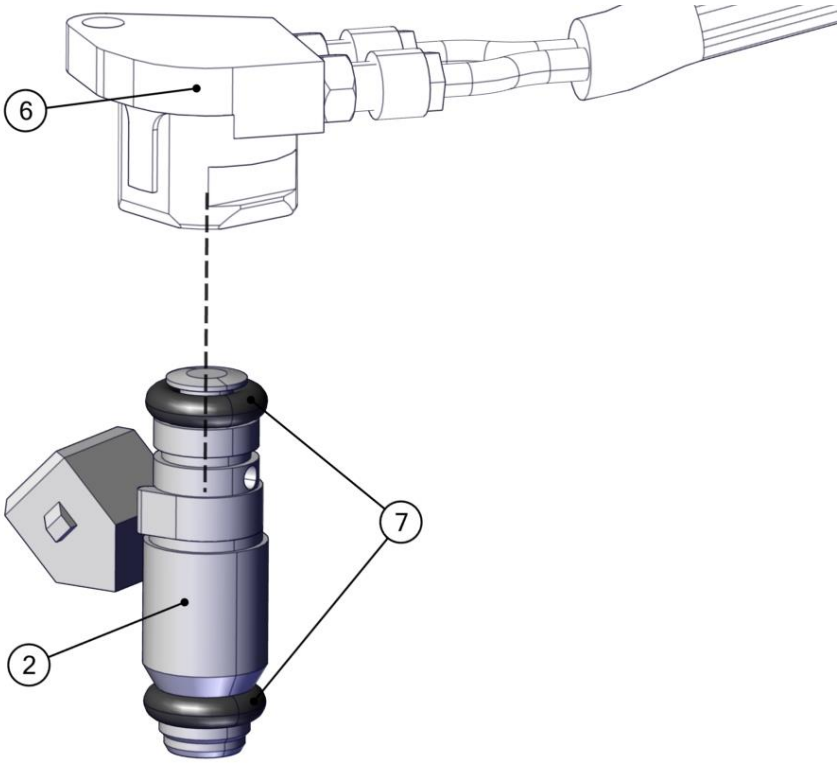


3.4.3 Fuel injector maintenance

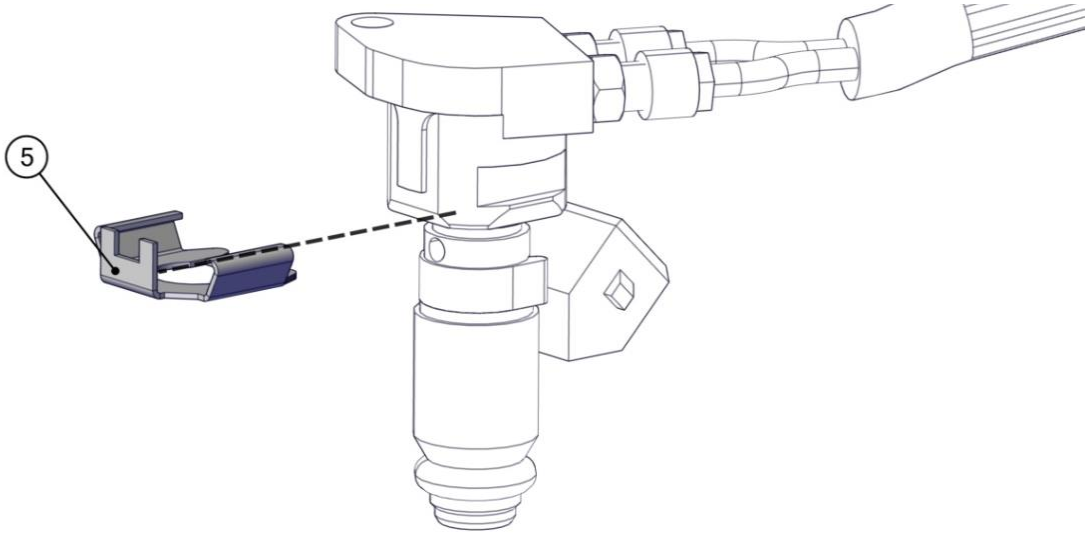
Check the connector (4): if it shows signs of wear or cracks, replace the signal wiring including the connector.
Check that the O-rings (7) are in good condition.
Check the flange (6) injector seat: if it shows signs of wear, replace the flange (6).
Check the air rotary valve (3) injector seat: if it shows signs of wear, replace it.

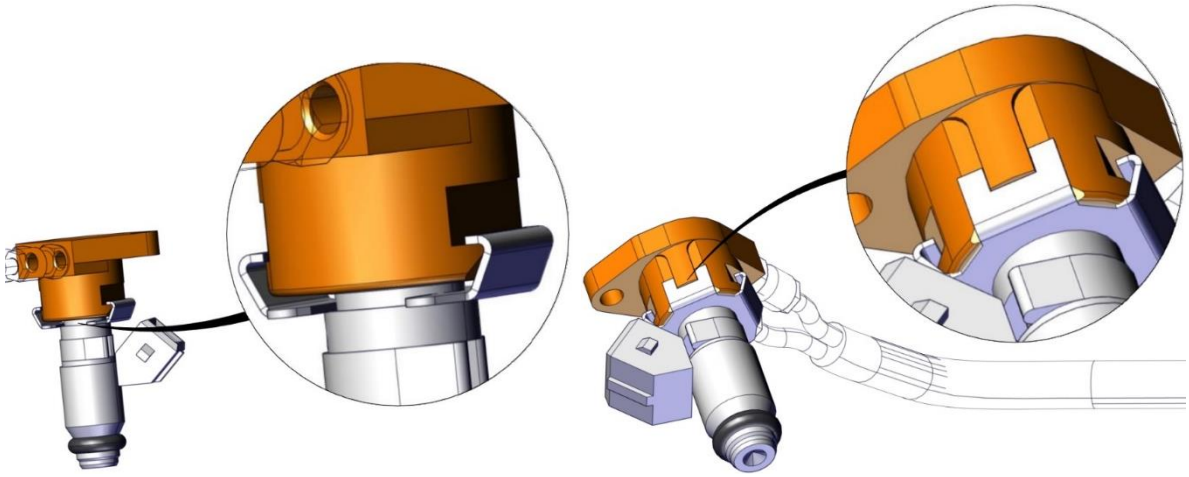
3.4.4 Fuel Injector assembly

Apply a small amount of silicon grease (Recommended FP Silicompound 225 - Silicon based grease + PTFE) on the injector O-rings (7) and insert the injector (2) in the flange (6) seat.



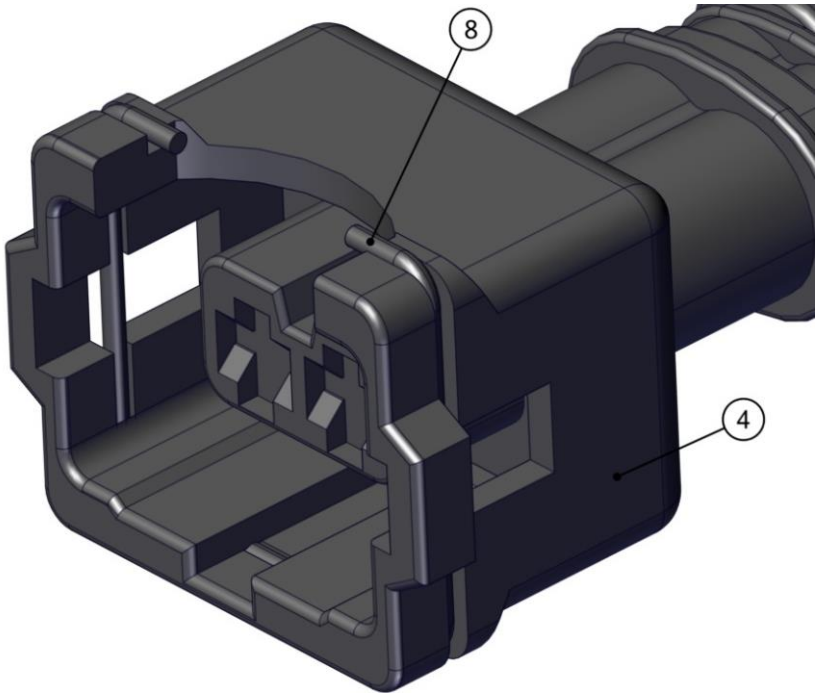
Insert the injector clip (5) correctly as show in the figures.



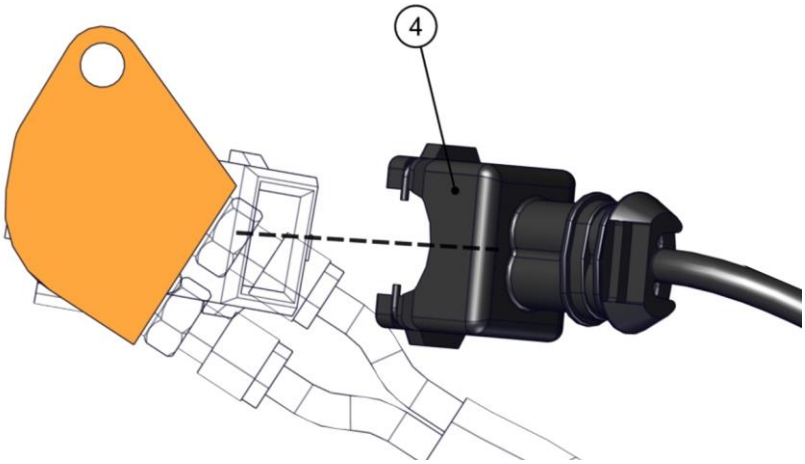


Control the position of the security ring (8) in the connector (4).

Apply a small amount of contact grease (recommended ELECTROLUBE contact treatment grease SGB - 2GX) on the connector and the injector contacts.



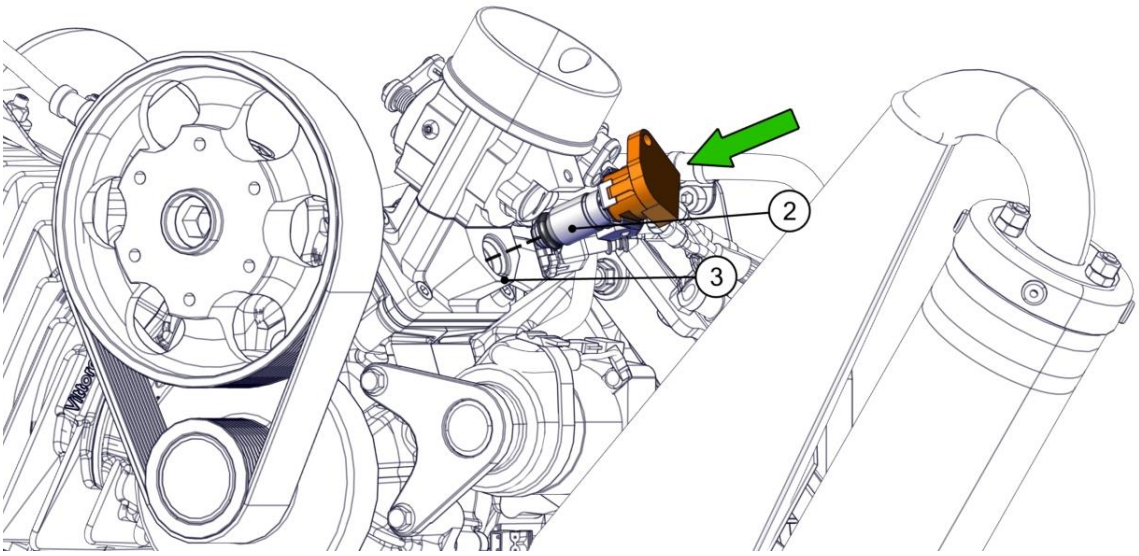
Insert the connector (4).



Check that the coupling of the connector (4) with the injector (2) is solid, with minimal clearance and secure, if it’s wrong, replace the signal wiring including the connector (4).

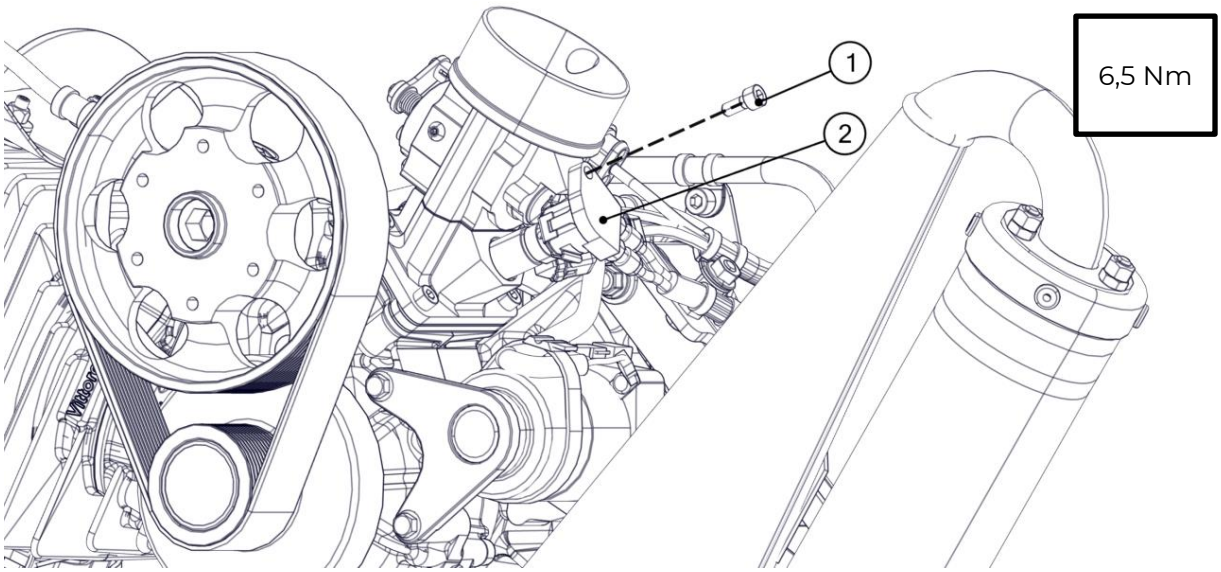
Before inserting the injector (2) in its seat on the air rotary valve (3), perform an injector test min and an injector test max and adjust the pump value min and pump value max according to the results.

Insert the injector (2) in its seat on the air rotary valve (3).



Insert the flange screw M5x12 (1), with threadlocker (recommended Loxeal 55-03/Loctite 243), screw progressively, then tighten with the torque shown in the figure.

While tightening the screw M5x12 (1), control that the injector remains coaxial with its seat to avoid any bend on the fuel pipes.

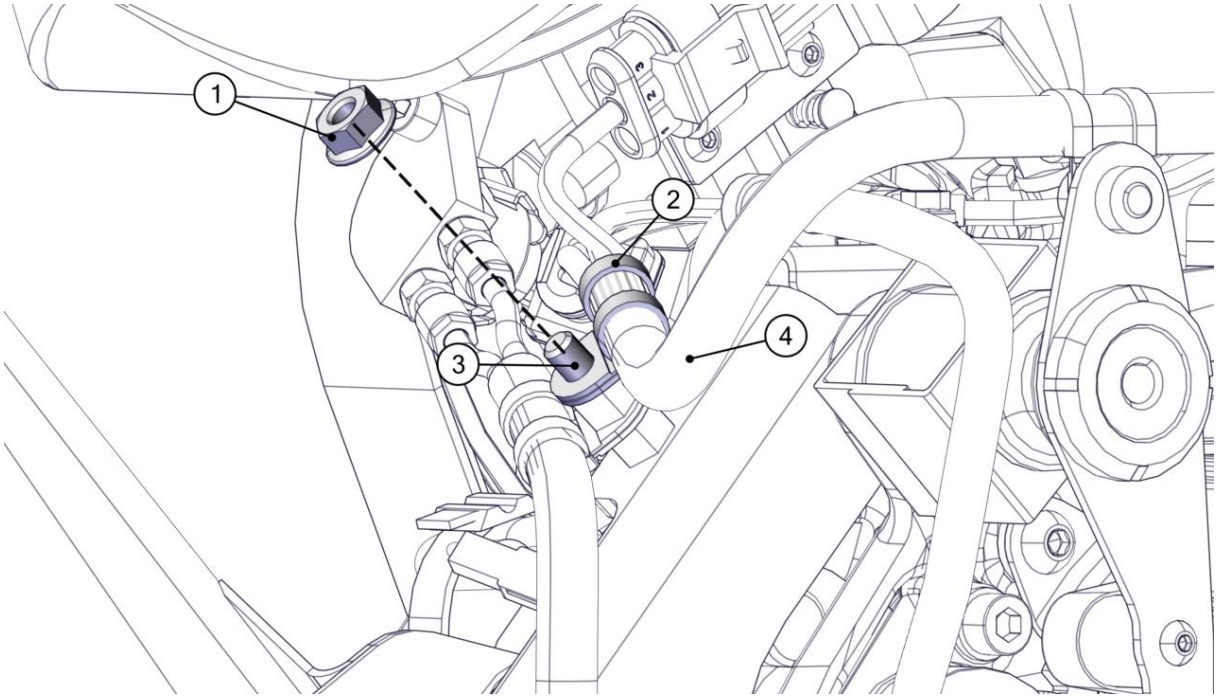


Insert the airbox (see chapter 3.3 Airbox).

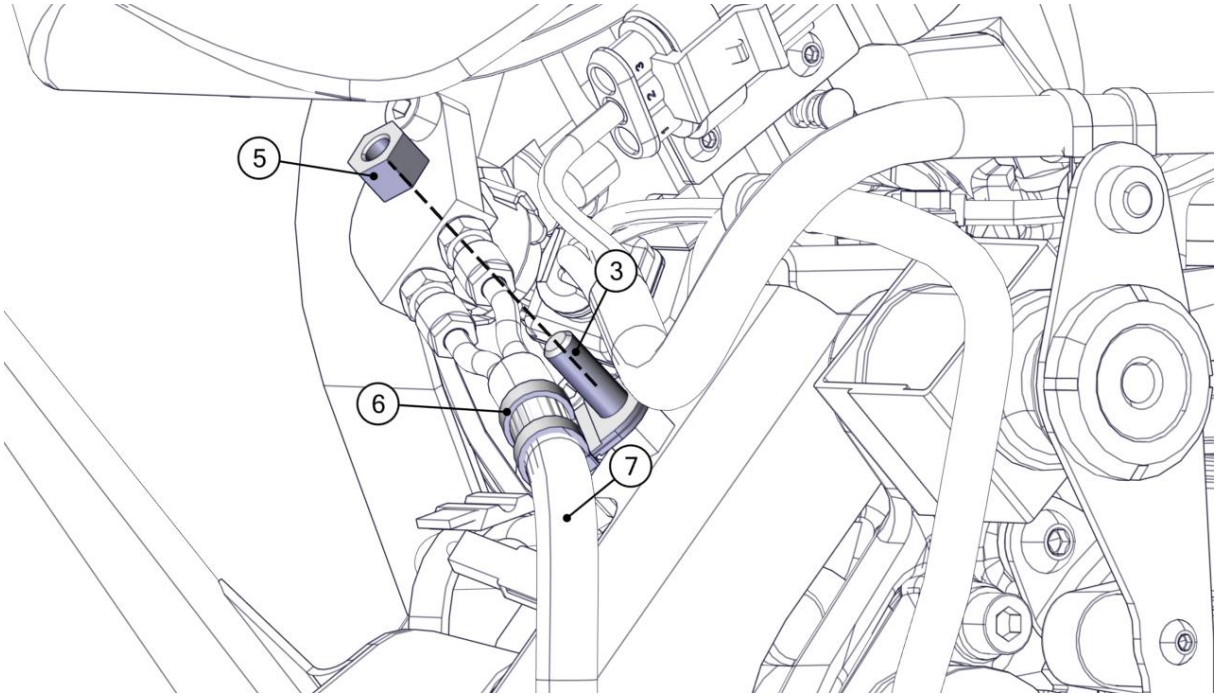
3.4.5 Fuel injector pipes disassembly

Carry out the following operations in a clean and dust-free environment.
The entry of impurities into the hydraulic circuit can impair the functioning of the circuit components.

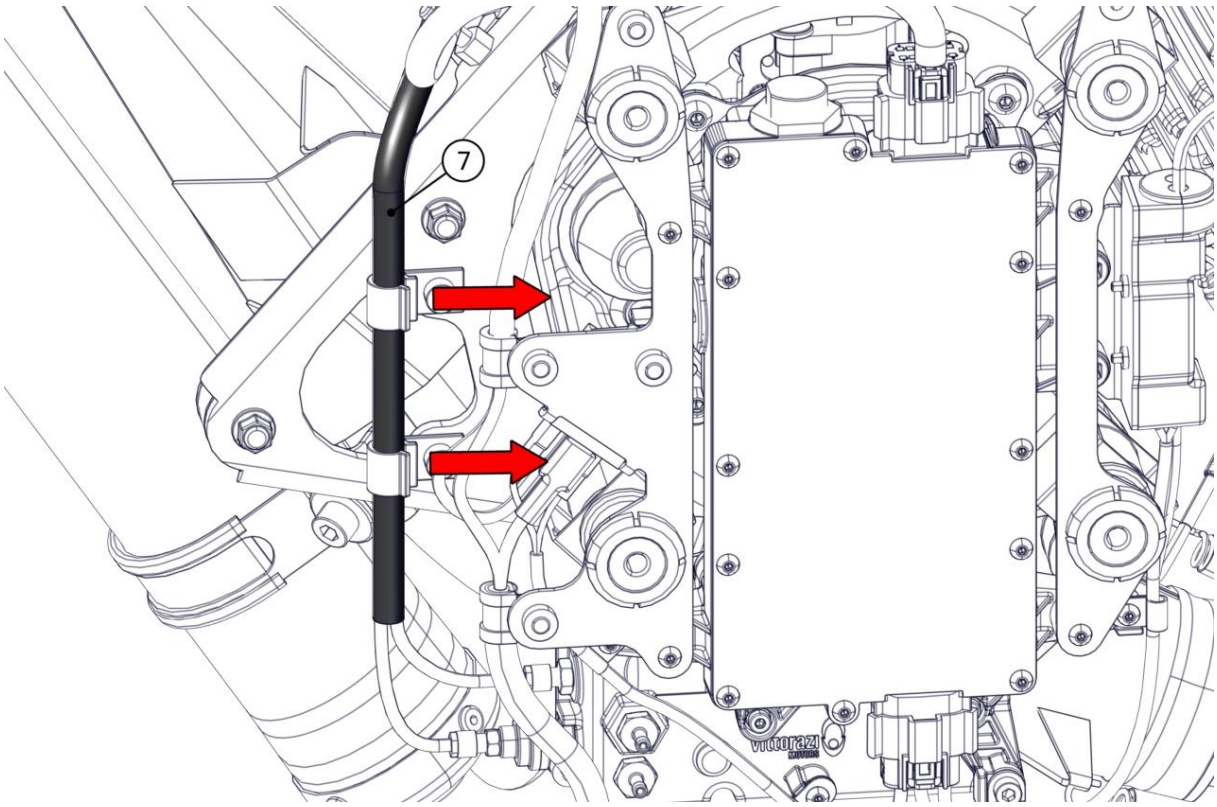
Remove the M6 nut (1) and the M6 F10 cable clamp (2).



Remove the M6 nut (5) and the M6 F10 cable clamp (6).

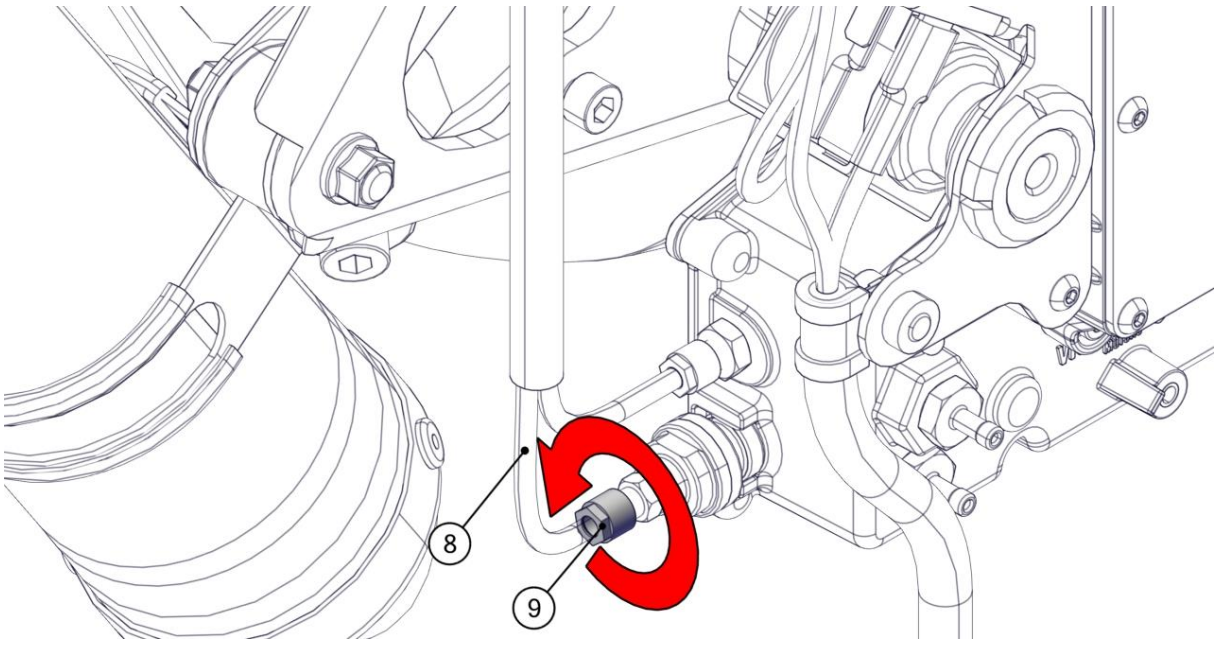


Remove the fuel pipes (7) from the 2 cable supports.

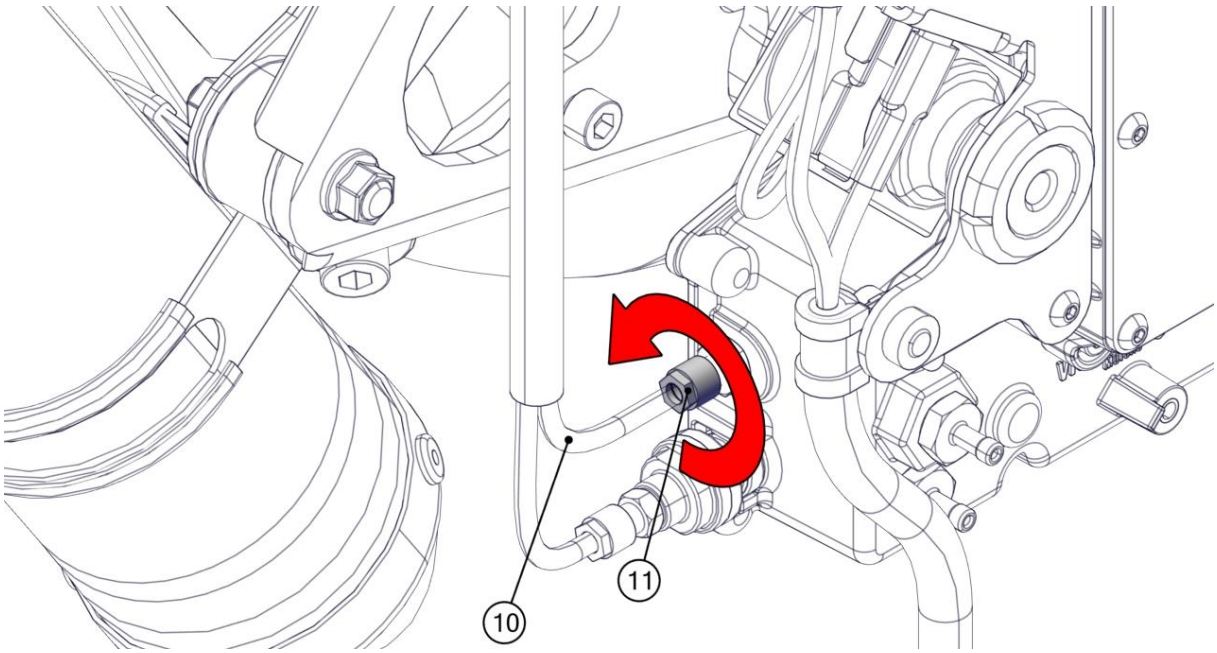


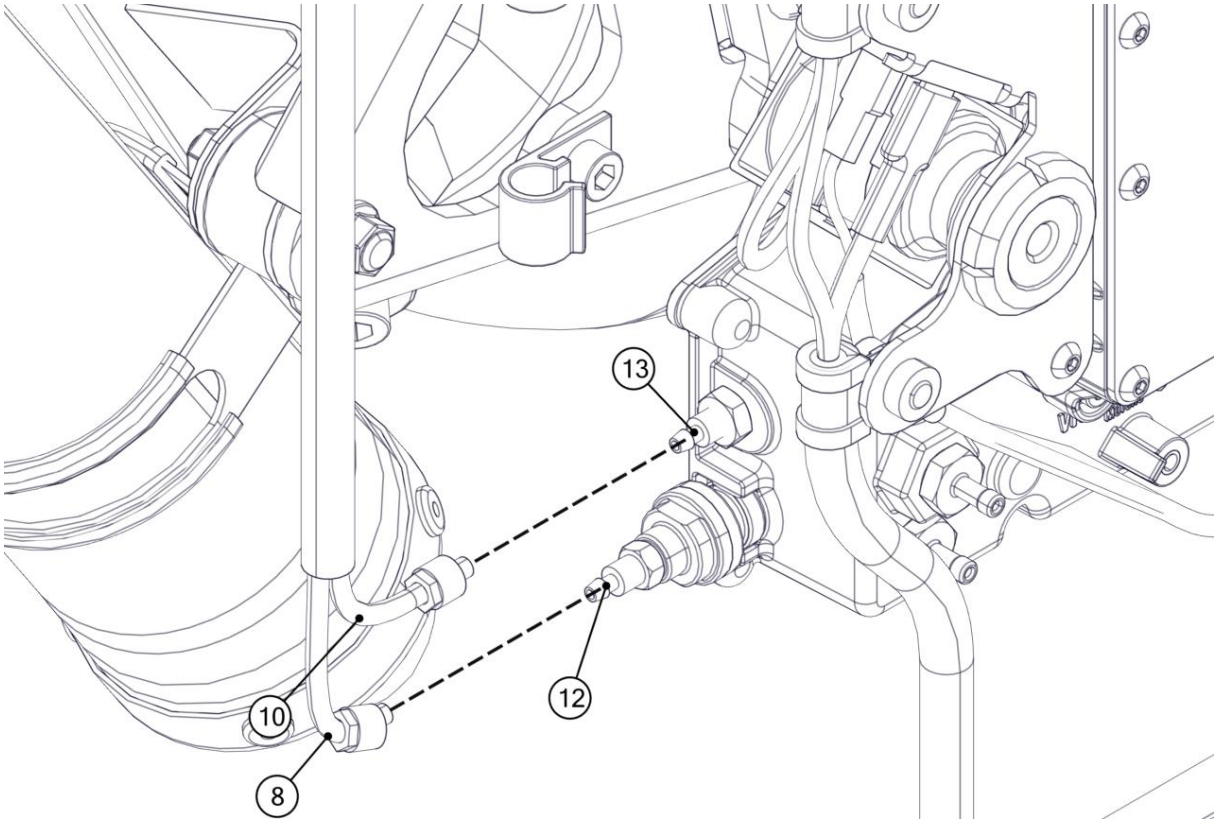
Remove the injector fuel supply pipe (8) by unscrewing the external ring (9) and carefully bending the injector fuel supply pipe (8) to the sides while pulling.

Do not use pliers or screwdrivers to extract the injector fuel supply pipe, this could cause damage to the pipe or the pipe connector
Do not unscrew the pipe connector; it is locked with high-strength threadlocker. Turning it could damage the connector itself or the hydraulic system.



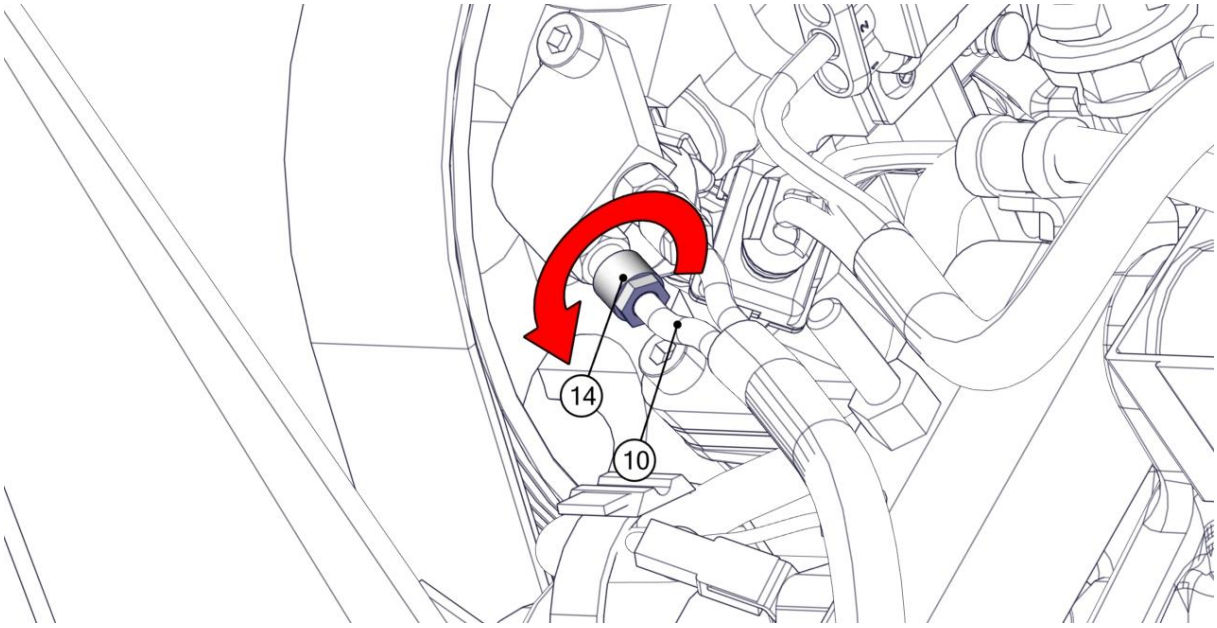
Repeat this operation with the injector fuel return pipe (10).



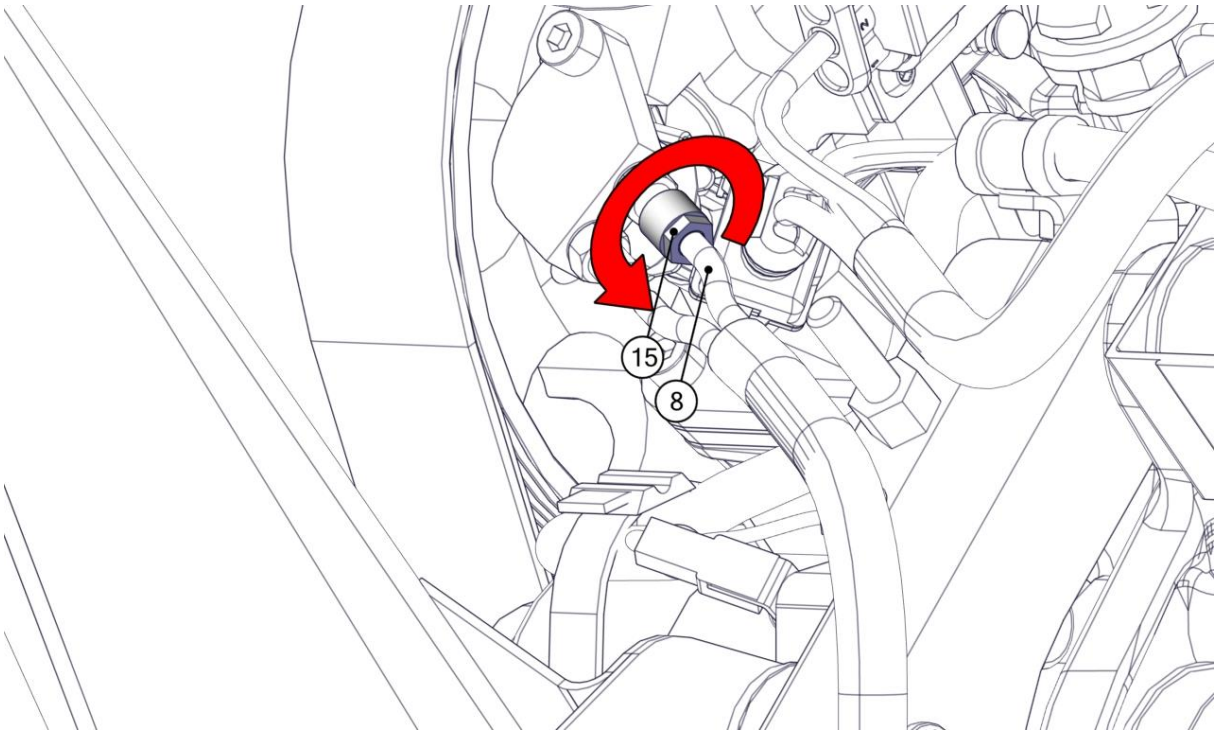


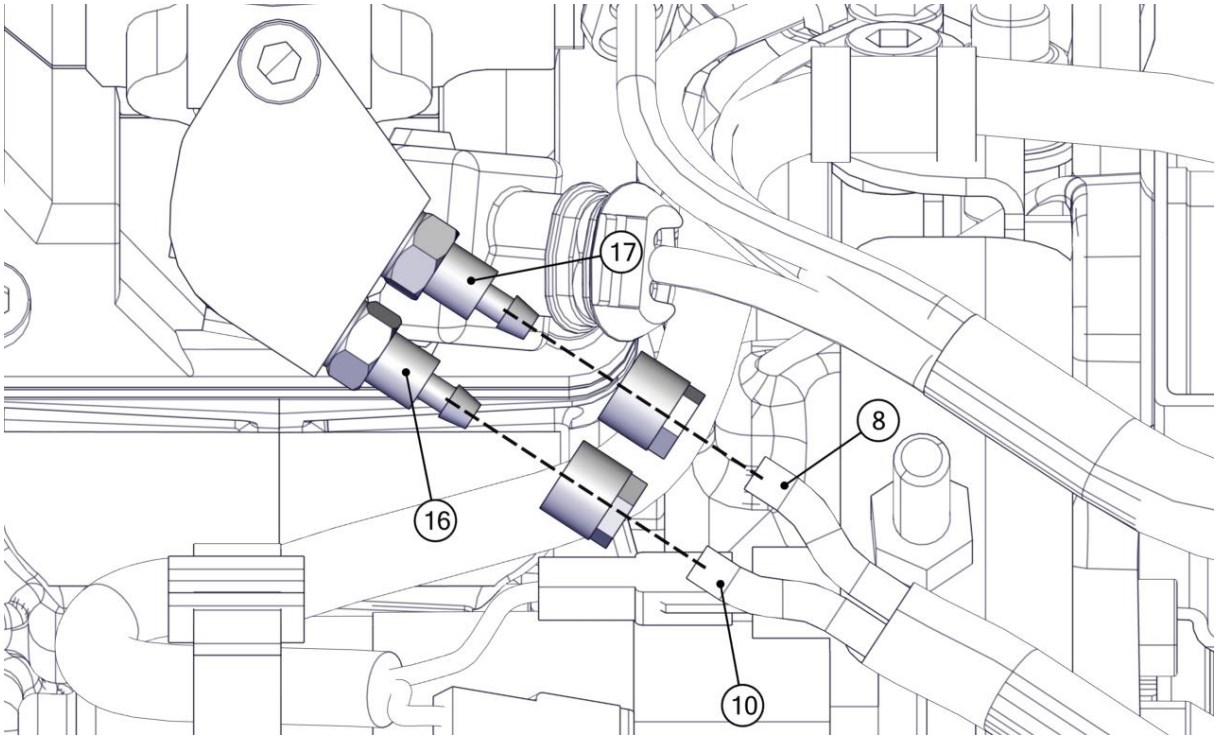
Remove the injector fuel return pipe (10) by unscrewing the external ring (14) and carefully bending the injector fuel return pipe (10) to the sides while pulling.

Do not use pliers or screwdrivers to extract the injector fuel supply pipe, this could cause damage to the pipe or the pipe connector
Do not unscrew the pipe connector; it is locked with high-strength threadlocker. Turning it could damage the connector itself or the injector flange.



Repeat this operation with the injector fuel supply pipe (8).

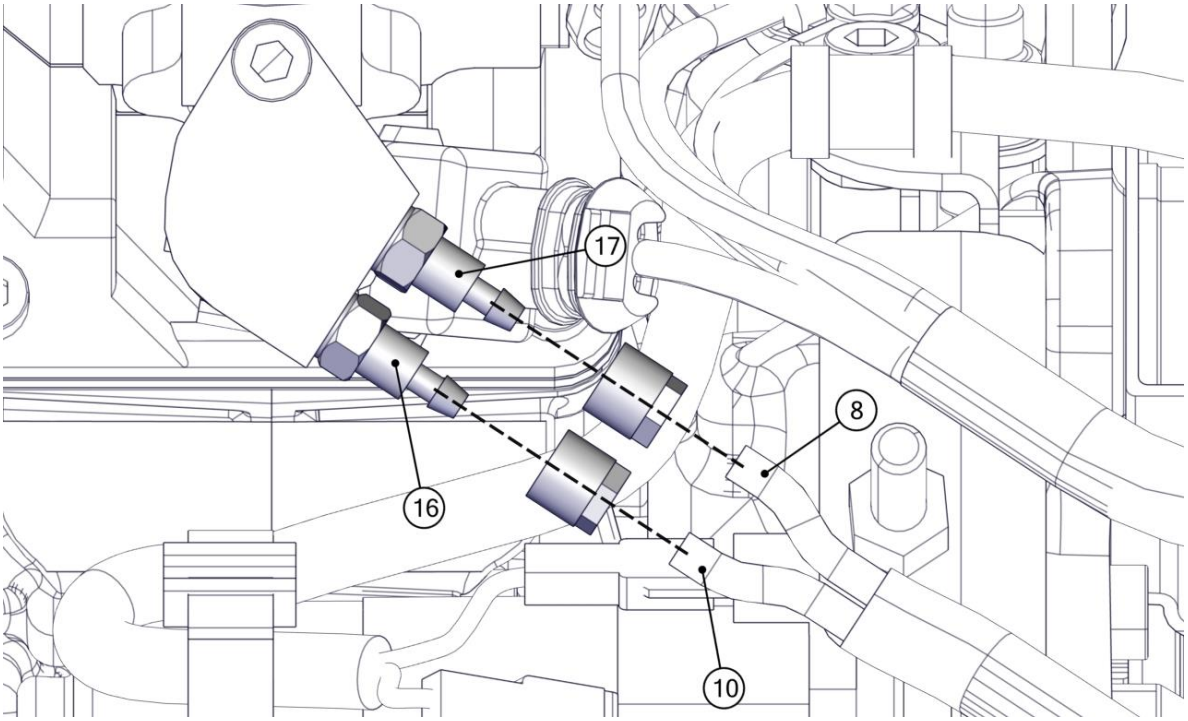




3.4.6 Fuel injector pipes assembly

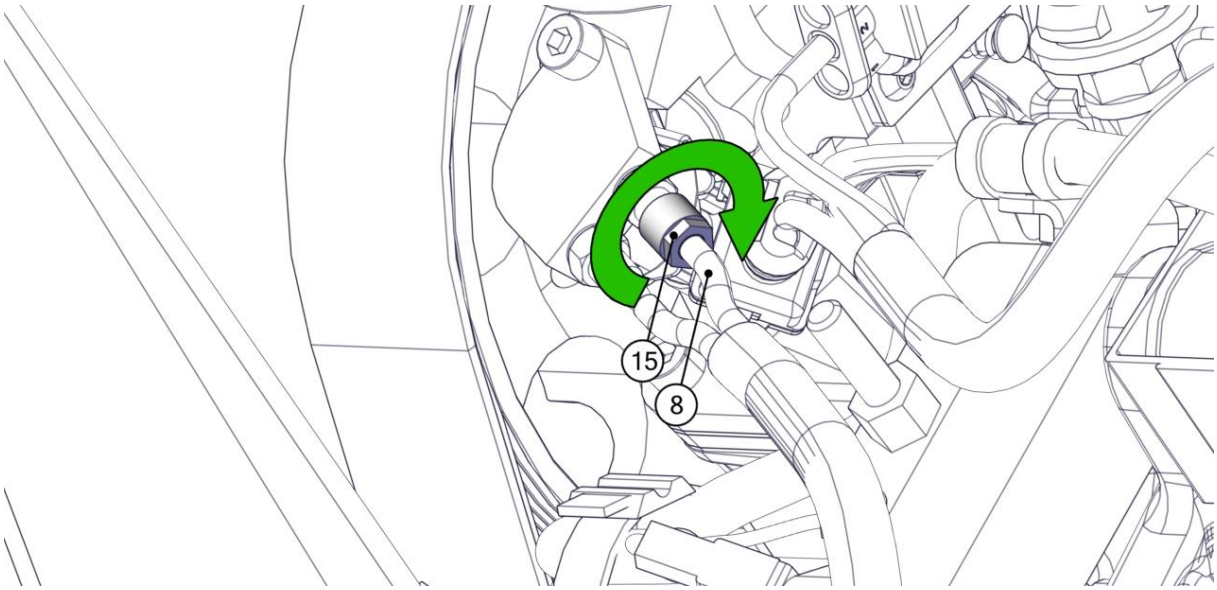
Insert the injector fuel supply (8) and return (10) pipes on the injector fittings (16, 17)

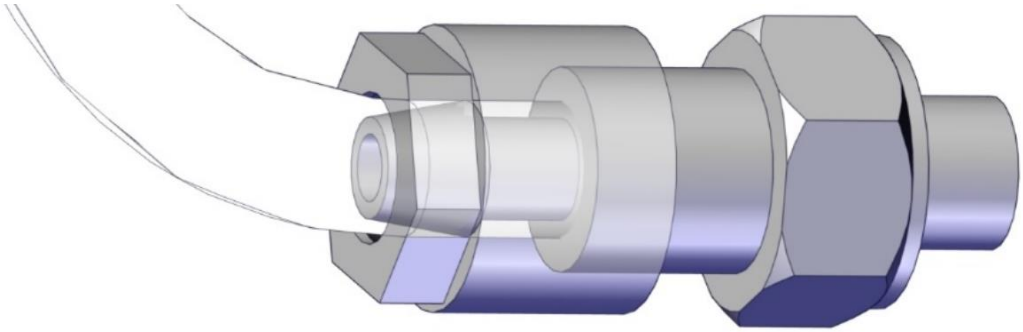
The connection position of the injector fuel supply (8) and return (10) pipes can be interchanged indifferently. By default, they are connected as shown in the figure.



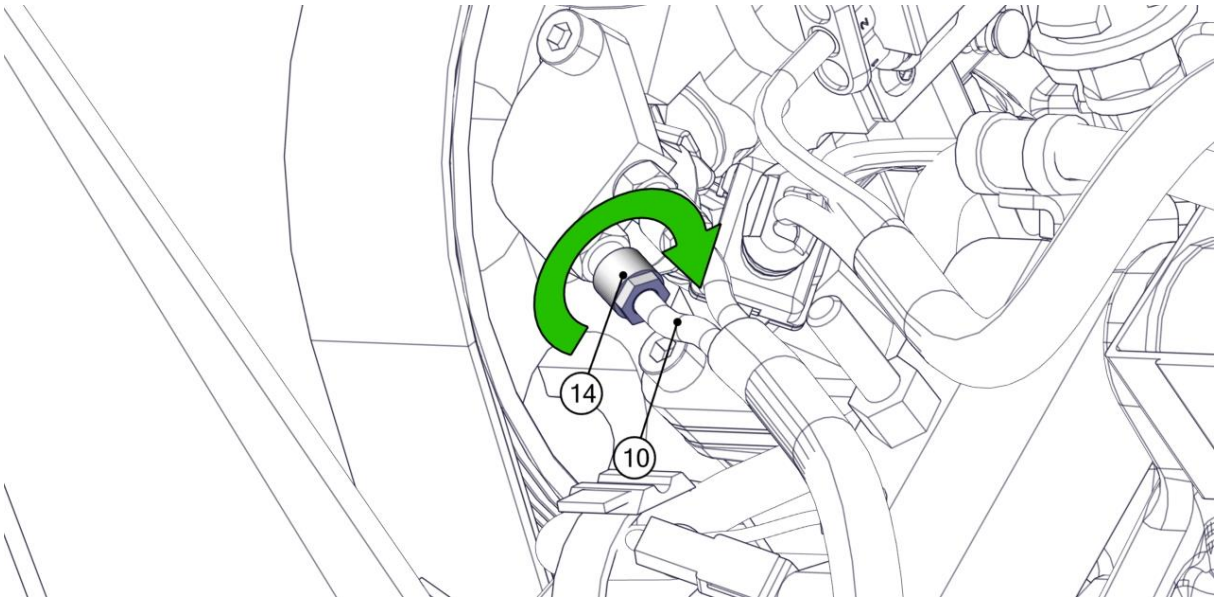
Once the injector fuel supply (8) and return (10) pipes have been inserted, apply a small amount of silicon grease (Recommended FP Silicompound 225 - Silicon based grease + PTFE) to the tubes, taking care not to get it inside the tubes, to facilitate the sliding of the external rings (14, 15) and to avoid damaging the tubes and twisting them.

Screw the external ring (15) of the injector fuel supply pipe (8) until it is aligned with the tip of the internal cylinder.

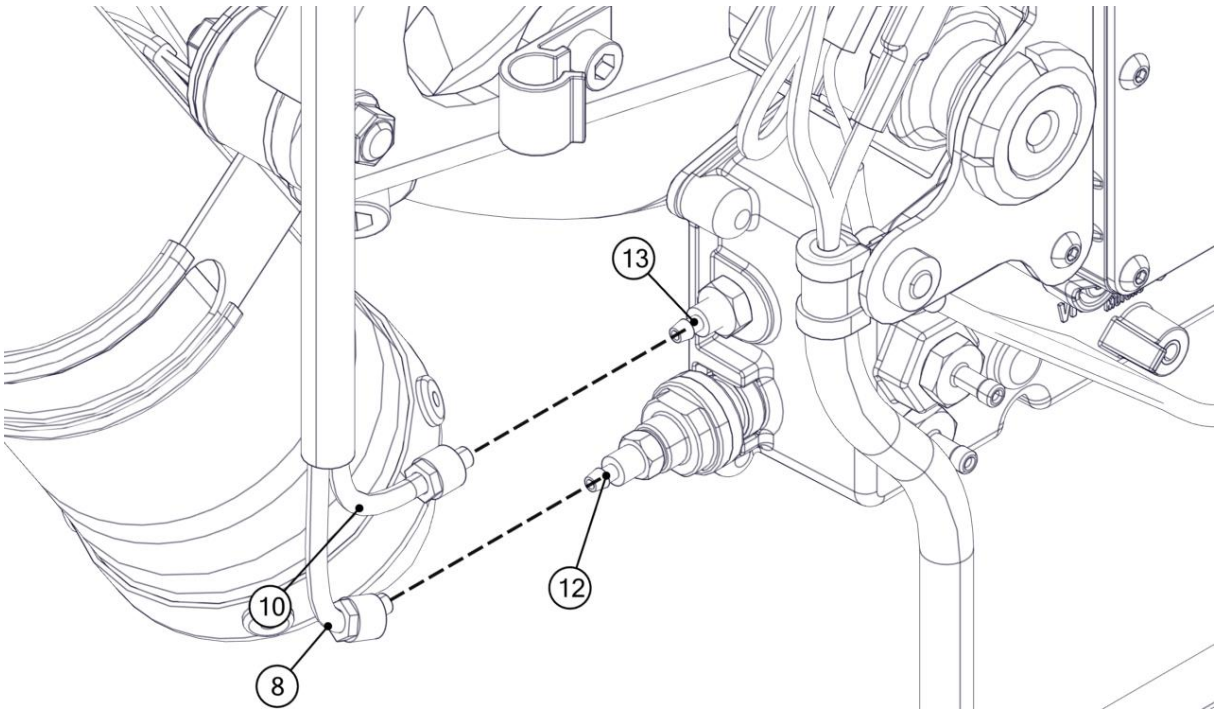




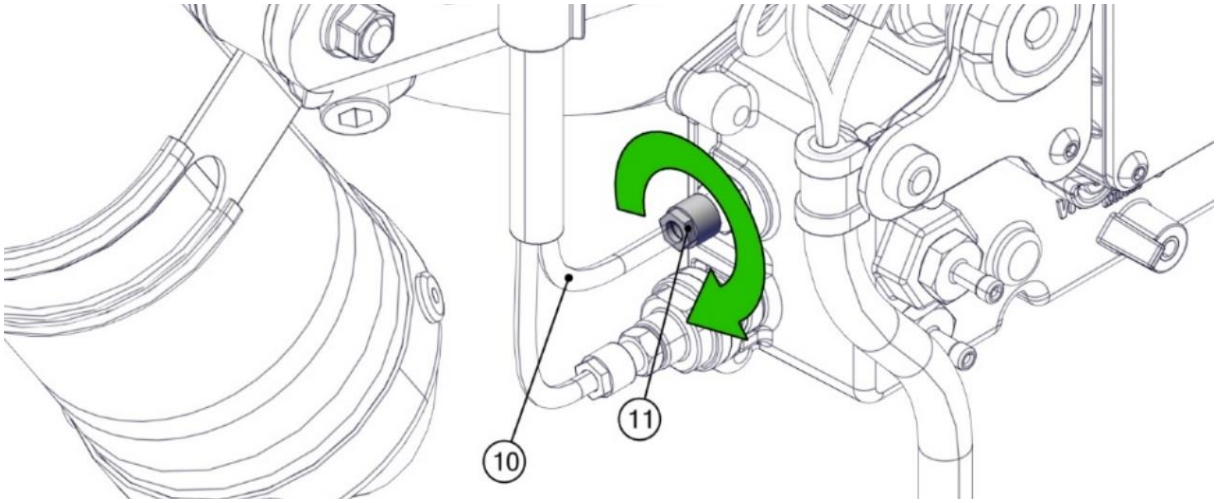
Repeat this operation with the external ring (14) of the injector fuel return pipe (10).

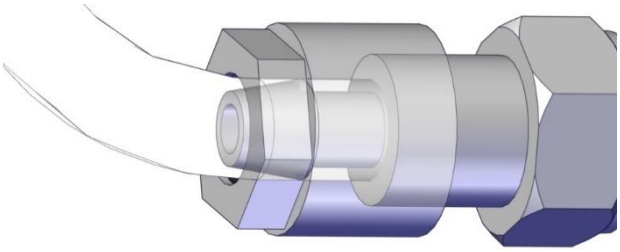


Insert the injector fuel supply tube (8) and the injector fuel return tube (10).

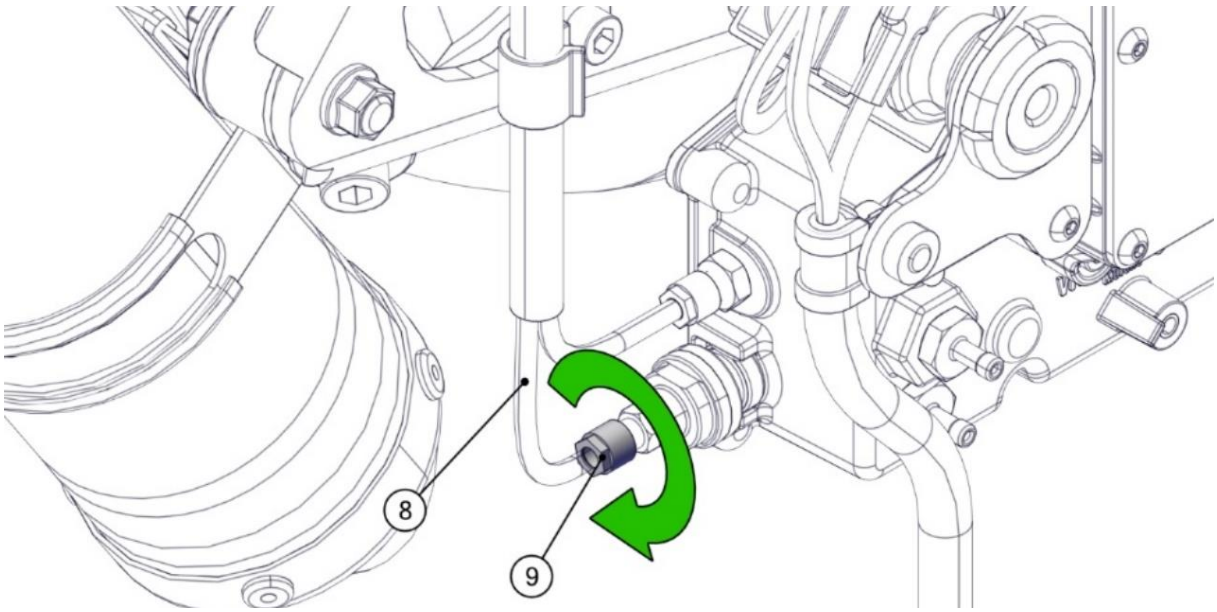


Once the injector fuel supply tube (8) and the injector fuel return tube (10) have been inserted, apply a small amount of silicon grease (Recommended FP Silicompound 225 - Silicon based grease + PTFE) to the tubes, taking care not to get it inside the tubes, to facilitate the sliding of the external rings (9, 11) and to avoid damaging the tubes and twisting them.
Screw the external ring (11) of the injector fuel return tube (10) until it is aligned with the tip of the internal cylinder.



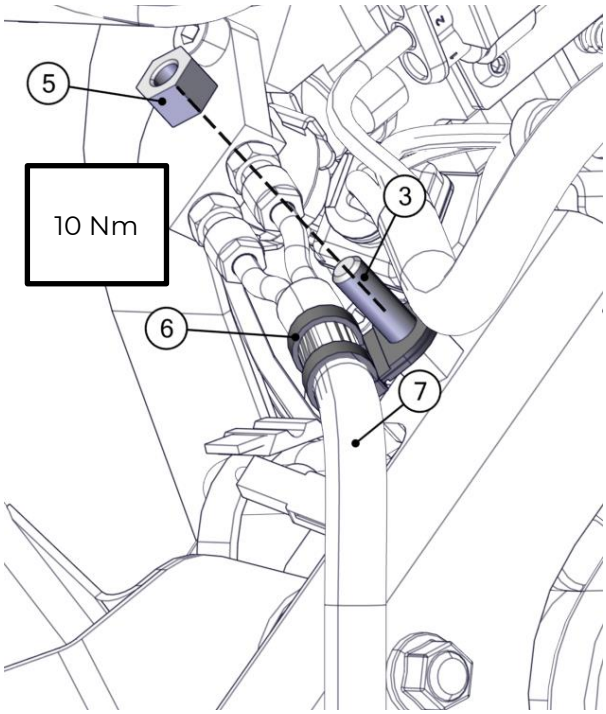


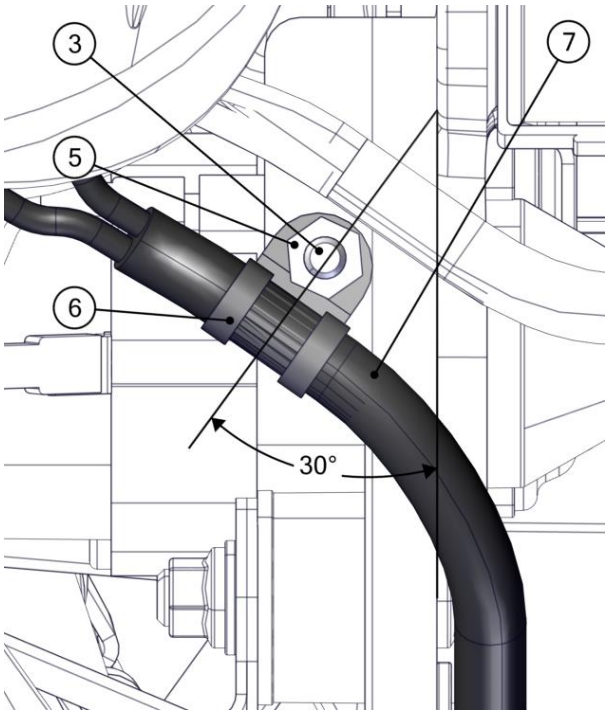
Repeat this operation with the external ring (9) of the injector fuel supply tube (8).



Fix the injector fuel tubes (7) with the M6 F10 cable clamp (6) and the M6 nut (5) on the M6x30 screw (3) in the position shown in the figure and tighten with the torque shown in the figure.

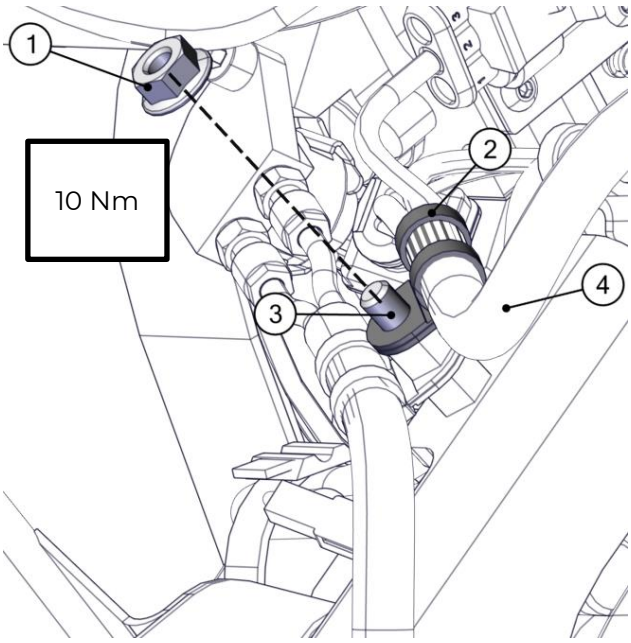
Before tightening, control that the injector fuel pipes are not bended or pulled and make sure to block the cable clamp to prevent rotation while tightening.

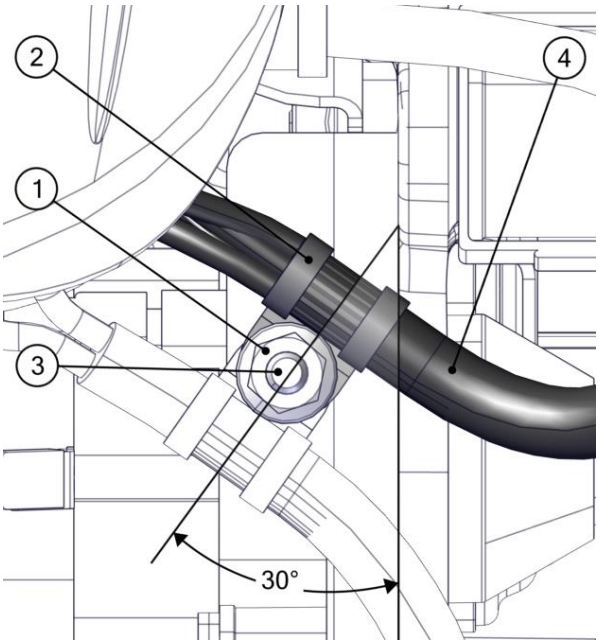




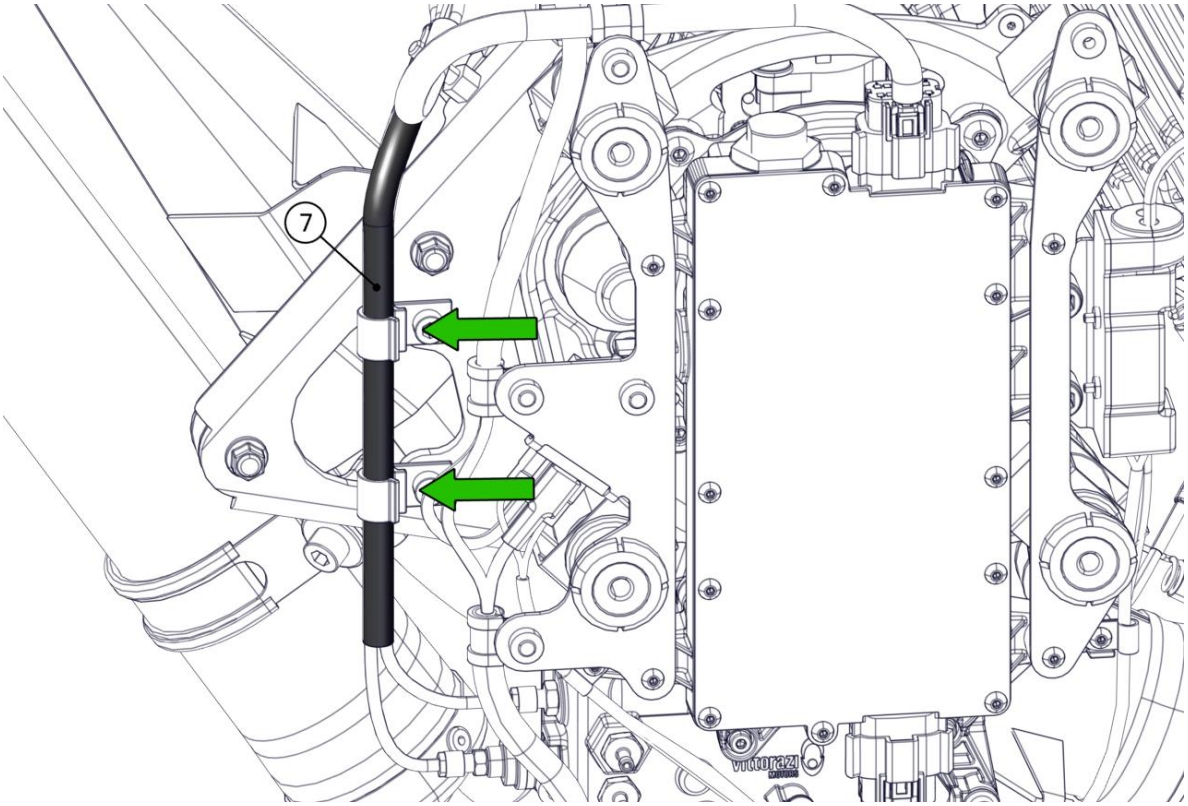
Fix the signal cable (4) with the M6 F10 cable clamp (2) and the M6 nut (1) on the M6x30 screw (3) in the position shown in the figure with threadlocker (recommended Loxeal 55-03/Loctite 243) and tighten with the torque shown in the figure.

Before tightening, control that the signal cable is not bended or pulled and make sure to block the cable clamp to prevent rotation while tightening.





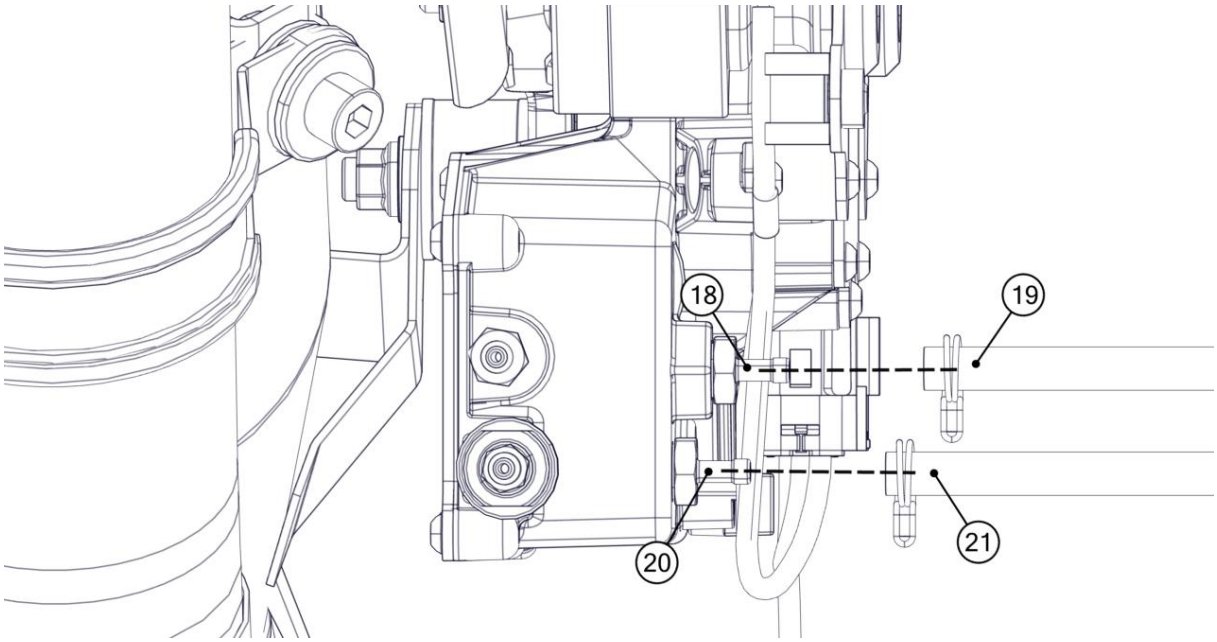
Insert the fuel tubes (7) on the 2 cable supports.



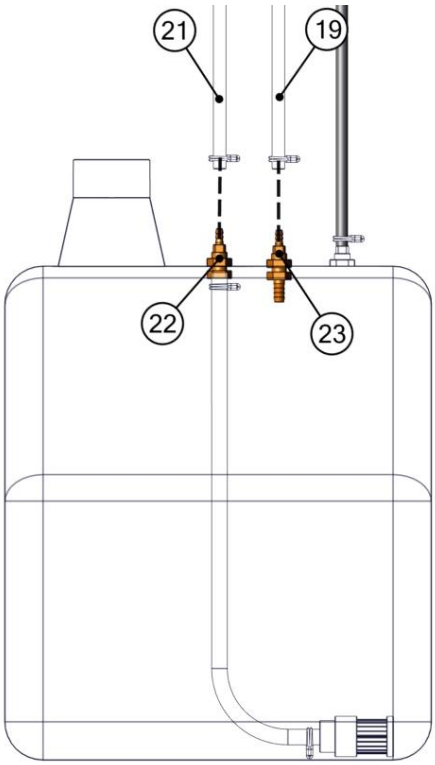
3.4.7 Fuel tank pipes disassembly

Carry out the following operations in a clean and dust-free environment.
The entry of impurities into the hydraulic circuit can impair the functioning of the circuit components.

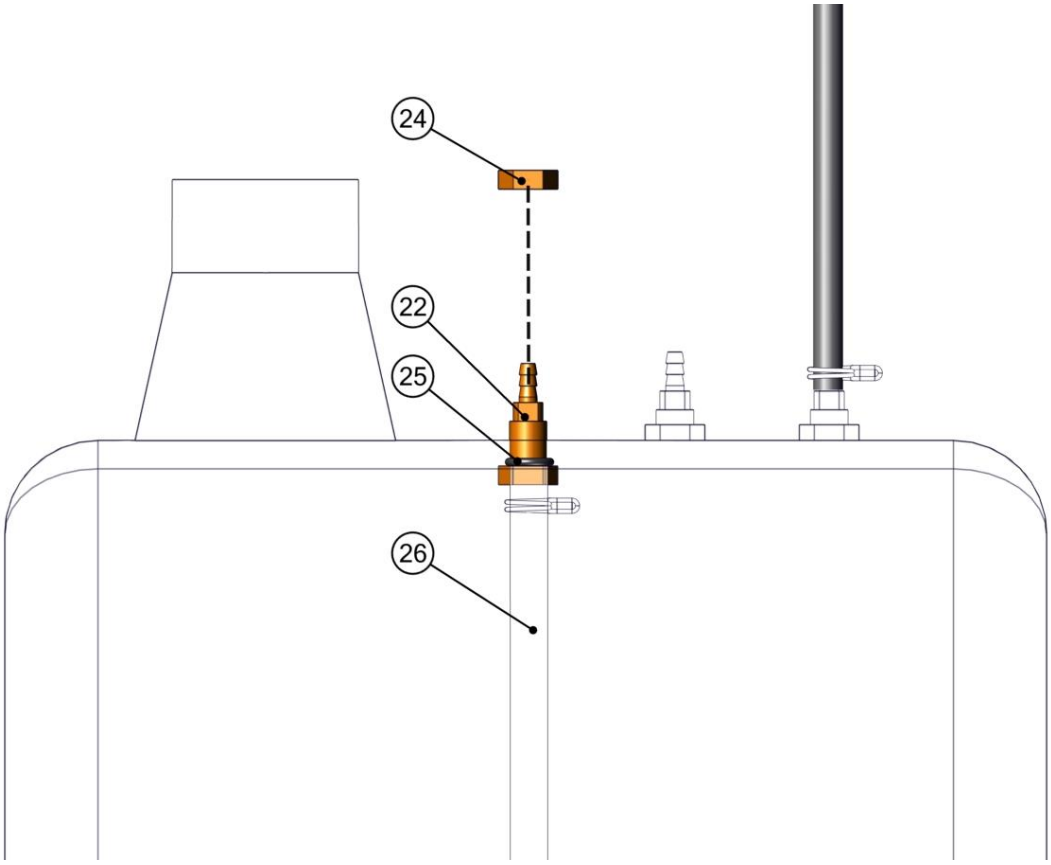
Remove the tank fuel return pipe (19) and the tank fuel supply pipe (21).



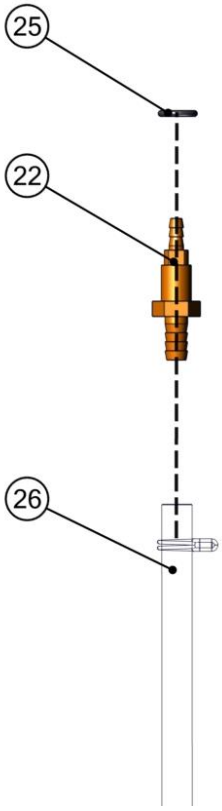
Remove the tank fuel return pipe (19) and the tank fuel supply pipe (21).



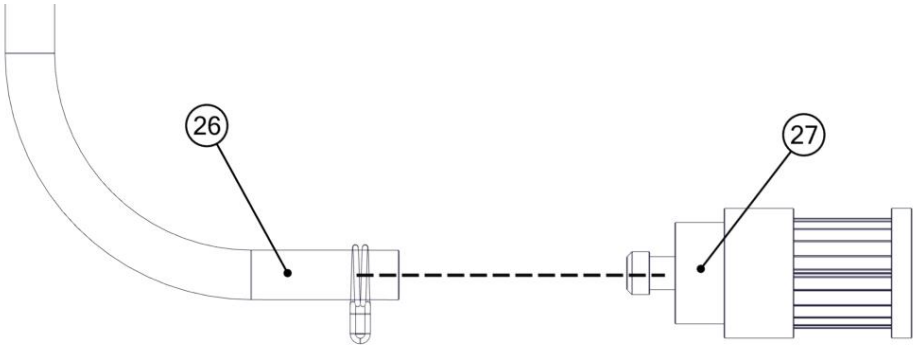
Remove the M10 nut (24) from the tank supply pass-through fitting (22) and remove the fuel pipe inside the tank (26).



Remove the tank supply pass-through fitting (22) from the pipe (26).



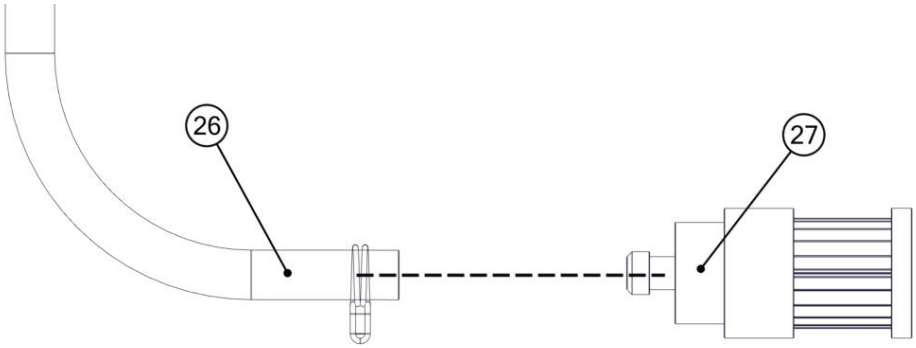
Remove the Vittorazi paper filter (27) from the pipe (26).



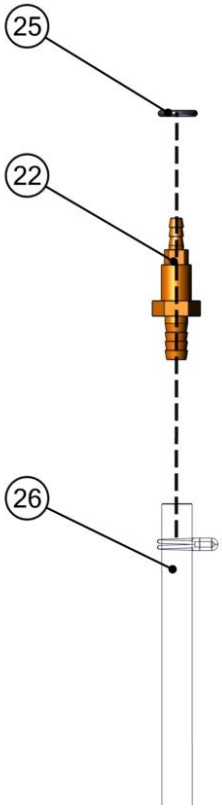
3.4.8 Fuel tank pipes assembly

Carry out the following operations in a clean and dust-free environment.
The entry of impurities into the hydraulic circuit can impair the functioning of the circuit components.

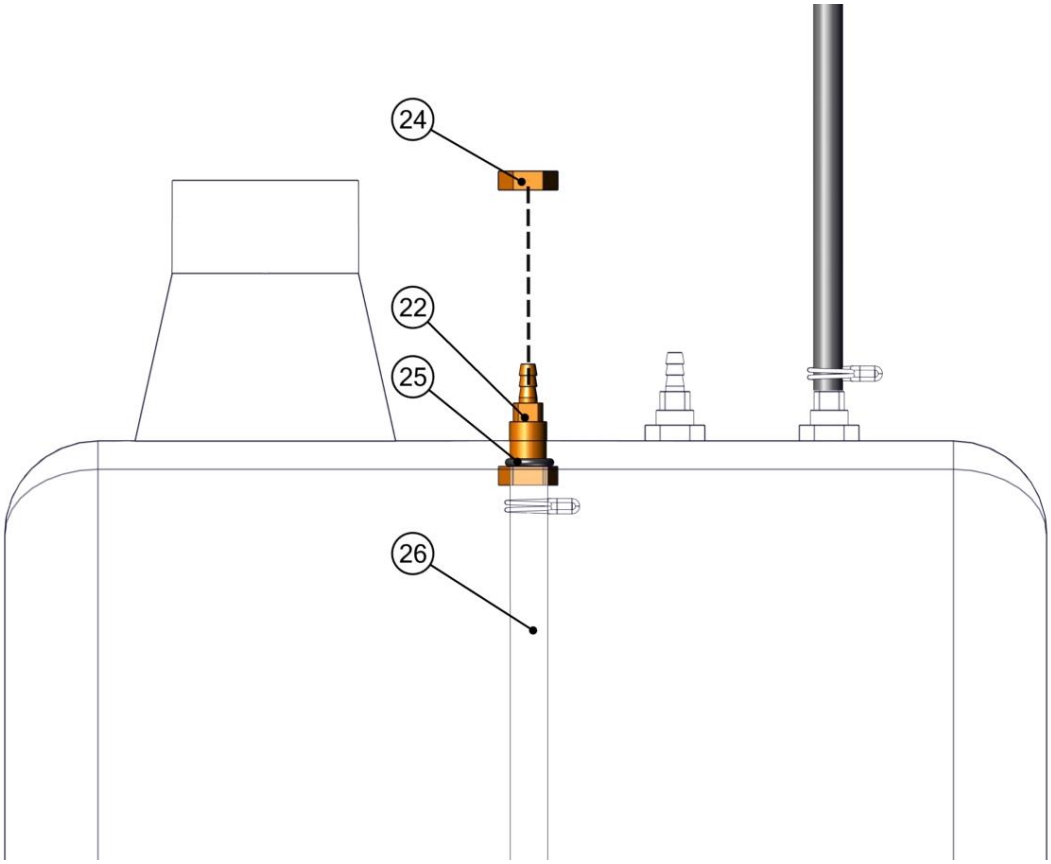
Insert the Vittorazi paper filter (27) on the pipe (26).



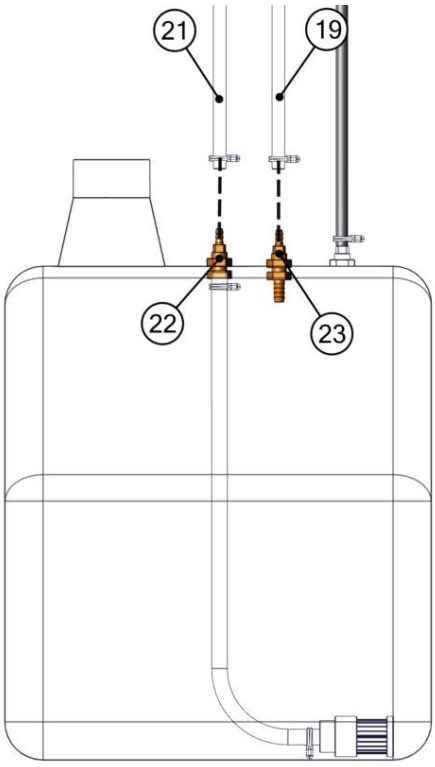
Insert the tank supply pass-through fitting (22) with the O-ring (25) on the other side of the pipe (26).



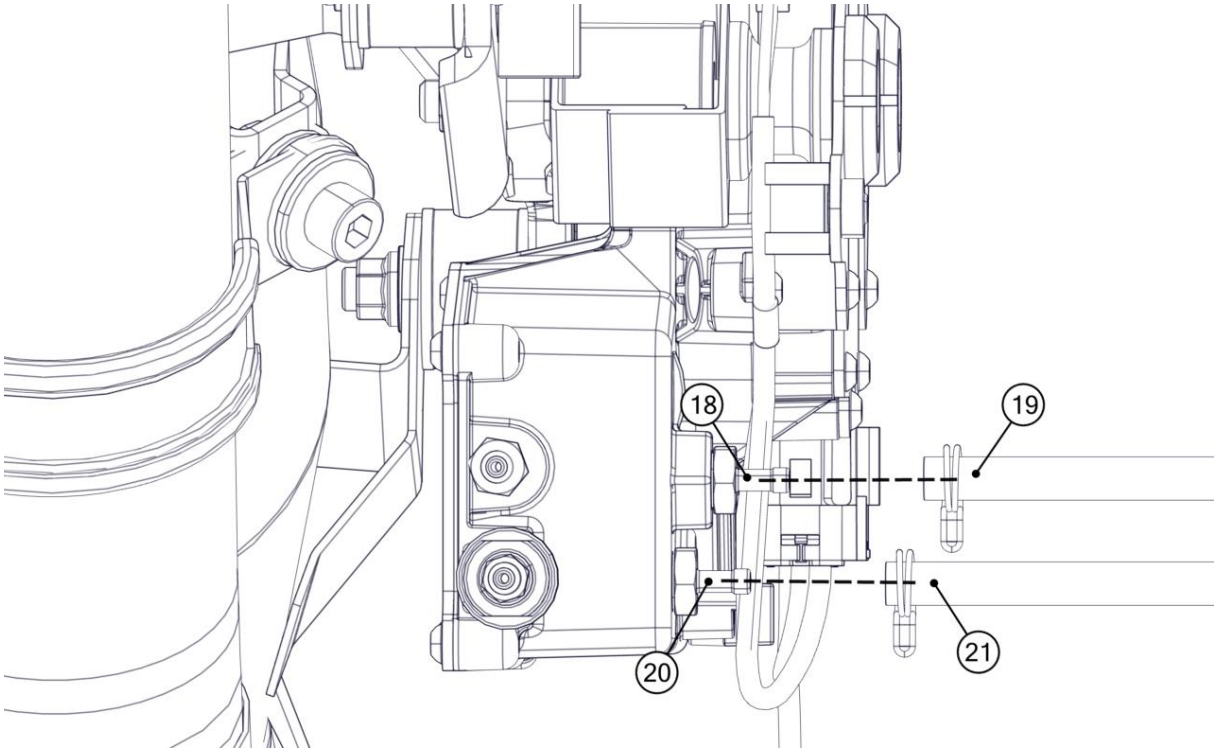
Place the pipe inside the tank and fix the tank supply pass-through fitting (22) with the M10 nut (24).



Insert the tank fuel return pipe (19) on the tank return pass-through fitting (23) and the tank fuel supply pipe (21) on the tank supply pass-through fitting (22).



Insert the tank fuel return pipe (19) to the upper fitting of the FBU (18) and the tank fuel supply pipe (21) on the lower fitting of the FBU (20).

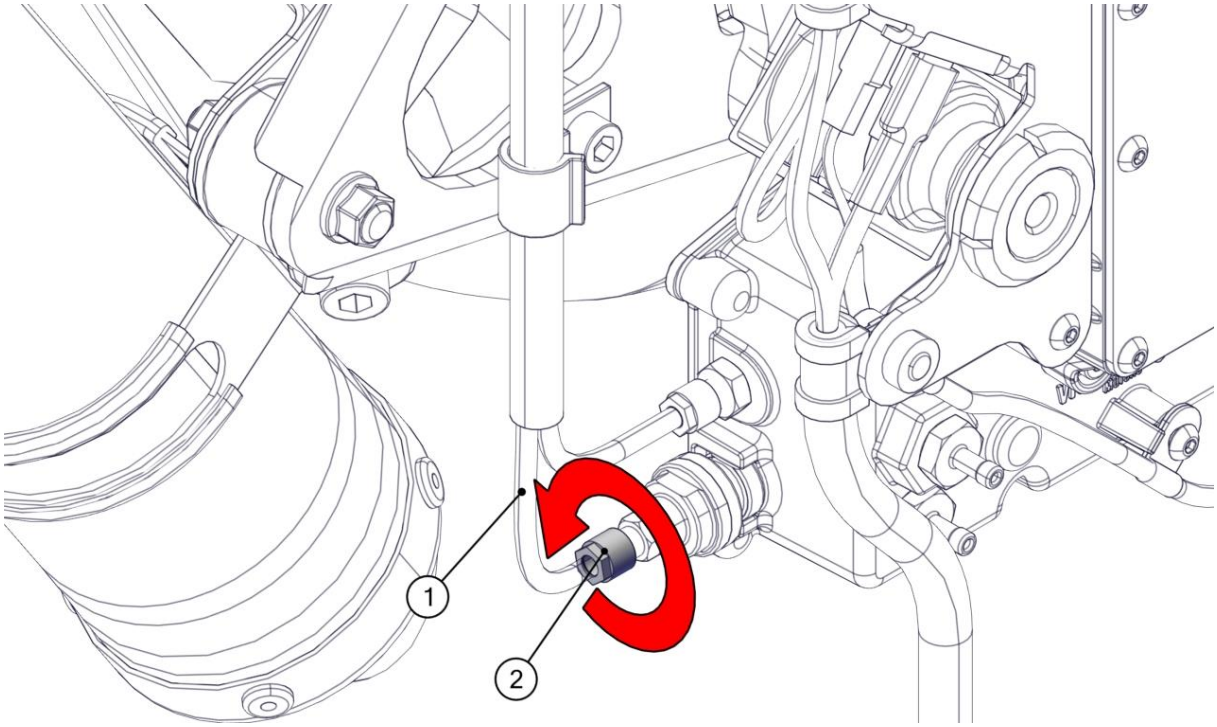


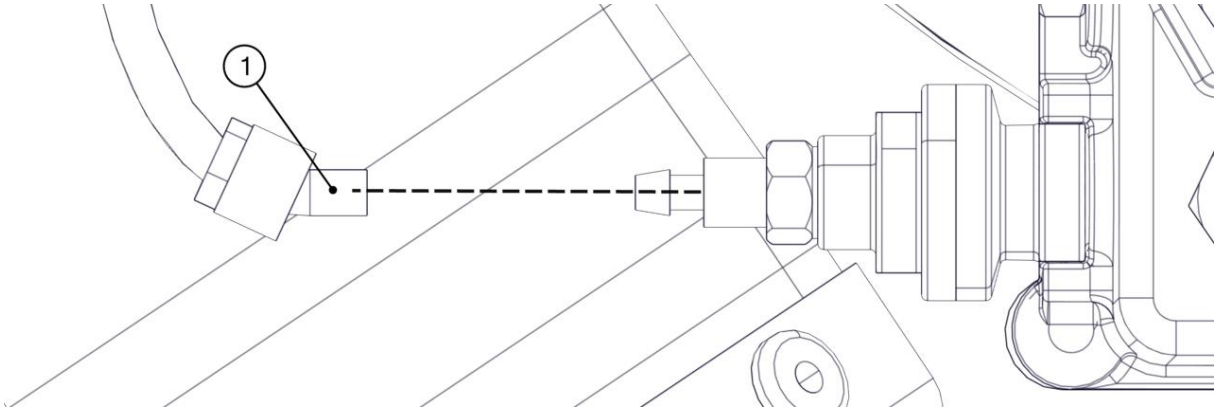
3.4.9 Fuel microfilter disassembly

Carry out the following operations in a clean and dust-free environment.
The entry of impurities into the hydraulic circuit can impair the functioning of the circuit components.

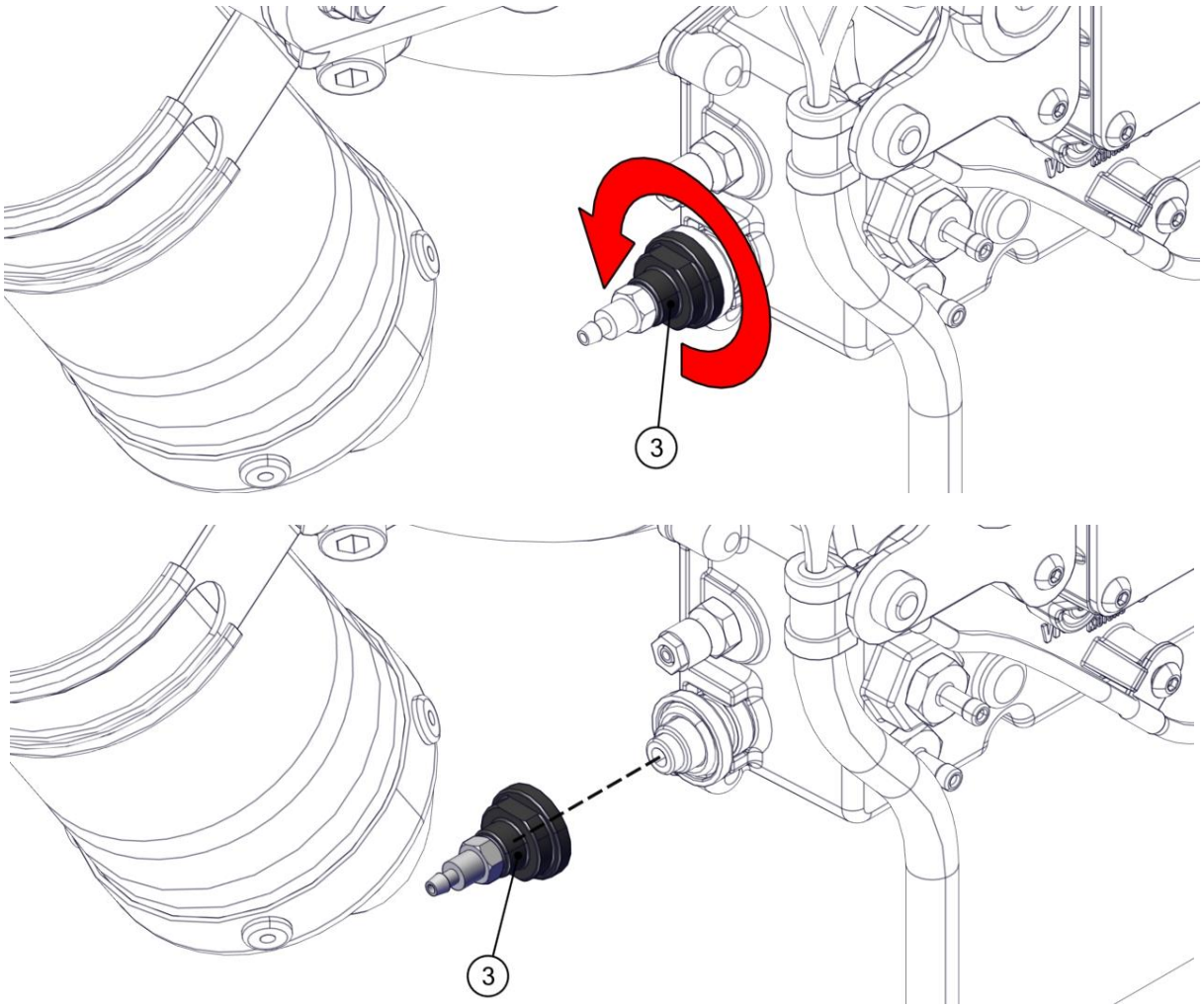
Remove the injector fuel supply tube (1) by unscrewing the external ring (2) and carefully bending the injector fuel supply tube (1) to the sides while pulling.

Do not use pliers or screwdrivers to extract the injector fuel supply tube, this could cause damage to the tube or the internal cylinder
Do not unscrew the internal cylinder; it is locked with high-strength threadlocker. Turning it could damage the cylinder itself or the hydraulic system.

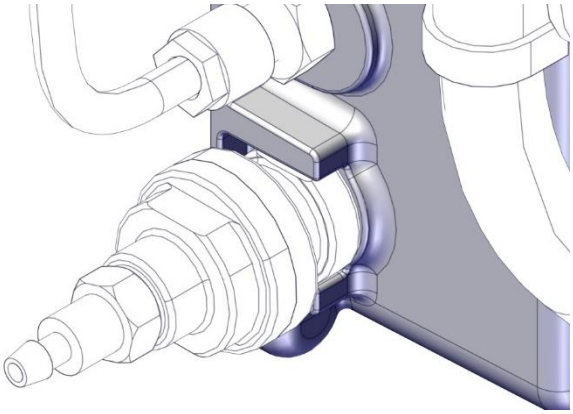




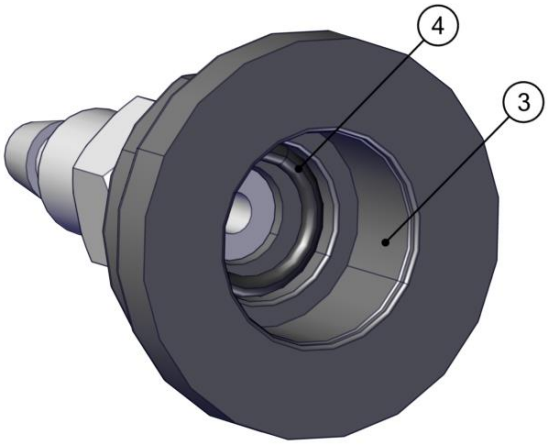
Remove the external microfilter cap (3).



Check that the FBU is equipped with an anti-rotation system, otherwise it is necessary to lock the other side of the microfilter capsule with a 12 mm wrench to prevent rotation.

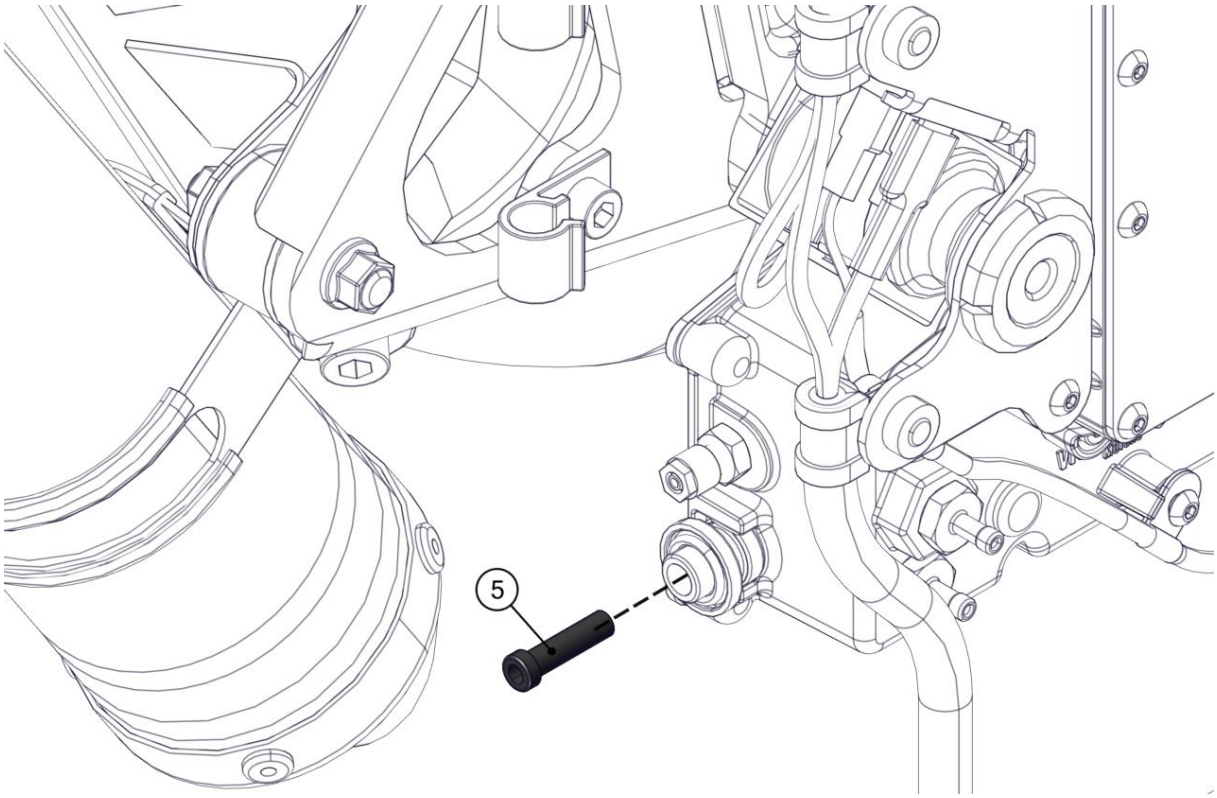


Carefully remove the O-ring (4) from the microfilter cap (3).

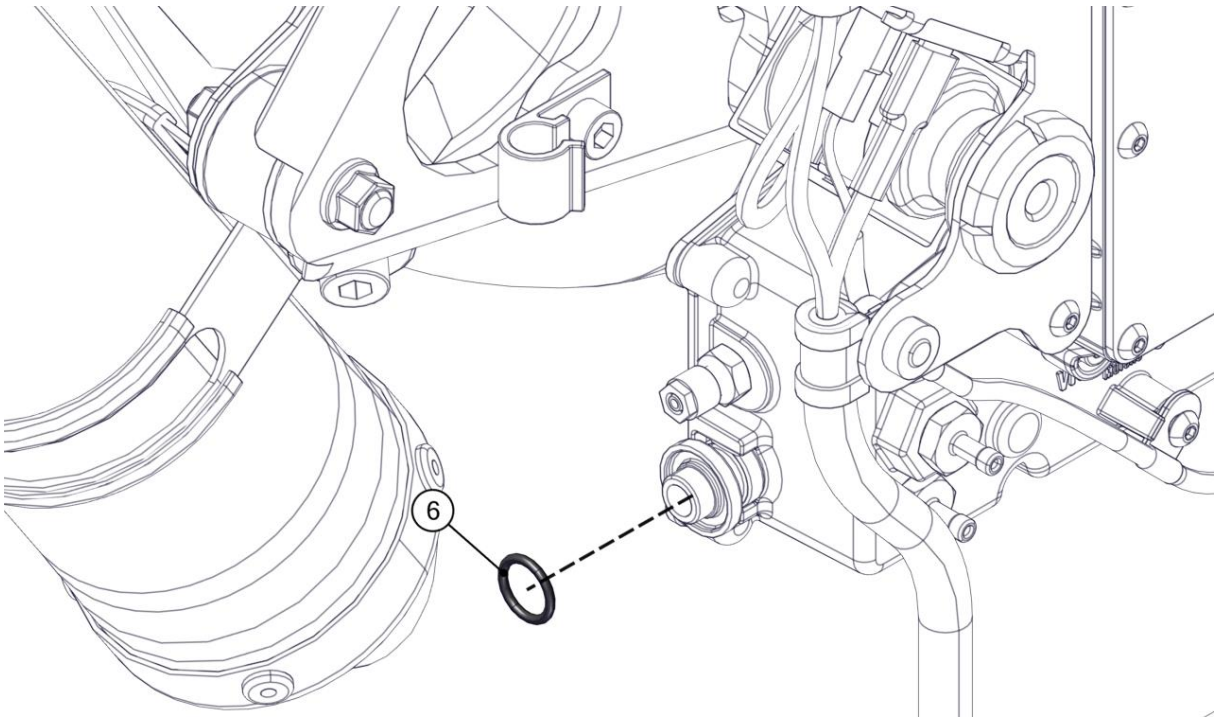


Pay attention not to damage or introduce dirt inside the microfilter cap (3).

Remove the microfilter (5).



Carefully remove the O-ring (6).



Pay attention not to damage or introduce dirt inside the microfilter seat.

3.4.10 Fuel microfilter maintenance

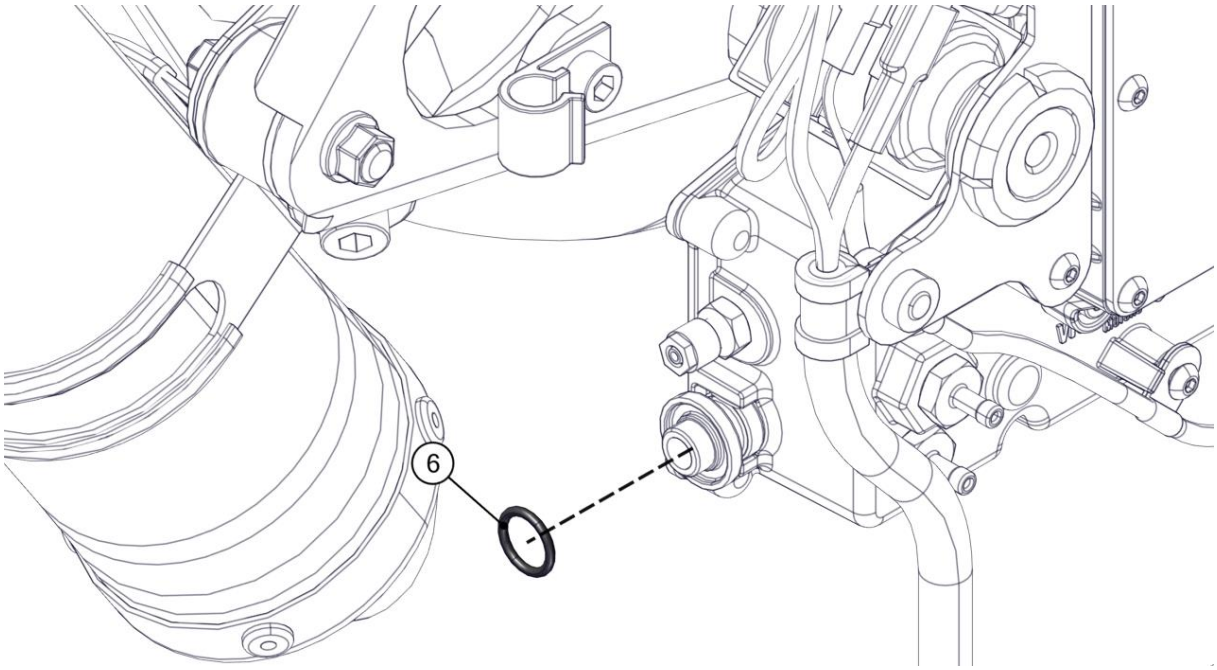
Replace the microfilter O-ring (4).
Replace the microfilter (5).
Check the O-ring (6).

3.4.11 Fuel microfilter assembly

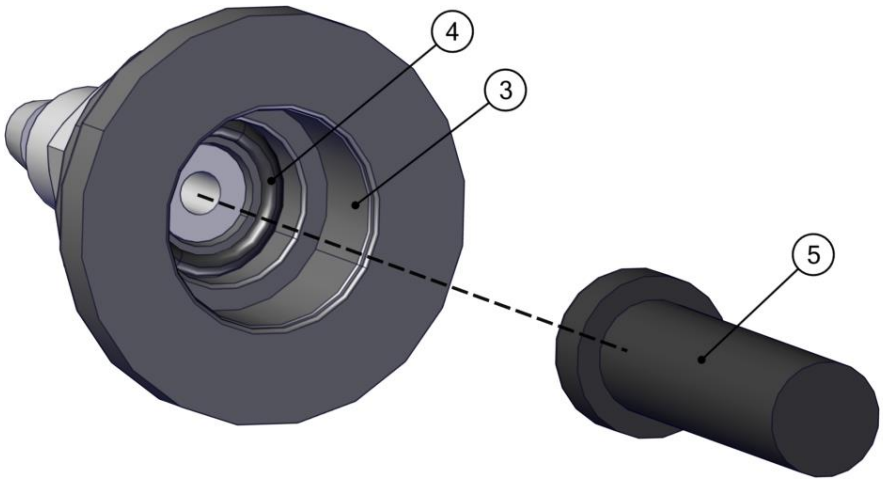
Carry out the following operations in a clean and dust-free environment.
The entry of impurities into the hydraulic circuit can impair the functioning of the circuit components.

Replace the O-rings (4, 6) and the microfilter (5) each time they are disassembled.

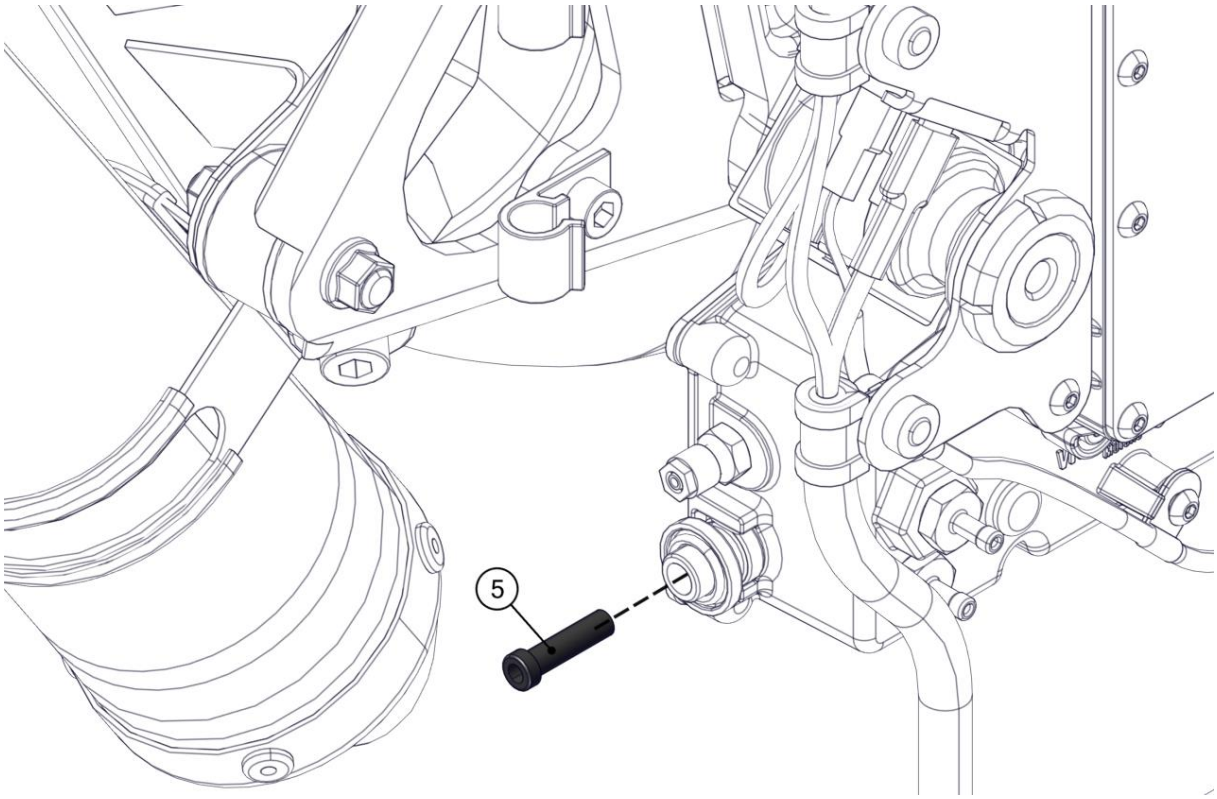
Insert the O-ring (6).



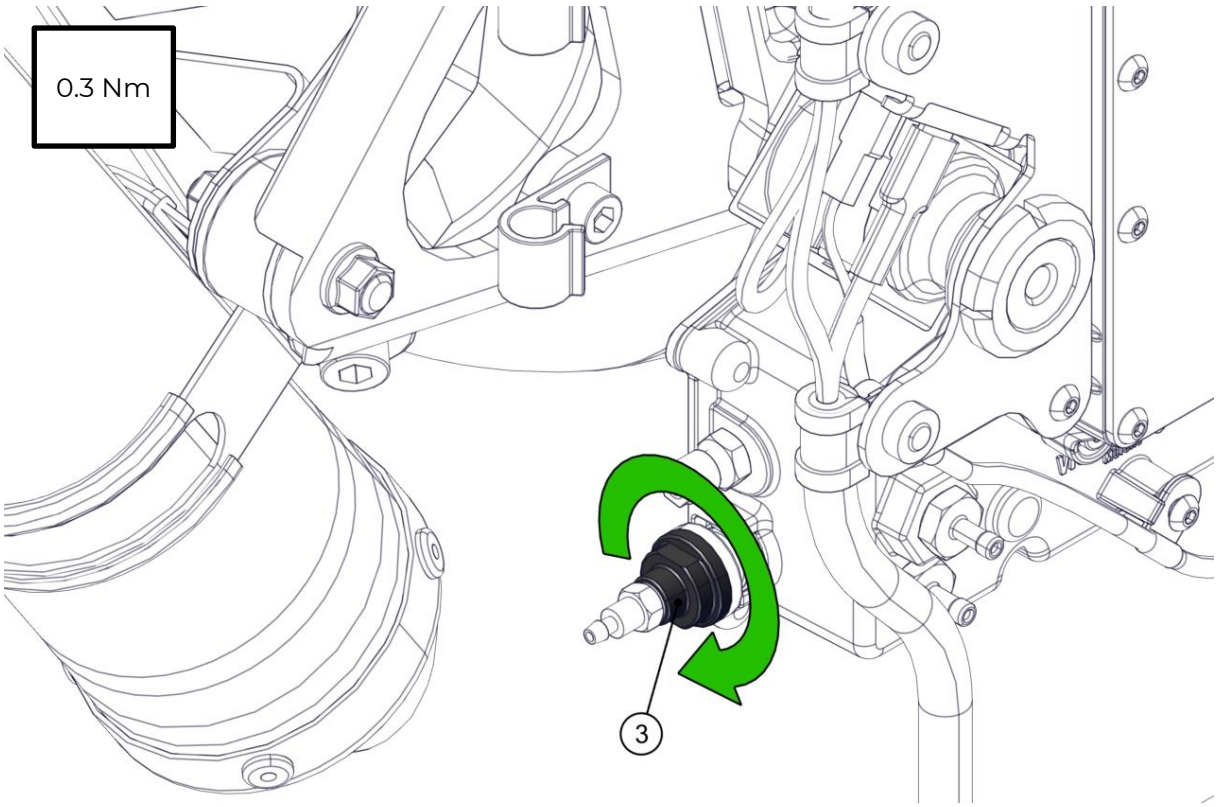
Place the O-ring (4) inside the external microfilter cap (3) using the microfilter (5) to push it in the right position.



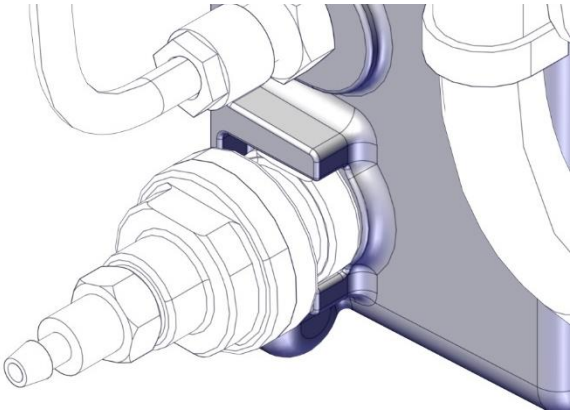
Insert the microfilter (5).



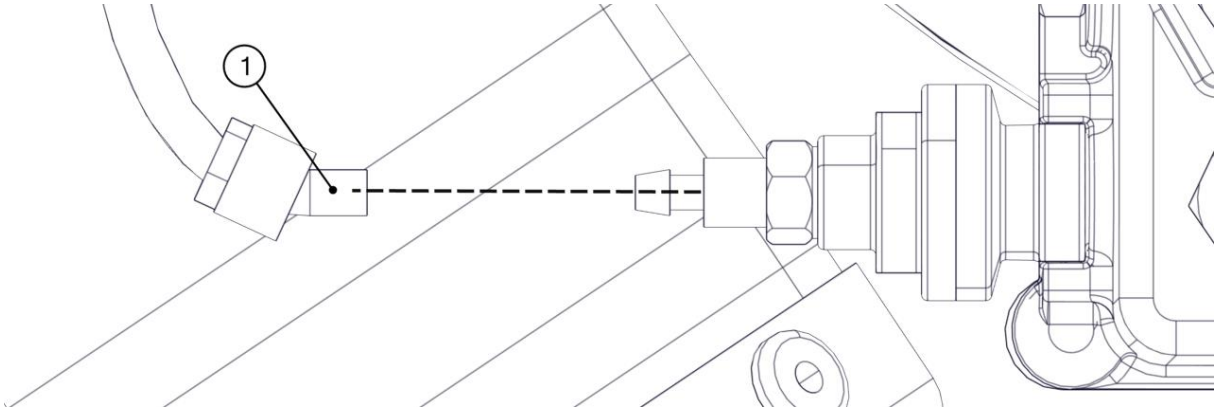
Insert the external microfilter cap (3) and carefully tighten with the torque shown in the figure.



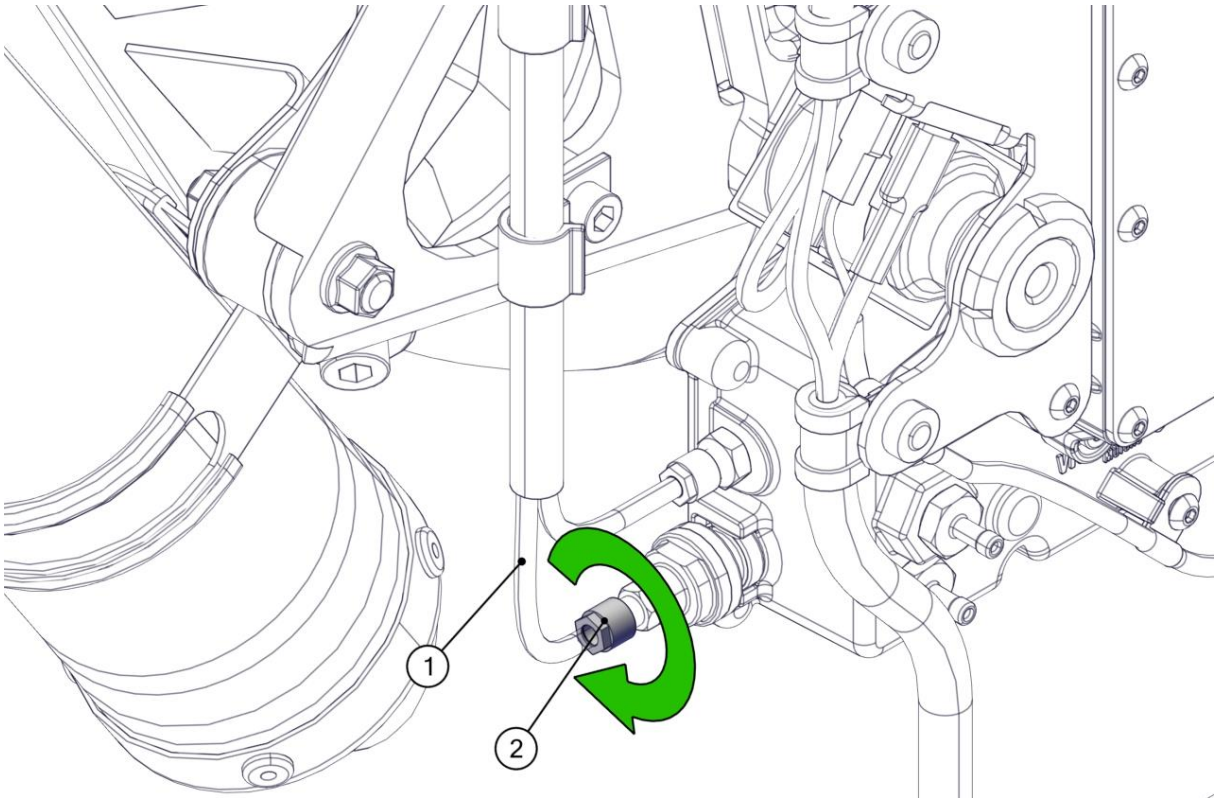
Check that the FBU is equipped with an anti-rotation system, otherwise it is necessary to lock the other side of the microfilter capsule with a 12 mm wrench to prevent rotation.

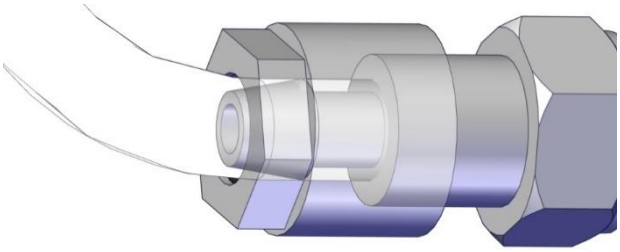


Insert the injector fuel supply tube (1).



Once the injector fuel supply tube (1) has been inserted, apply a small amount of silicon grease (Recommended FP Silicompound 225 - Silicon based grease + PTFE) to the tube, taking care not to get it inside the tube, to facilitate the sliding of the external ring (2) and to avoid damaging the tube and twisting it.
Screw the external ring (2) of the injector fuel supply tube (1) until it is aligned with the tip of the internal cylinder.

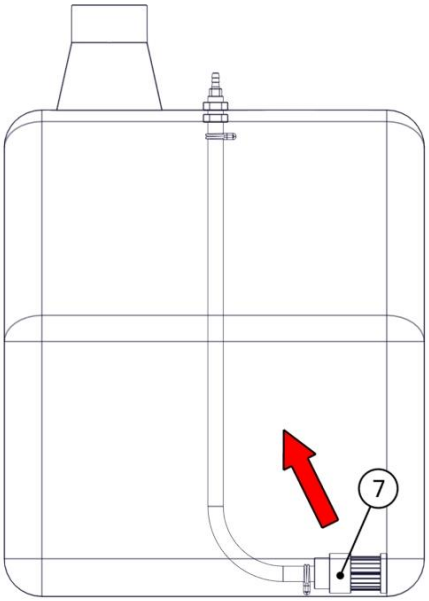




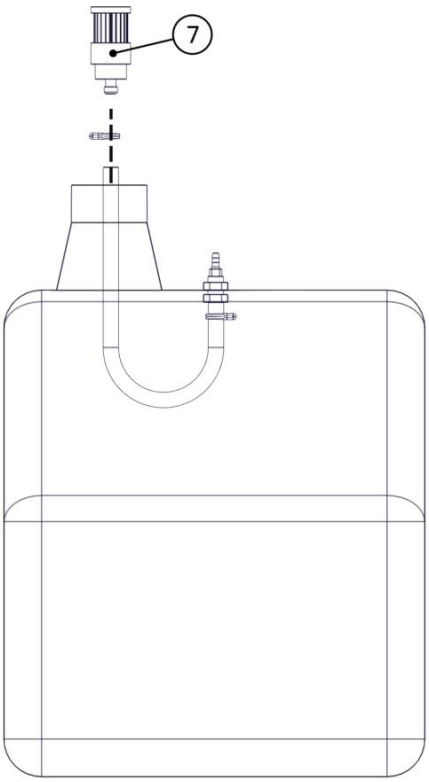
3.4.12 Vittorazi paper filter disassembly

Carry out the following operations in a clean and dust-free environment.
The entry of impurities into the hydraulic circuit can impair the functioning of the circuit components.

Extract the Vittorazi paper filter (7) from the fuel tank.



Remove the Vittorazi paper filter (7).



3.4.13 Vittorazi paper filter maintenance

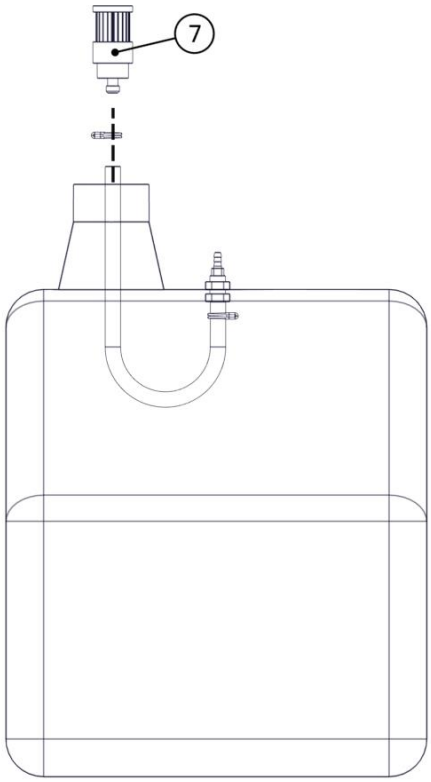
Replace the Vittorazi paper filter (7).

3.4.14 Vittorazi paper filter assembly

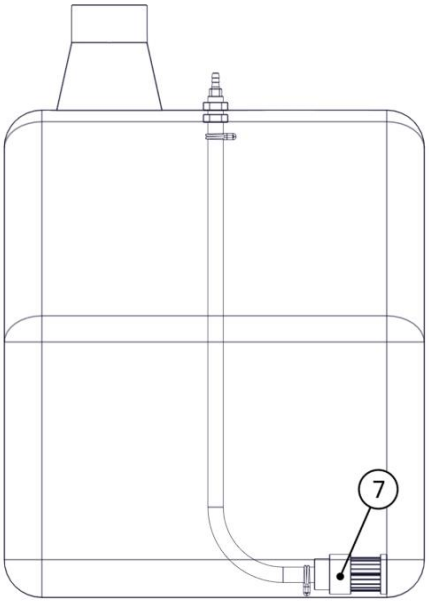
Carry out the following operations in a clean and dust-free environment.
The entry of impurities into the hydraulic circuit can impair the functioning of the circuit components.

Replace the Vittorazi paper filter (7) each time they are disassembled.

Insert the Vittorazi paper filter (7).



Place the Vittorazi paper filter (7) inside the tank.

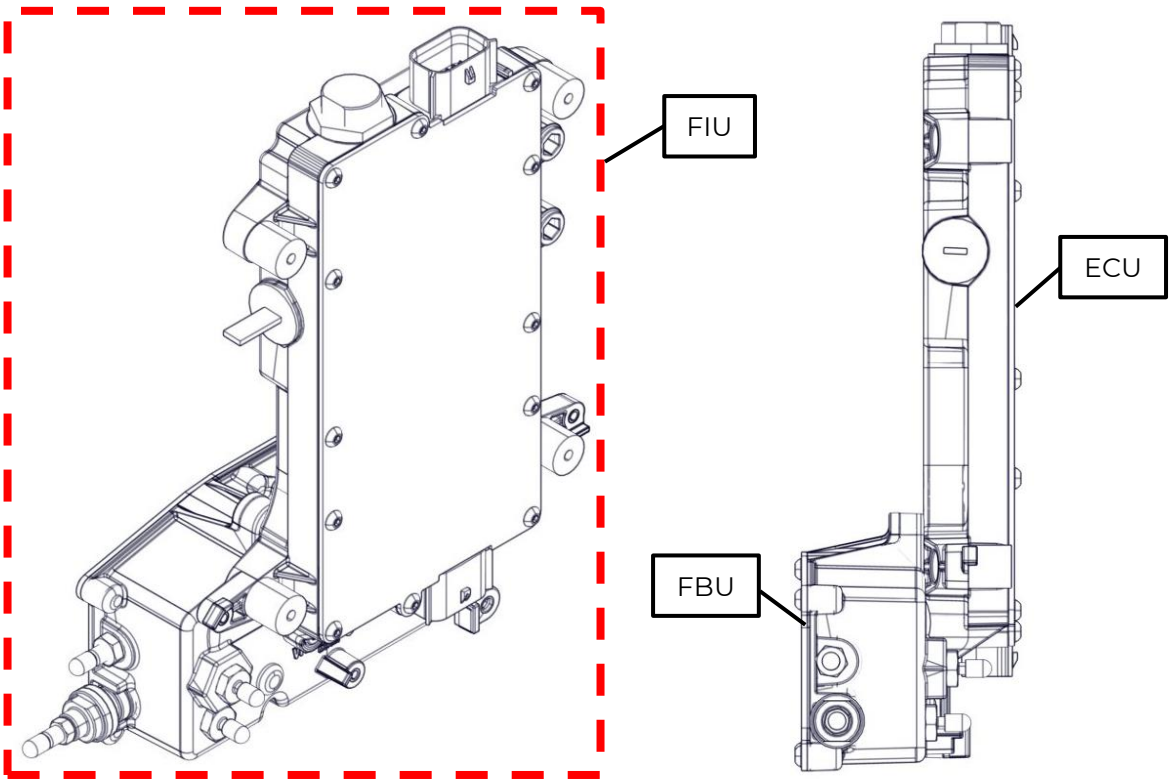


3.5 Full integrated unit (FIU)

<table>
<tr><td>Components to replace</td><td>
<table>
<tr><th></th><th>Time limit</th></tr>
<tr><td>FIU rubber mountings (MI402)</td><td>150h or 1 year</td></tr>
<tr><td>FIU (MI400)</td><td>400h</td></tr>
<tr><td>Loxeal 55-03/Loctite 243 *</td><td></td></tr>
<tr><td>FP Silicompound 225 *</td><td></td></tr>
</table>
</td></tr>
<tr><td>Special tools</td><td>Not required.</td></tr>
<tr><td>Values</td><td>Screws M4x10: 1.6 Nm.
Screws M4x6: 1.6 Nm.
Screw M5x10: 5 Nm.
Screws M4x6: 0.6 Nm.
Screw M4x16: 3 Nm.</td></tr>
</table>

*Always replace it when disassembled.

All critical components are sealed inside the Full Integrated Unit (FIU), which integrates the Electronic Control Unit (ECU) and Fuel Box Unit (FBU), to ensure maximum reliability through the use of Vittorazi-approved and tested components, which are installed by competent personnel and also to facilitate the replacement of the entire FIU.



Breach of the seals invalidates the warranty and relieves dealers and Vittorazi of any responsibility.

Vittorazi's diagnostics allow the accurate identification of malfunctioning components.
In case of maintenance after 400h or malfunction of an ECU or FBU component, it is necessary to disassemble the FIU and ship it to Vittorazi for maintenance.

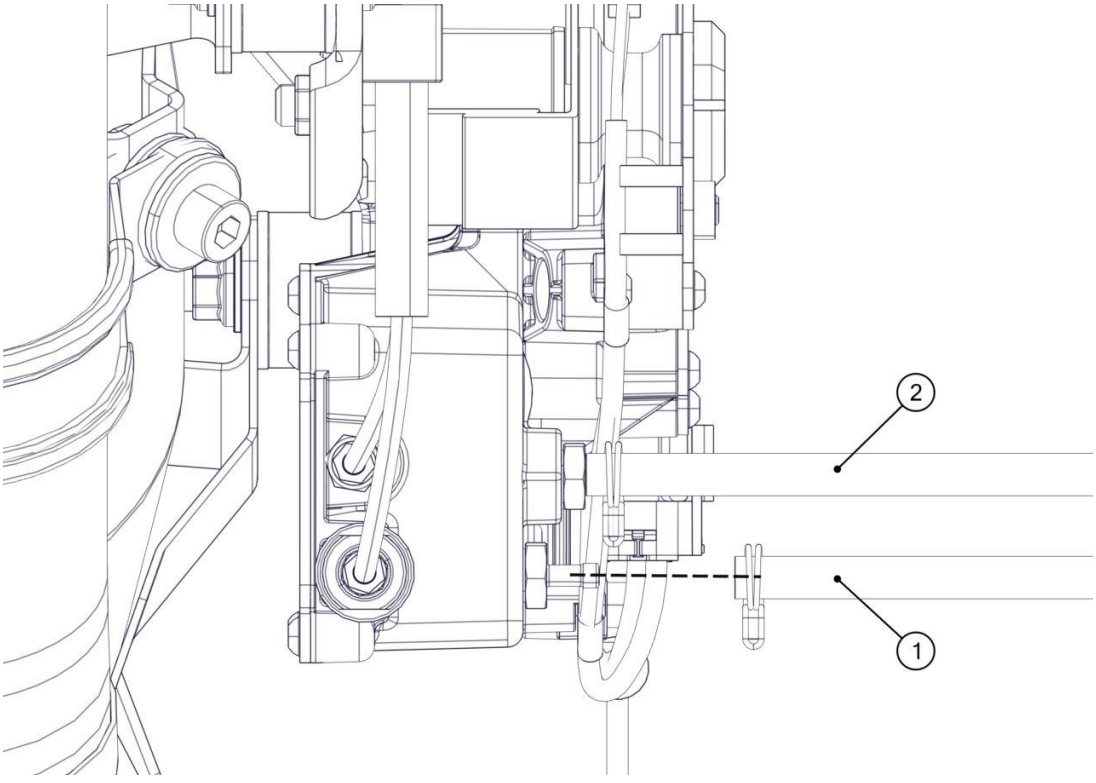
FIU Maintenance operations are reserved for authorised personnel.

Adverse operating conditions, temperatures above 35 °C or below 5 °C and the use of non-high-quality fuel may not guarantee 400 operating hours of the FIU.

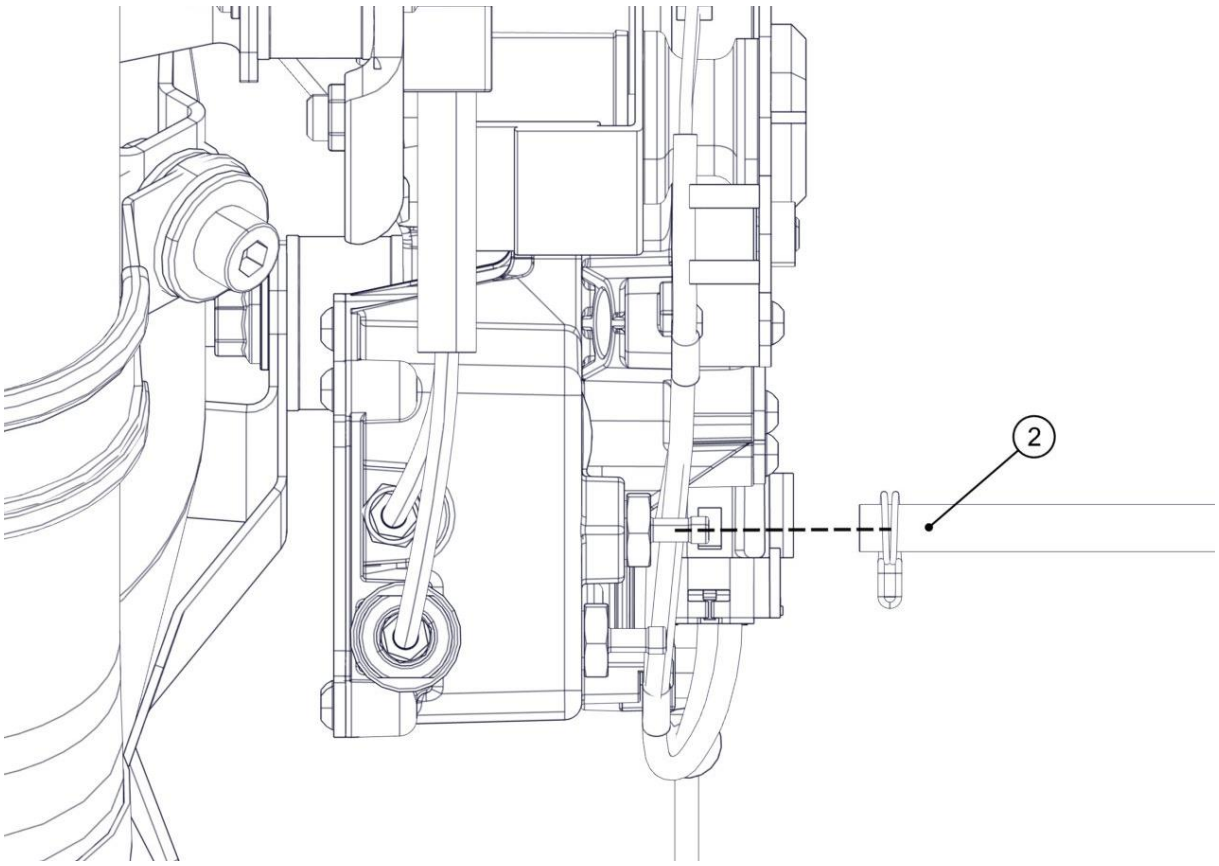
3.5.1 FIU disassembly

Carry out the following operations in a clean and dust-free environment.
The entry of impurities into the hydraulic circuit can impair the functioning of the circuit components.

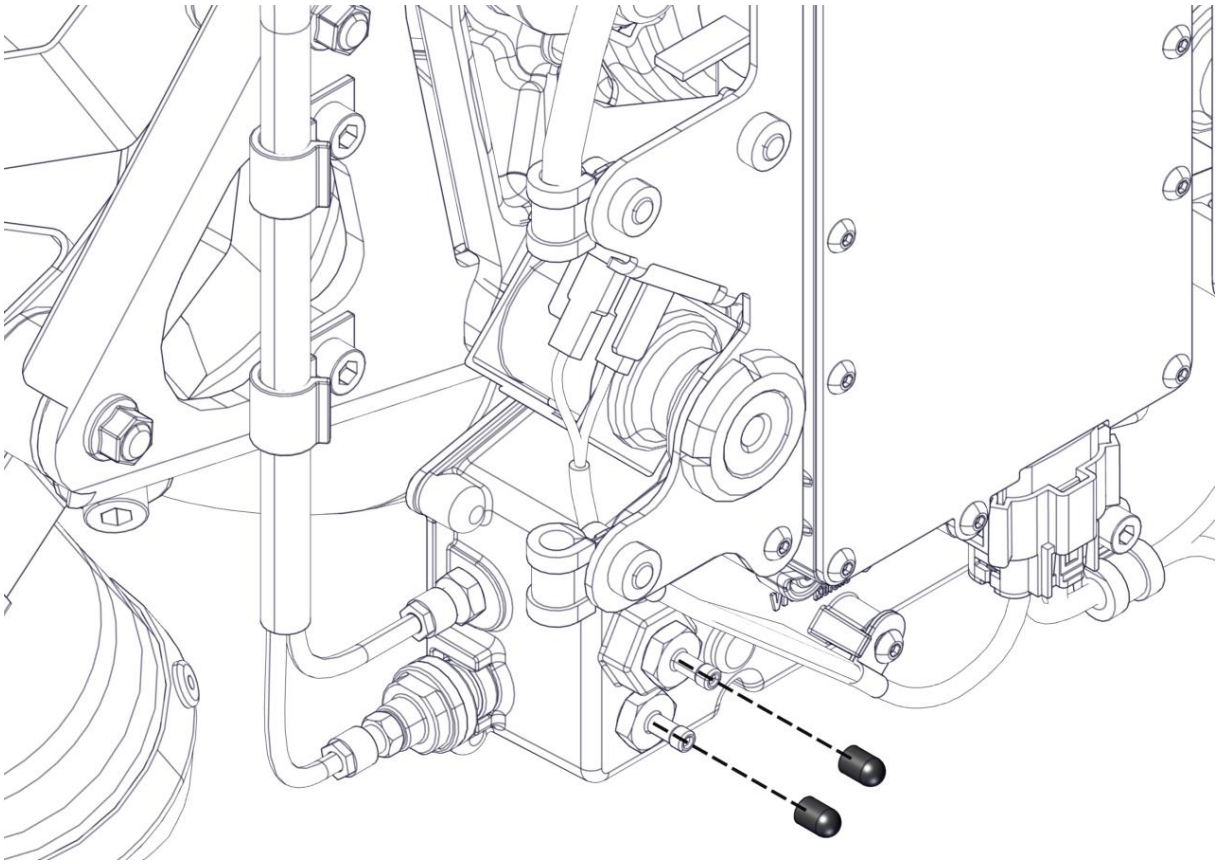
Before disassembling the FIU, empty the fuel line by removing the supply pipe (1) and turning on the ECU. Make sure the return pipe (2) is connected to the fuel tank to collect the fuel contained inside the fuel line.
Wait until air comes out from the fuel return pipe (2) and turn off the ECU.



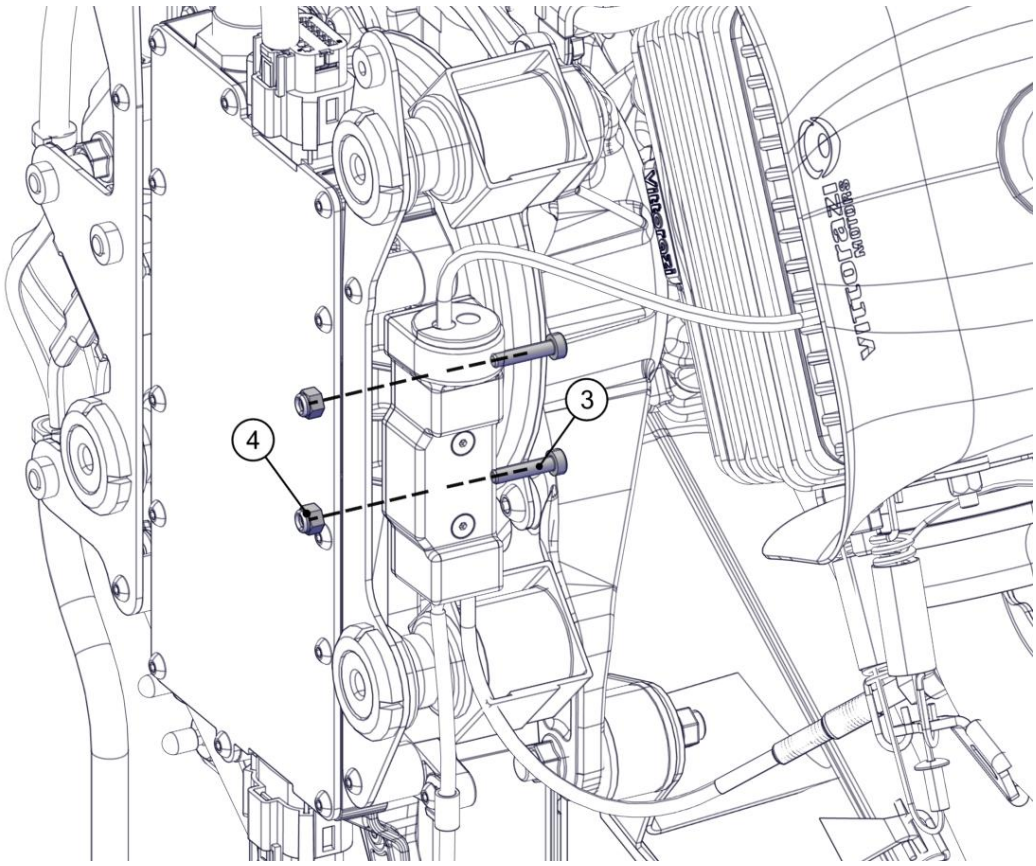
Remove the return tank pipe (2).



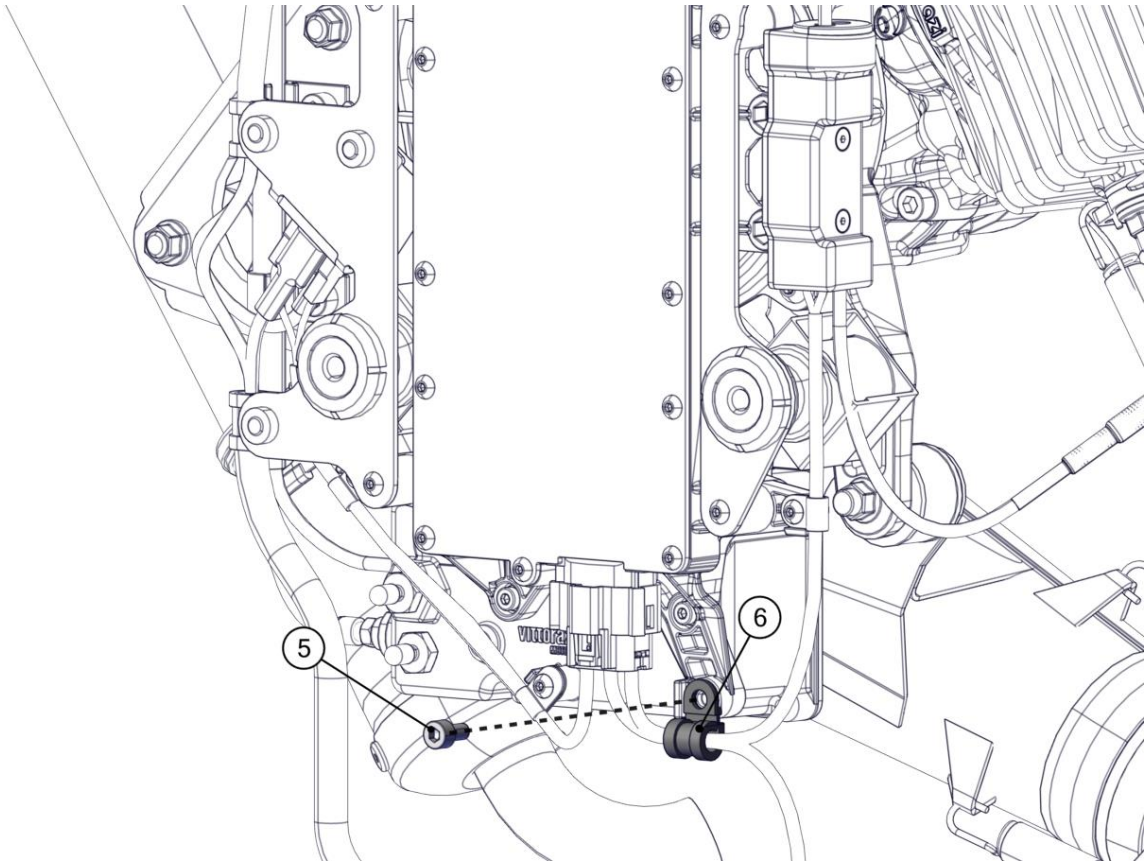
Protect the tank supply and return FBU fittings with caps to prevent the entry of impurities inside the fuel line.



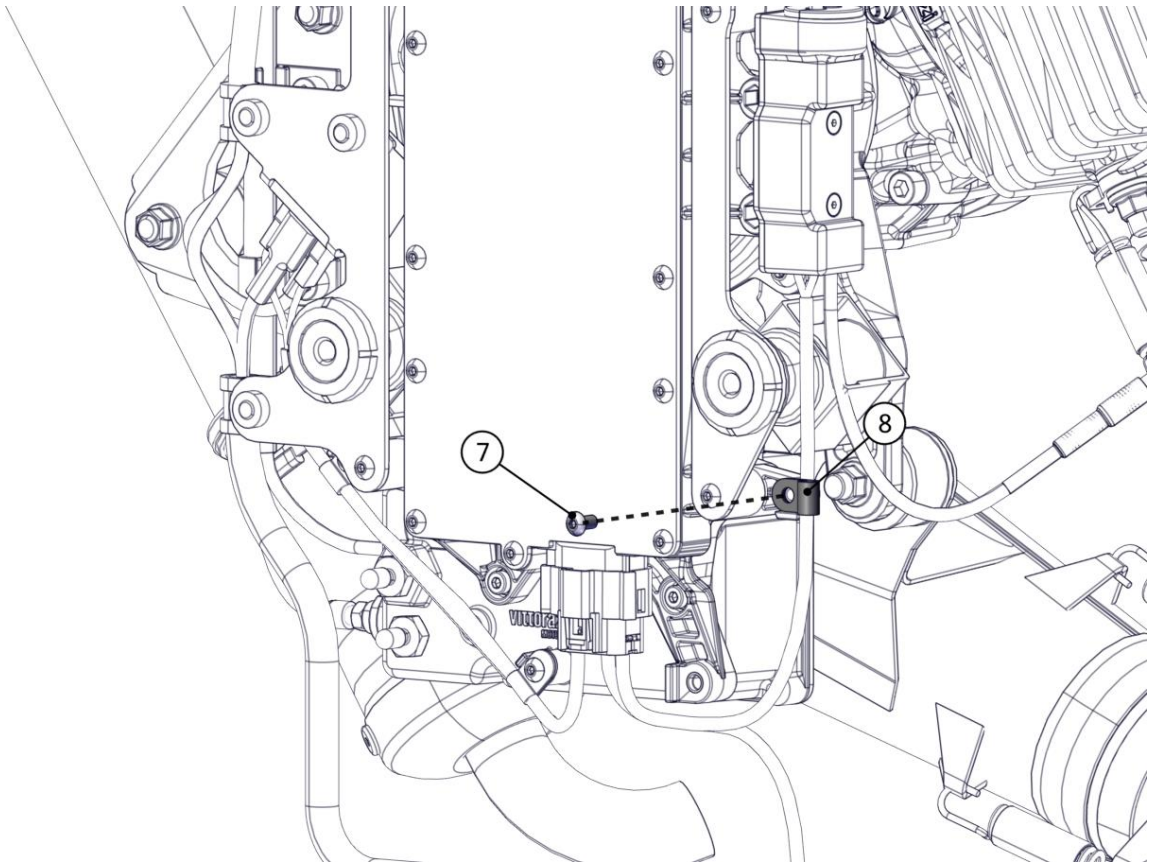
Remove the 2 screws M4x16 (3) and the 2 self-locking nuts M4 (4).



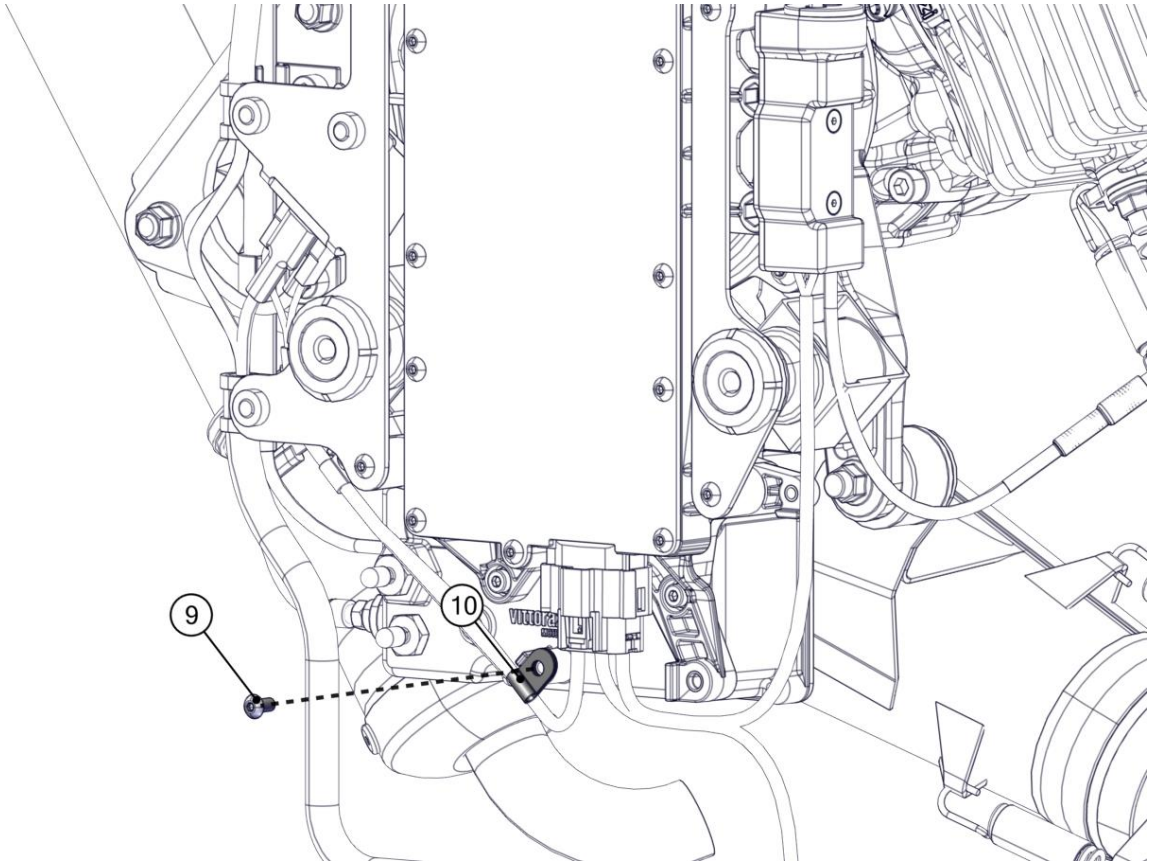
Remove the screw M5x10 (5).



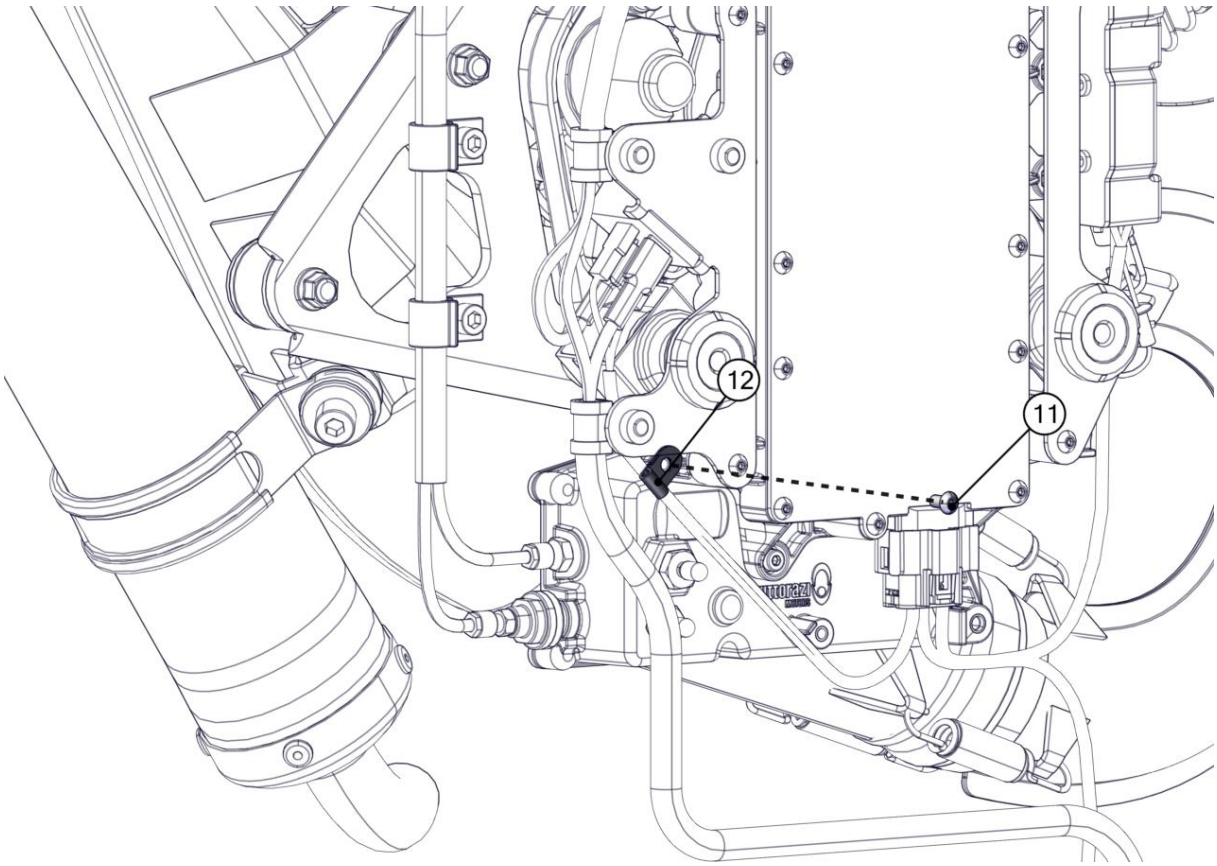
Remove the screw M4x6 (7).



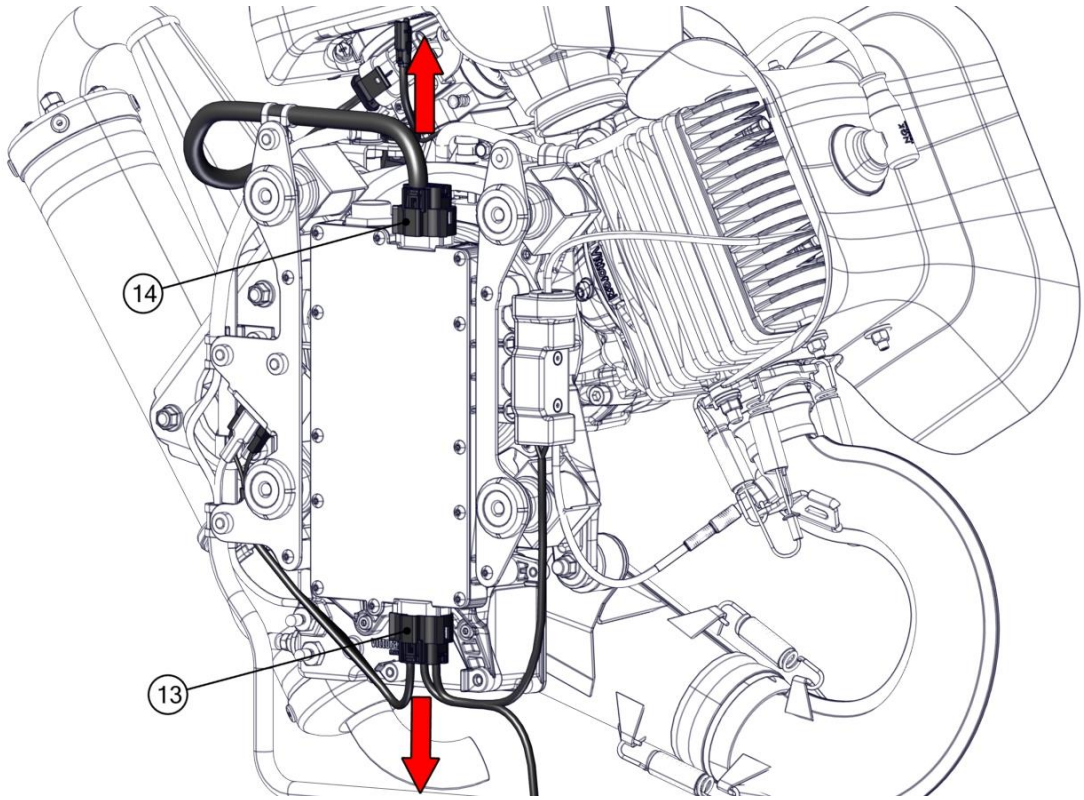
Remove the screw M4x6 (9).



Remove the screw M4x6 (11).

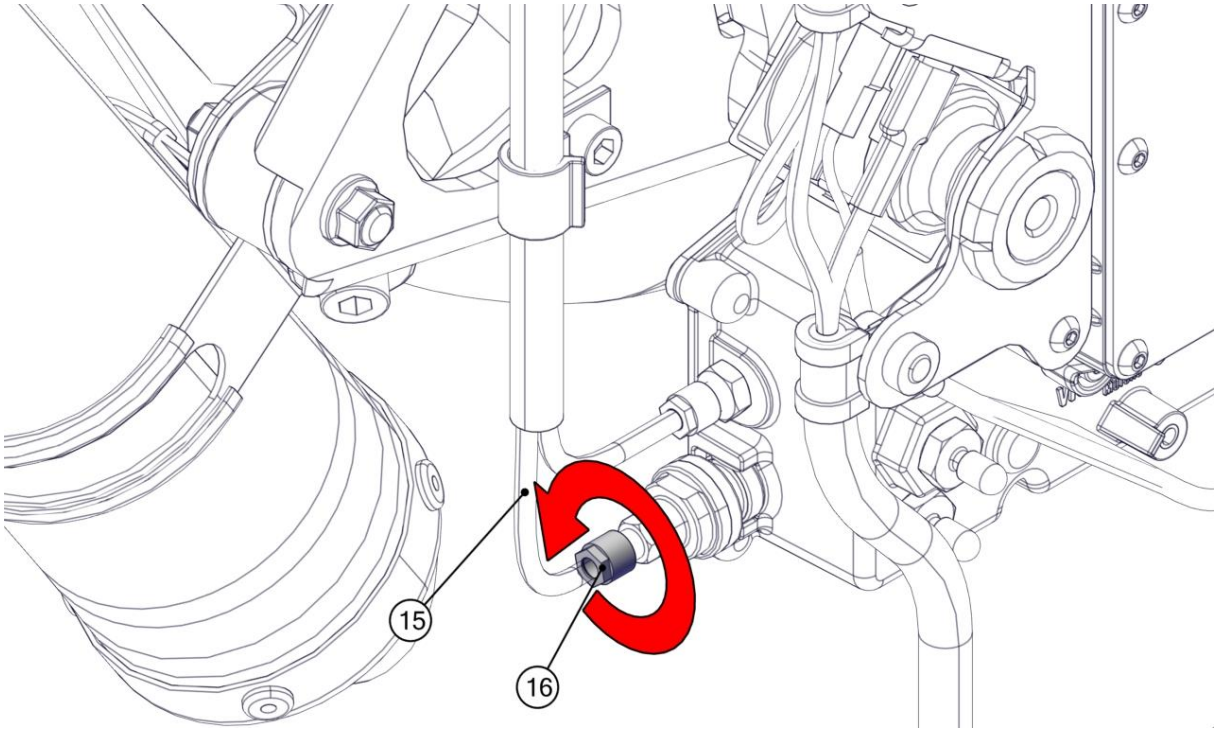


Remove the power wiring connector (13) and the signal wiring connector (14).

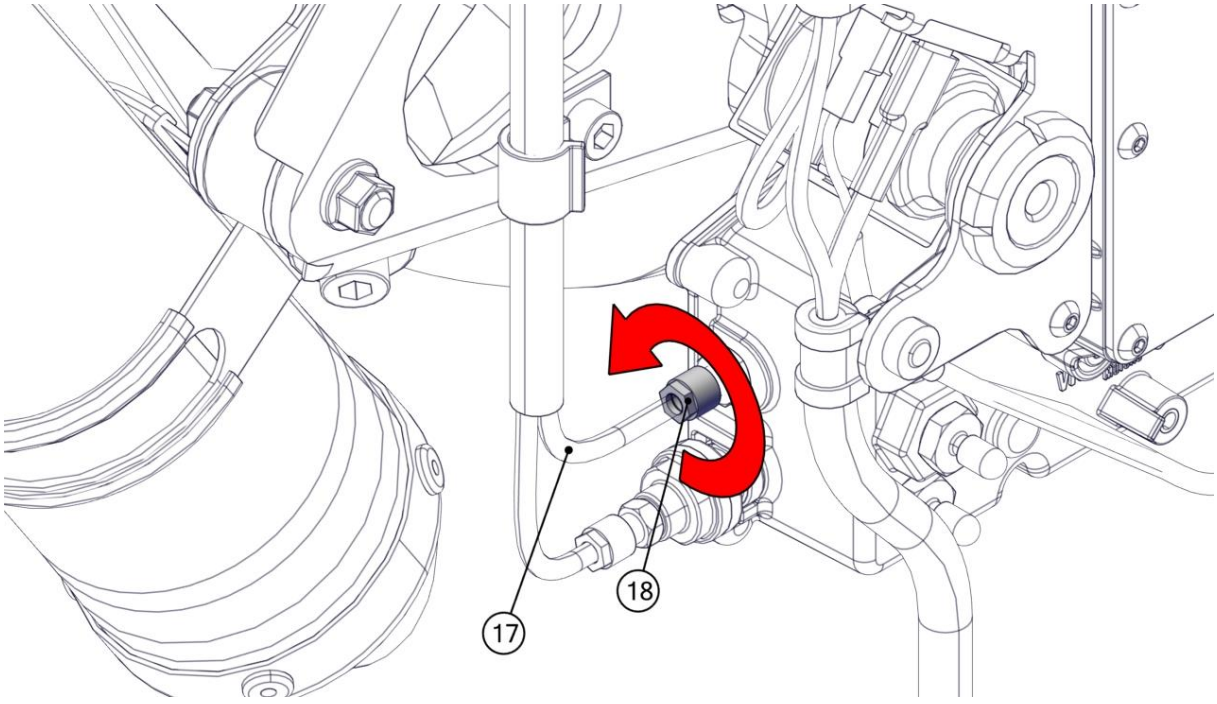


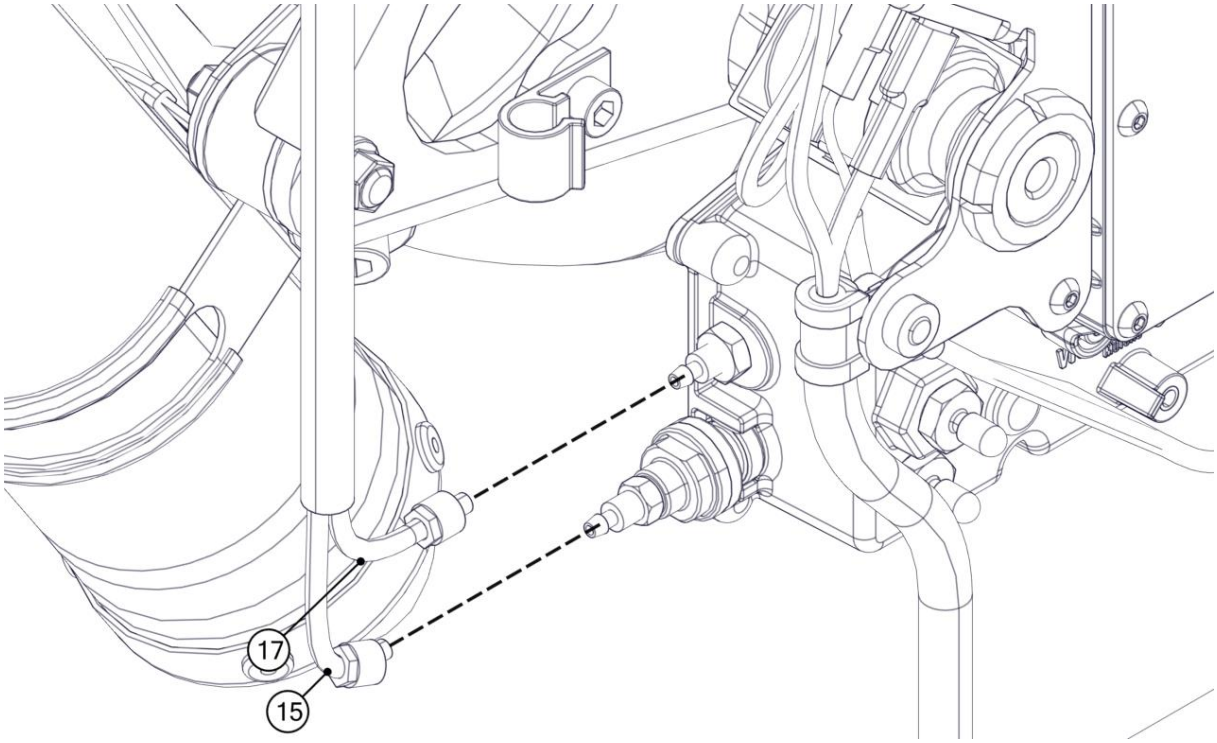
Remove the injector fuel supply tube (15) by unscrewing the external ring (16) and carefully bending the injector fuel supply tube (15) to the sides while pulling.

Do not use pliers or screwdrivers to extract the injector fuel supply tube, this could cause damage to the tube or the pipe connector
Do not unscrew the pipe connector; it is locked with high-strength threadlocker. Turning it could damage the connector itself or the hydraulic system.

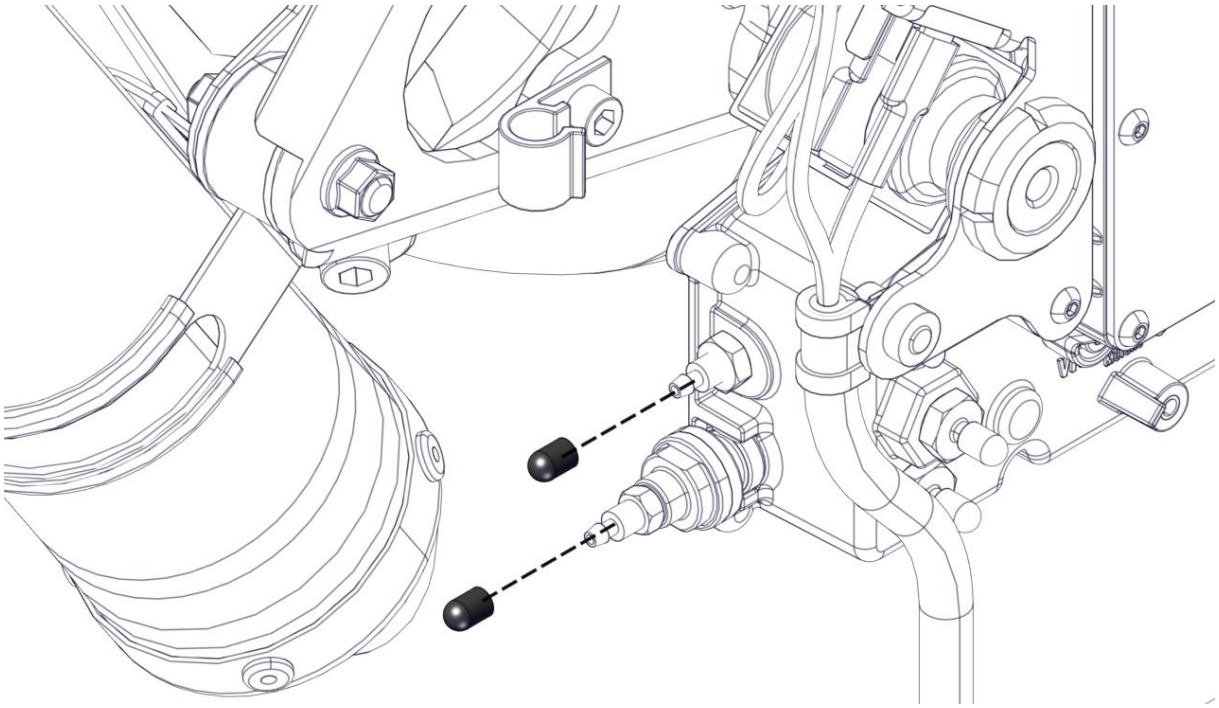


Repeat this operation with the injector fuel return tube (17).

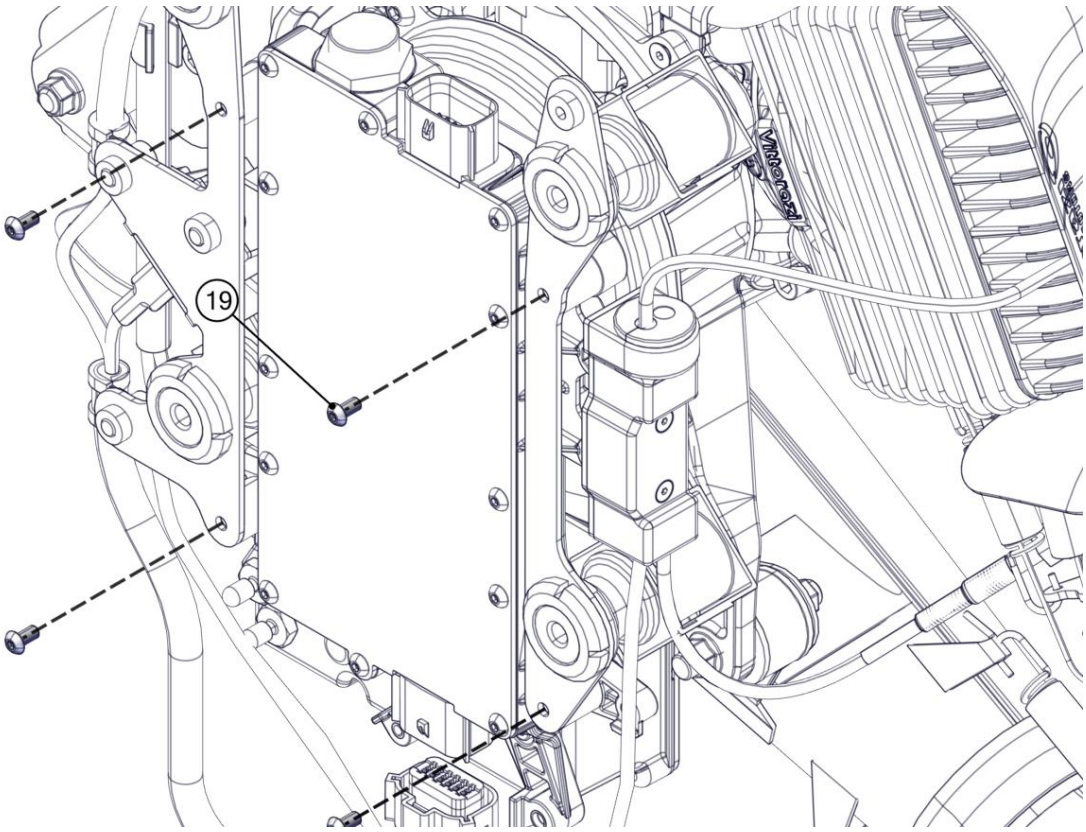




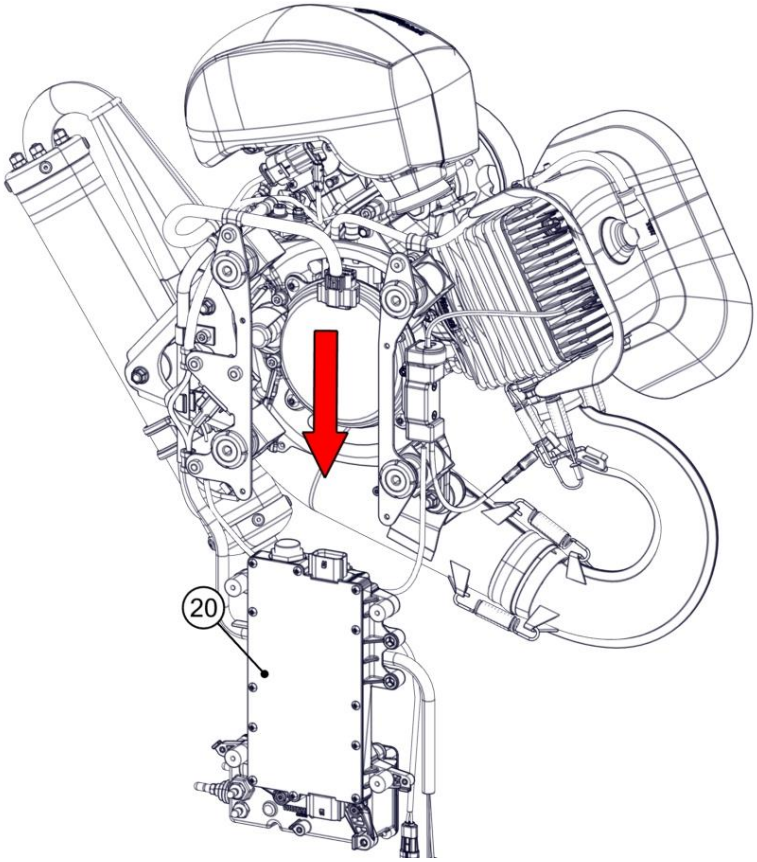
Protect the injector supply and return FBU fittings with caps to prevent the entry of impurities inside the fuel line.



Remove the 4 screws M4x6 (19).



Remove the FIU (20).



3.5.2 FIU maintenance

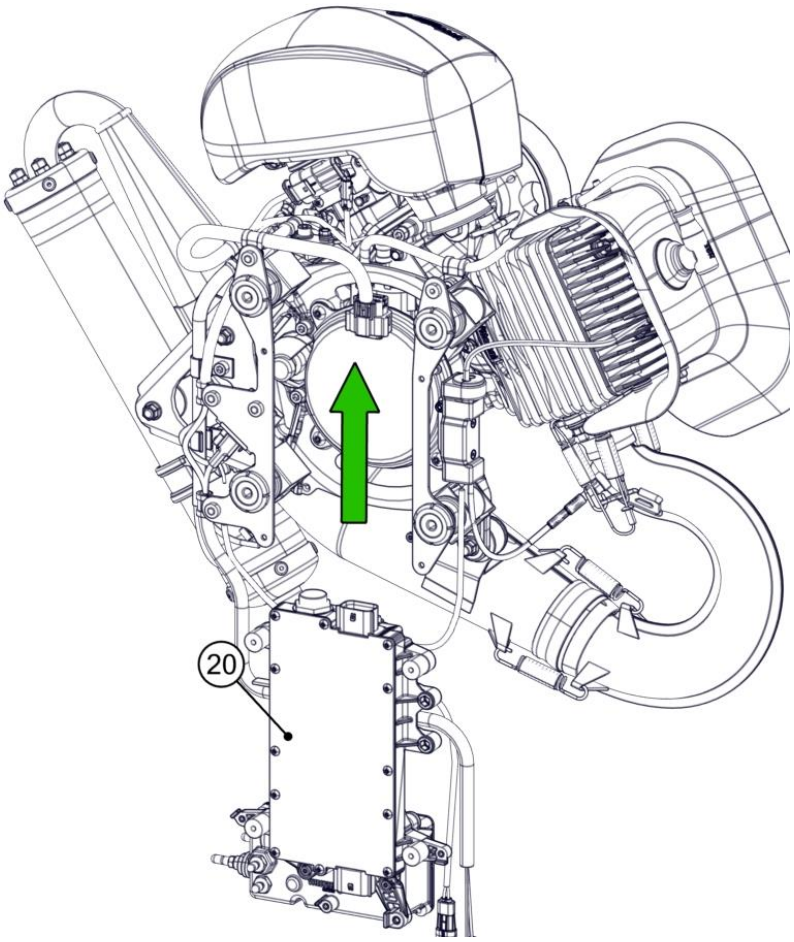
FIU Maintenance operations are reserved for authorised personnel.

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.

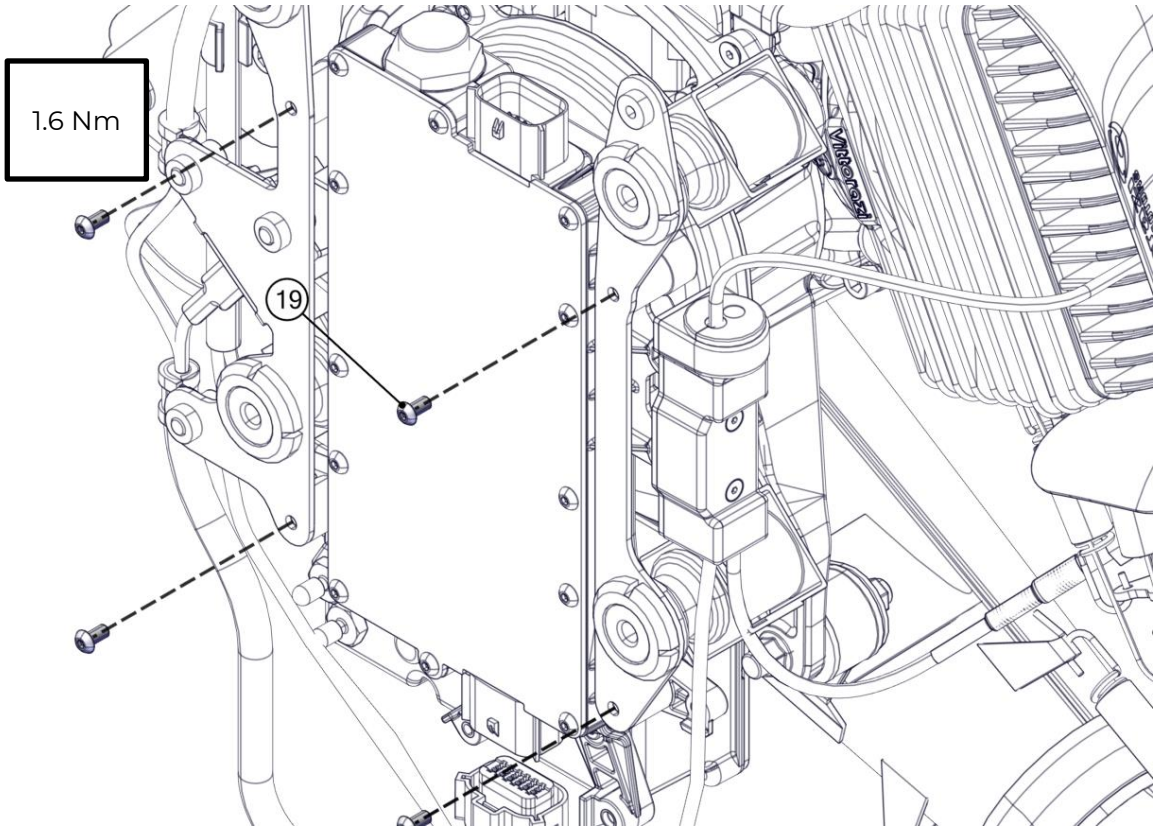
3.5.3 FIU assembly

Carry out the following operations in a clean and dust-free environment.
The entry of impurities into the hydraulic circuit can impair the functioning of the circuit components.

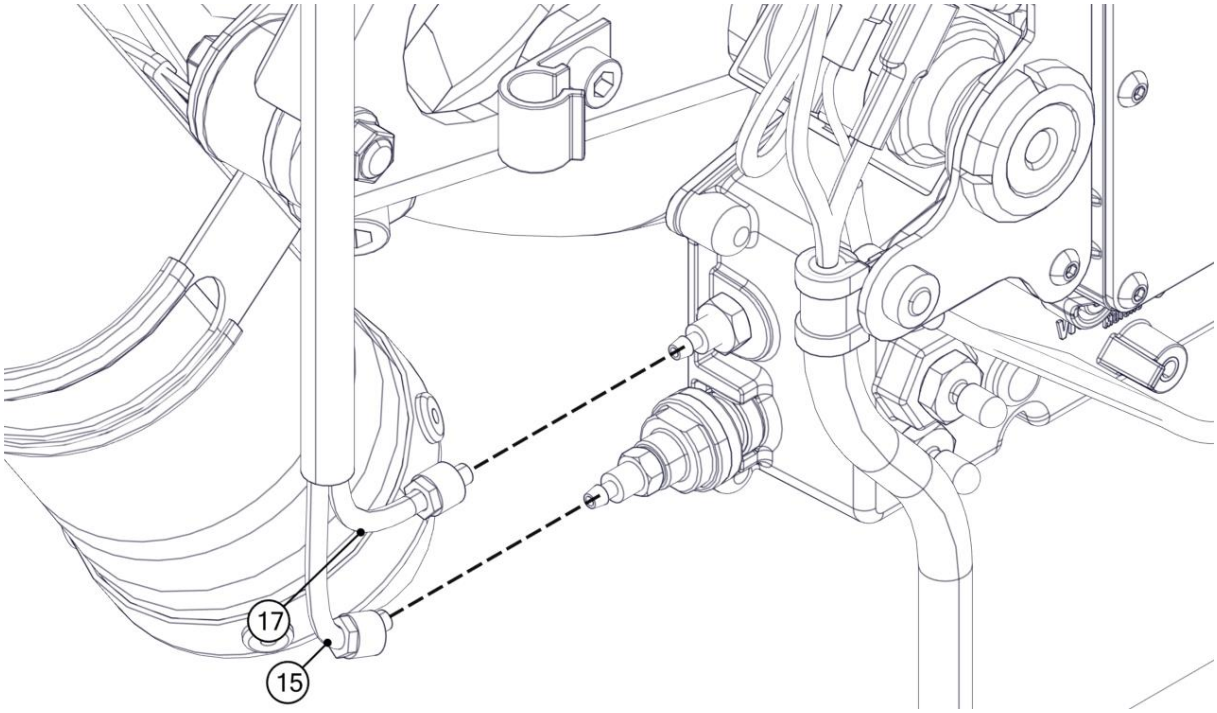
Place the FIU (20).



Insert the 4 screws M4x6 (19) with threadlocker (recommended Loxeal 55-03/Loctite 243) and tighten with the torque shown in the figure.

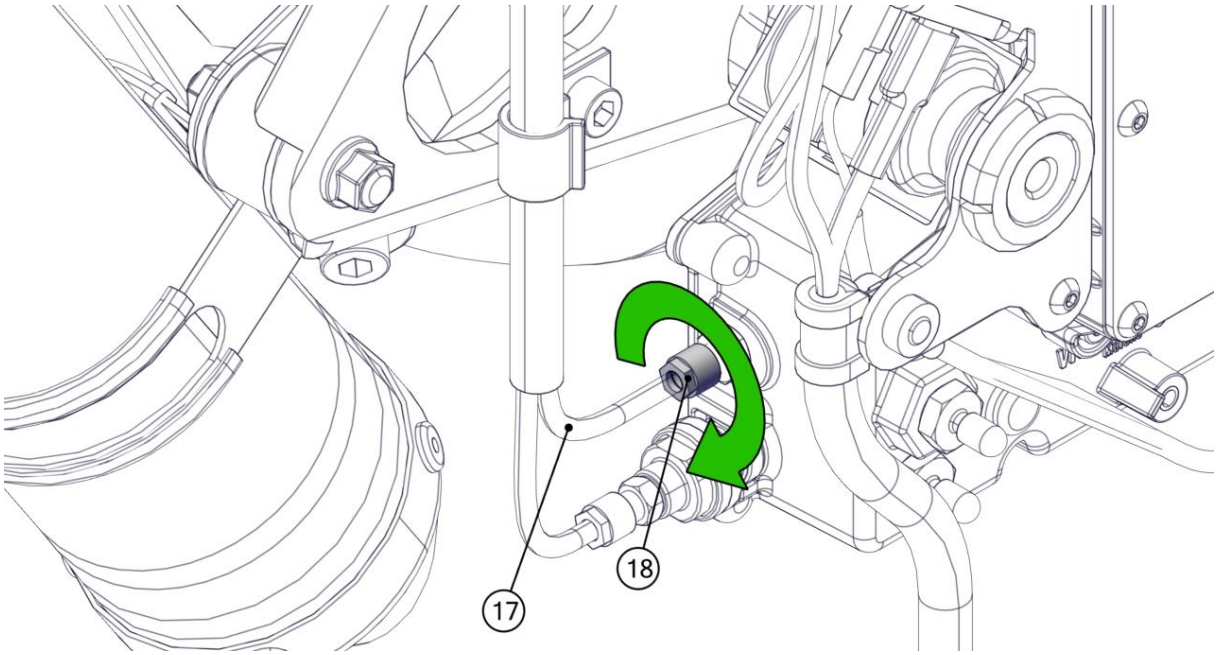


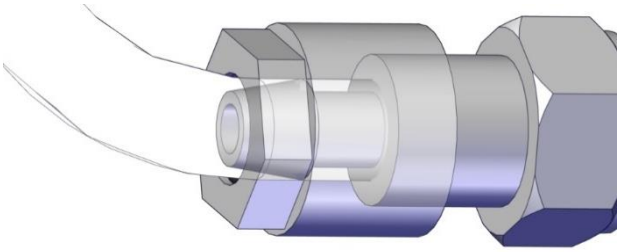
Insert the injector fuel supply tube (15) and the injector fuel return tube (17).



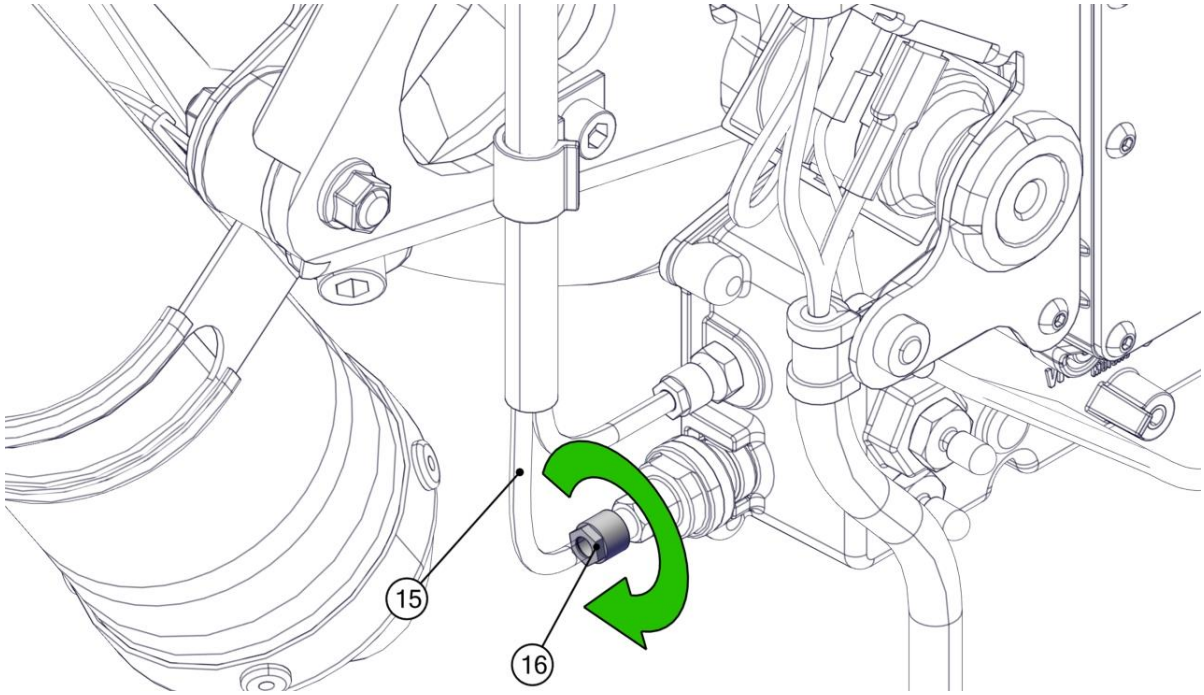
Once the injector fuel supply (15) and the injector fuel return (17) tubes have been inserted, apply a small amount of silicon grease (Recommended FP Silicompound 225 - Silicon based grease + PTFE) to the tubes, taking care not to get it inside the tubes, to facilitate the sliding of the external rings (16, 18) and to avoid damaging the tubes and twisting them.

Screw the external ring (18) of the injector fuel return tube (17) until it is aligned with the tip of the pipe connector.

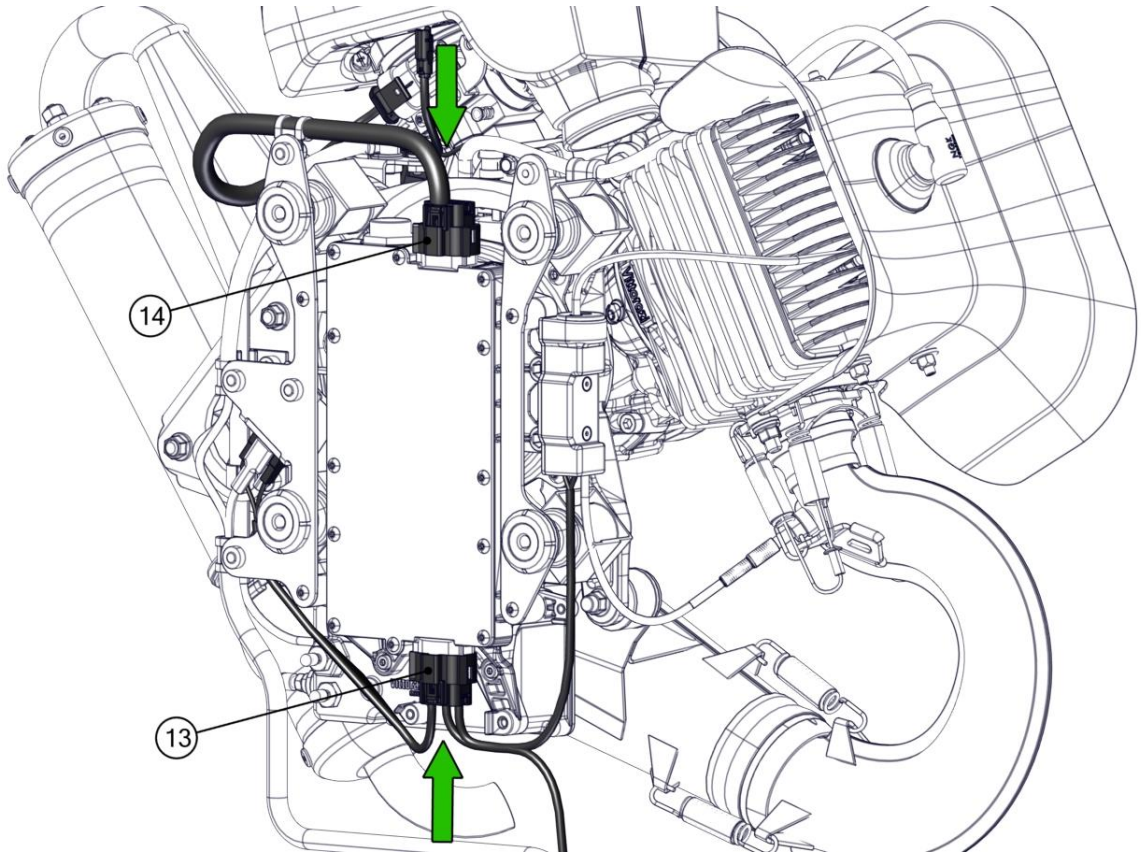




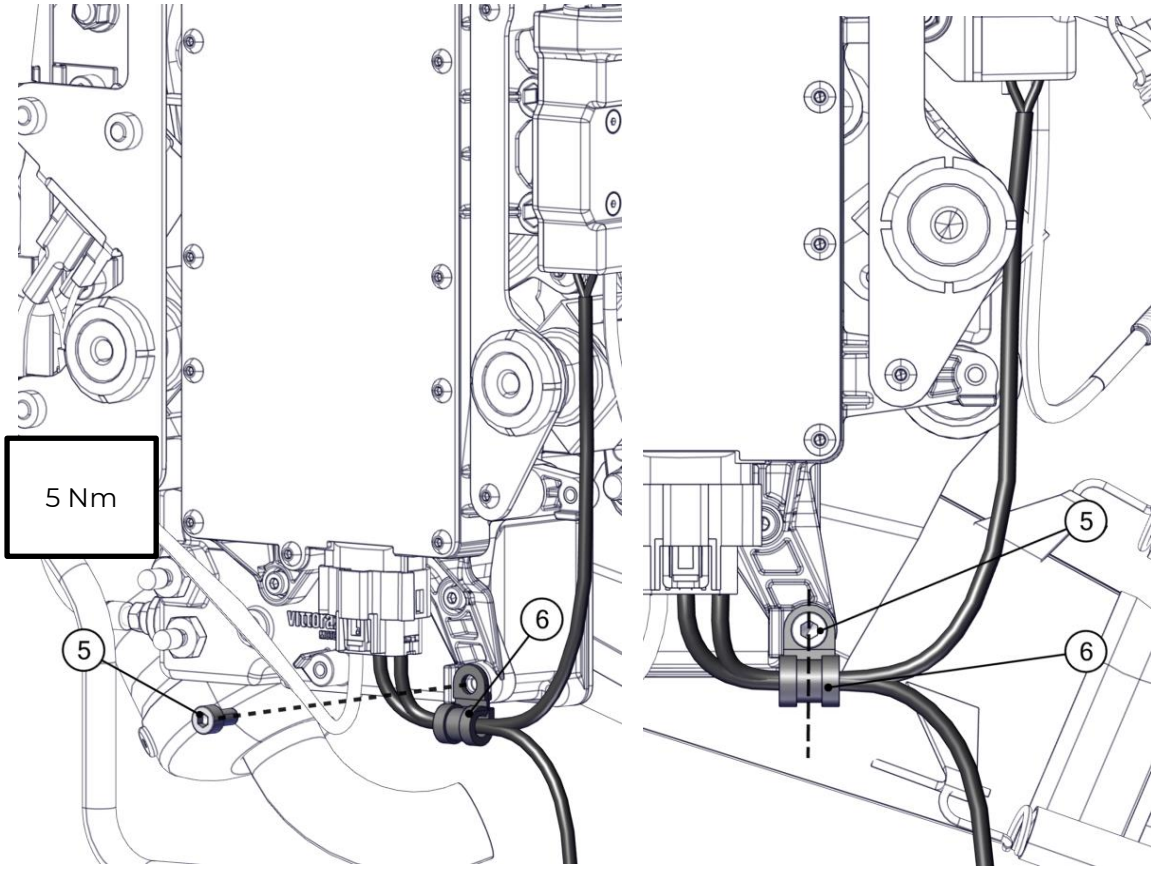
Repeat this operation with the external ring (16) of the injector fuel supply tube (15).



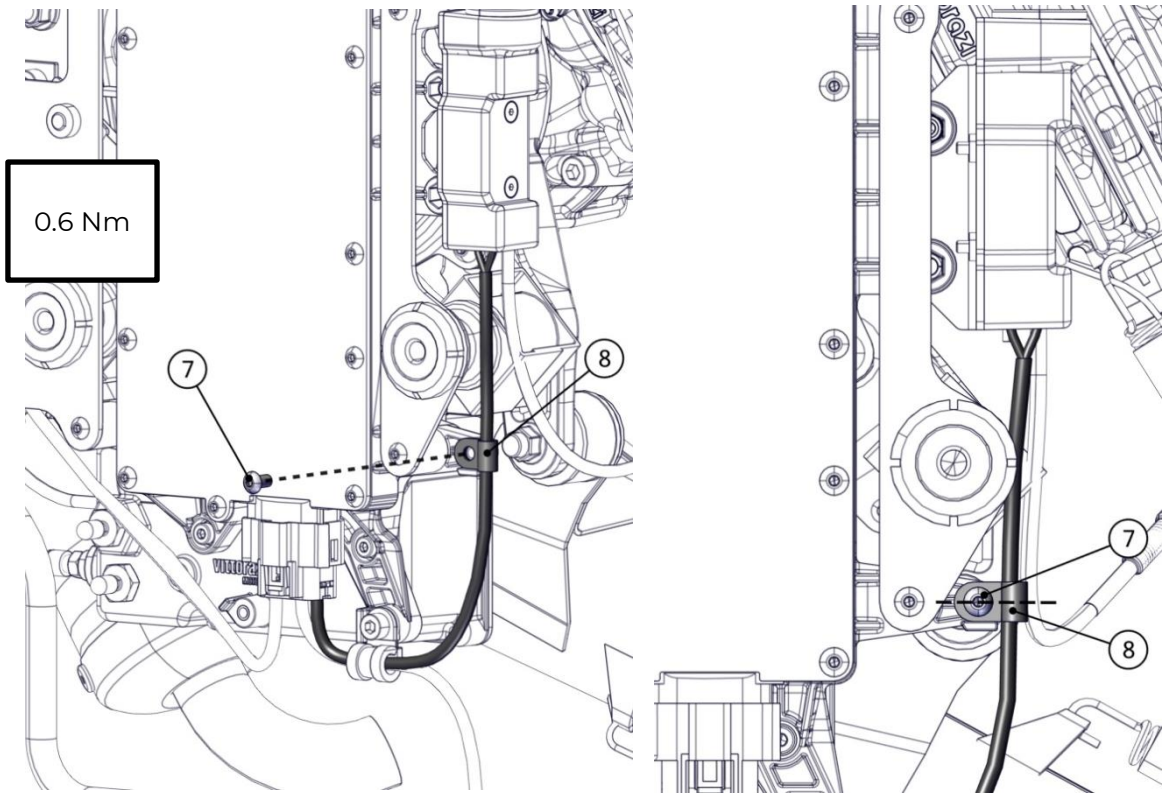
Connect the power wiring connector (13) and the signal wiring connector (14).



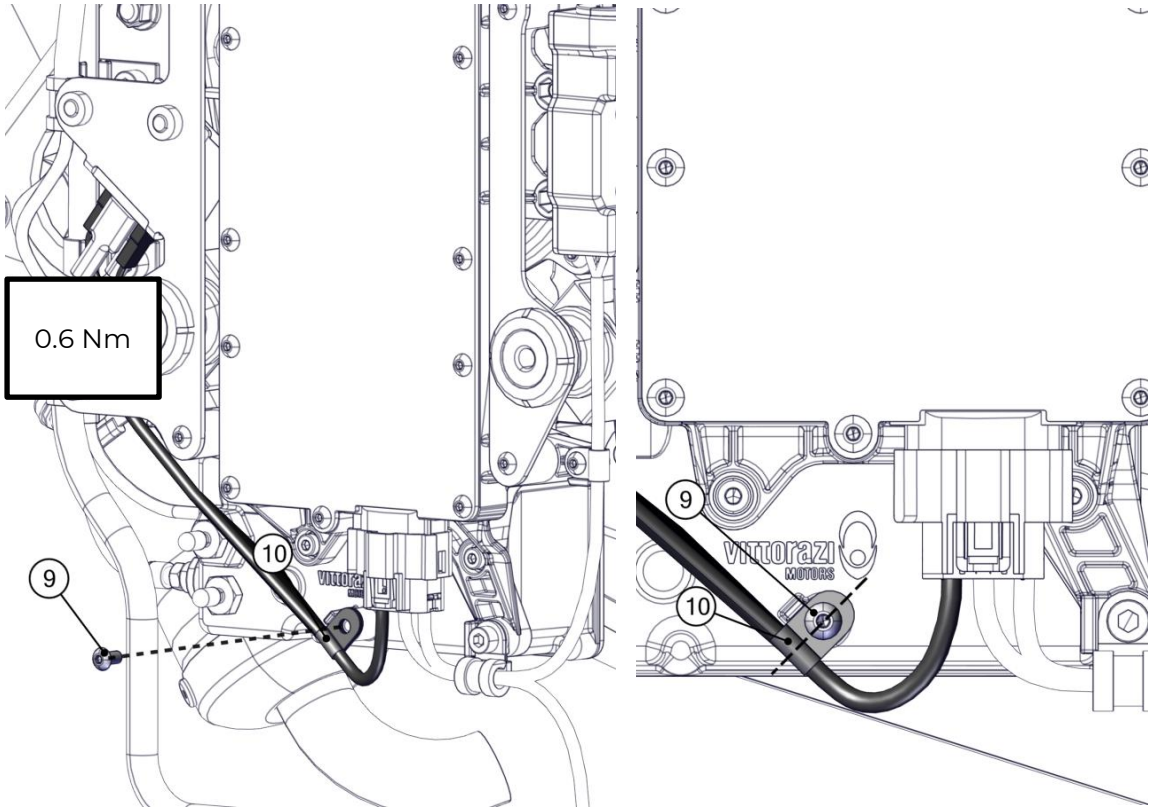
Fix the sensors supply cable and the battery cable on the FBU with the M5 F6 cable clamp (6) and the screw M5x10 (5) in the position shown in the figure and tighten with the torque shown in the figure.



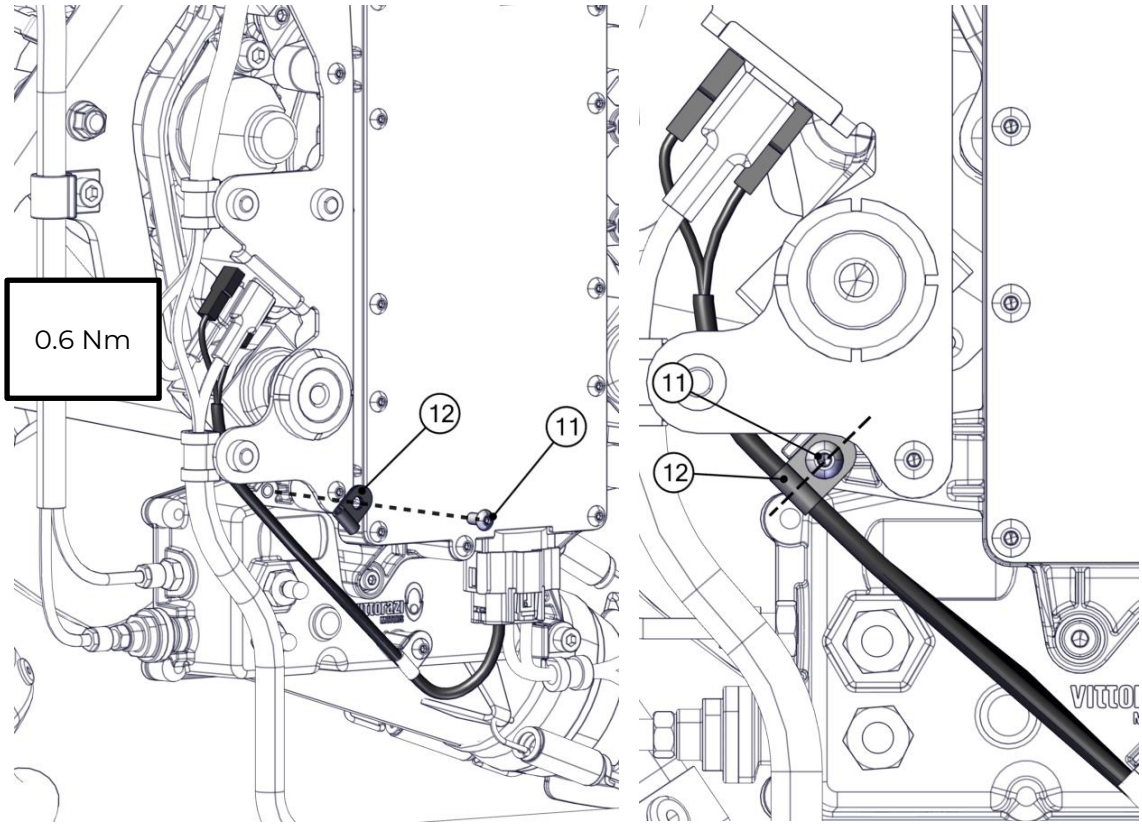
Fix the sensors supply cable on the FBU with the 5 mm plastic cable clamp (8) and the screw M4x6 (7) in the position shown in the figure with threadlocker (recommended Loxeal 55-03/Loctite 243) and tighten with the torque shown in the figure.



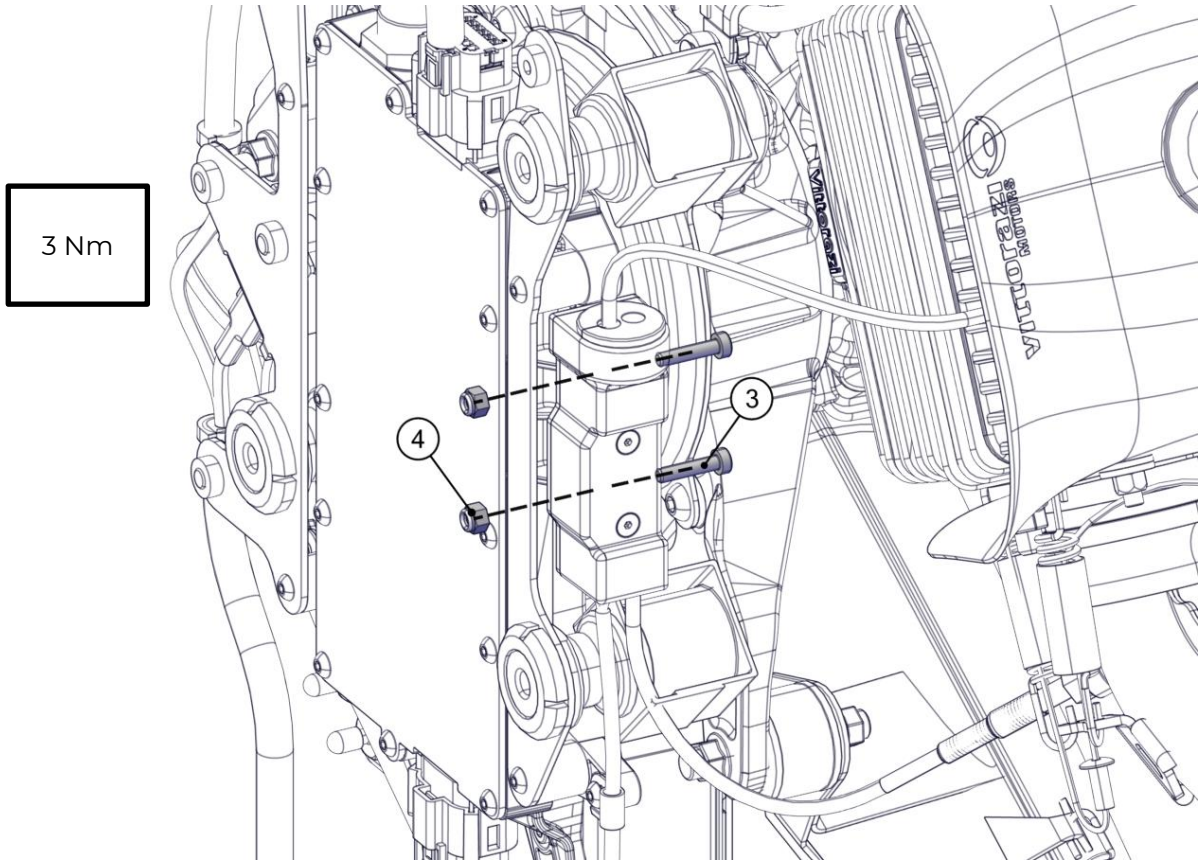
Fix the relay supply cable on the FBU with the 3 mm plastic cable clamp (10) and the screw M4x6 (9) in the position shown in the figure with threadlocker (recommended Loxeal 55-03/Loctite 243) and tighten with the torque shown in the figure.



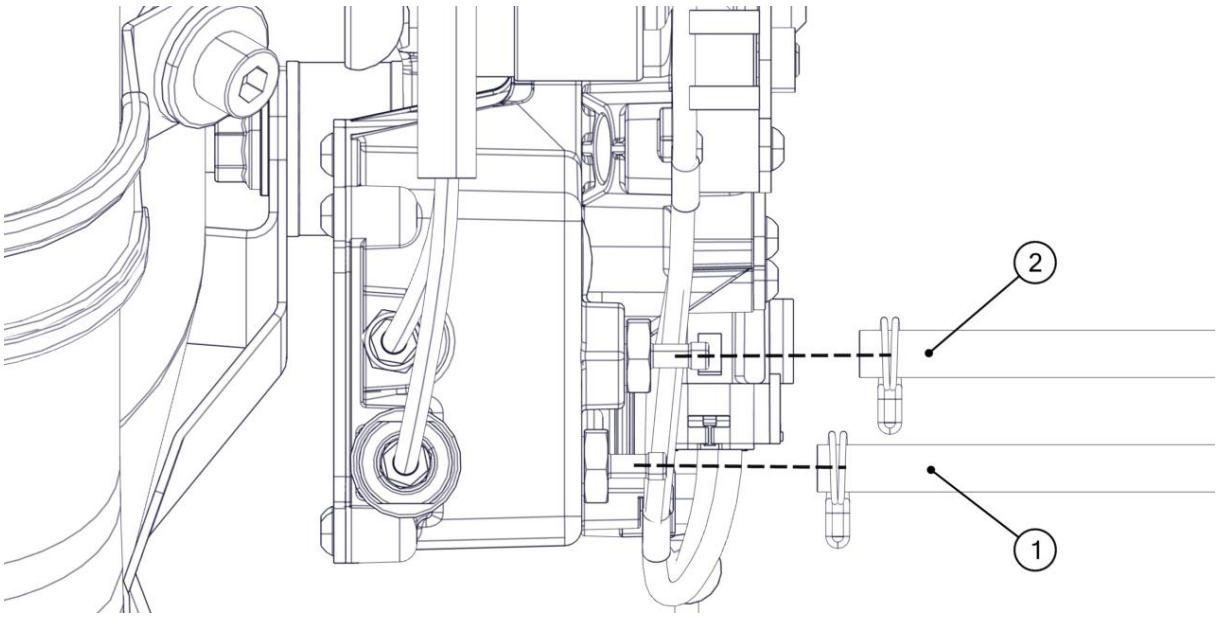
Fix the relay supply cable on the FBU with the 3 mm plastic cable clamp (12) and the screw M4x6 (11) in the position shown in the figure with threadlocker (recommended Loxeal 55-03/Loctite 243) and tighten with the torque shown in the figure.



Insert the 2 screws M4x16 (3) with the 2 self-locking nuts M4 (4) and tighten with the torque shown in the figure.



Insert the supply and return tank pipes (1, 2).



Perform an injector test min and an injector test max and adjust the pump value min and pump value max according to the results (See chapter 3.4.1 Fuel Injector test).

3.6 Wirings

Components to replace	

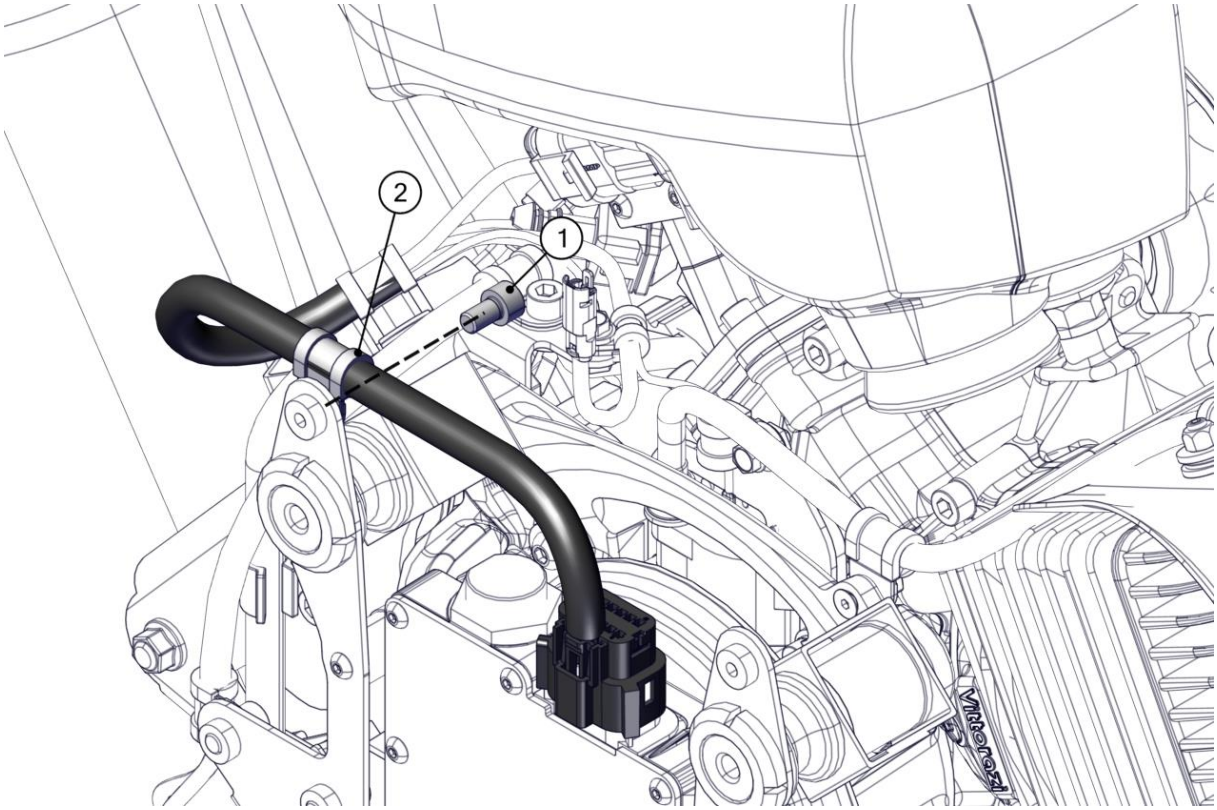
	Time limit
RJ-45 cable (MI430)	100 h
Signal wiring (MI650)	200 h
Supply wiring (MI651)	200 h
Starter wiring (MI652)	200 h
Cable clamp (MI309) *	200 h
Loxeal 55-03/Loctite 243 *	

Special tools	Not required.
Values	Screw M6x10: 10 Nm. Screw M5x10: 5 Nm. Nut M6: 10 Nm. Screw M4x12: 4 Nm. Screws M3x25: 0.4 nm. Screw M4x6: 0.6 Nm.

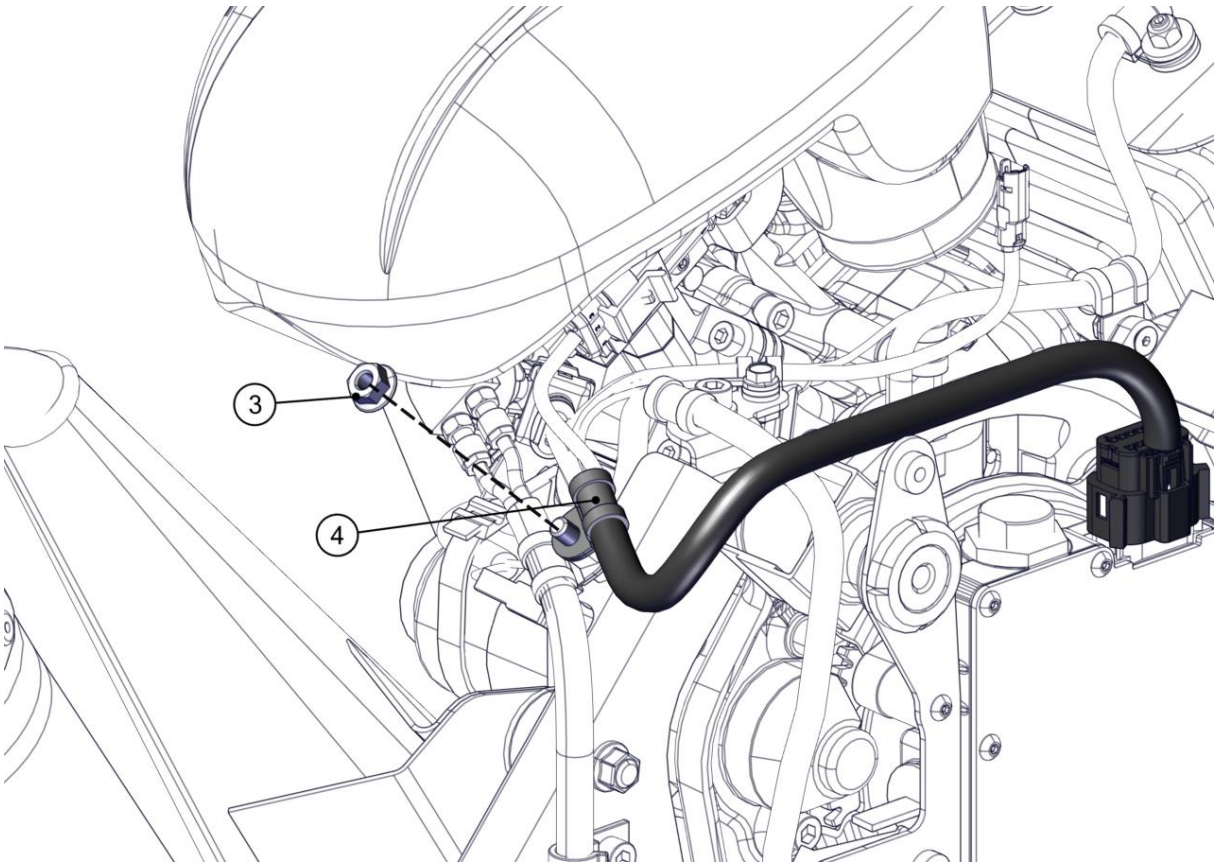
*Always replace it when disassembled.

3.6.1 ECU Signal wiring disassembly

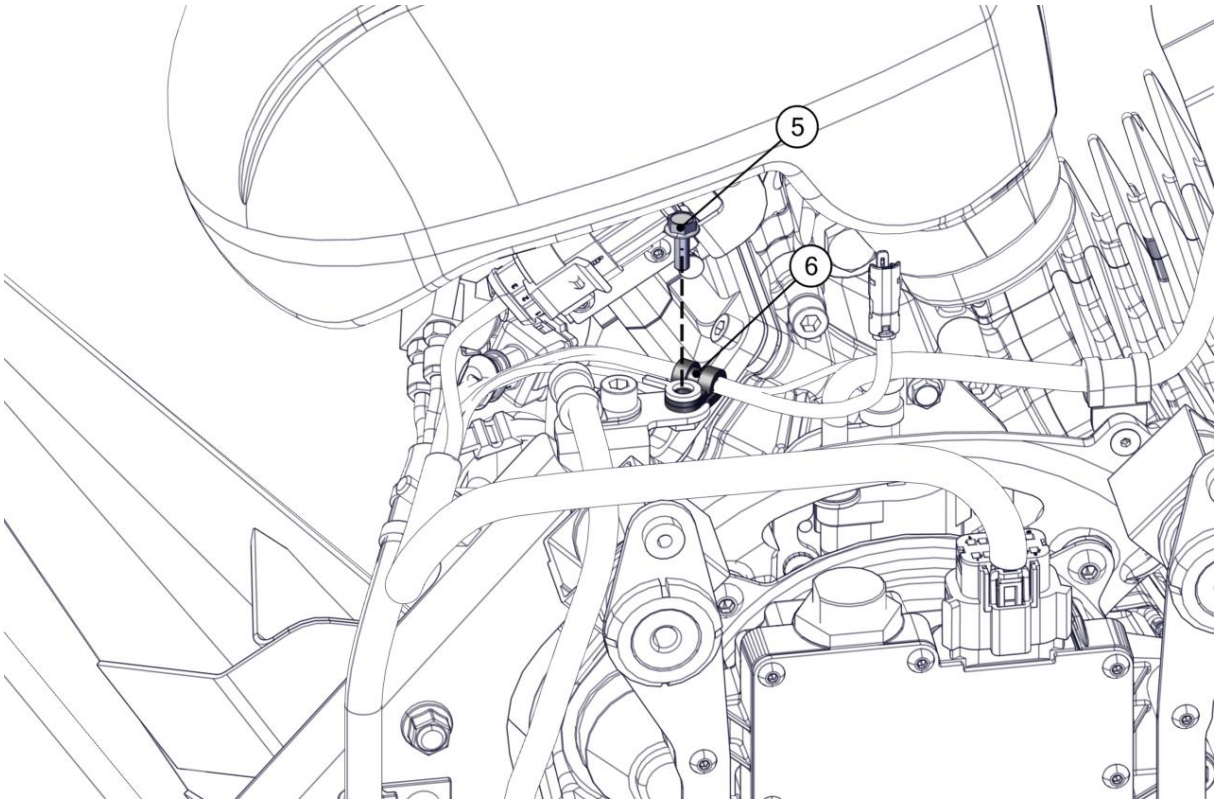
Remove the screw M6x10 (1) and the M6 F8 cable clamp (2).



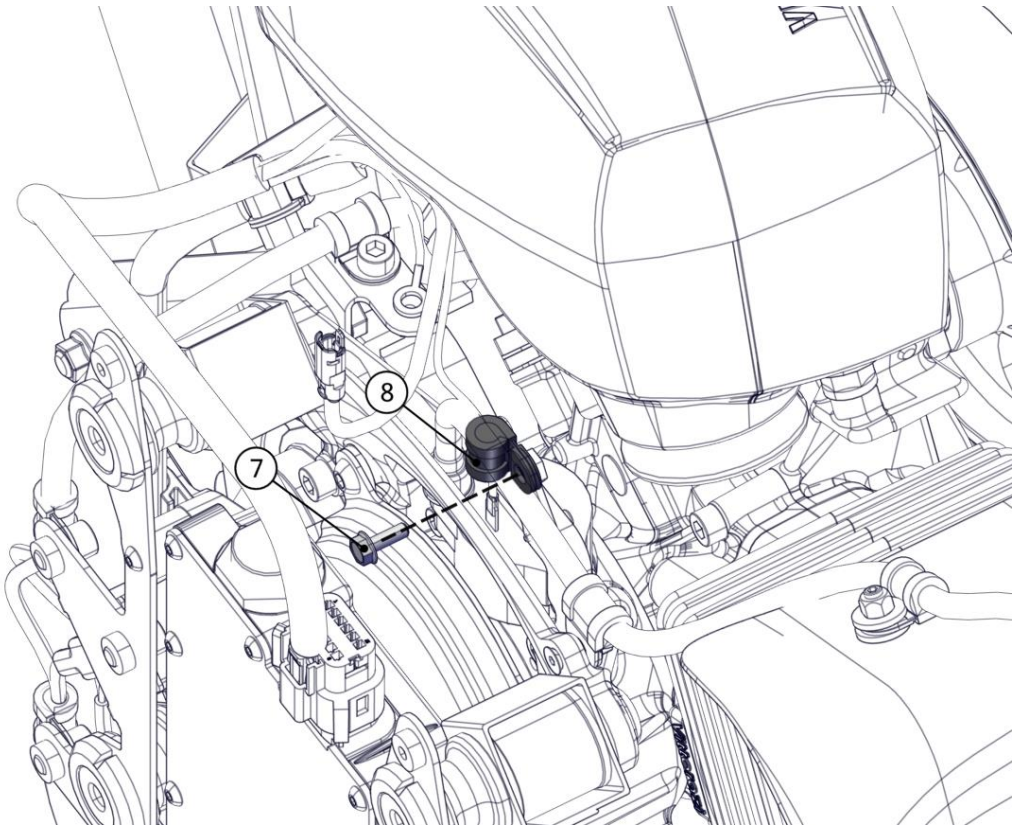
Remove the nut M6 (3) and the M6 F8 cable clamp (4).



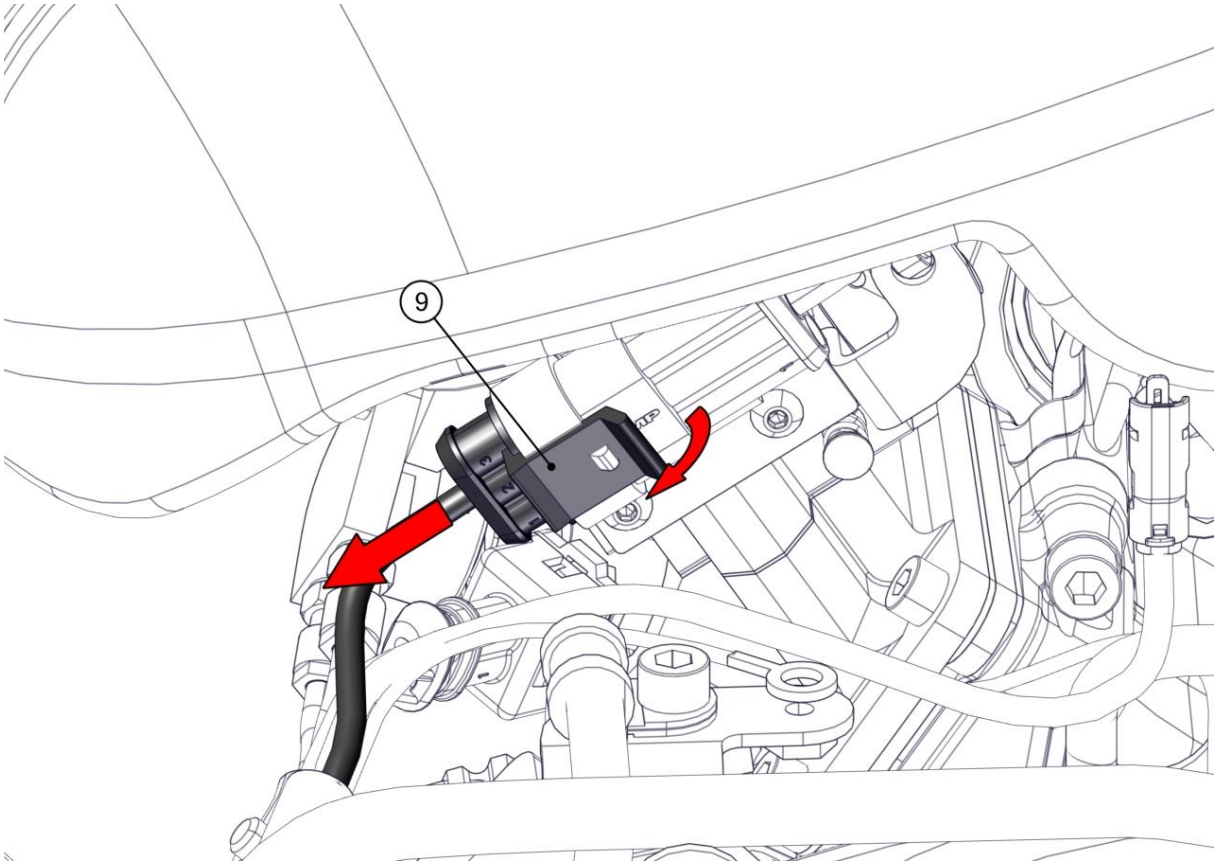
Remove the screw M4x12 (5) and the M5 F5 cable clamp (6).



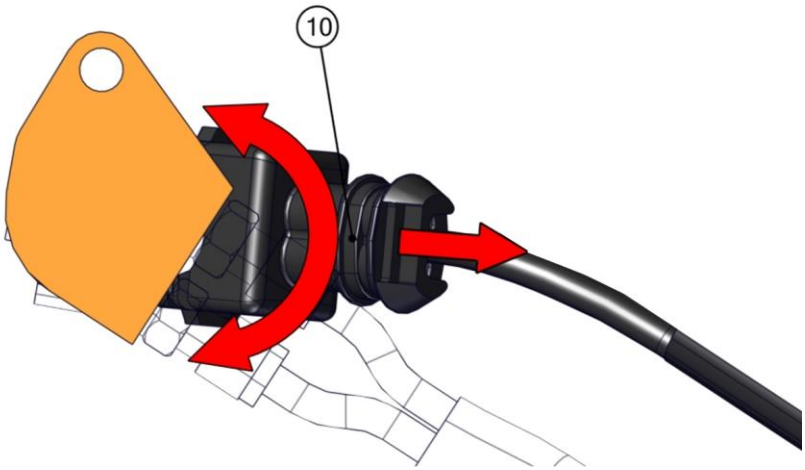
Remove the screw M4x12 (7) and the M5 F6 cable clamp (8).



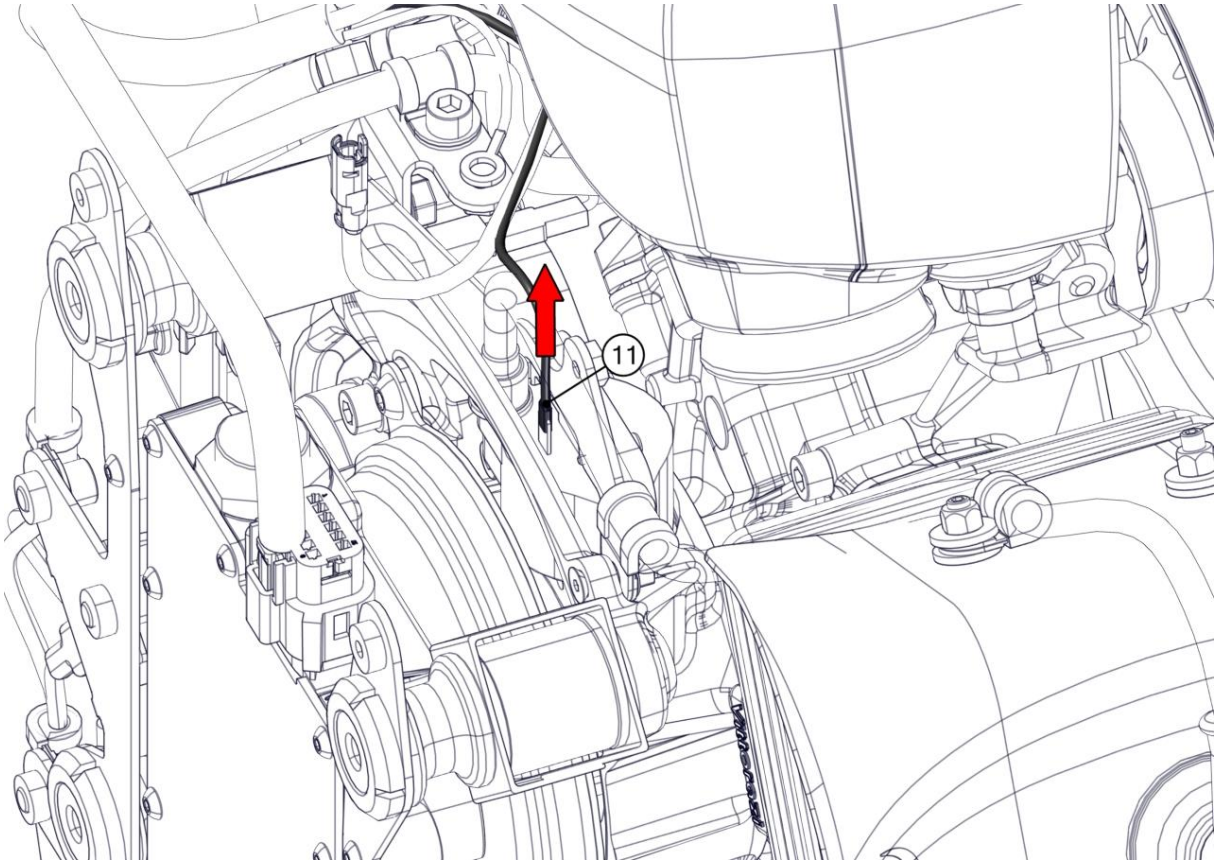
Remove the Air rotary valve connector (9) by lifting the lever while pulling.



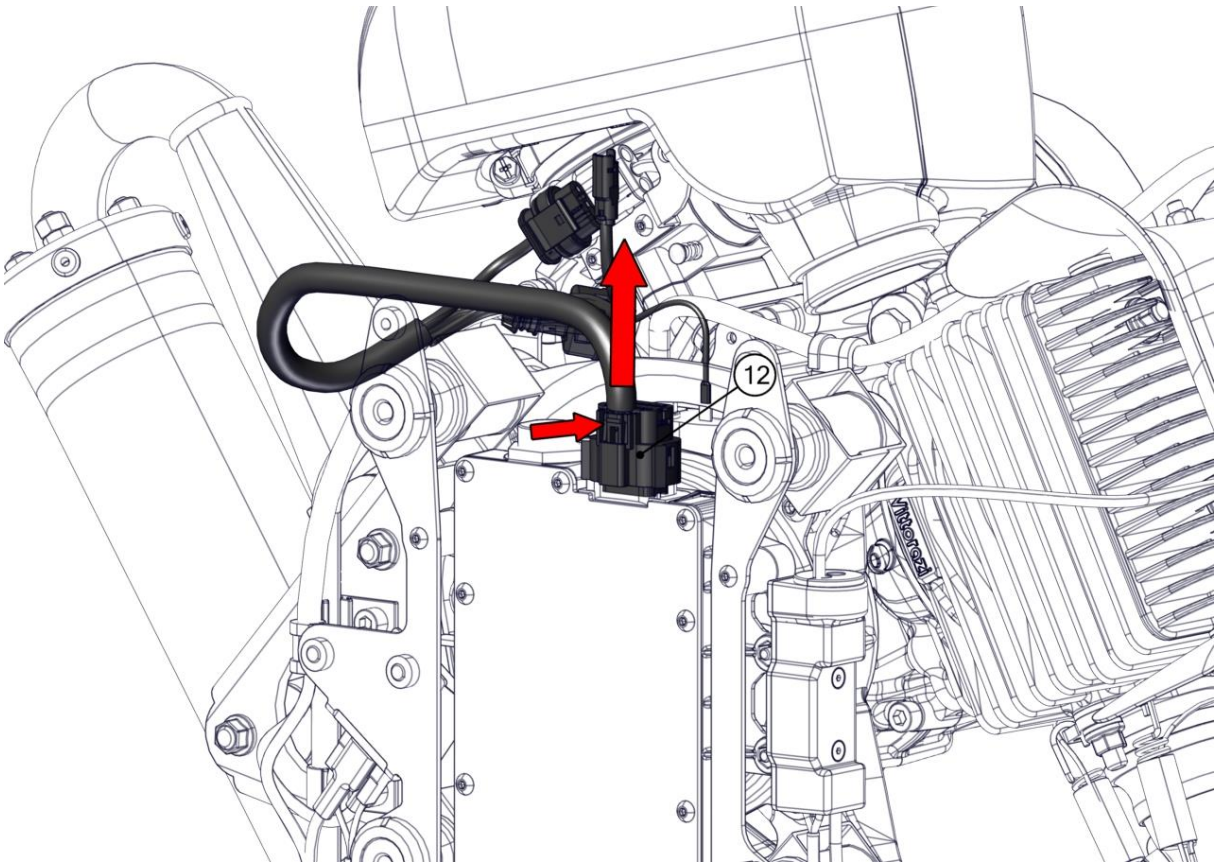
Extract the fuel injector (see chapter 3.4.2 fuel injector disassembly) and remove the fuel injector connector (10) by carefully turning it left and right while pulling.



Remove the coil connector (11).

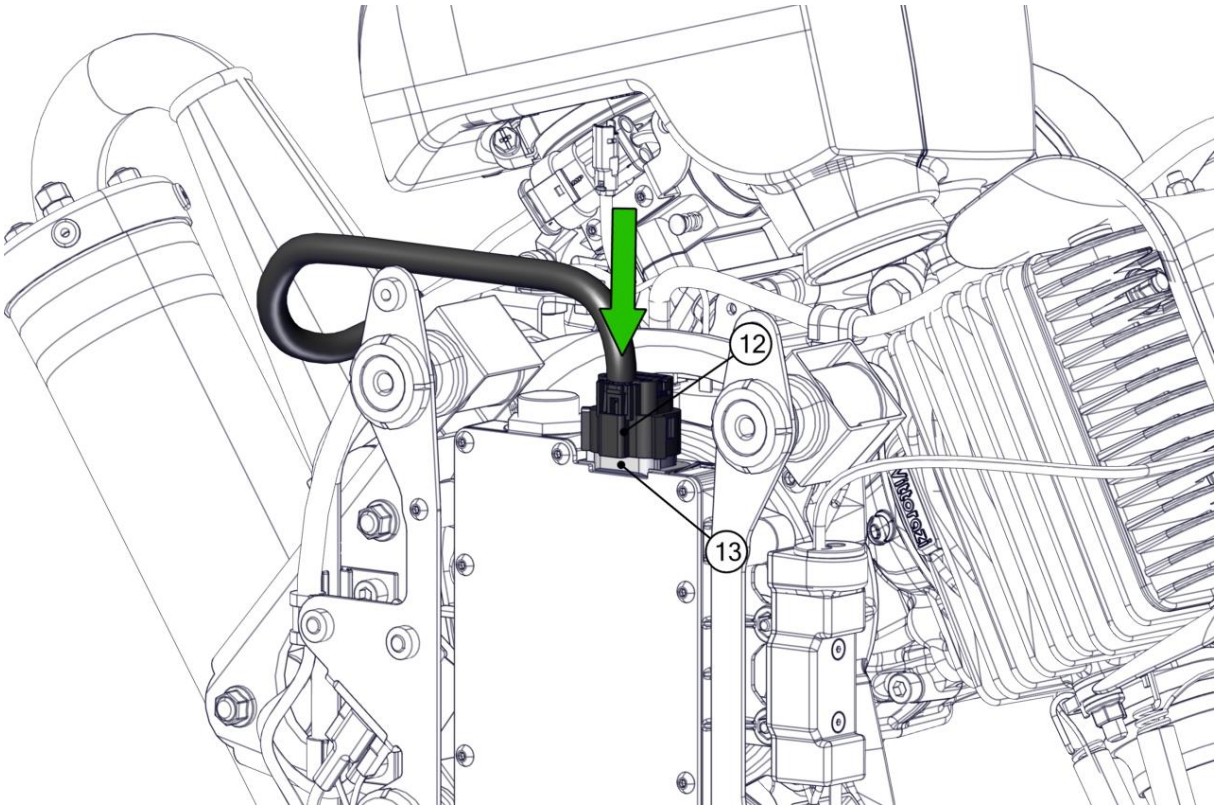


Remove the signal cable connector (12) by pushing the lever while pulling.

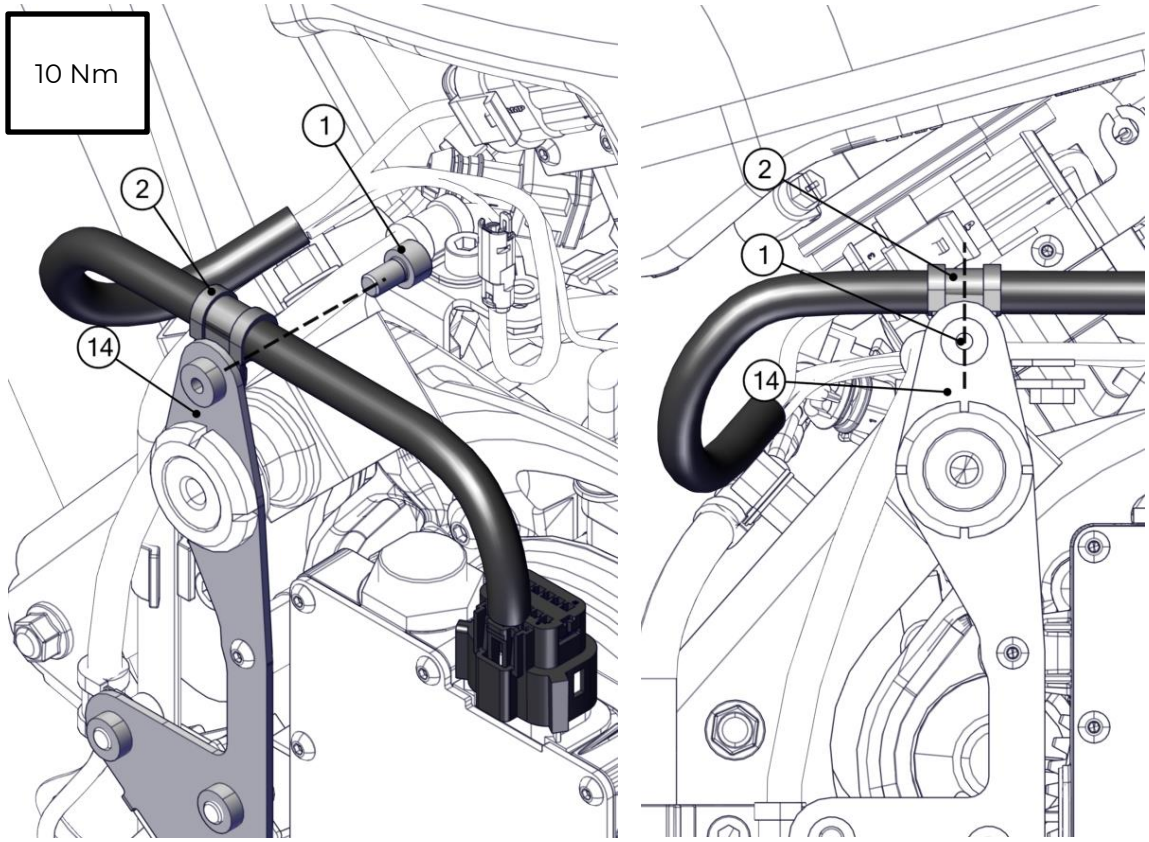


3.6.2 ECU Signal wiring assembly

Insert the signal cable connector (12) to the ECU connector (13).

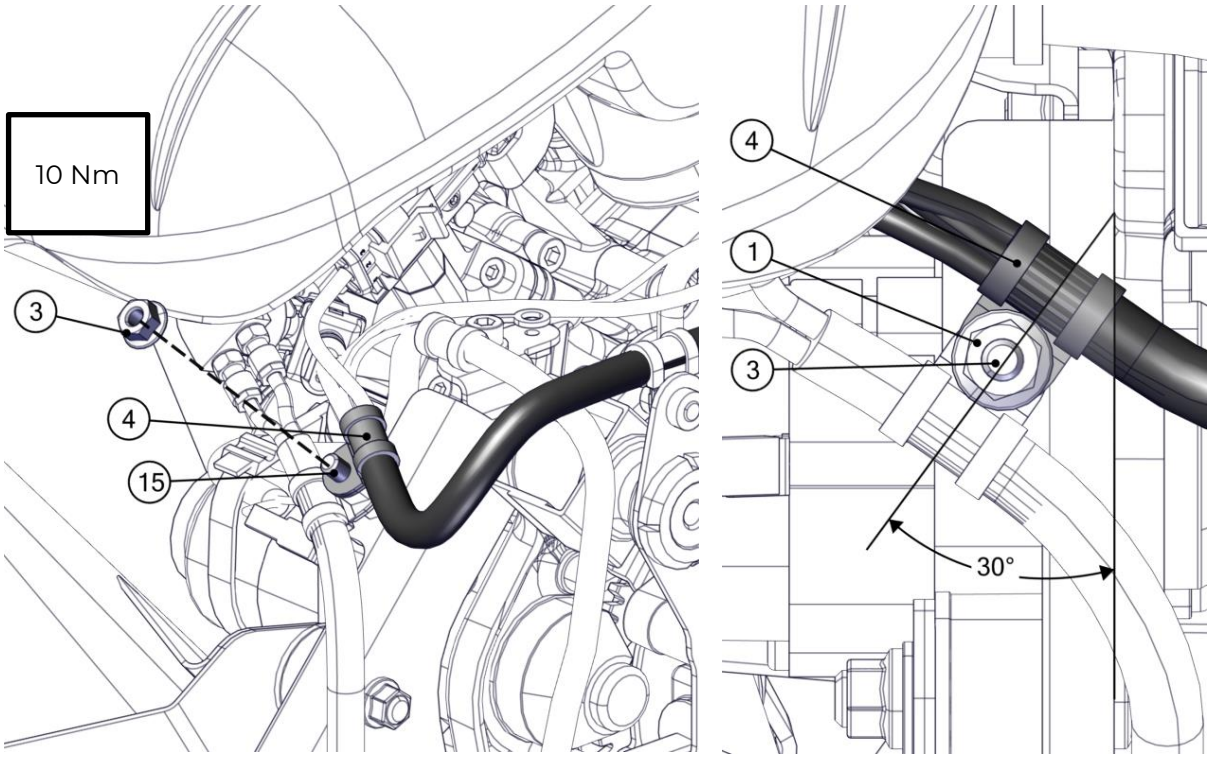


Fix the signal cable with the M6 F8 cable clamp (2) and the screw M6x10 (1) on the steel bracket (14) in the position shown in the figure and tighten with the torque shown in the figure.

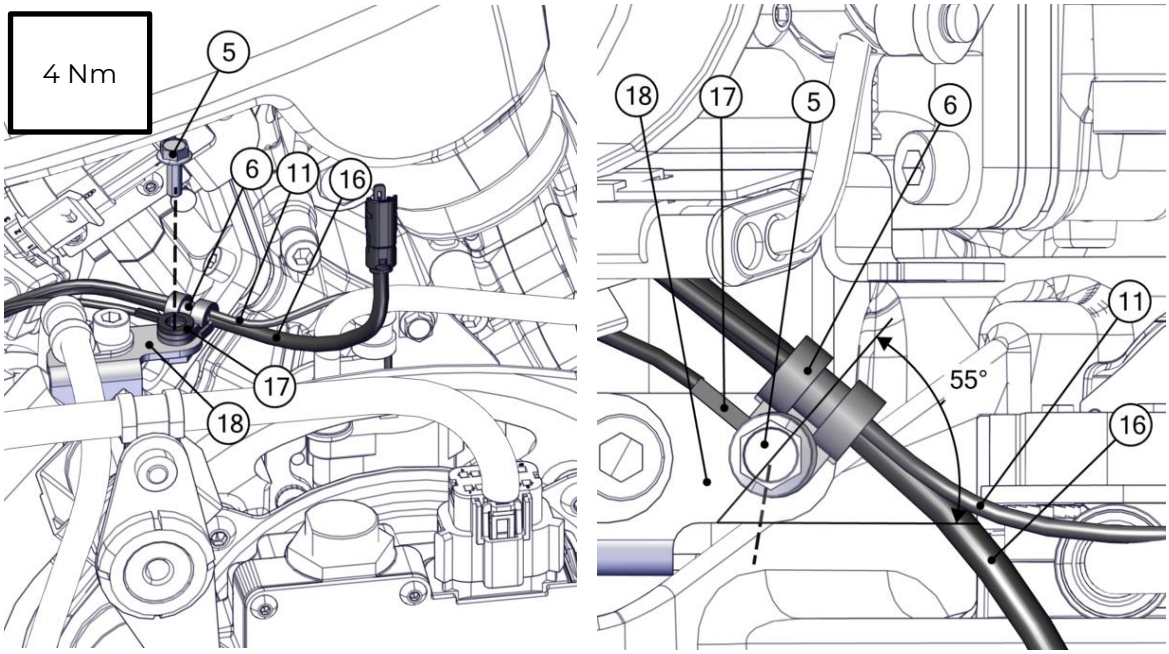


Fix the signal cable with the M6 F8 cable clamp (4) and the nut M6 (3) on the screw M6x30 (15) in the position shown in the figure with threadlocker (recommended Loxeal 55-03/Loctite 243) and tighten with the torque shown in the figure.

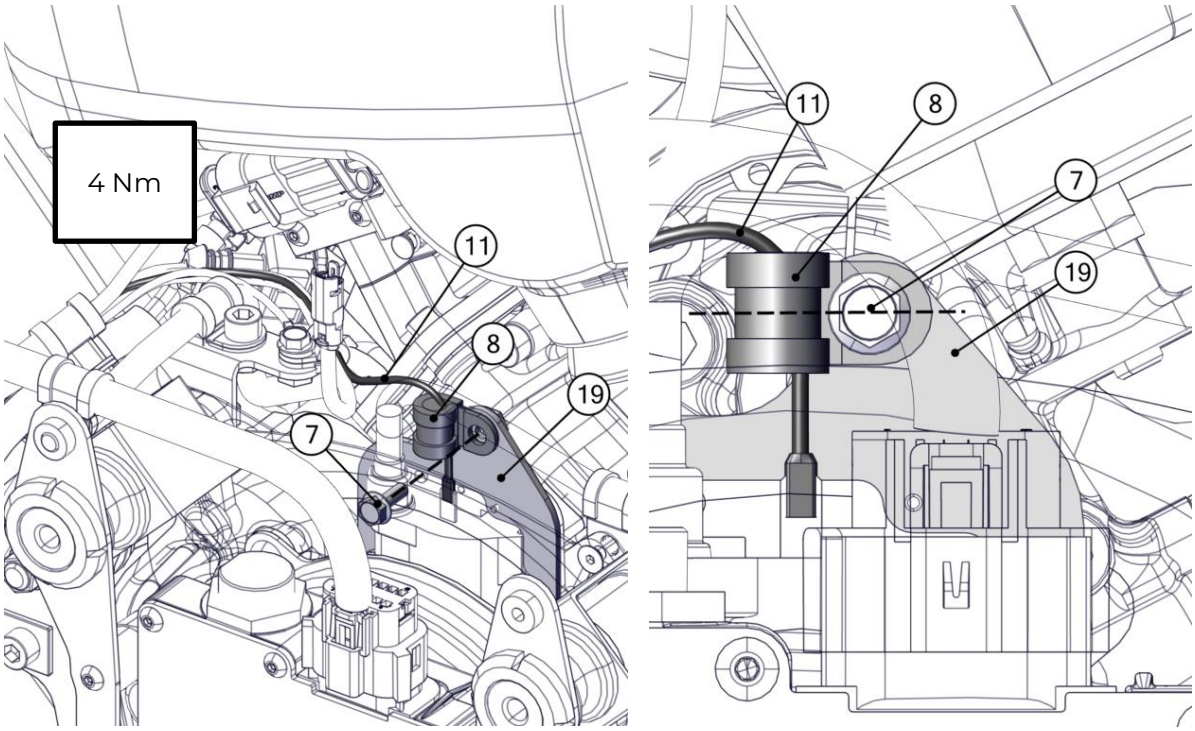
Make sure to block the cable clamp to prevent rotation while tightening.



Fix the start/stop cable (16) and the coil cable (11) with the M5 F5 cable clamp (6) in the position shown in the figure and fix the ground cable (17) with the screw M4x12 (5) on the flange (18) with threadlocker (recommended Loxeal 55-03/Loctite 243) and tighten with the torque shown in the figure.

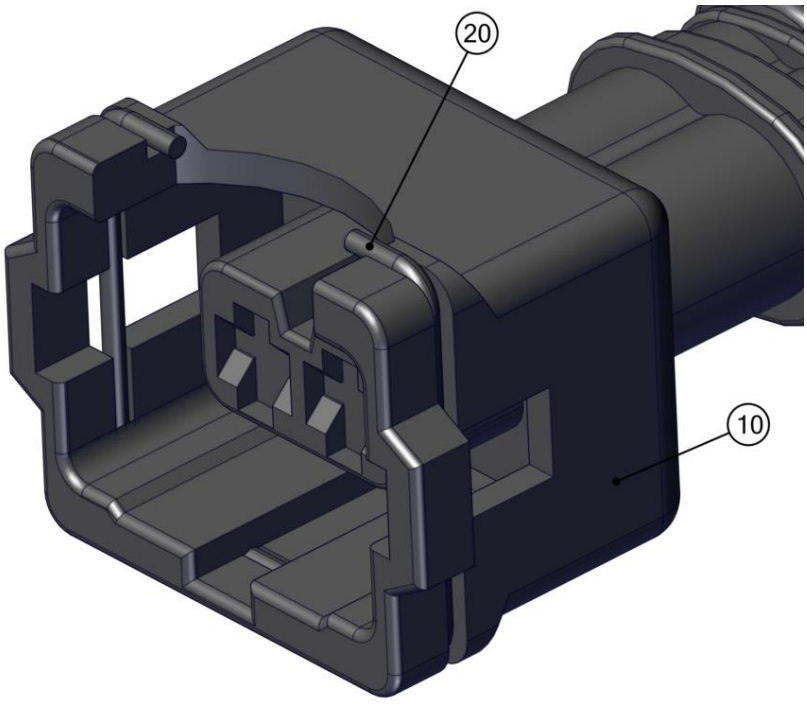


Fix the coil cable (11) with the M5 F6 cable clamp (8) and the screw M4x12 (7) in the position shown in the figure with threadlocker (recommended Loxeal 55-03/Loctite 243) on the coil flange (19) and tighten with the torque shown in the figure.

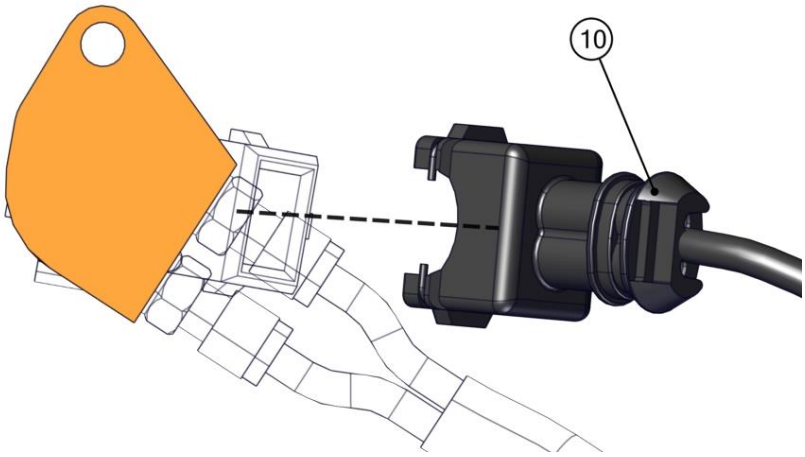


Control the position of the security ring (20) in the connector (10).

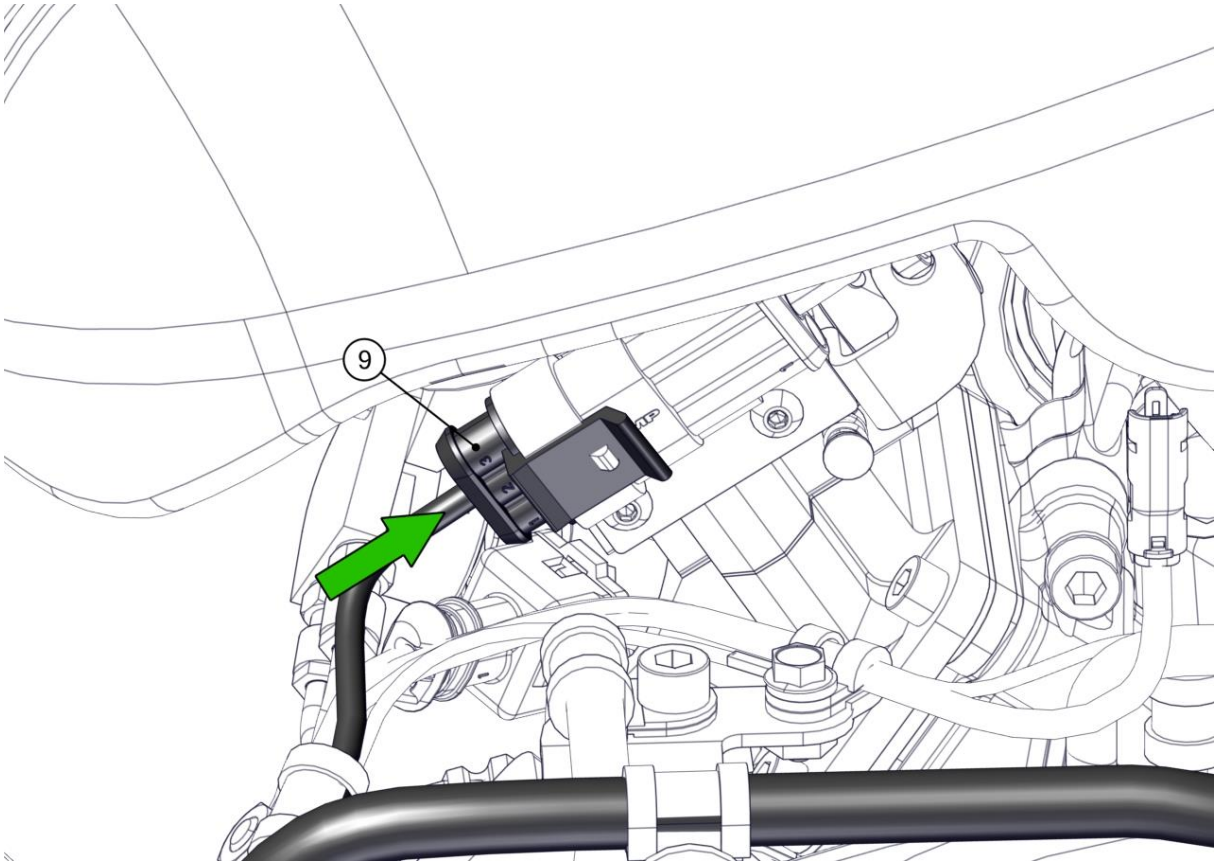
Apply a small amount of contact grease (recommended ELECTROLUBE contact treatment grease SGB - 2GX) on the connector and the injector contacts.



Insert the fuel injector connector (10) and insert the fuel injector on its seat on the air rotary valve (see chapter 3.4.4 Fuel injector assembly).

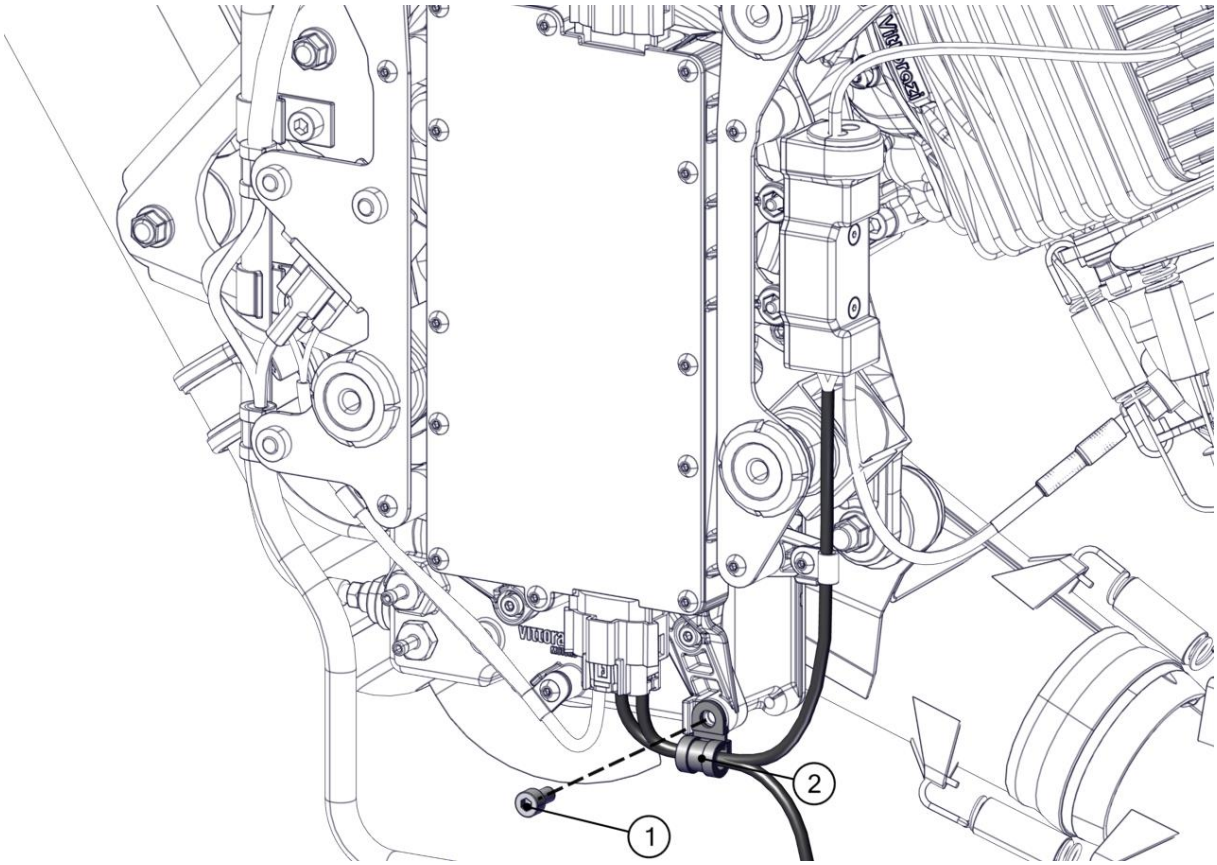


Insert the air rotary valve connector (9).

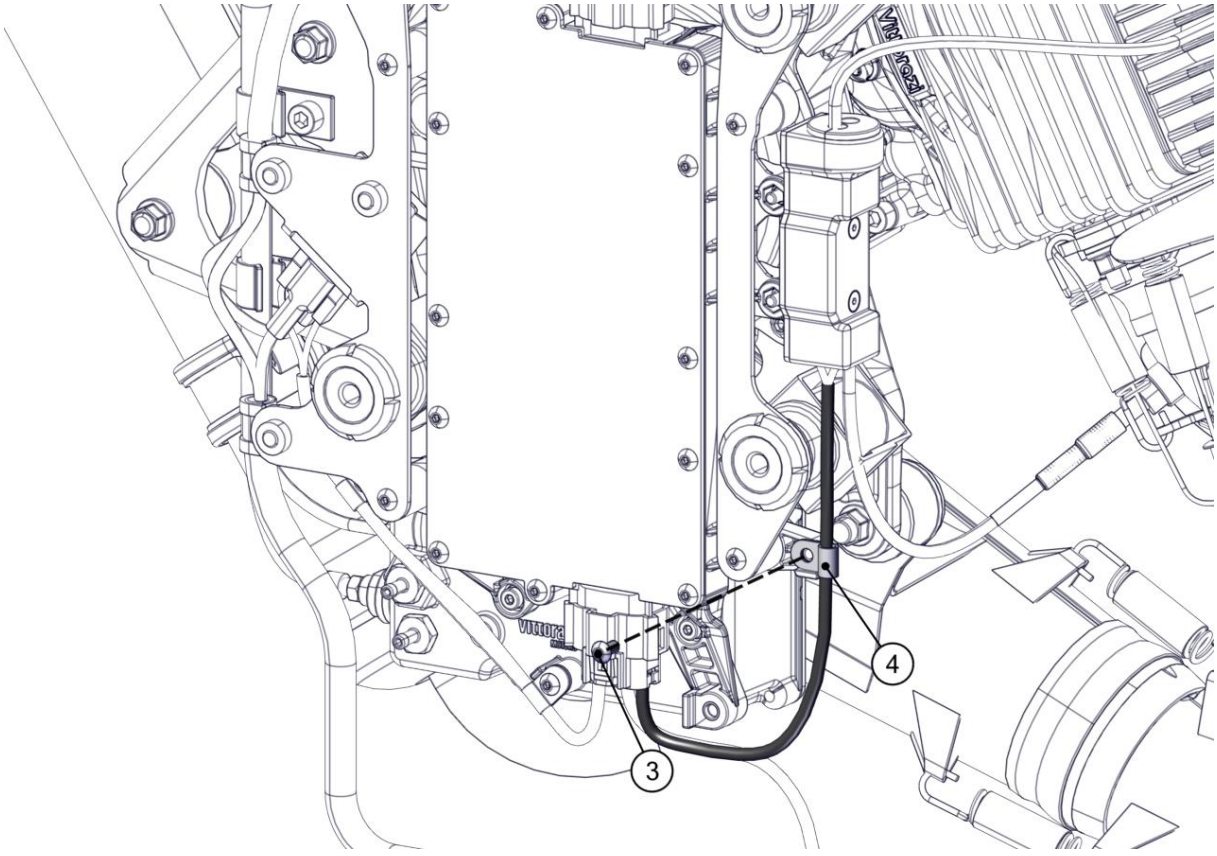


3.6.3 ECU Supply wiring disassembly

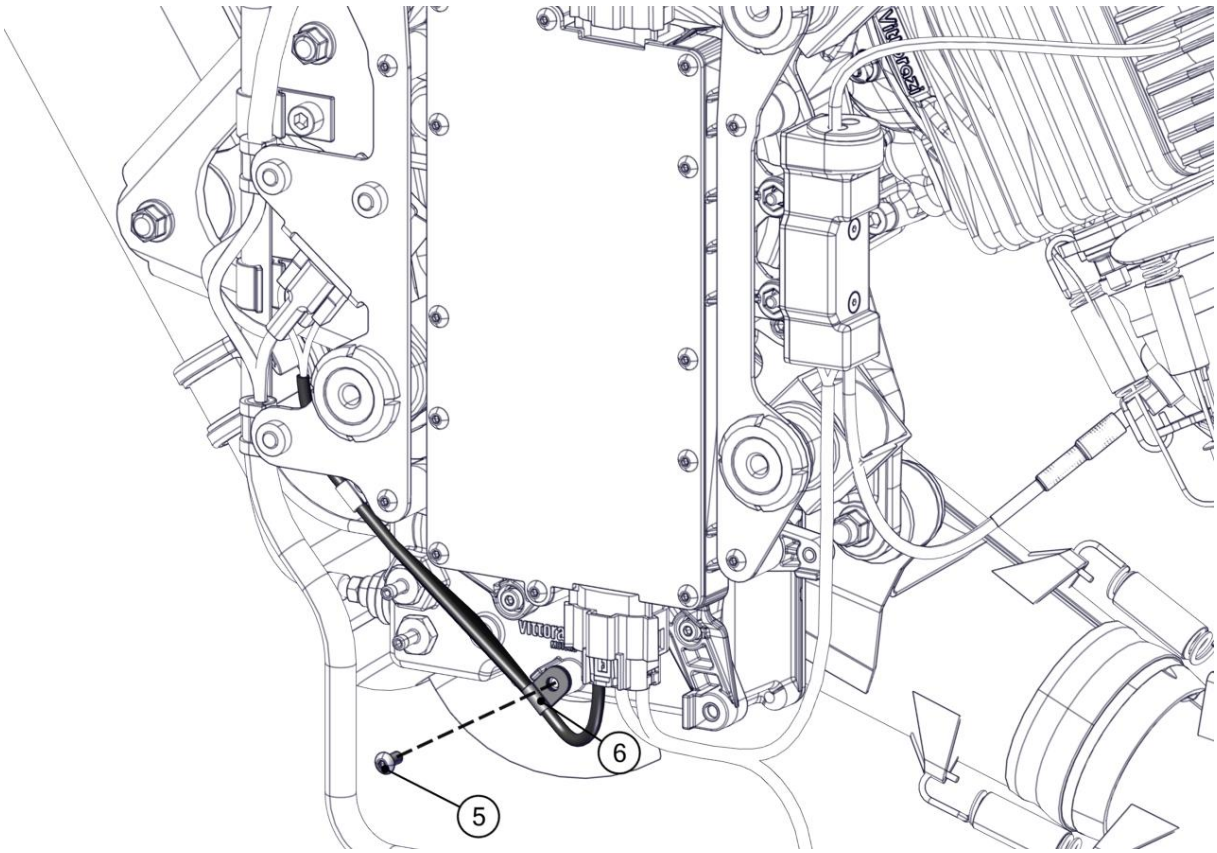
Remove the screw M5x10 (1) and the M5 F6 cable clamp (2).



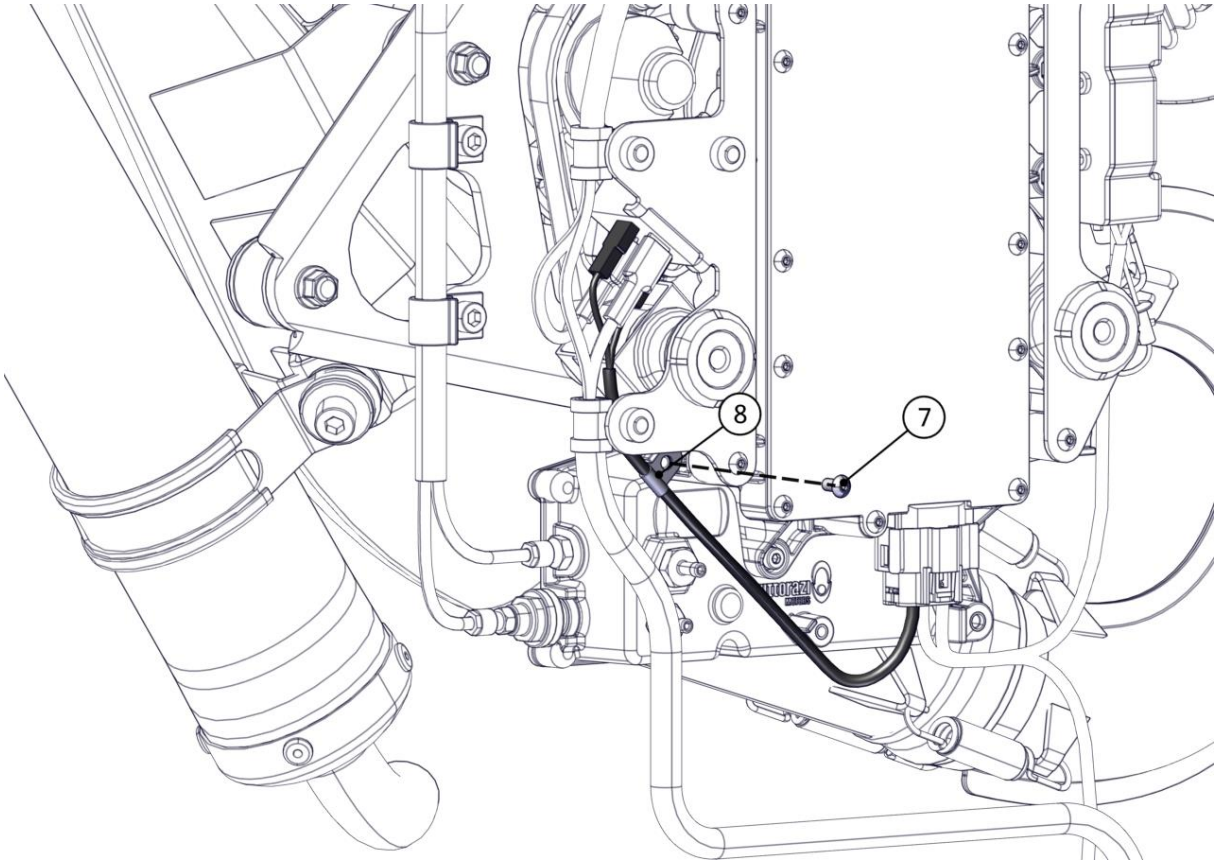
Remove the screw M4x6 (3) and the 5 mm plastic cable clamp (4).



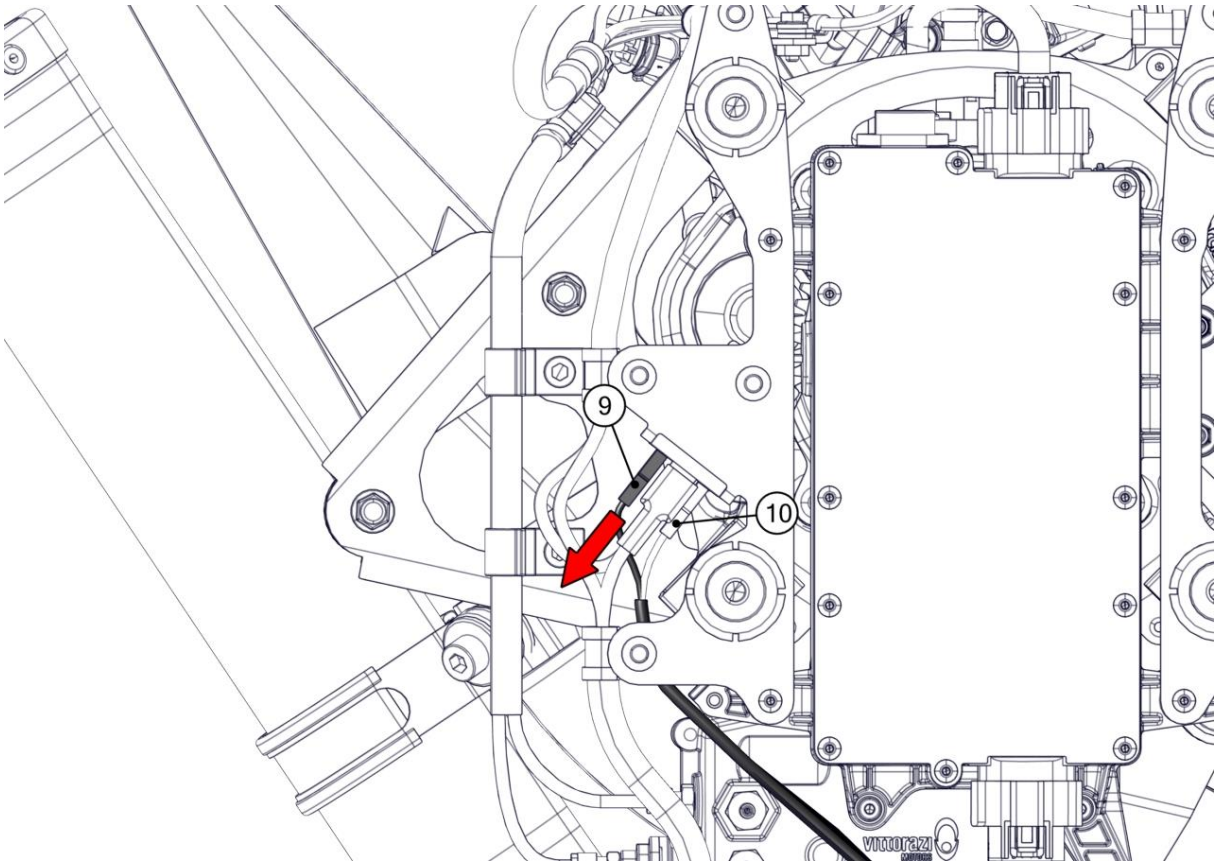
Remove the screw M4x6 (5) and the 3 mm plastic cable clamp (6).



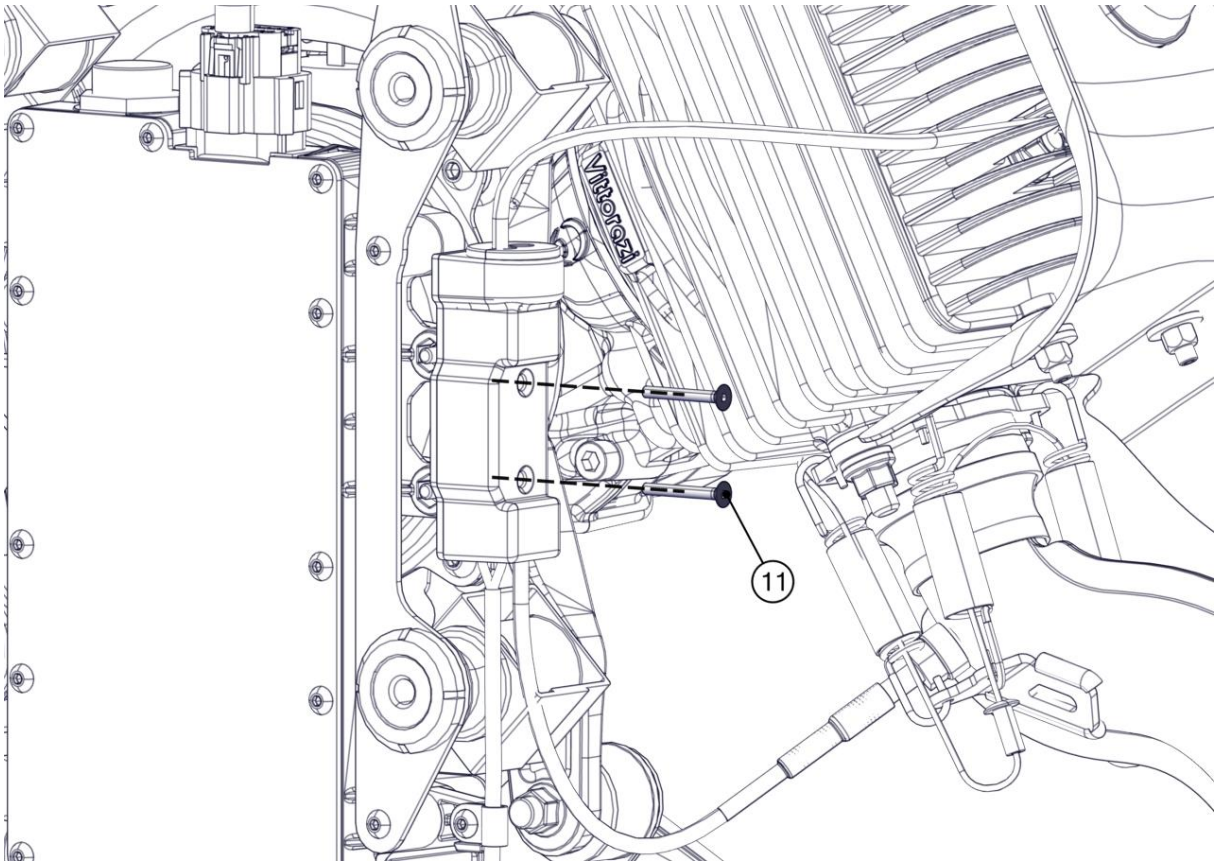
Remove the screw M4x6 (7) and the 3 mm plastic cable clamp (8).



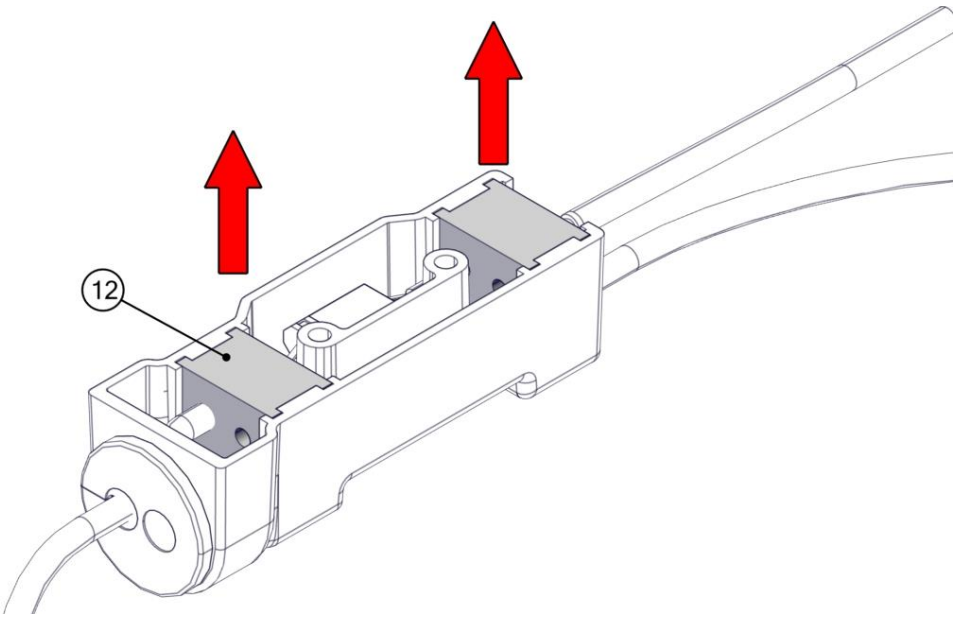
Remove the outer relay supply connector (9) by pressing the internal lever with a screwdriver while pulling.

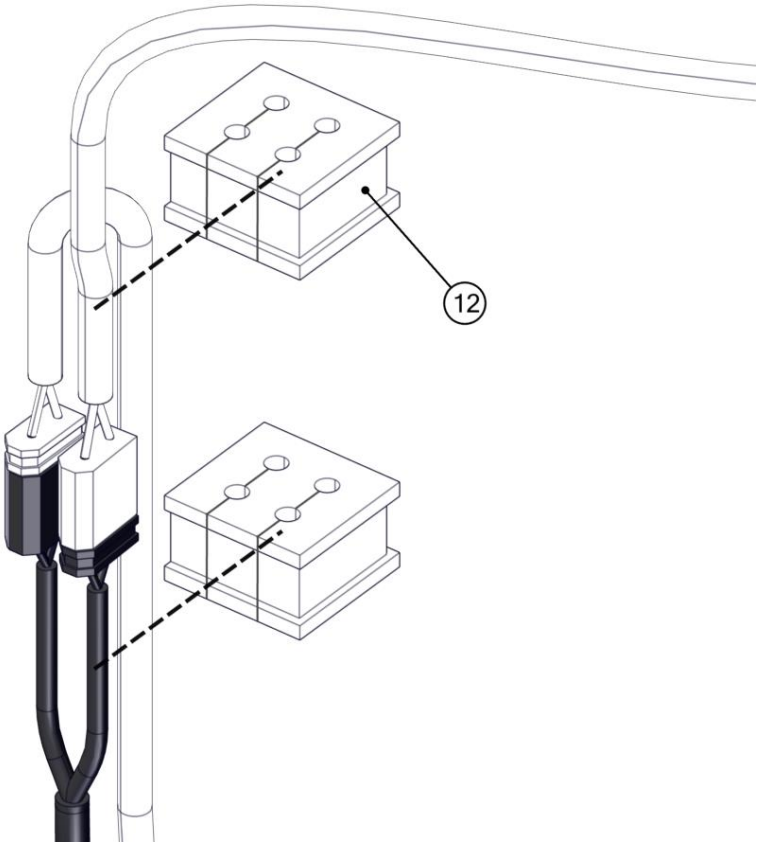


Repeat this operation with the inner relay supply connector (10).
Remove the 2 screws M3x25 (11) from the sensors support.

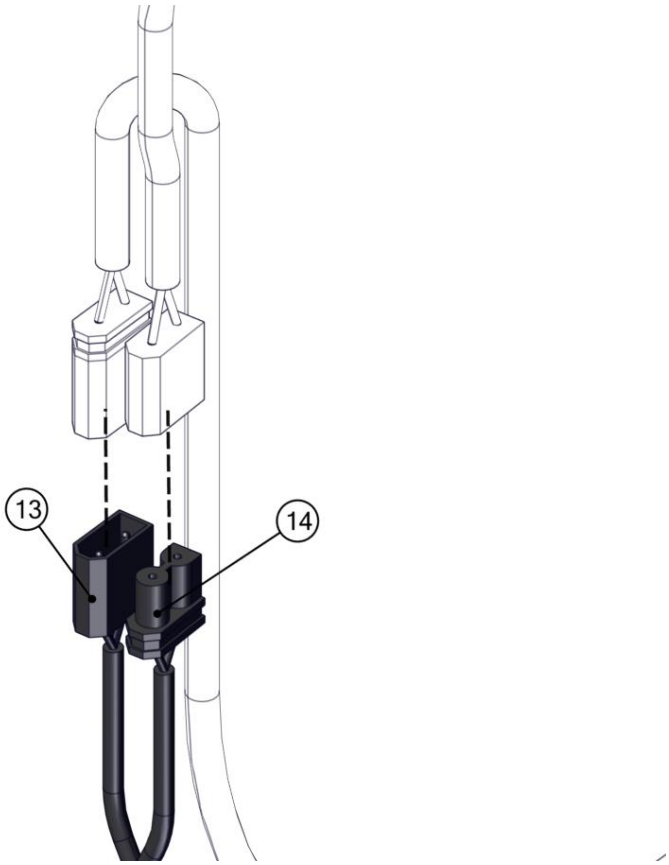


Extract the 2 rubber blocks (12).

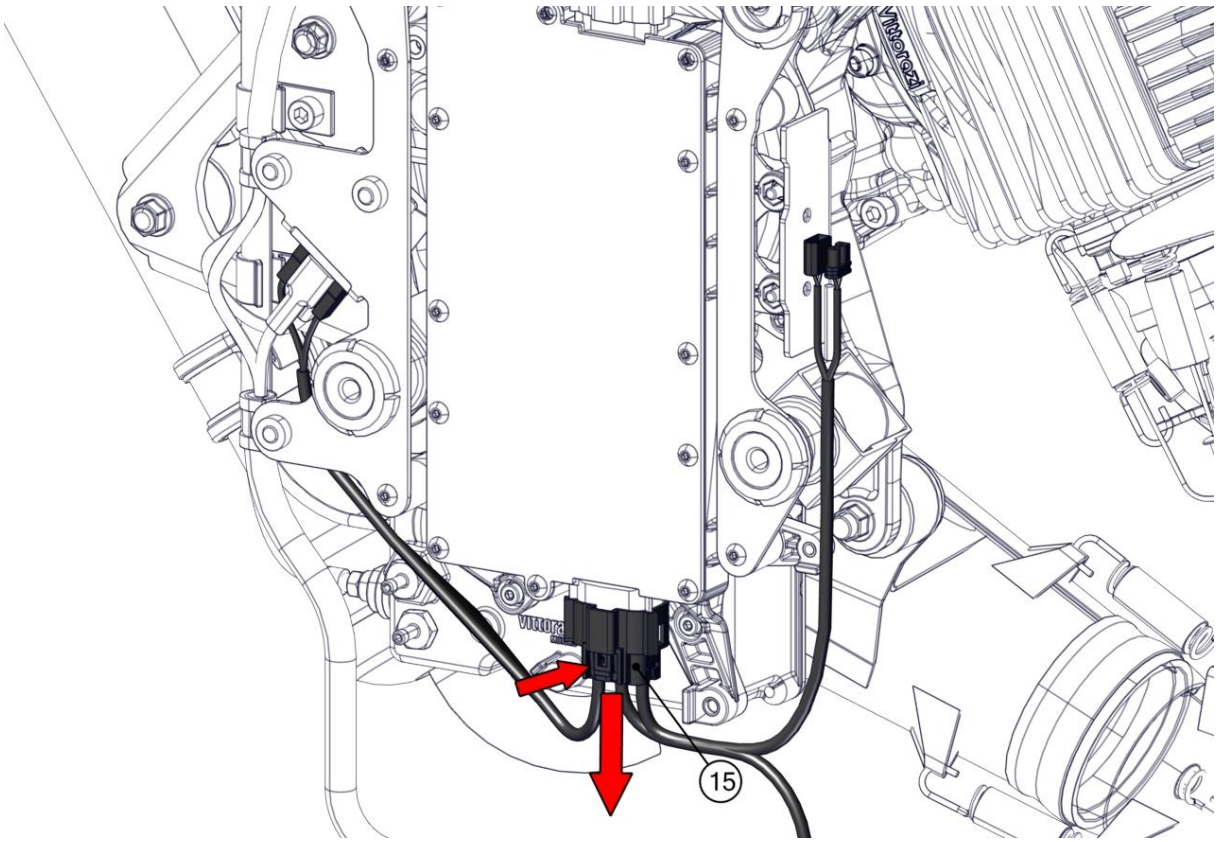




Disconnect the EGT (13) and the CHT (14) sensor connector.

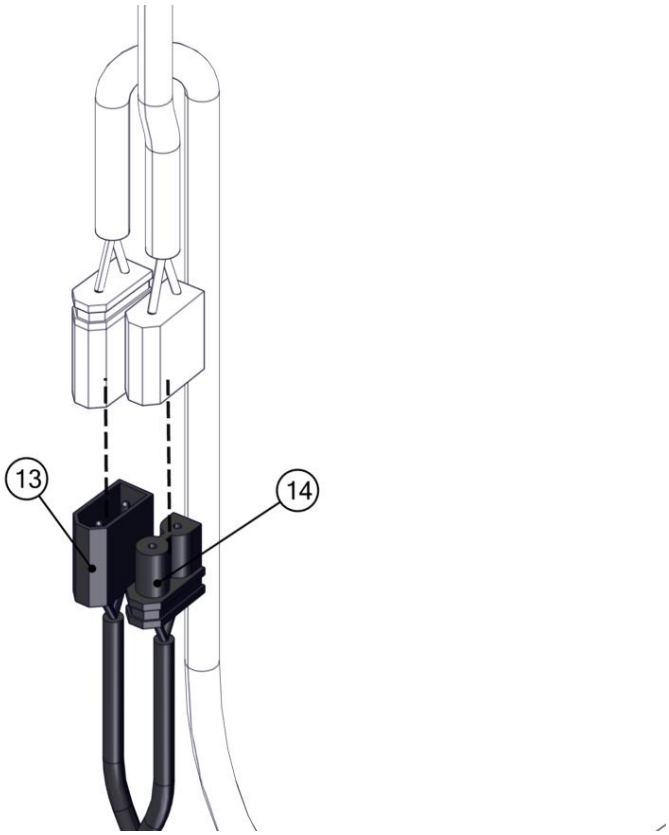


Extract the ECU supply connector (15).

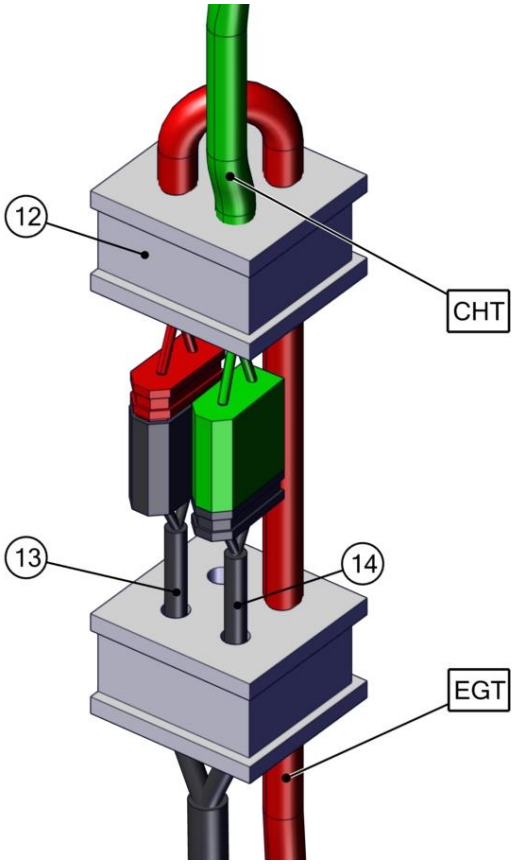


3.6.4 ECU Supply wiring assembly

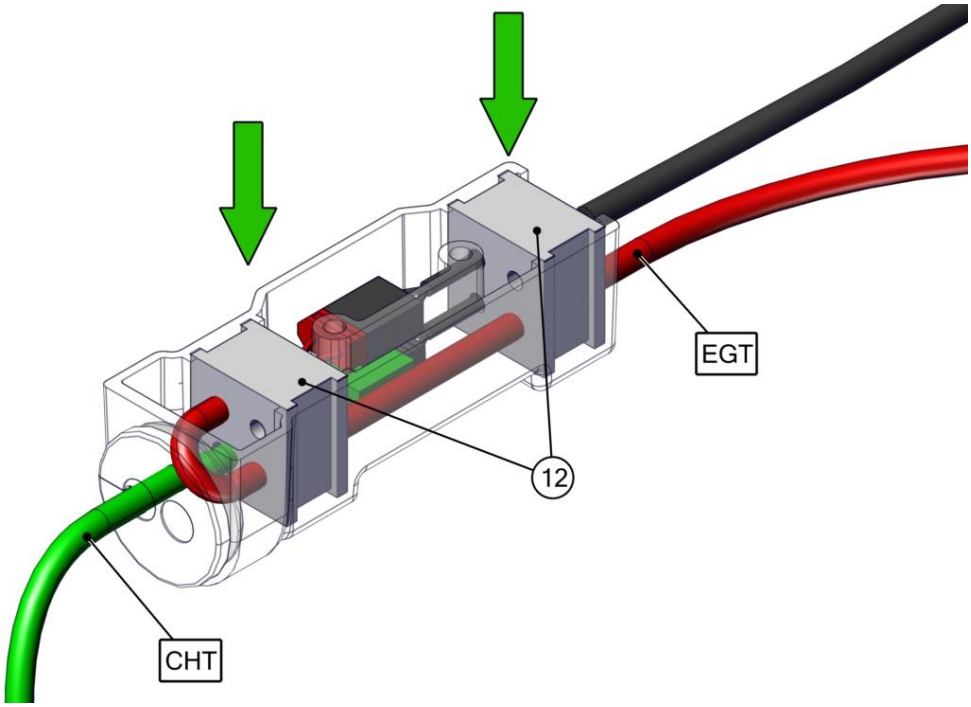
Connect the EGT (13) and the CHT (14) sensor connector.



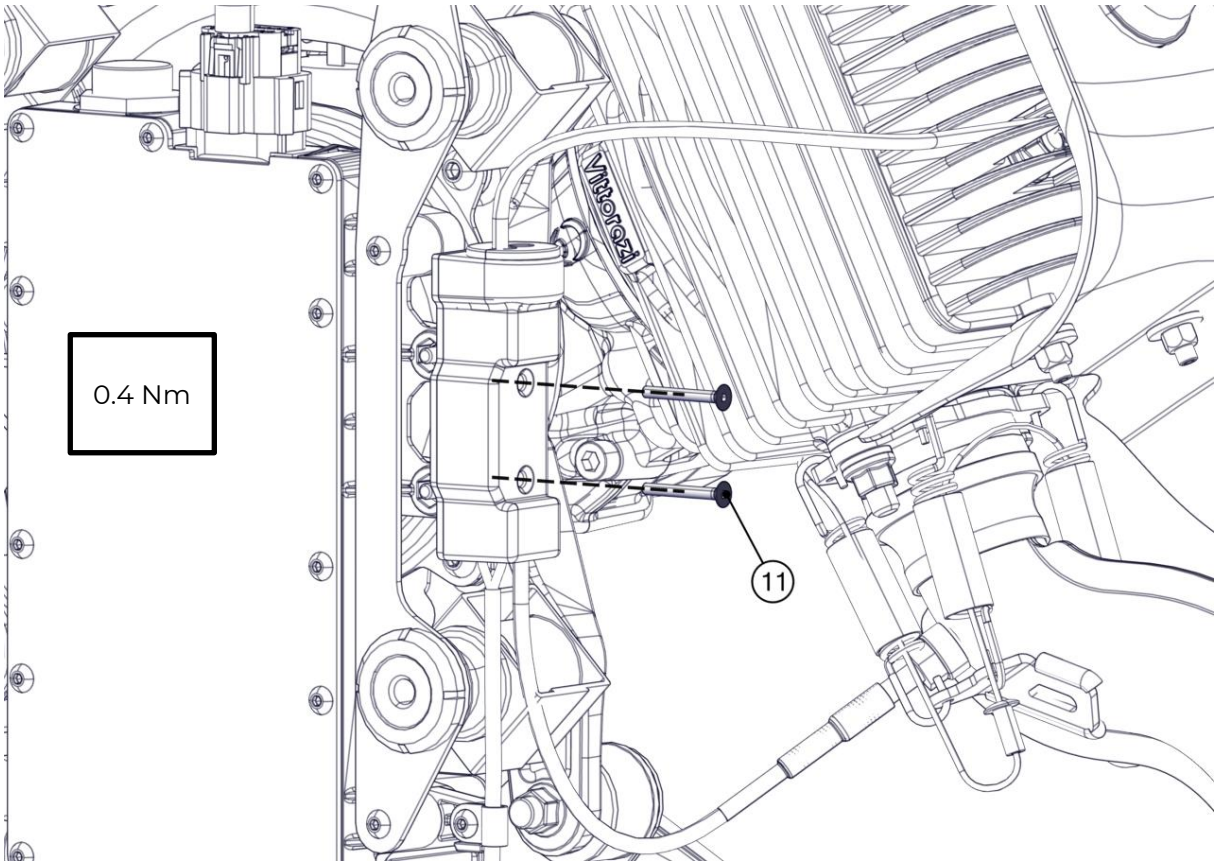
Insert the cables inside the rubber blocks (12) following the scheme shown in the figure.



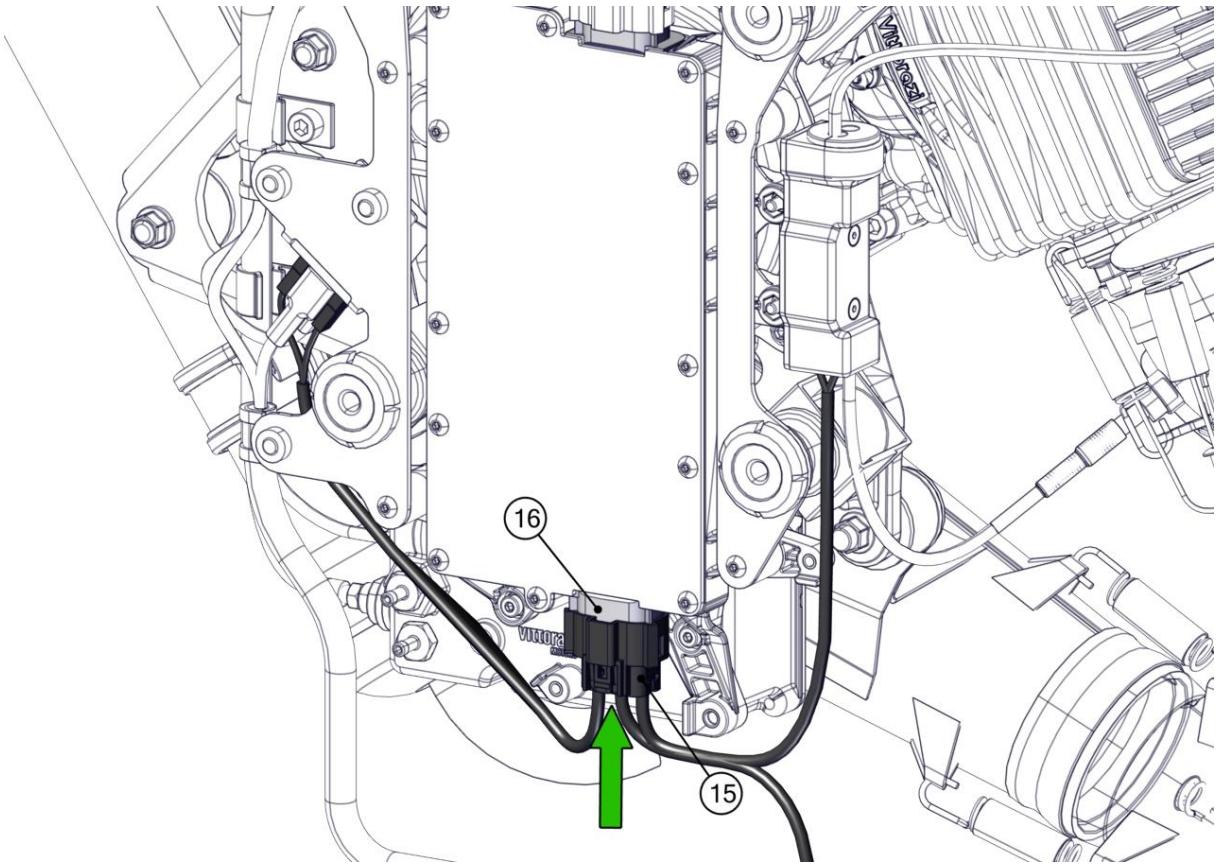
Insert the rubber blocks (12) inside their seats in the sensors support as shown in the figure.



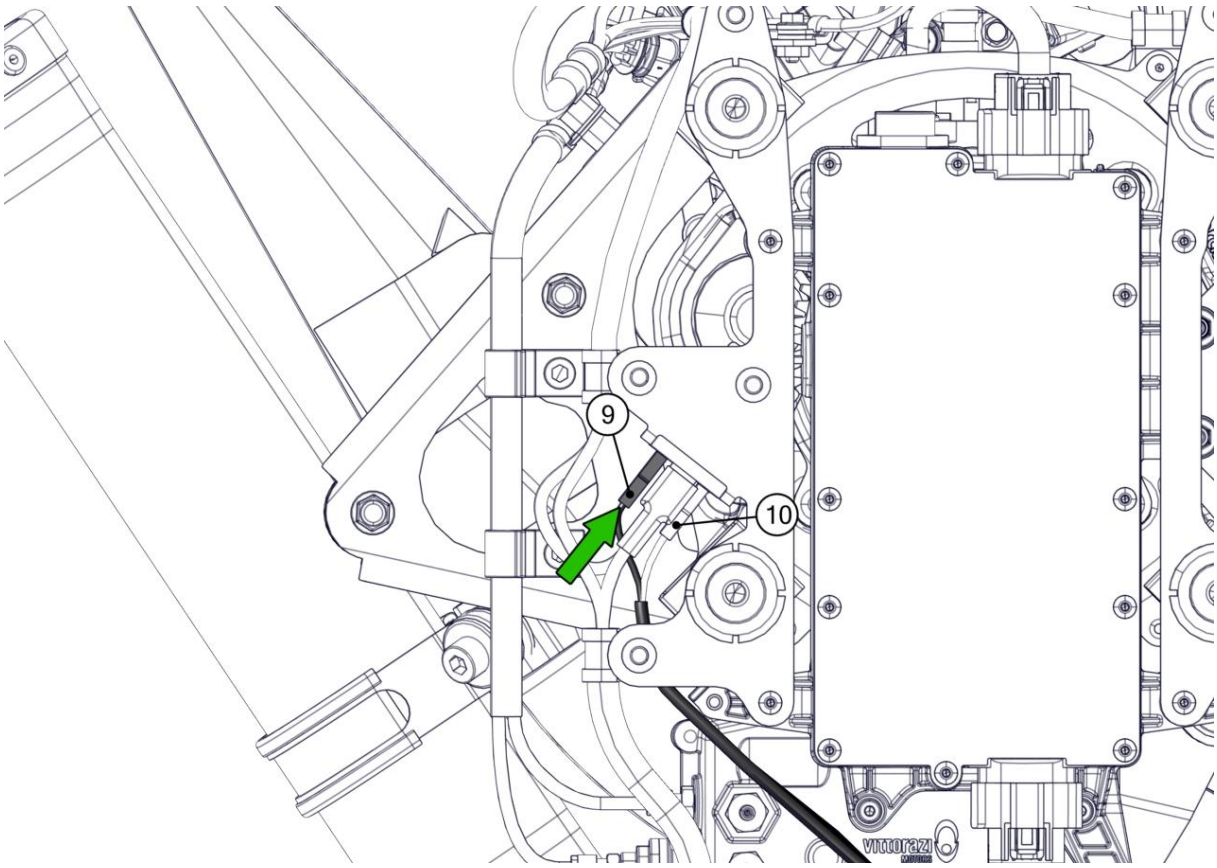
Insert the 2 screws M3x25 with threadlocker (recommended Loxeal 55-03/Loctite 243) and tighten with the torque shown in the figure.



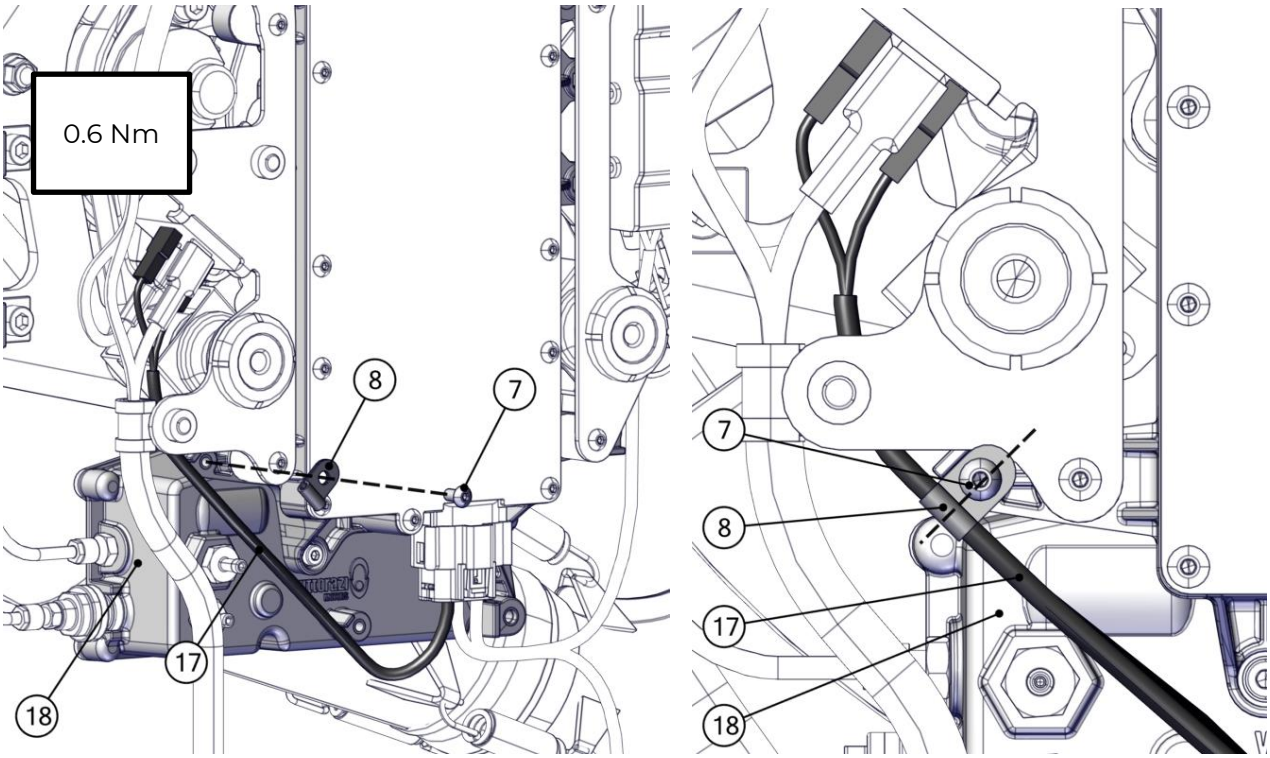
Insert the ECU supply connector (15) on the ECU connector (16).



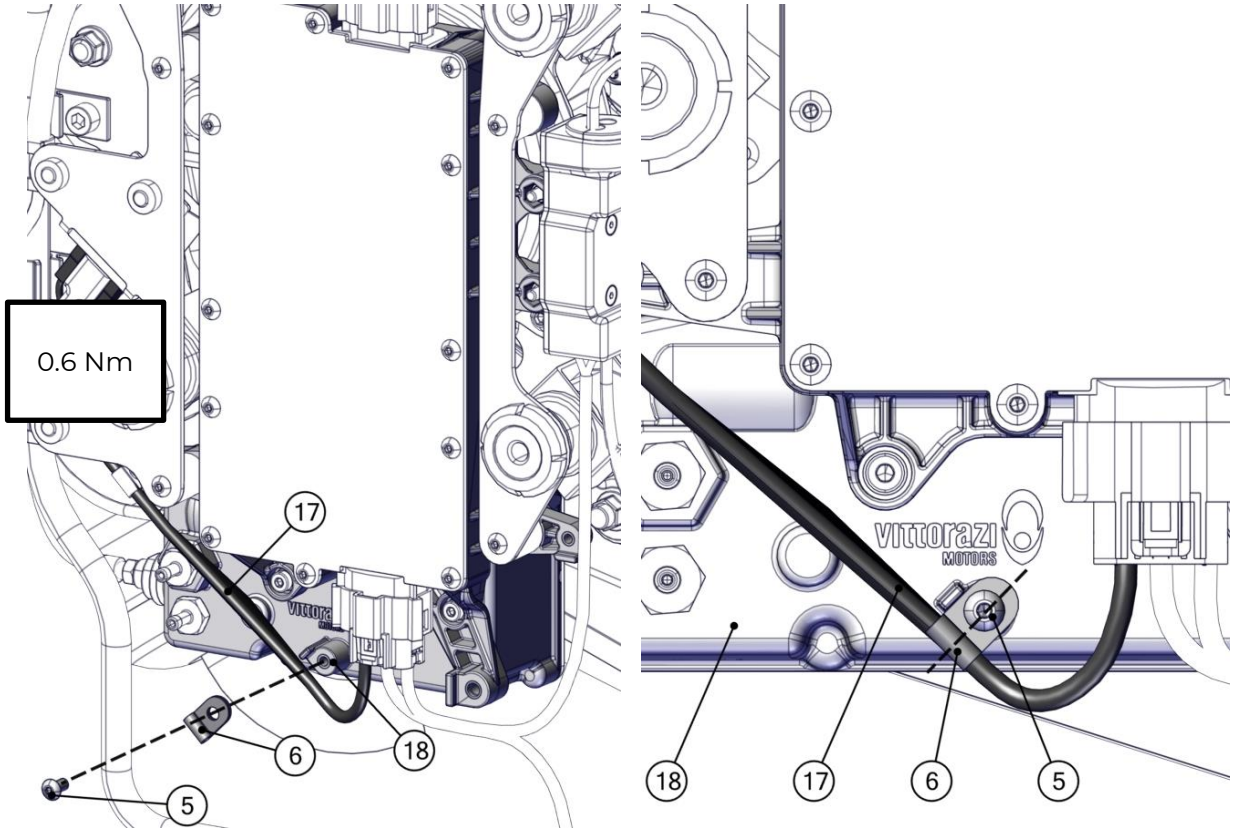
Insert the outer relay supply connector (9) (with black spot) on the external relay plug with the internal lever of the faston connector facing inwards



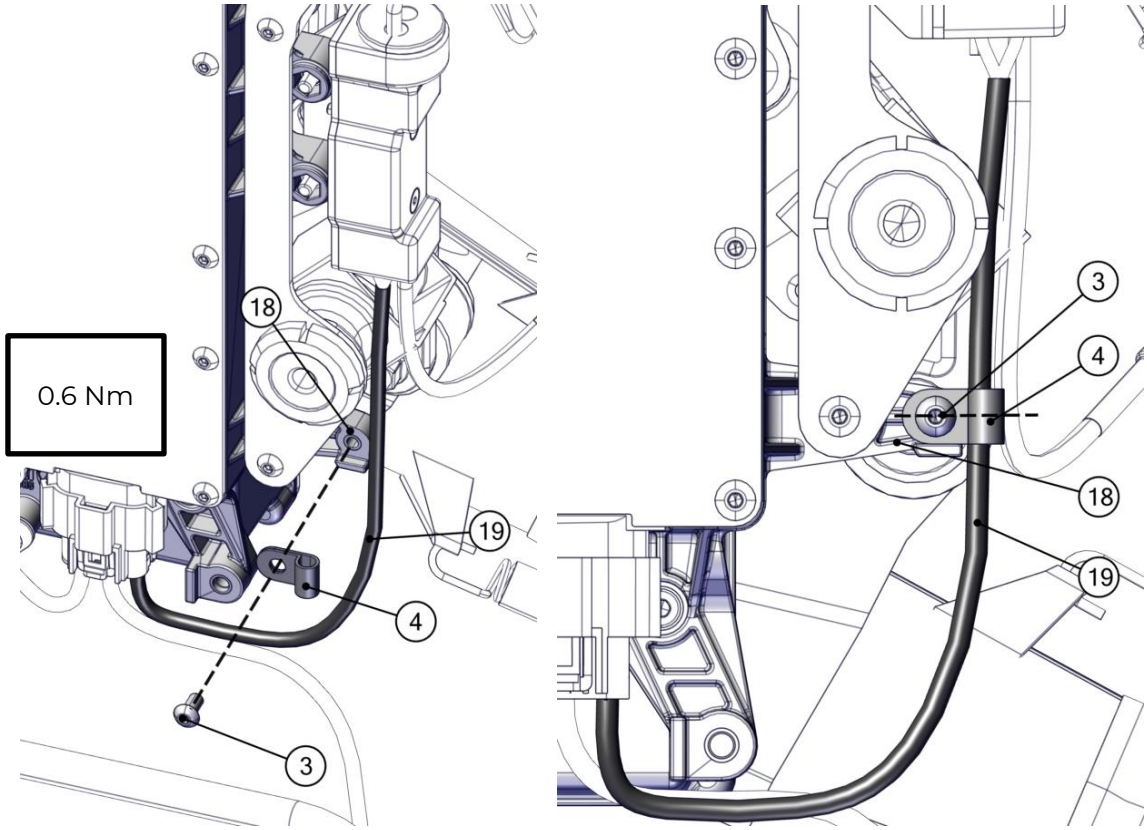
Repeat this operation with the inner relay supply connector (10) (with red spot) on the internal relay plug with the internal lever of the faston connector facing inwards.
Fix the relay supply cable (17) on the FBU (18) with the 3 mm plastic cable clamp (8) and the screw M4x6 (7) in the position shown in the figure with threadlocker (recommended Loxeal 55-03/Loctite 243) and tighten with the torque shown in the figure.



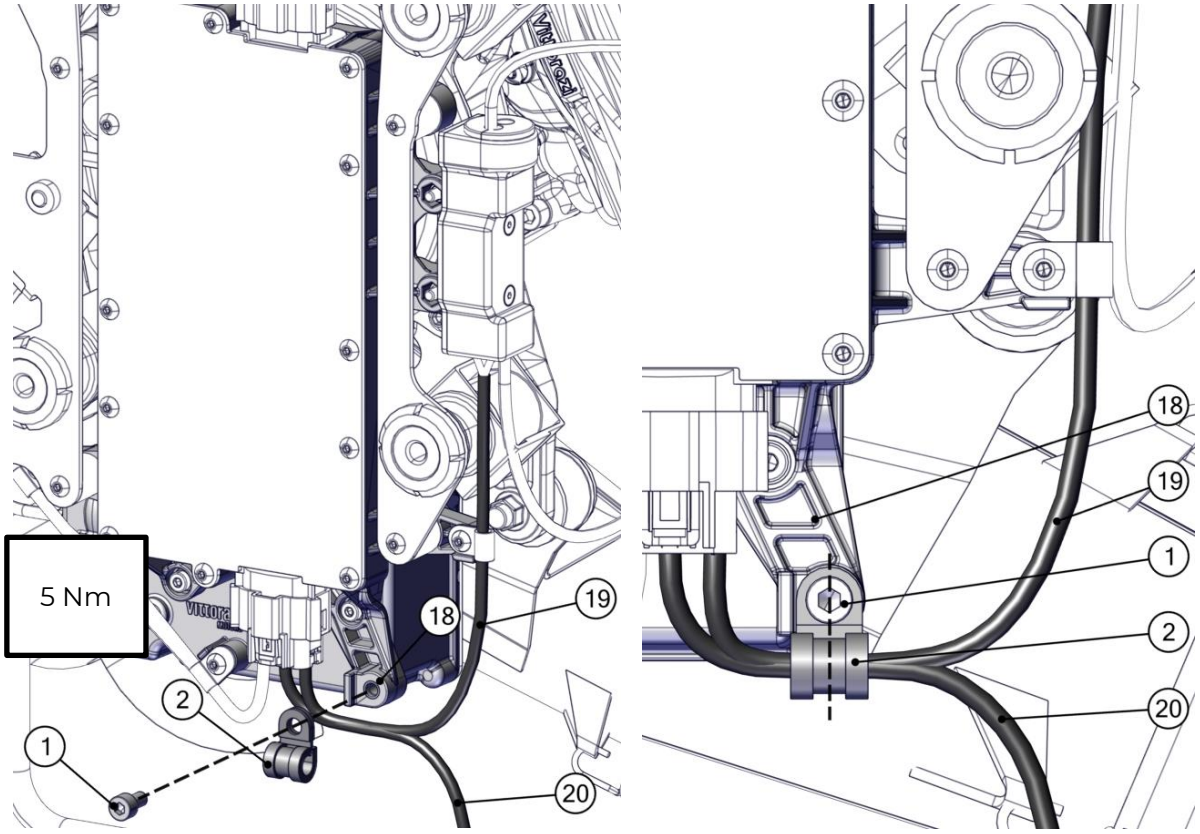
Fix the relay supply cable (17) on the FBU (18) with the 3 mm plastic cable clamp (6) and the screw M4x6 (5) in the position shown in the figure with threadlocker (recommended Loxeal 55-03/Loctite 243) and tighten with the torque shown in the figure.



Fix the sensors supply cable (19) on the FBU (18) with the 5 mm plastic cable clamp (4) and the screw M4x6 (3) in the position shown in the figure with threadlocker (recommended Loxeal 55-03/Loctite 243) and tighten with the torque shown in the figure.

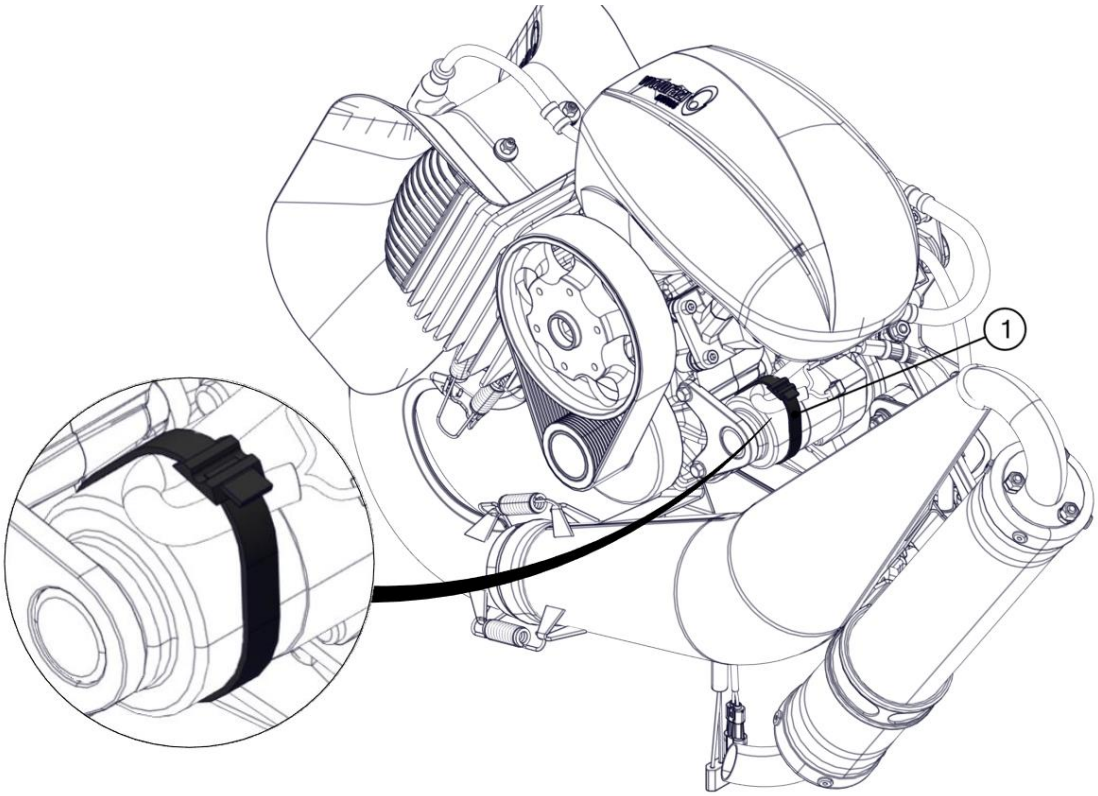


Fix the sensors supply cable (19) and the battery cable (20) on the FBU (18) with the M5 F6 cable clamp (2) and the screw M5x10 (1) in the position shown in the figure and tighten with the torque shown in the figure.

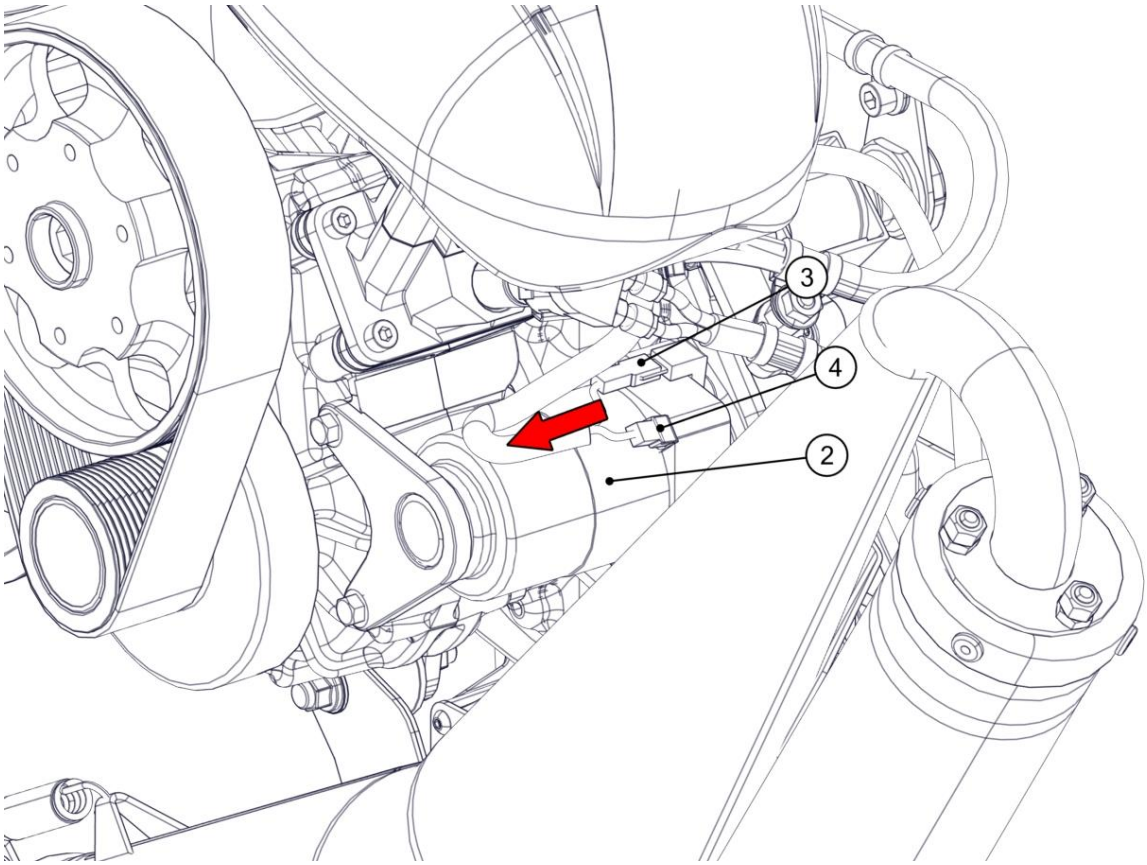


3.6.5 Electric starter wiring disassembly

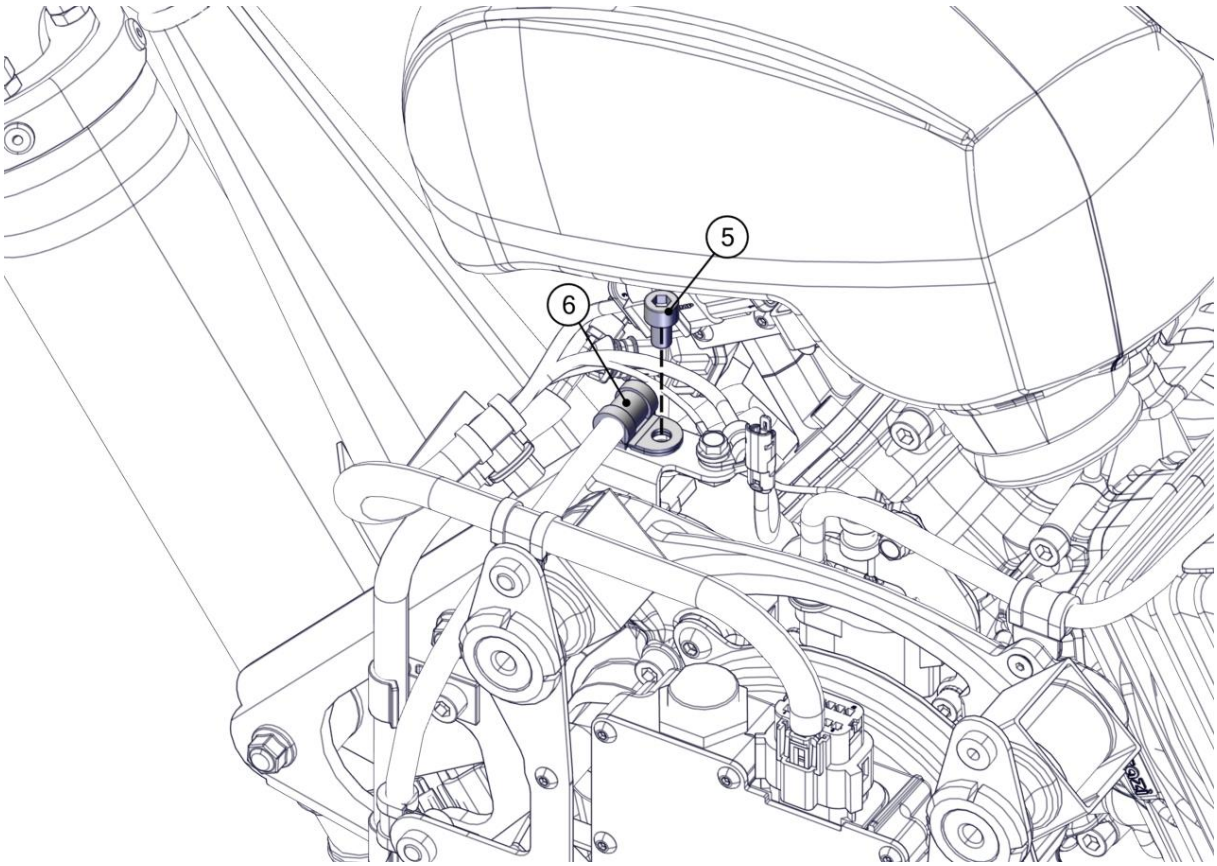
Remove the plastic cable clamp (1).



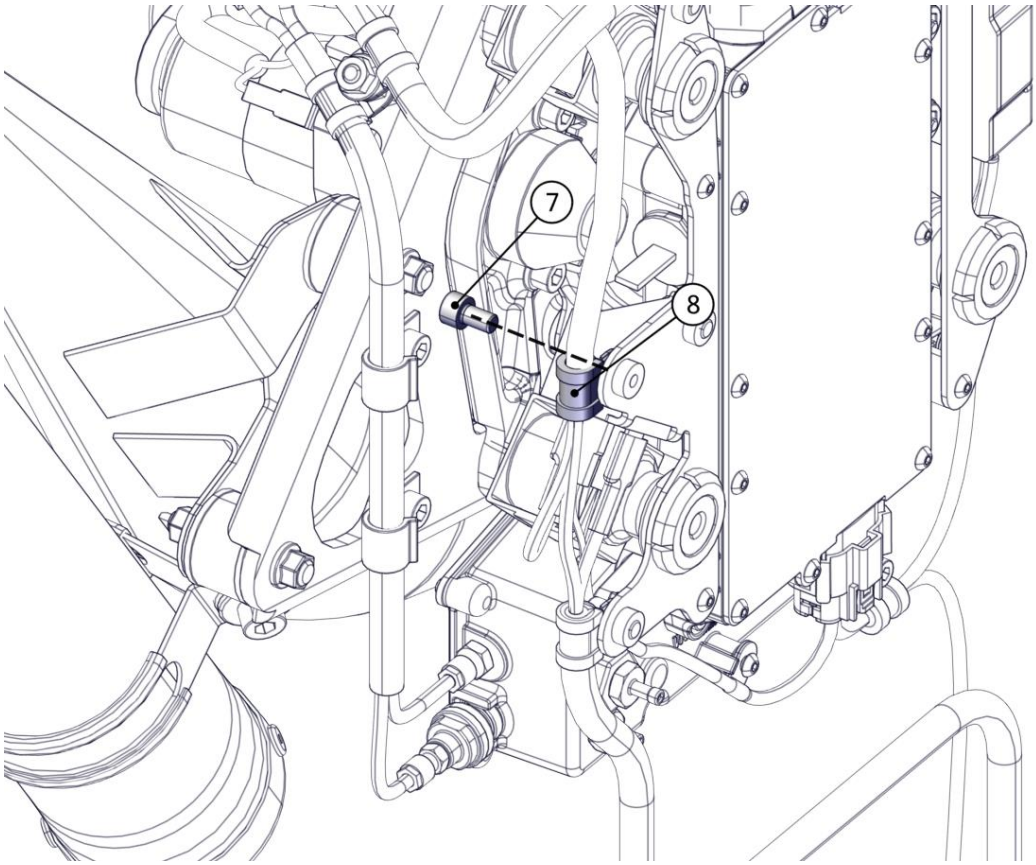
Carefully disconnect the 2 faston connectors (3, 4).



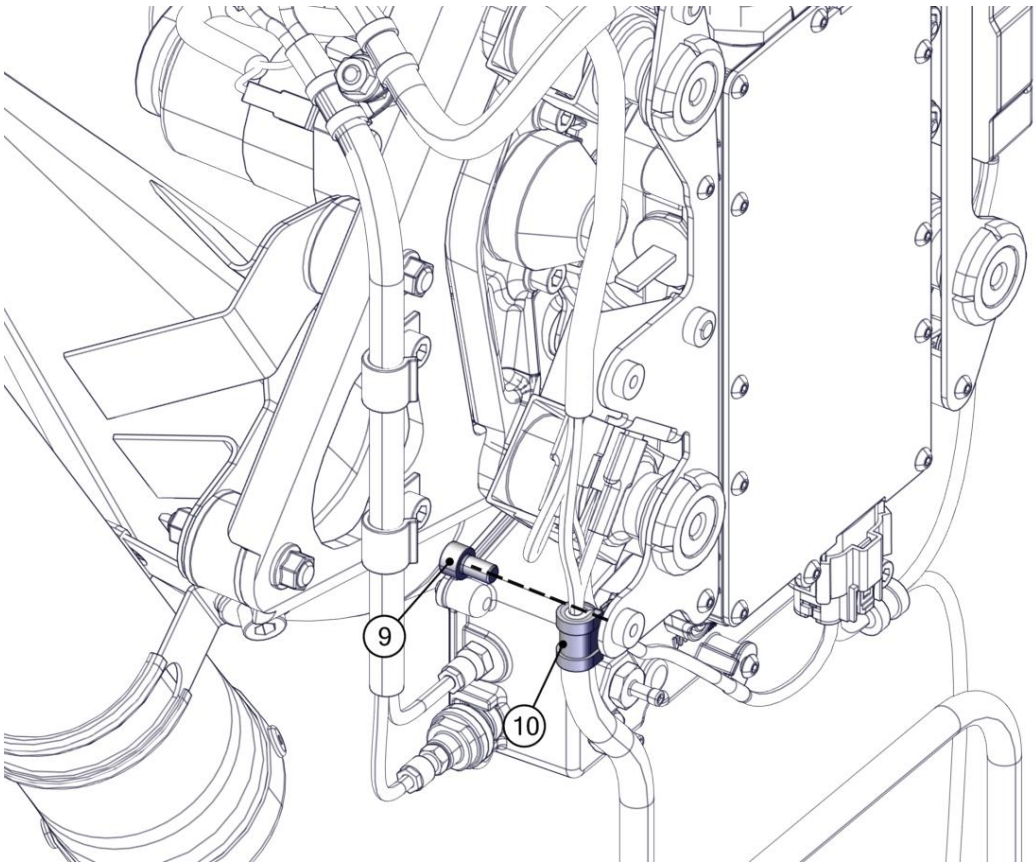
Remove the screw M6x10 (5) and the M6 F8 cable clamp (6).



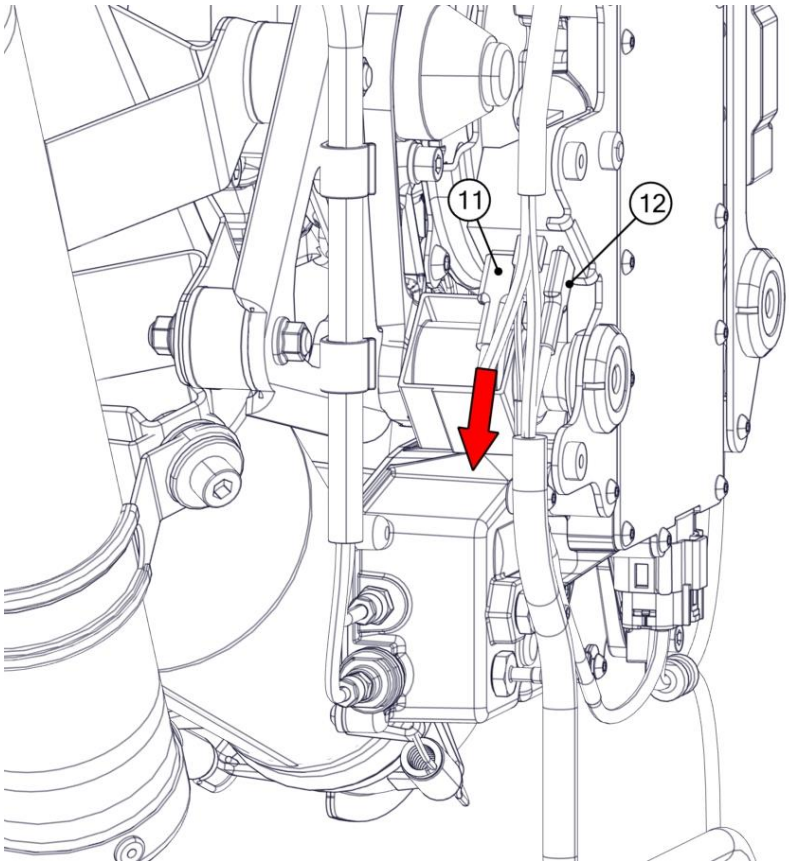
Remove the screw M6x10 (7) and the M6 F8 cable clamp (8).



Remove the screw M6x10 (9) and the M6 F8 cable clamp (10).



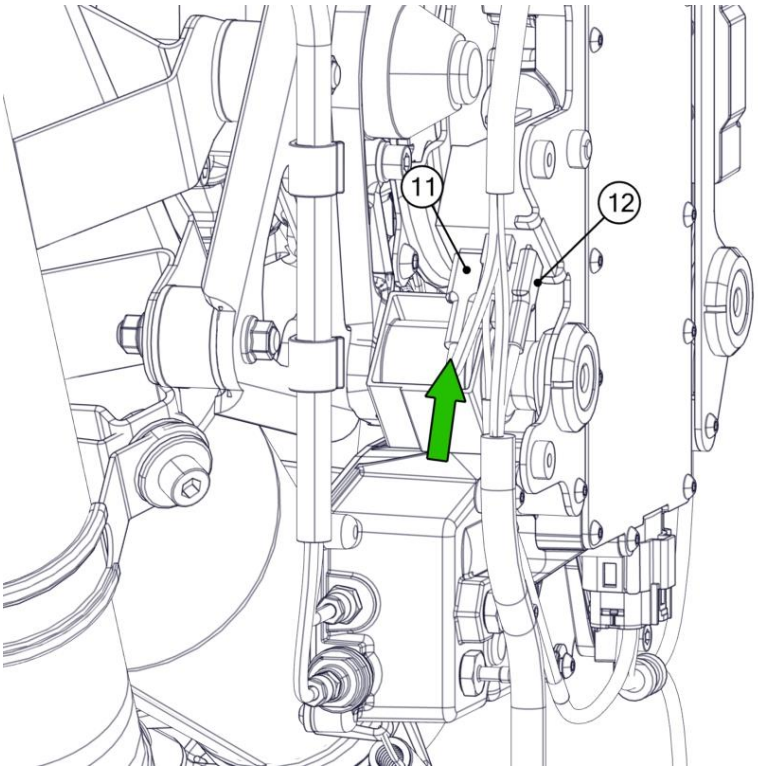
Carefully remove the starter power cable that goes from the relay to the starter (11).



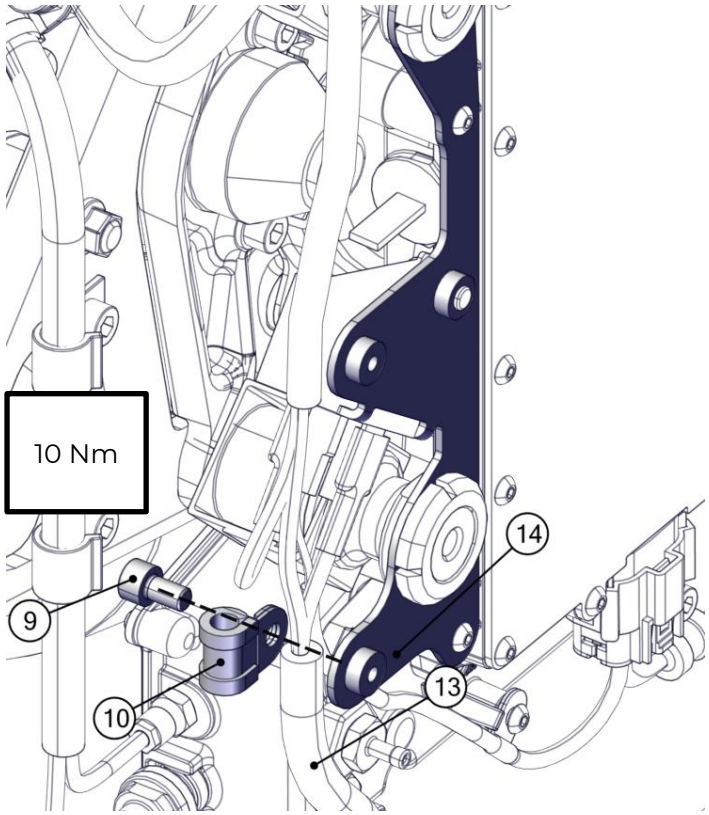
Repeat this operation with the starter power cable that comes from the battery to the relay (12).

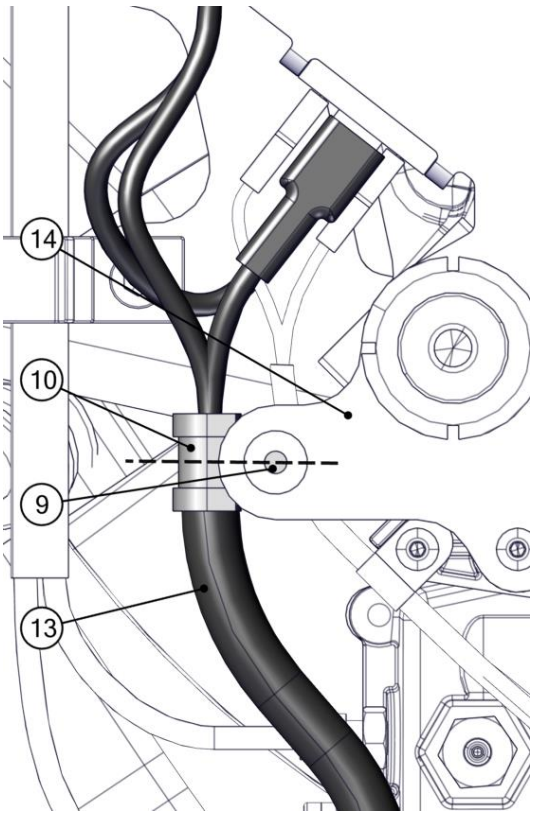
3.6.6 Electric starter wiring assembly

Insert the starter supply cable that goes from the relay to the starter (11) on the internal relay plug.

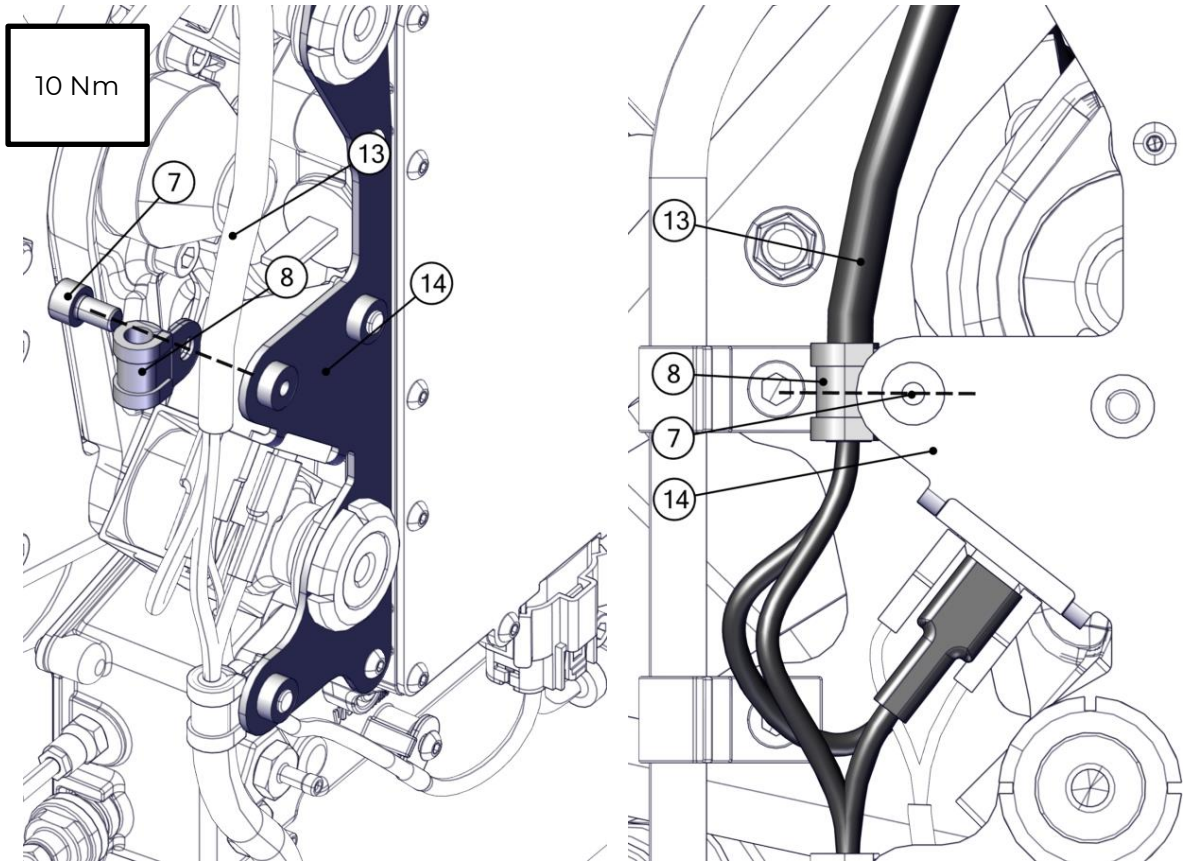


Repeat this operation with the starter power cable that comes from the battery (12) on the external relay plug.
Fix the starter supply cable (13) on the steel bracket (14) with the M6 F8 cable clamp (10) and the screw M6x10 (9) in the position shown in the figure and tighten with the torque shown in the figure.

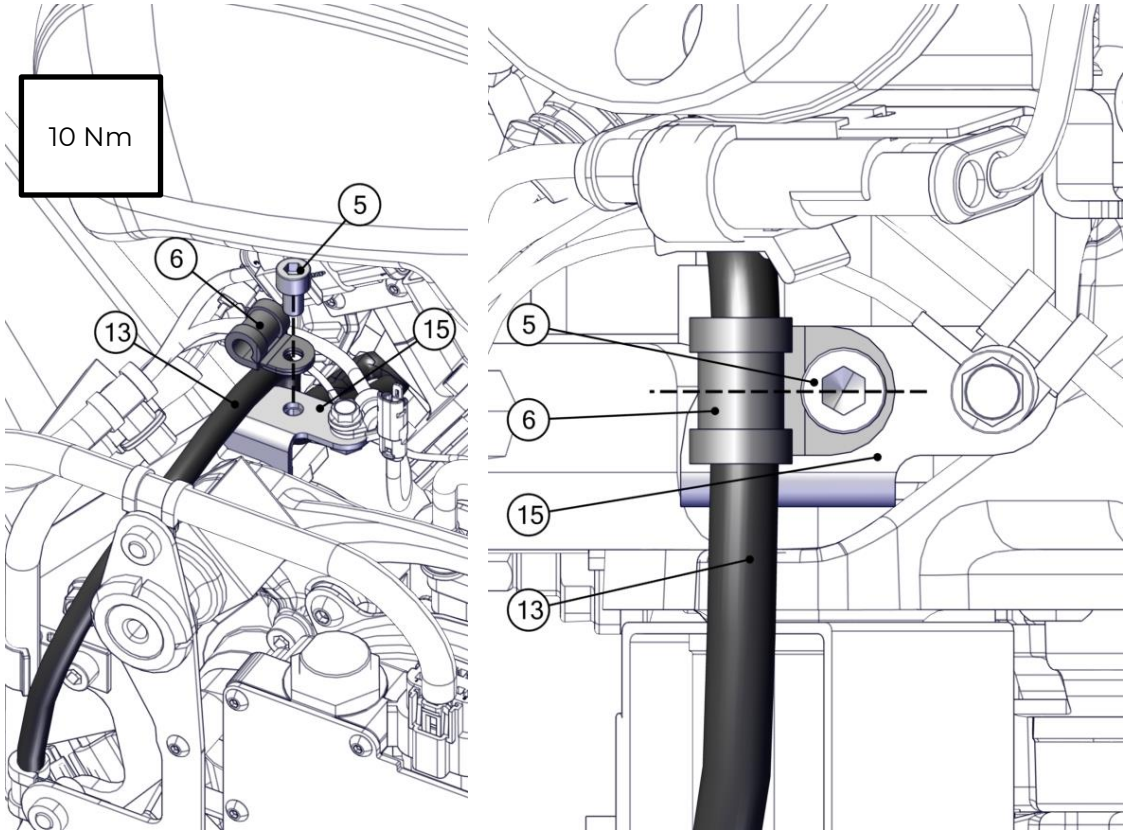




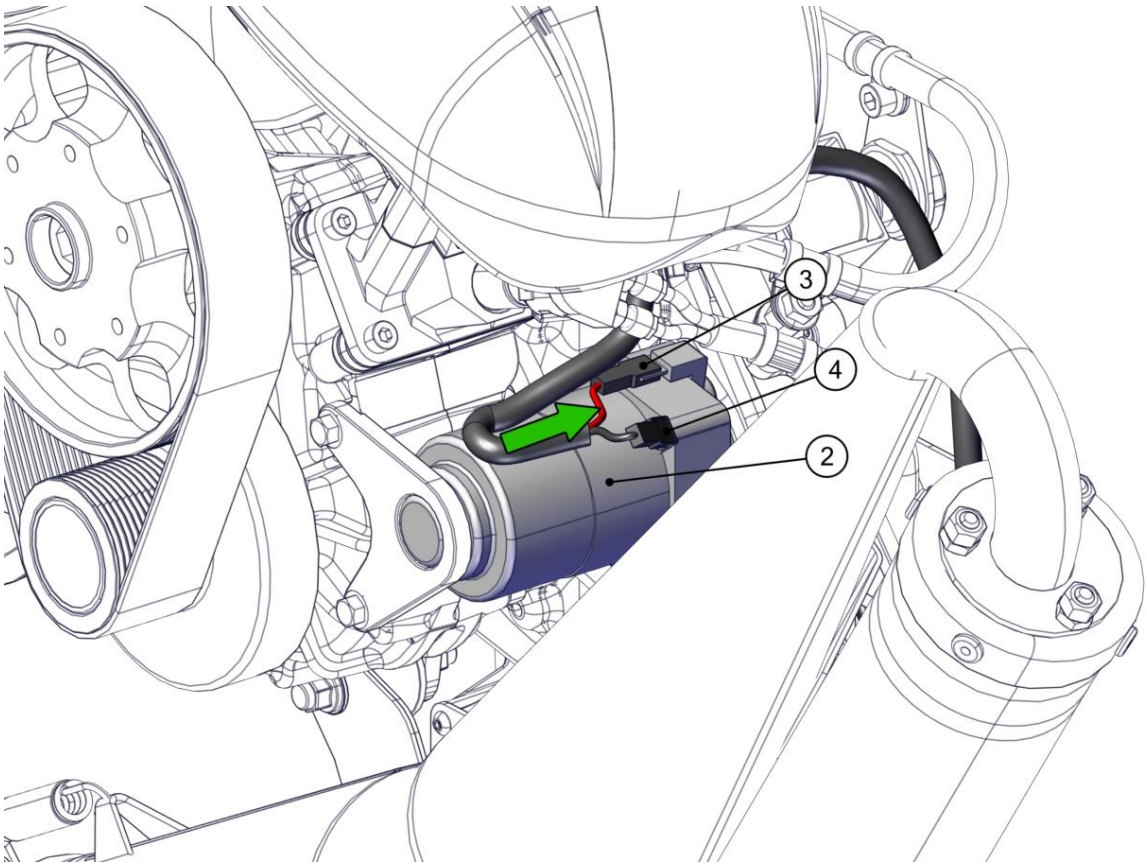
Fix the starter supply cable (13) on the steel bracket (14) with the M6 F8 cable clamp (8) and the screw M6x10 (7) in the position shown in the figure and tighten with the torque shown in the figure.



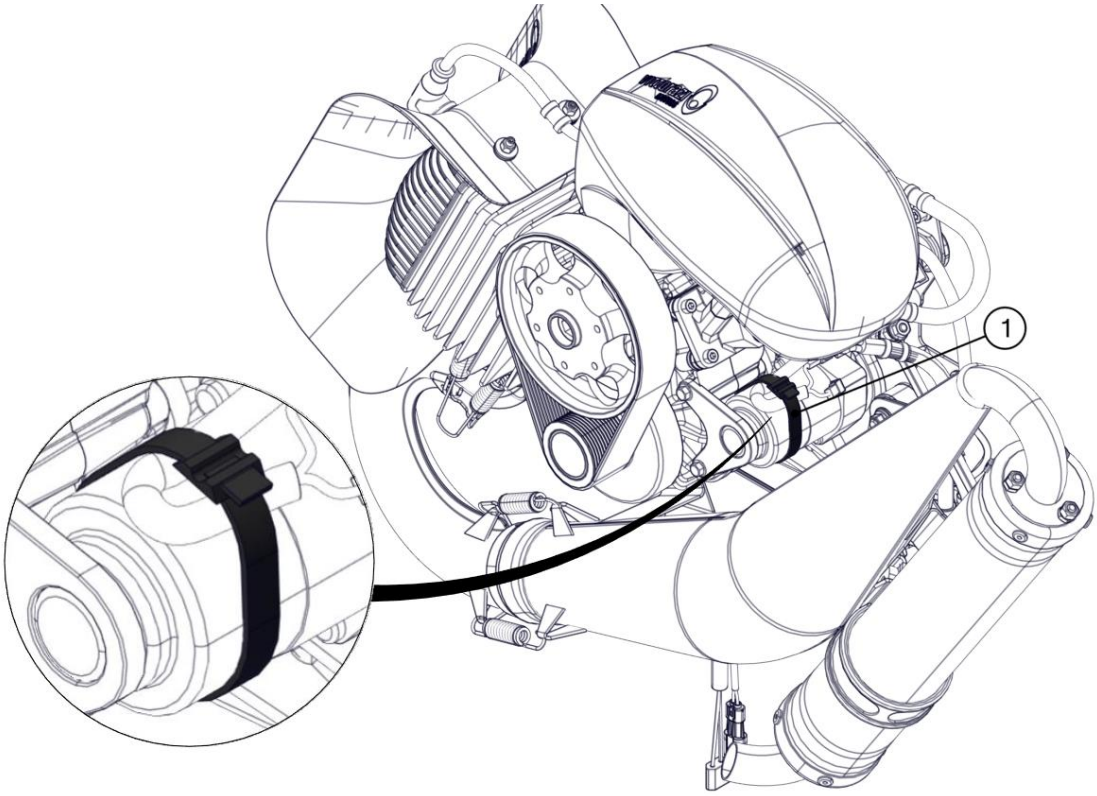
Fix the starter supply cable (13) to the flange (15) with the M6 F8 cable clamp (6) and the screw M6x10 (5) in the position shown in the figure and tighten with the torque shown in the figure.



Insert the starter supply connectors (3, 4) on the starter plugs (2) as shown in the figure.

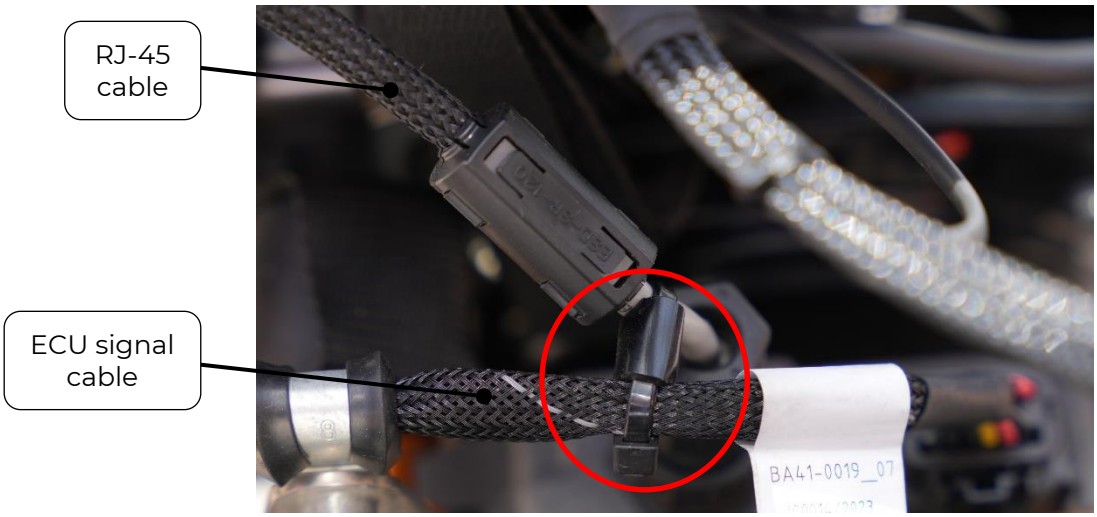


Fix the starter supply cables with the plastic cable clamp (1) as shown in the figure.

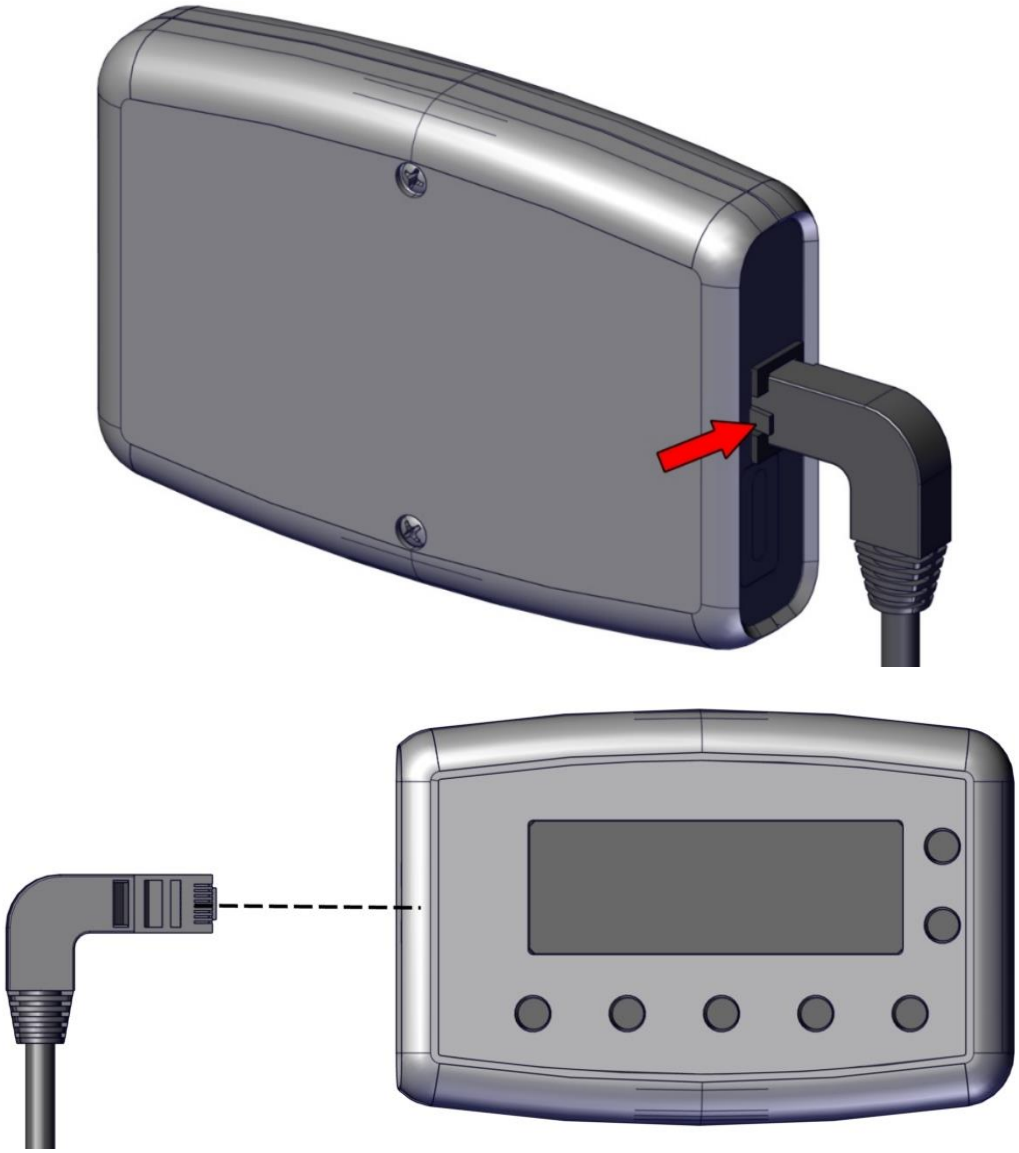


3.6.7 RJ-45 wiring disassembly

Cut the cable tie joining the RJ-45 cable to the ECU signal cable.

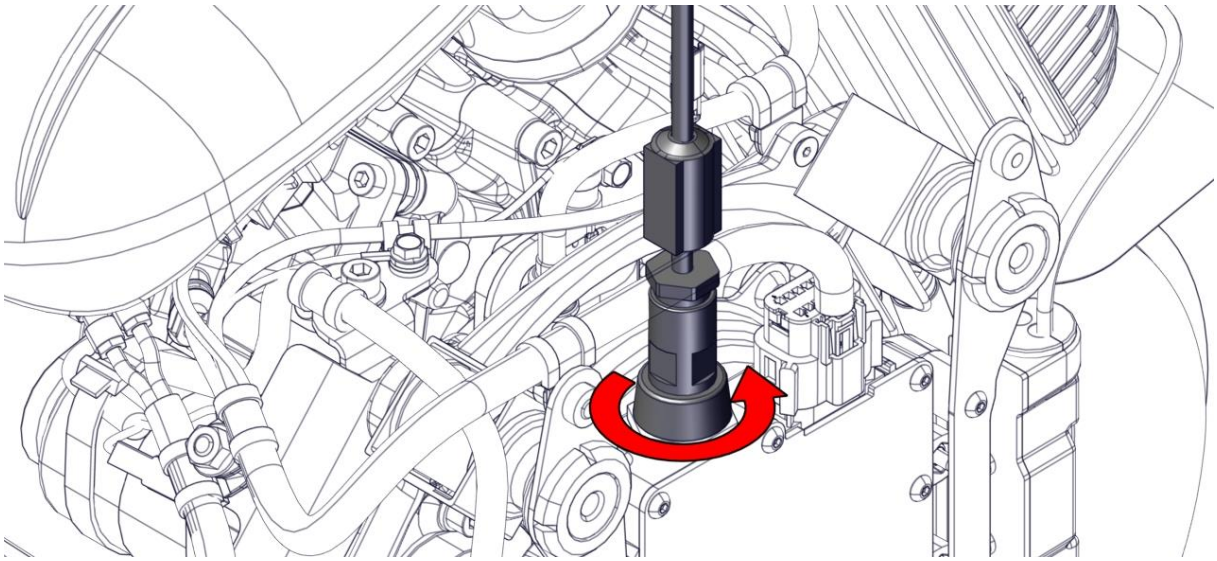


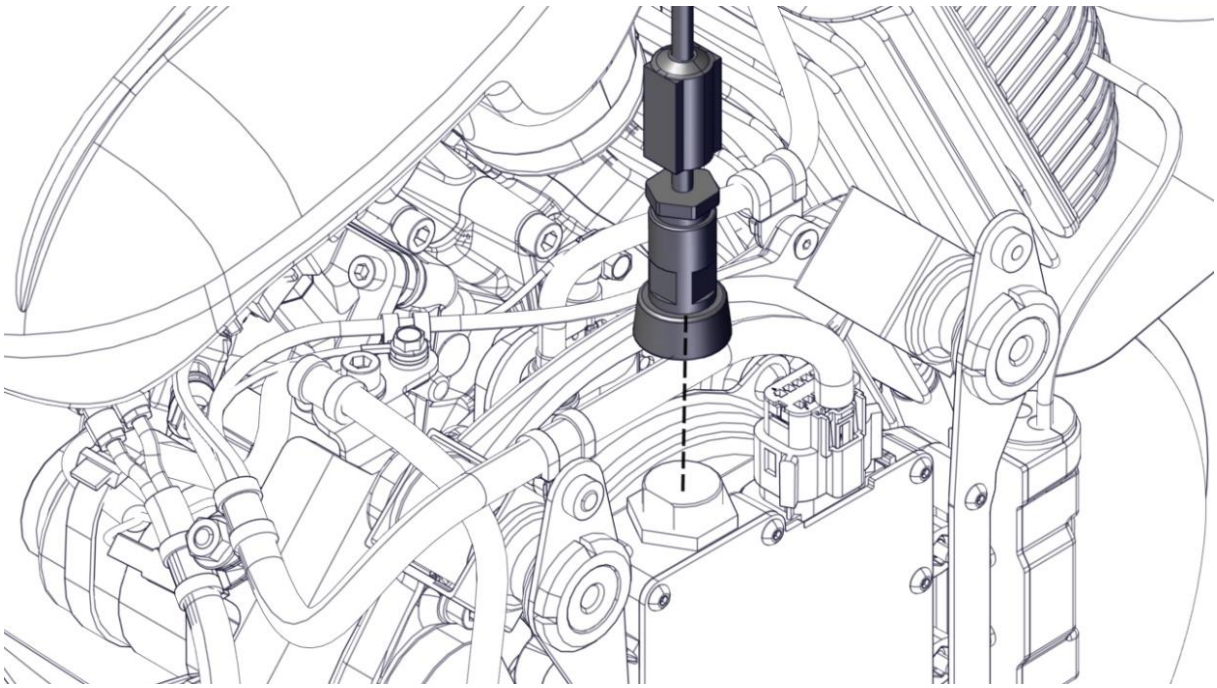
Remove the 90° plug of the RJ-45 cable from the display by pressing the connector lever and pulling.



Extract the RJ-45 cable from the elastic band of the display support.

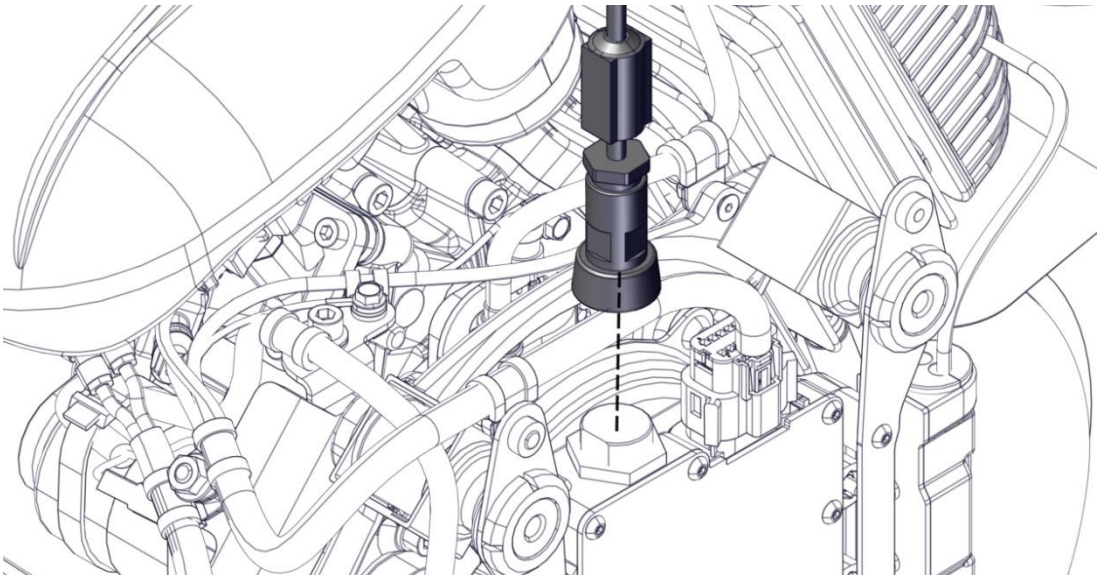
Unscrew the RJ-45 ferrule from the ECU socket and remove the RJ-45 cable.

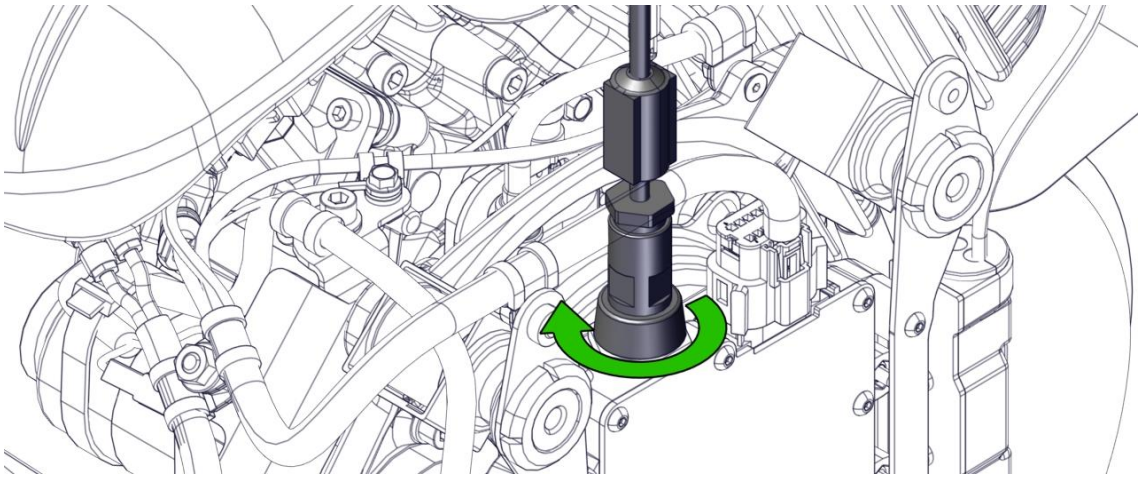




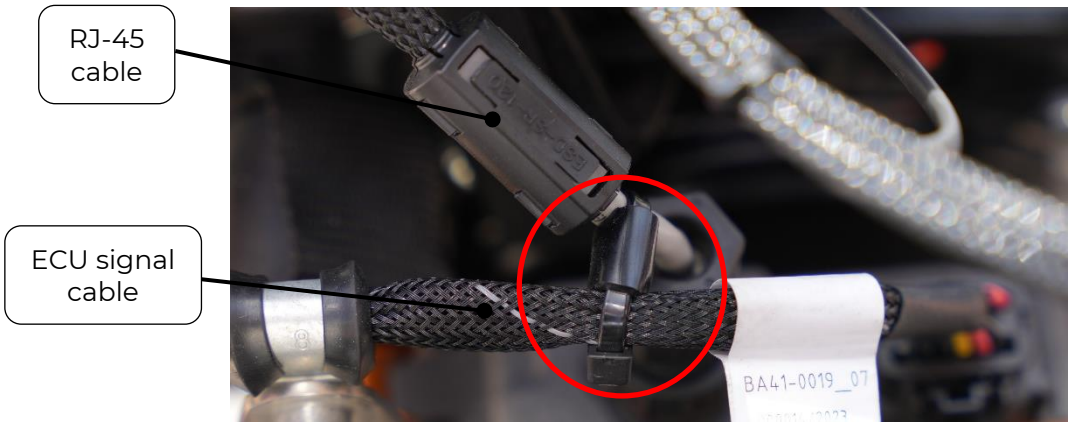
3.6.8 RJ-45 wiring assembly

Insert the RJ-45 plug into the ECU socket, screw the ferrule and tighten by hand.



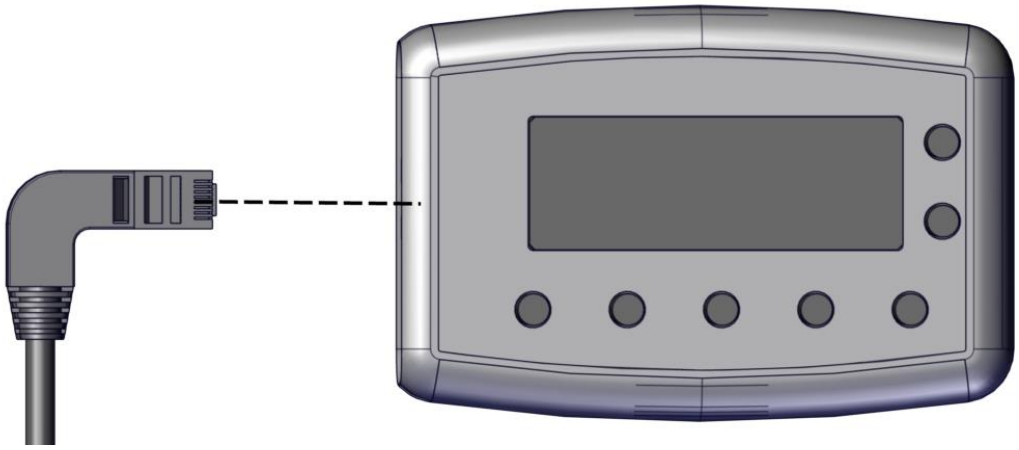


Crimp the RJ-45 cable to the ECU signal cable to avoid stress at the root of the connector.



Insert the 90° RJ-45 plug cable on the elastic band of the display support.

Insert the 90° plug of the RJ-45 cable on the display.



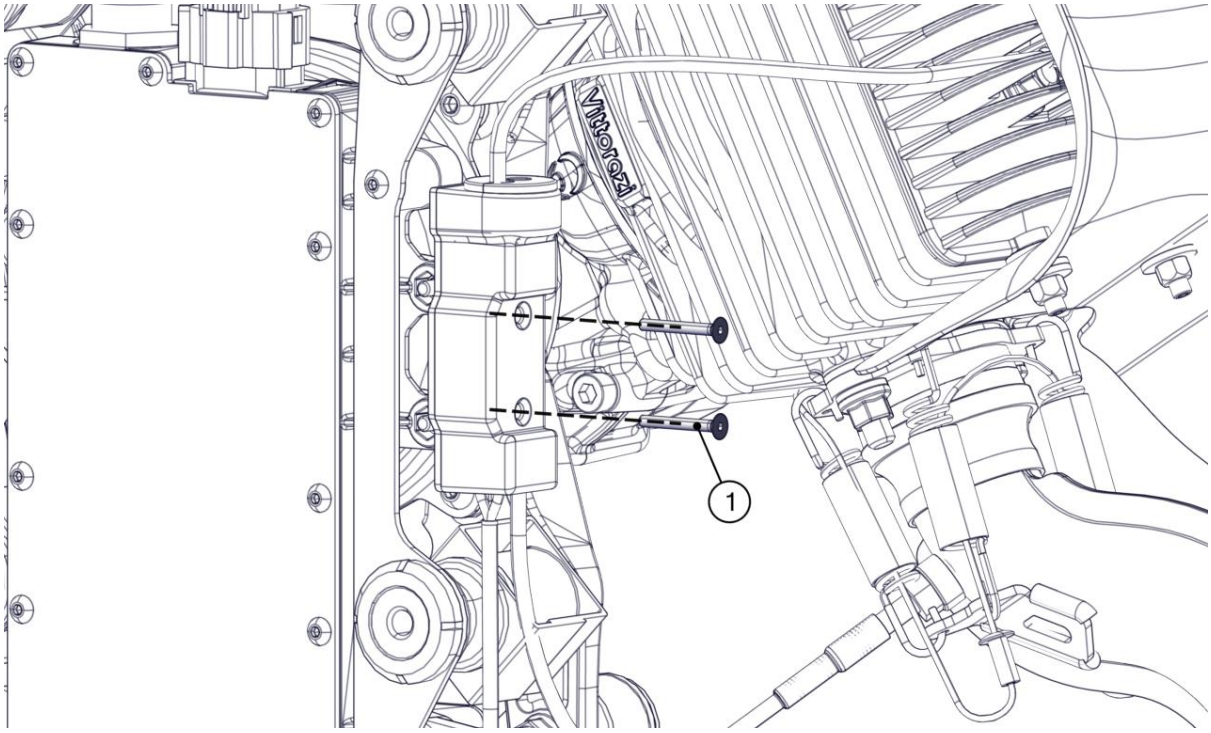
3.7 Temperature probes

Components to replace	<table><tr><th></th><th>Time limit</th></tr><tr><td>CHT sensor (MI605)</td><td>200 h</td></tr><tr><td>EGT sensor (MI604)</td><td>200 h</td></tr><tr><td>Loxeal 55-03/Loctite 243 *</td><td></td></tr><tr><td>Interflon paste HT1200 *</td><td></td></tr></table>
Special tools	Not required.
Values	Screw M6x10: 10 Nm Screws M3x25: 0.4 Nm EGT sensor: 7 Nm

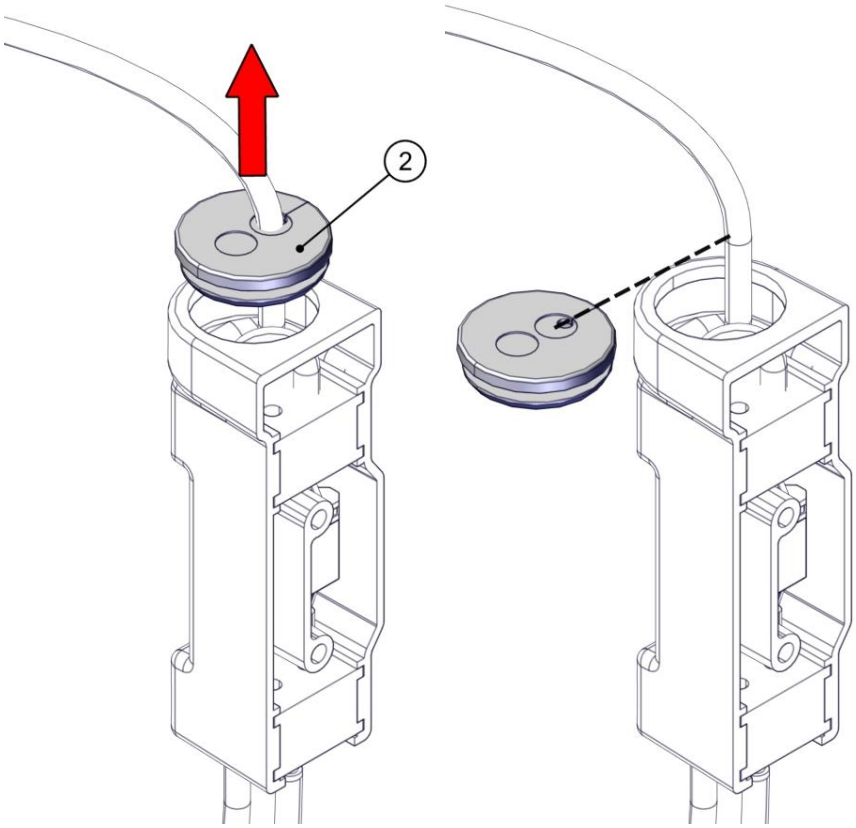
*Always replace it when disassembled.

3.7.1 CHT sensor disassembly

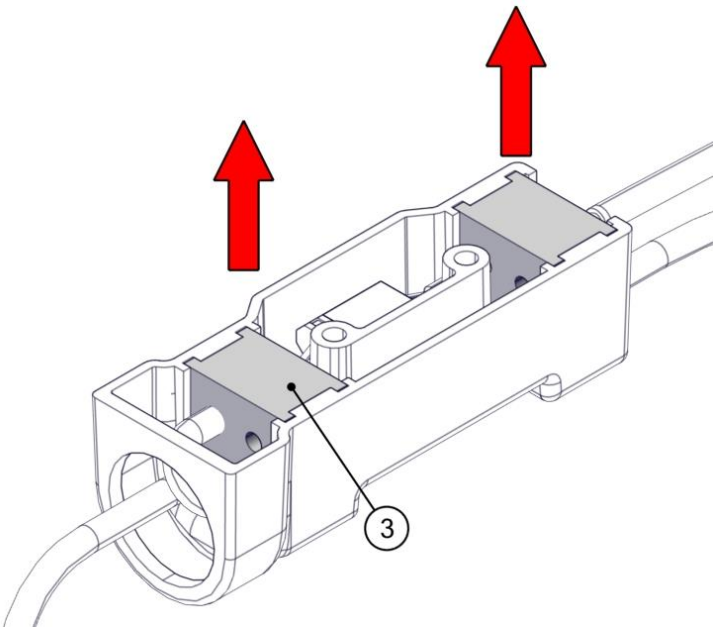
Extract the 2 screws M3x25 (1) from the sensors support.



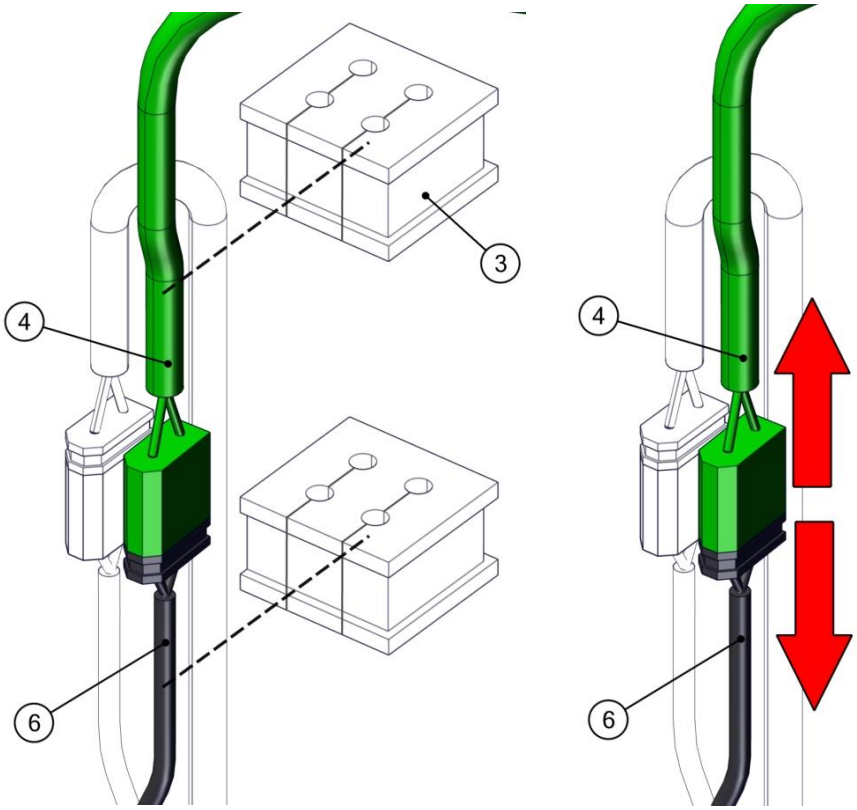
Extract the upper rubber stopper (2) from the sensors support.



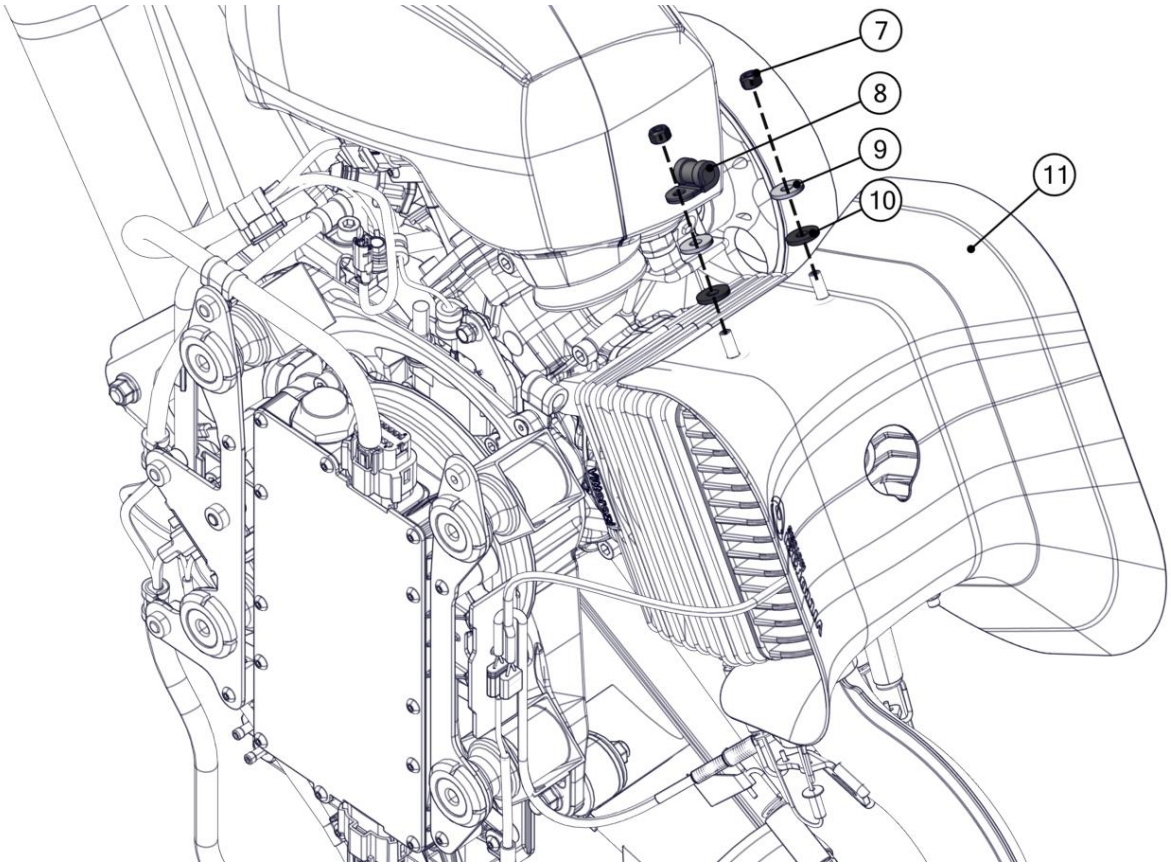
Extract the 2 rubber blocks (3).



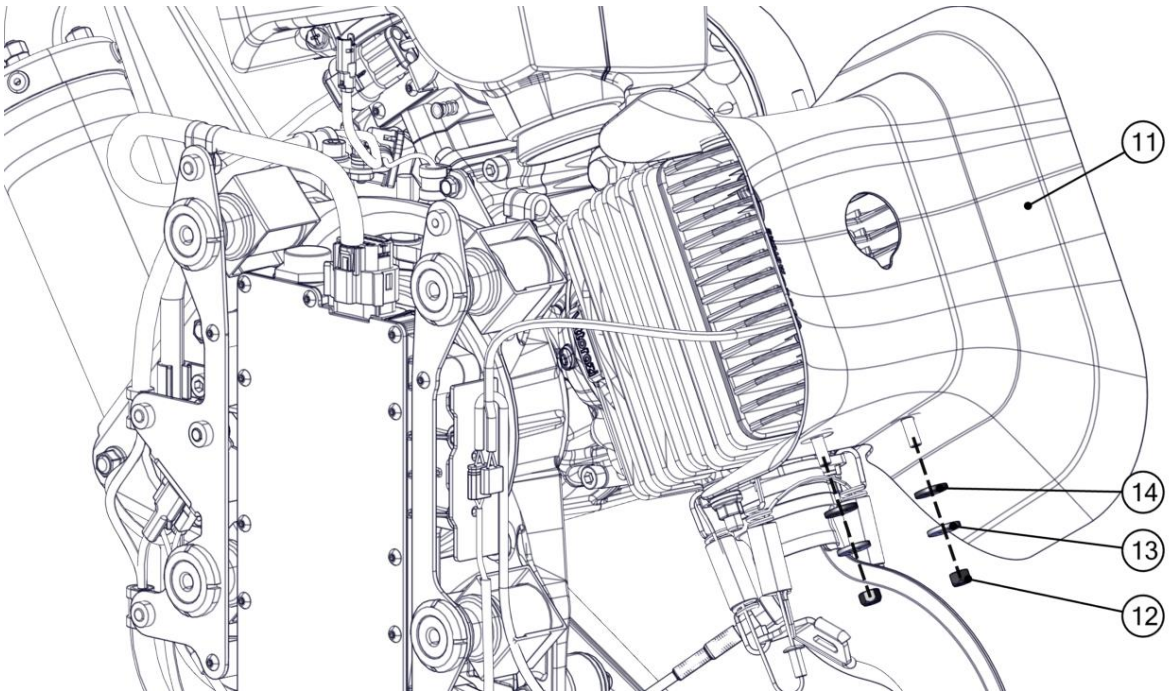
Disconnect the CHT sensor connector (4) from the power supply cable (6).



Remove the spark plug (see chapter 3.2.1 Spark plug disassembly).
Remove the 2 self-locking nuts M4 (7), the M5 F8 cable clamp (8), the 2 external washers (9) and the 2 external rubbers (10).

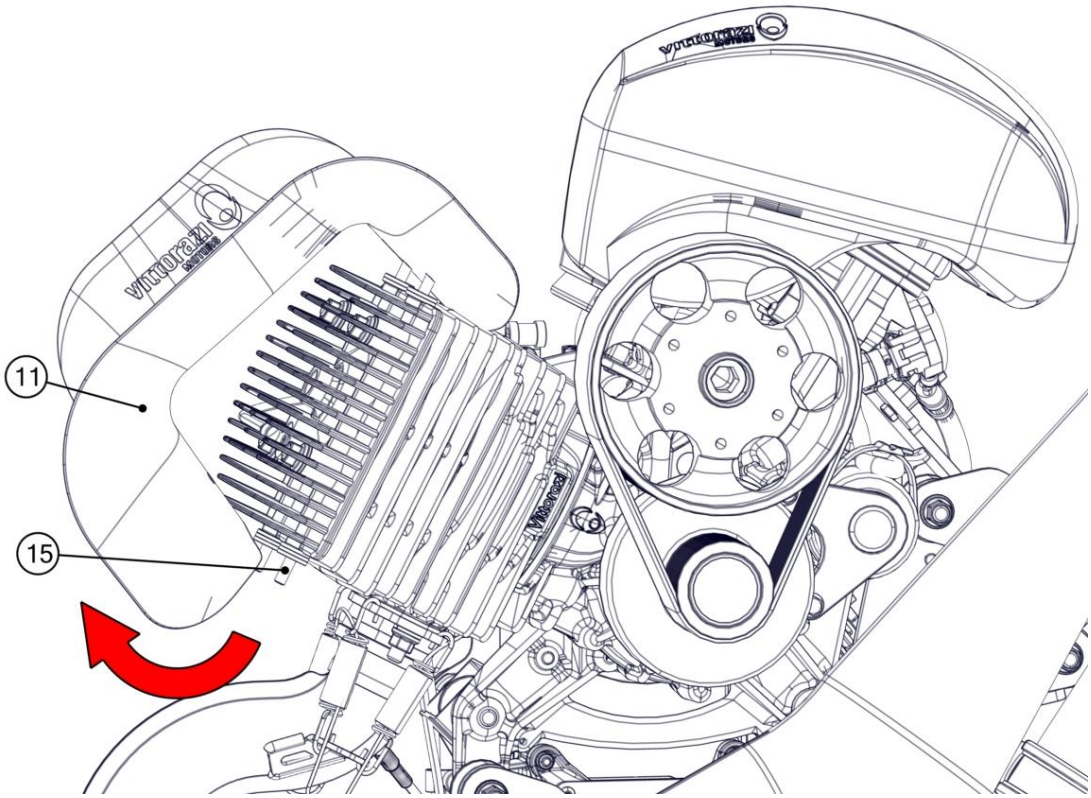


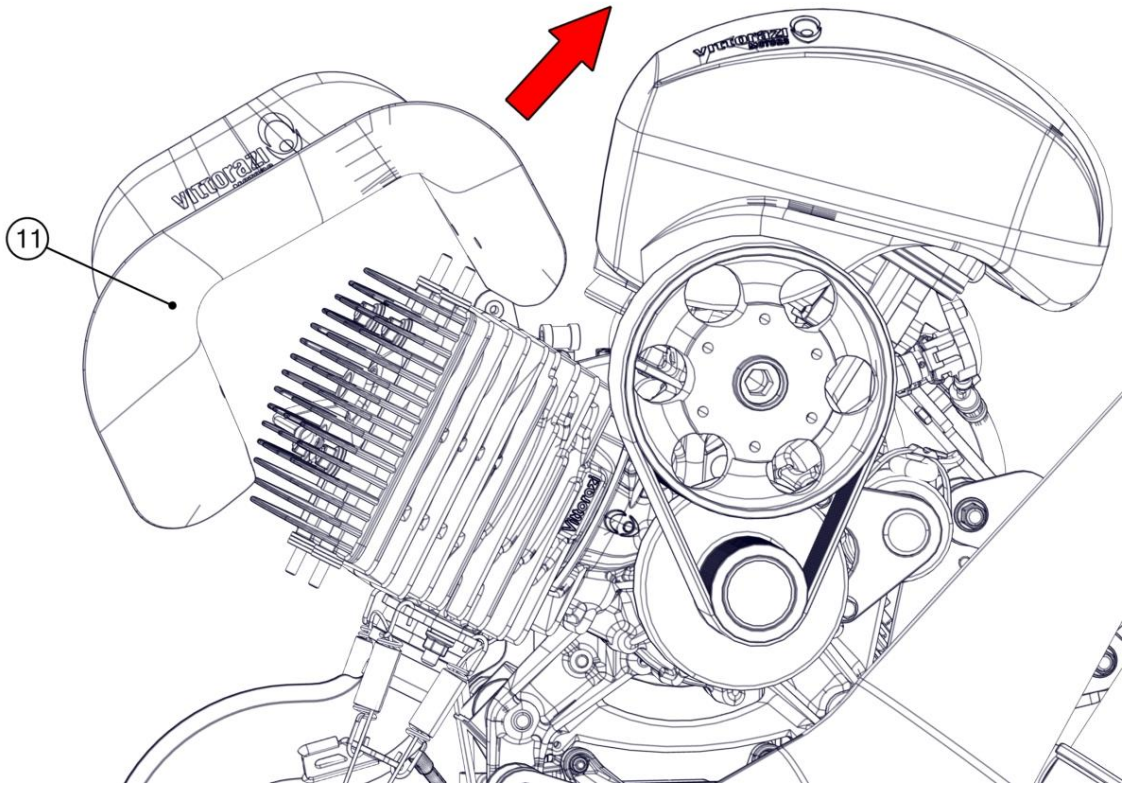
Remove the 2 self-locking nuts M4 (12), the 2 external washers (13) and the 2 external rubbers (14).



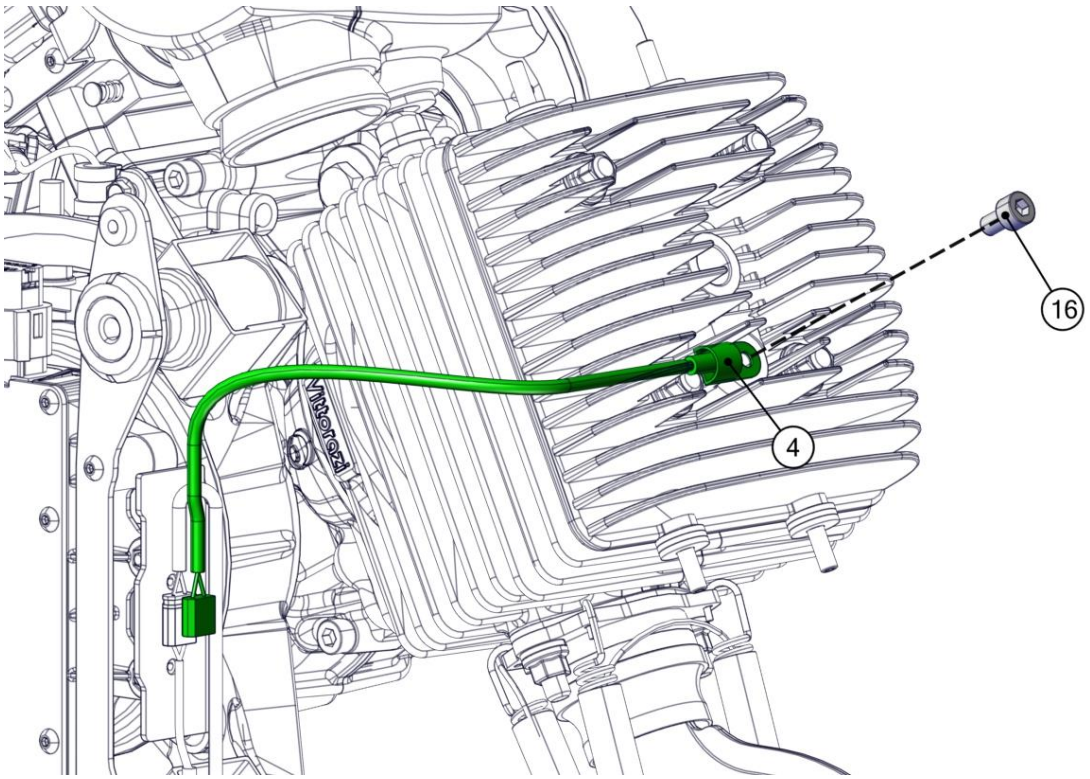
Disassembly requires bending the cooling shroud (11), so gloves must be used and force applied. The carbon layer is flexible and will not be damaged during disassembly bending.

Remove the cooling shroud (11) by bending it to make it pass over the 2 M5x30 studs (15).



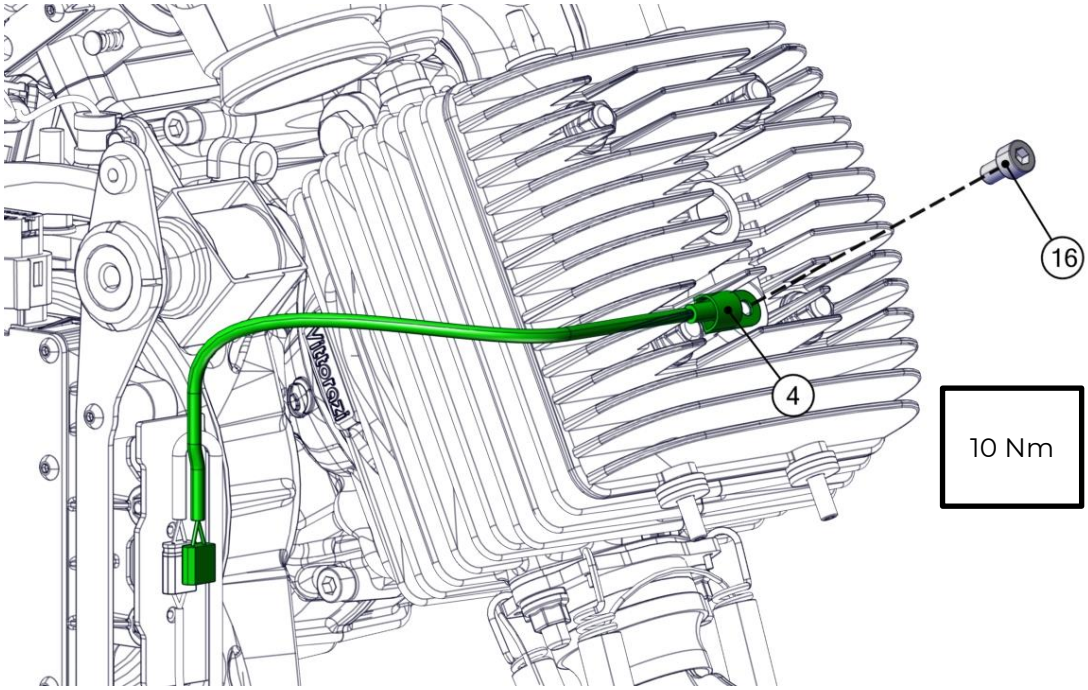


Extract the Allen screw M6x10 (16) and remove the CHT sensor (4).

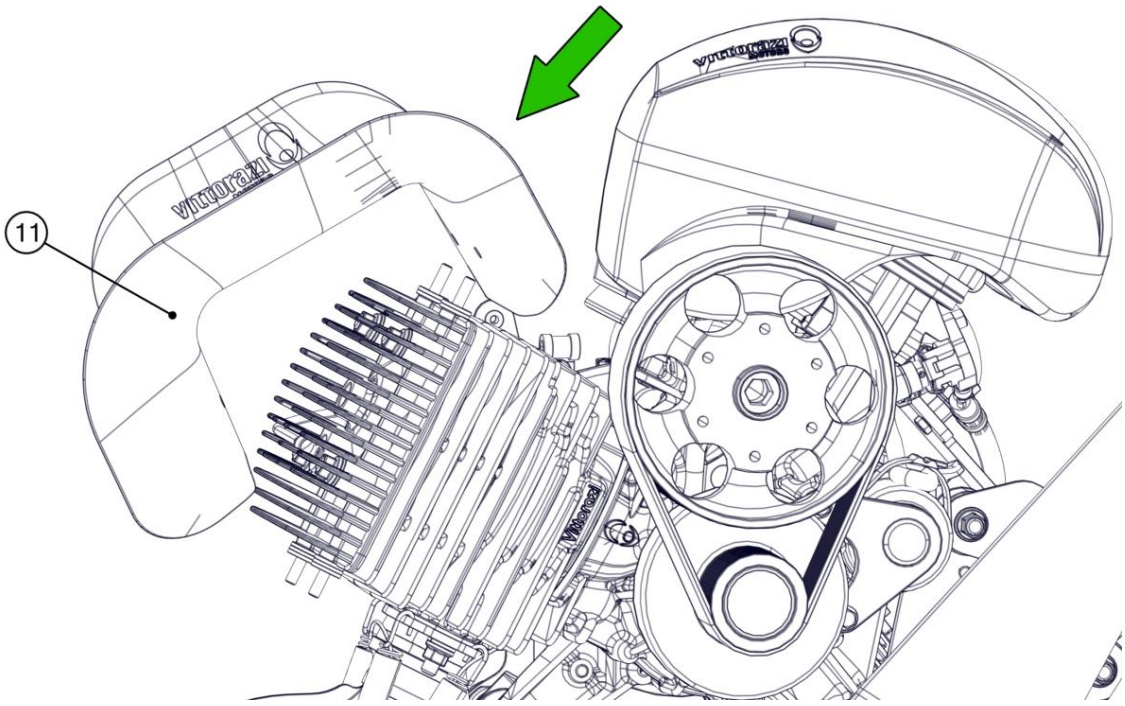


3.7.2 CHT sensor assembly

Place the CHT sensor (4) and insert the Allen screw M6x10 (16) with threadlocker (recommended Loxeal 83-55/Loctite 270) and tighten with the torque shown in the figure.

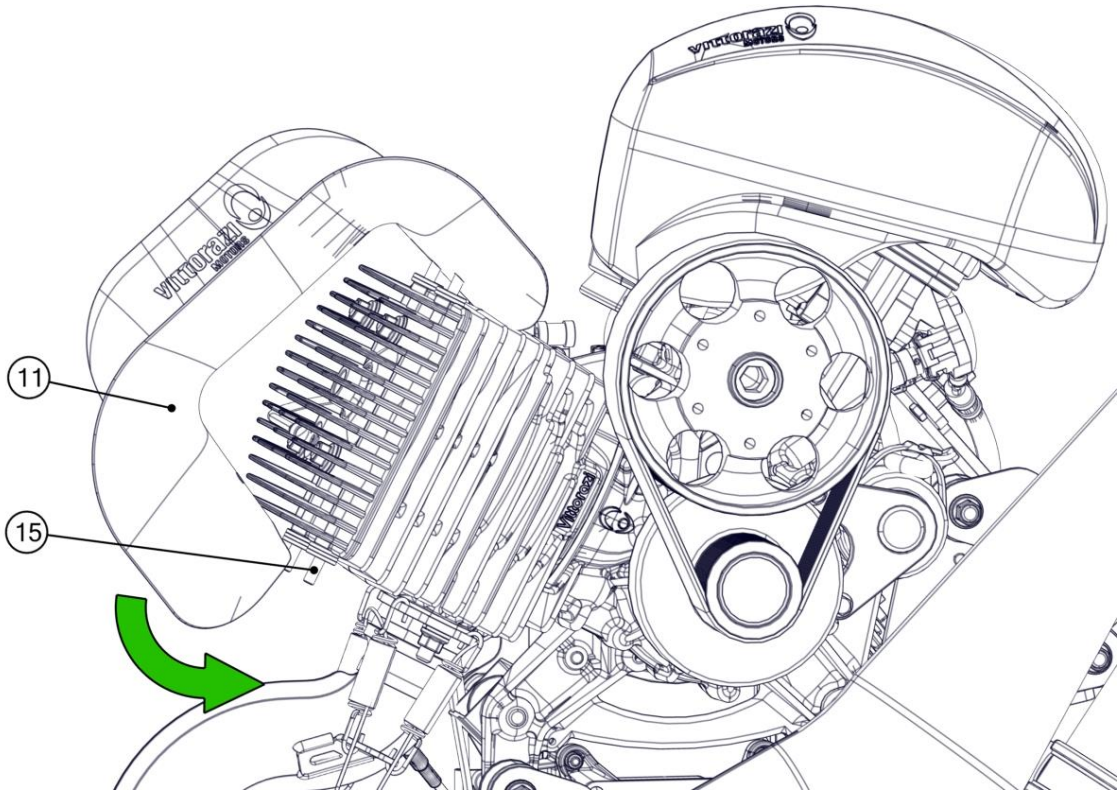


Place the cooling shroud (11) on the airbox side as shown in the figure.

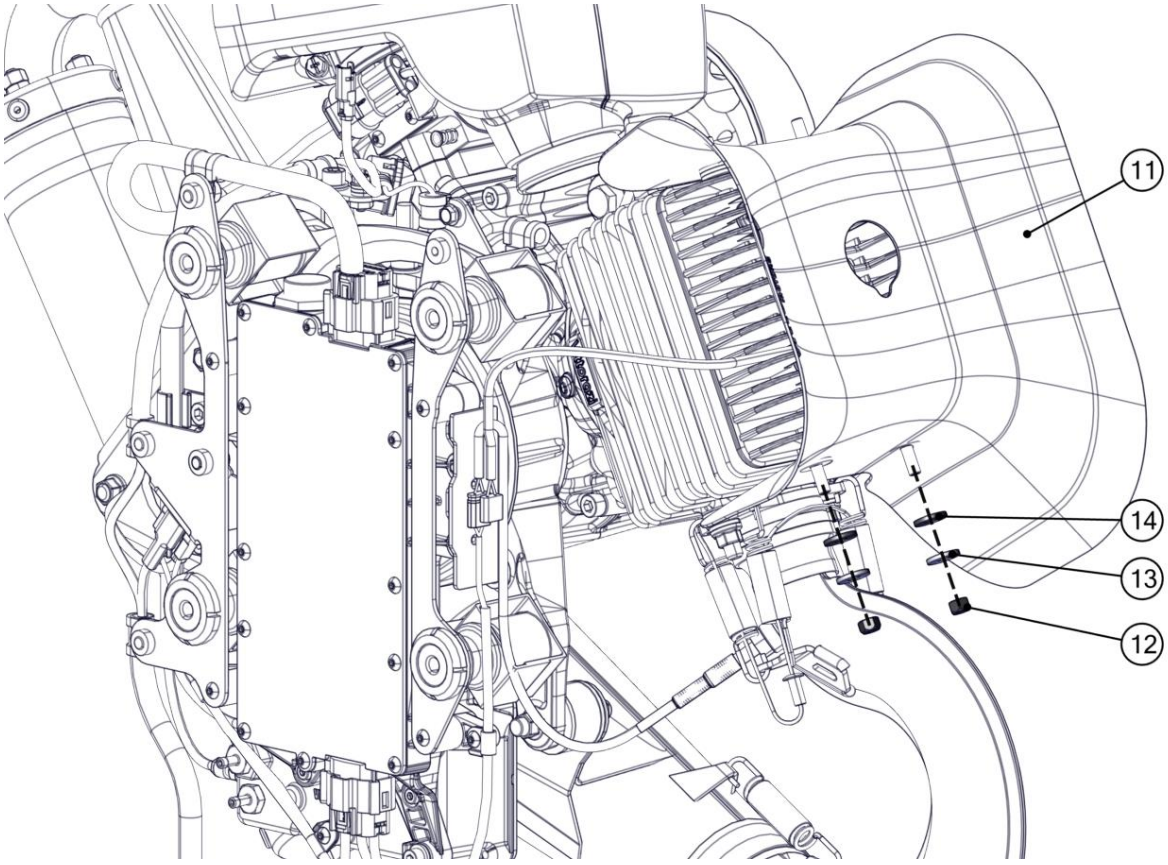


Assembly requires bending the cooling shroud (11), so gloves must be used and force applied. The carbon layer is flexible and will not be damaged during assembly bending.

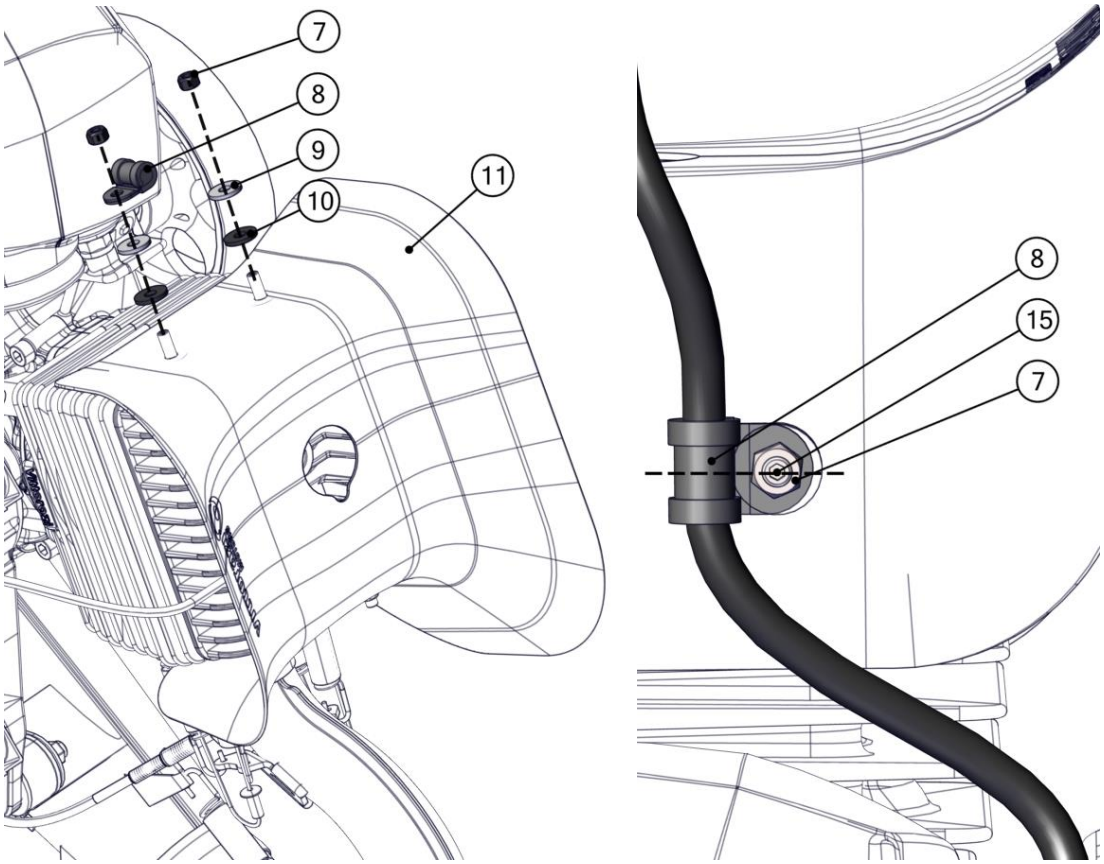
Pass the cooling shroud (11) over the 2 M5x30 studs (15) and then insert the M5x30 studs (15) into the cooling shroud holes.



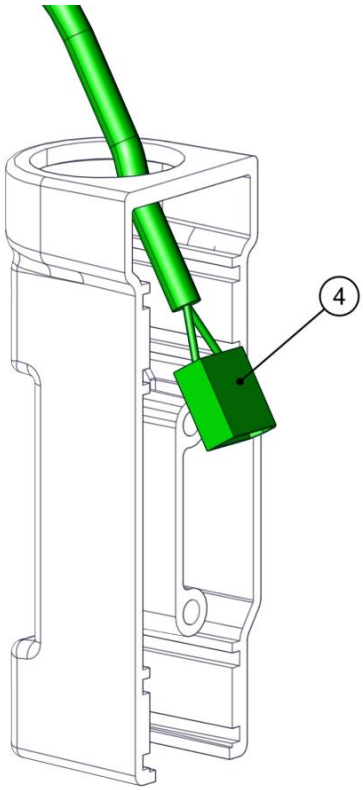
Insert the spark plug (see chapter 3.2.3 Spark plug assembly).
Insert the 2 external rubbers (14), the 2 external washers (13) and the 2 self-locking nuts M4 (12) and tighten by hand.



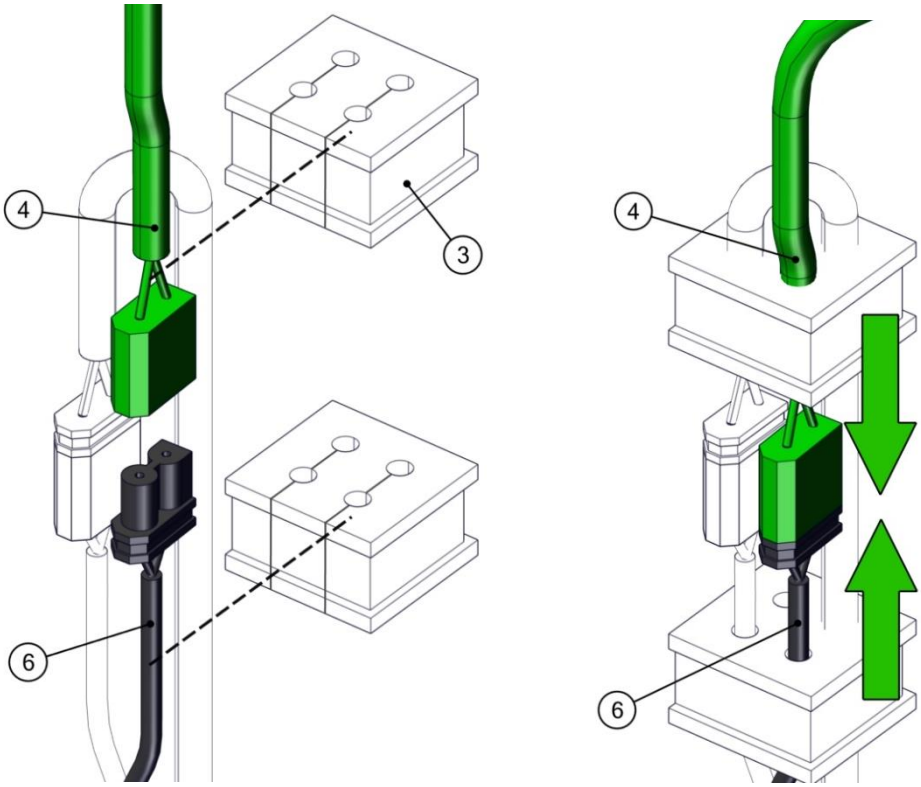
Insert the 2 external rubbers (10), the 2 external washers (9), secure the spark plug cable with the M5 F8 cable clamp (8) in the position shown in the figure and the 2 self-locking nuts M4 (7) and tighten by hand.



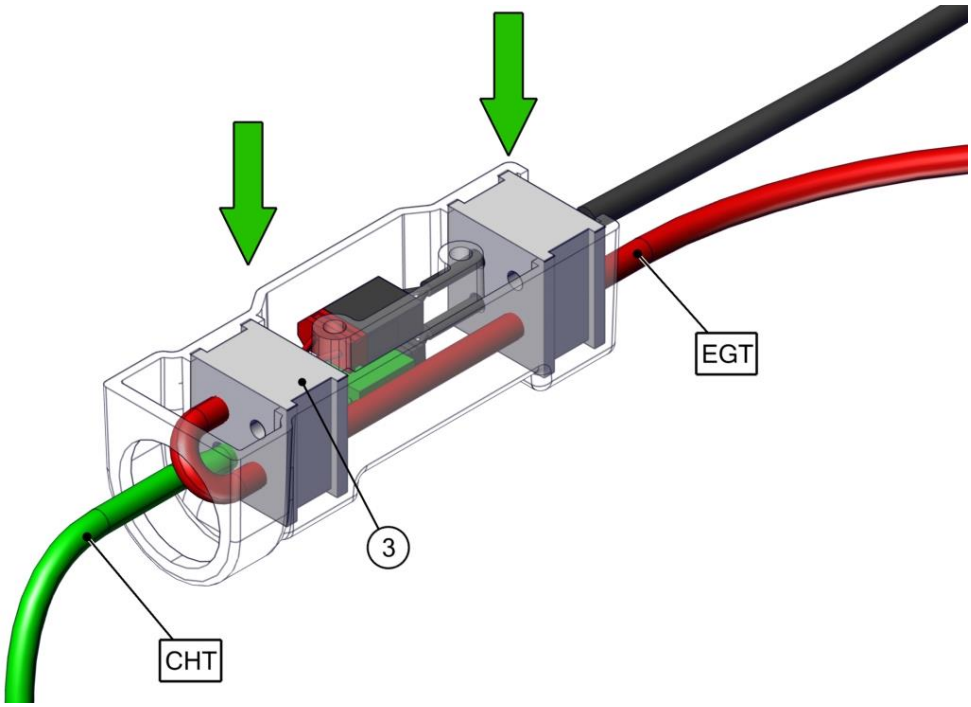
Pass the CHT cable (4) inside the sensors support hole.



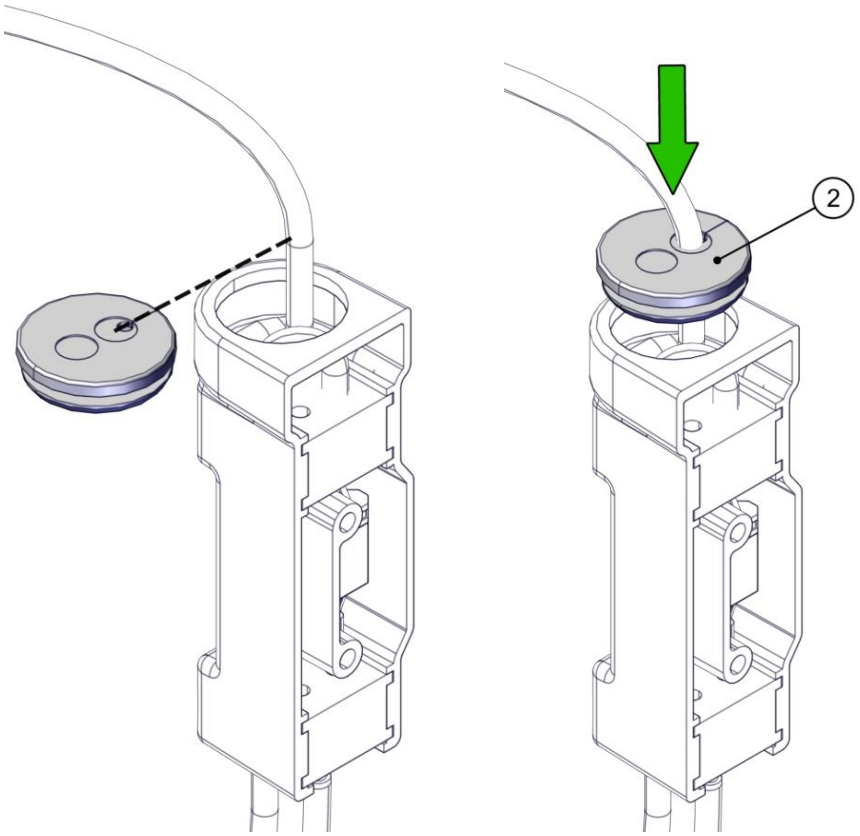
Connect the CHT sensor cable (4) with the power supply cable (6).
Insert the cables inside the rubber blocks (3) following the scheme shown in the figure.



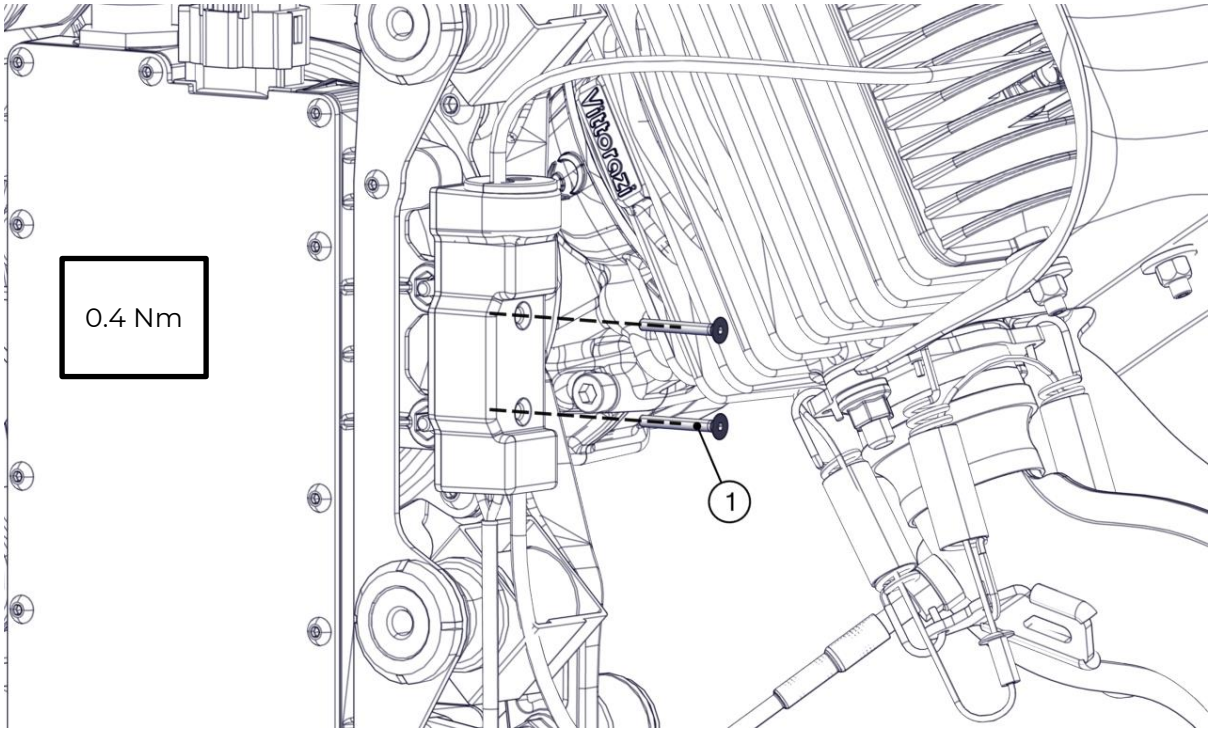
Insert the rubber blocks (3) inside their seats in the sensors support as shown in the figure.



Insert the rubber stopper (2).

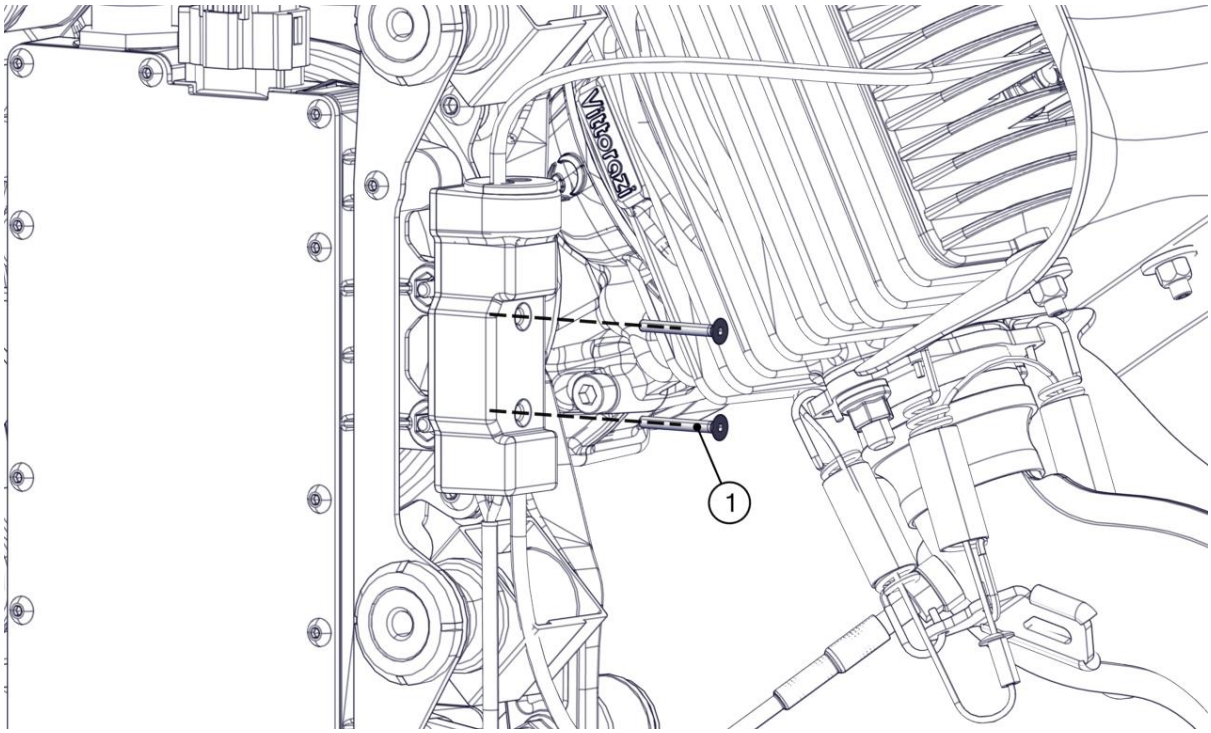


Insert the 2 screws M3x25 (1) with threadlocker (recommended Loxeal 55-03/Loctite 243) and tighten with the torque shown in the figure.

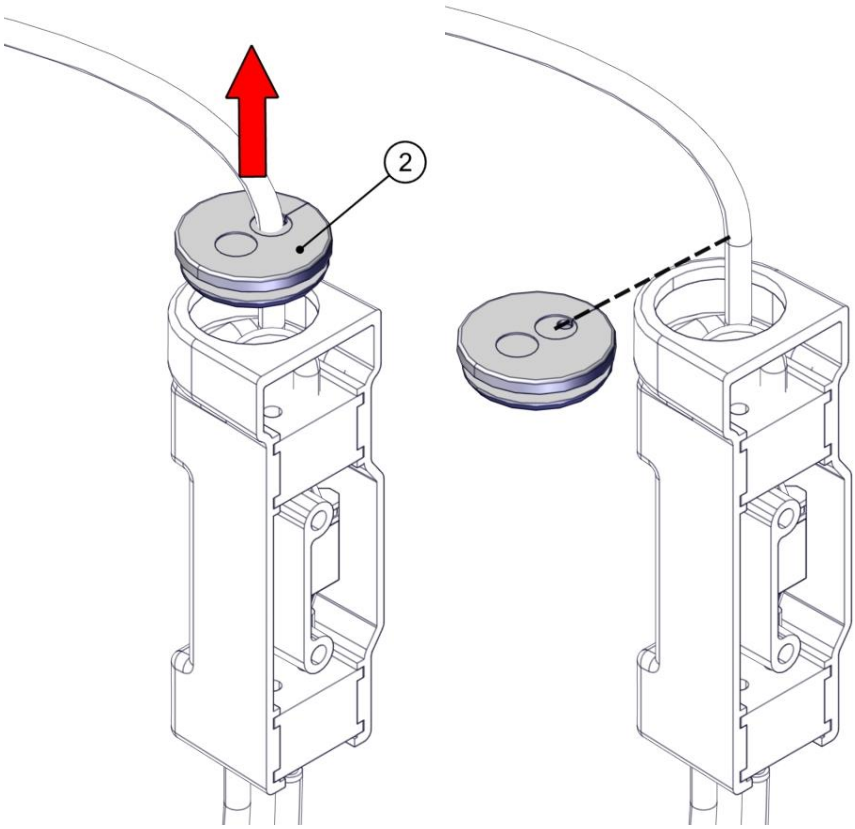


3.7.3 EGT sensor disassembly

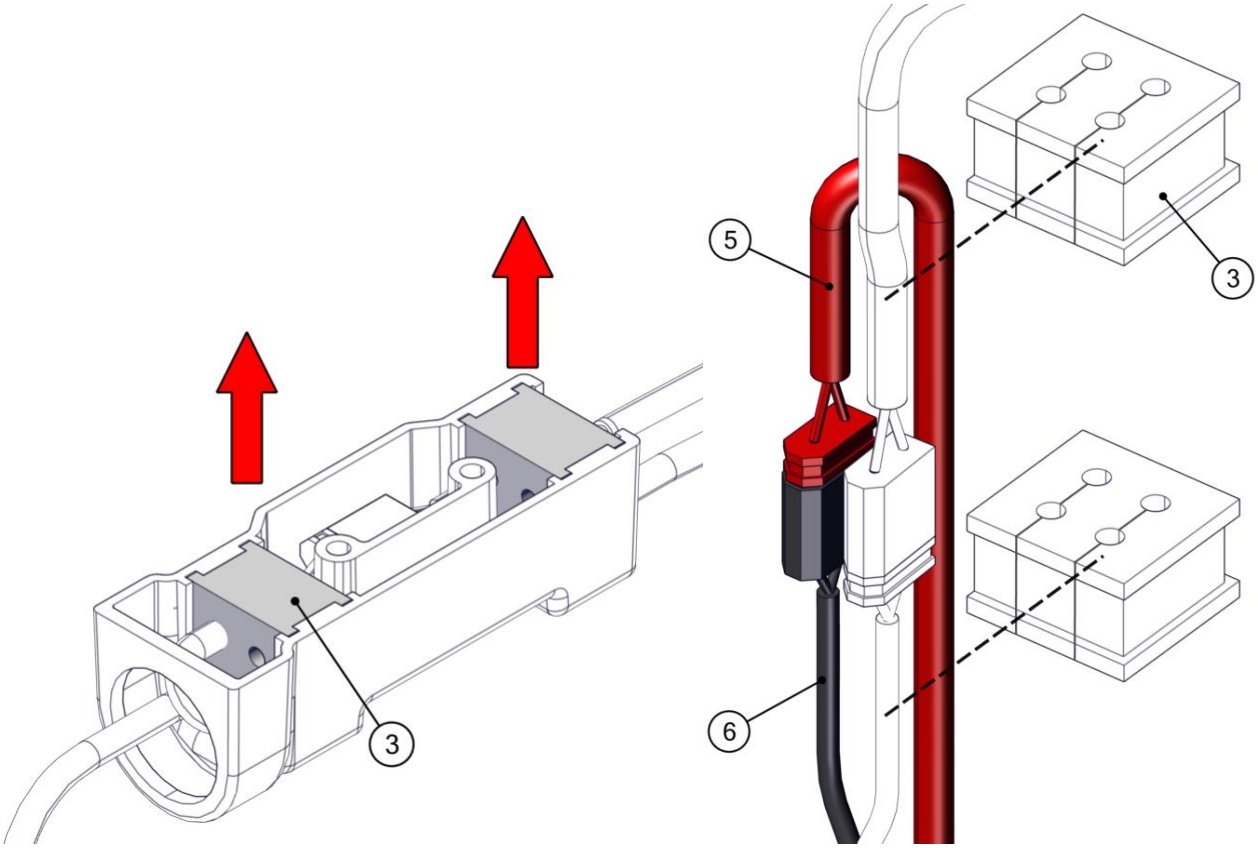
Extract the 2 screws M3x25 (1) from the sensors support.



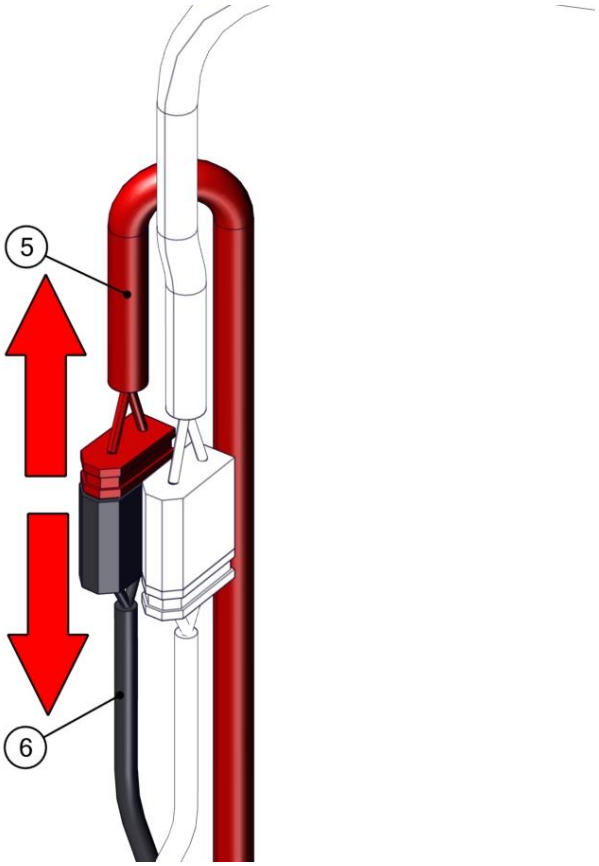
Extract the upper rubber stopper (2) from the sensors support.



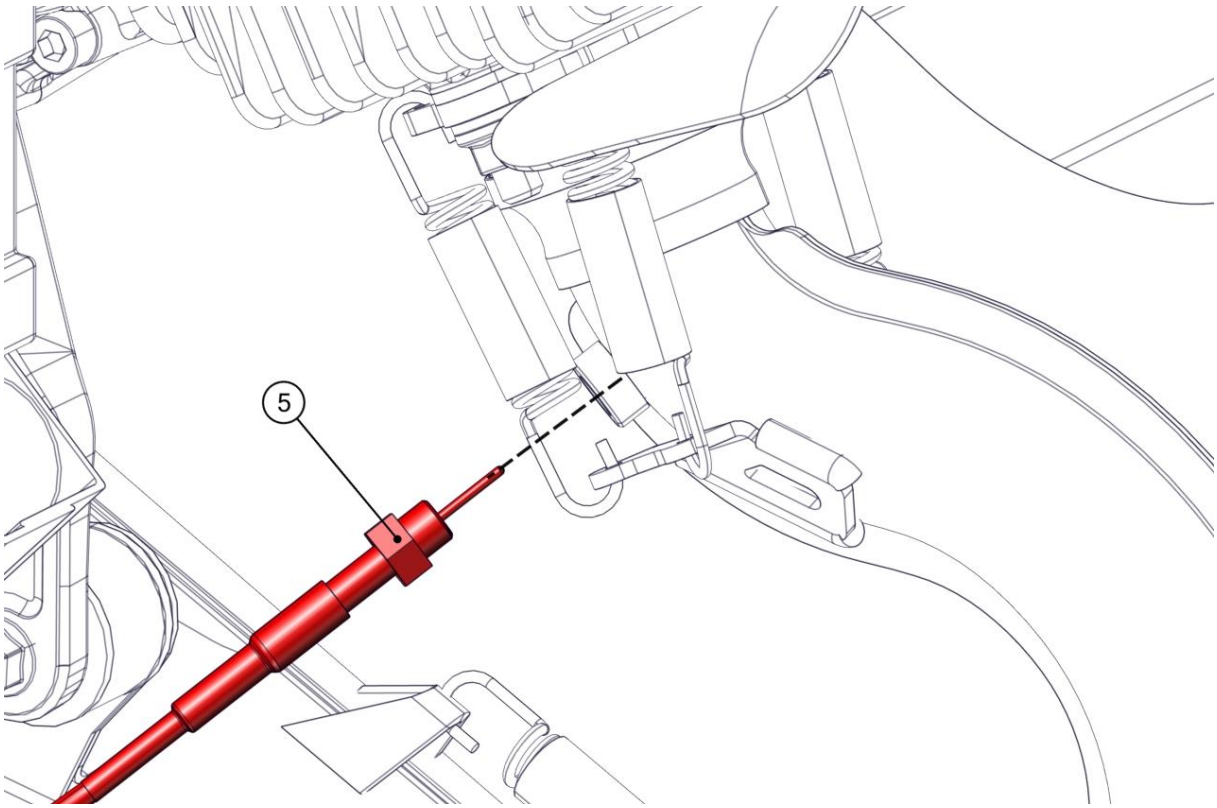
Extract the 2 rubber blocks (3).



Disconnect the EGT sensor connector (5) from the power supply cable (6).

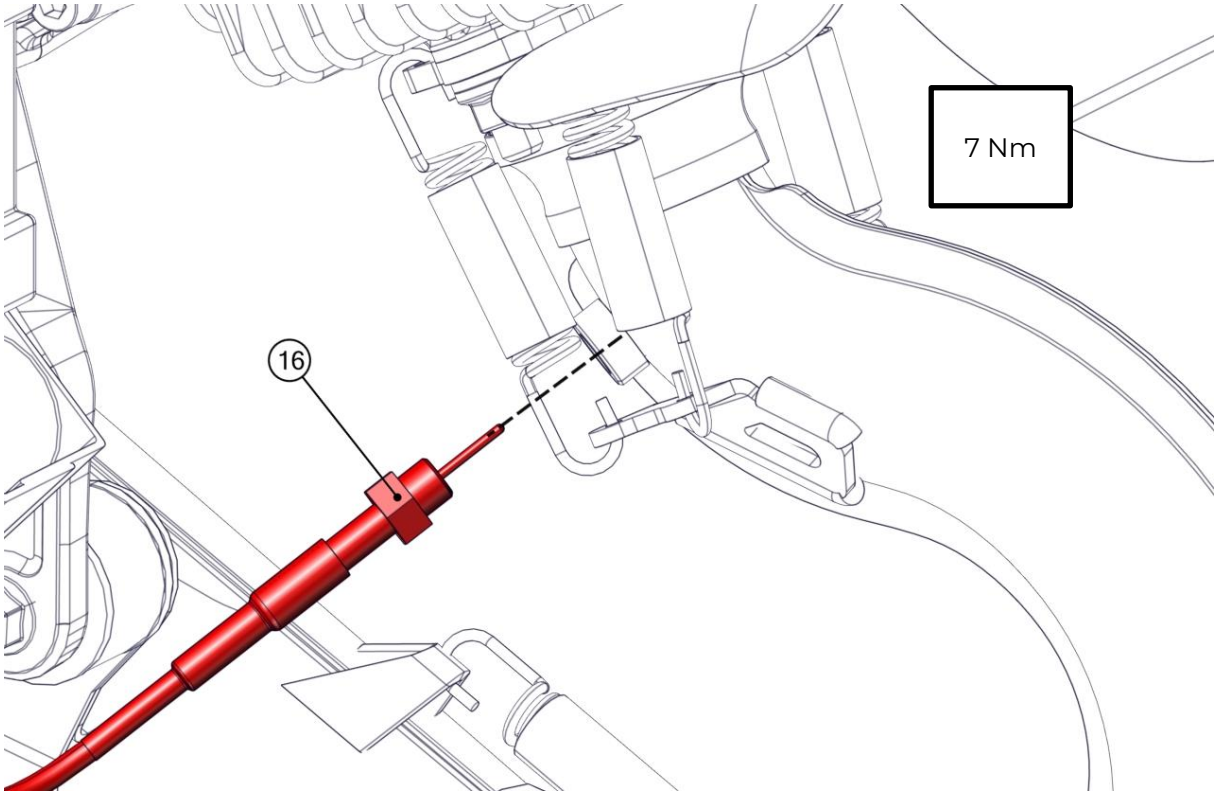


Unscrew the EGT sensor (5).

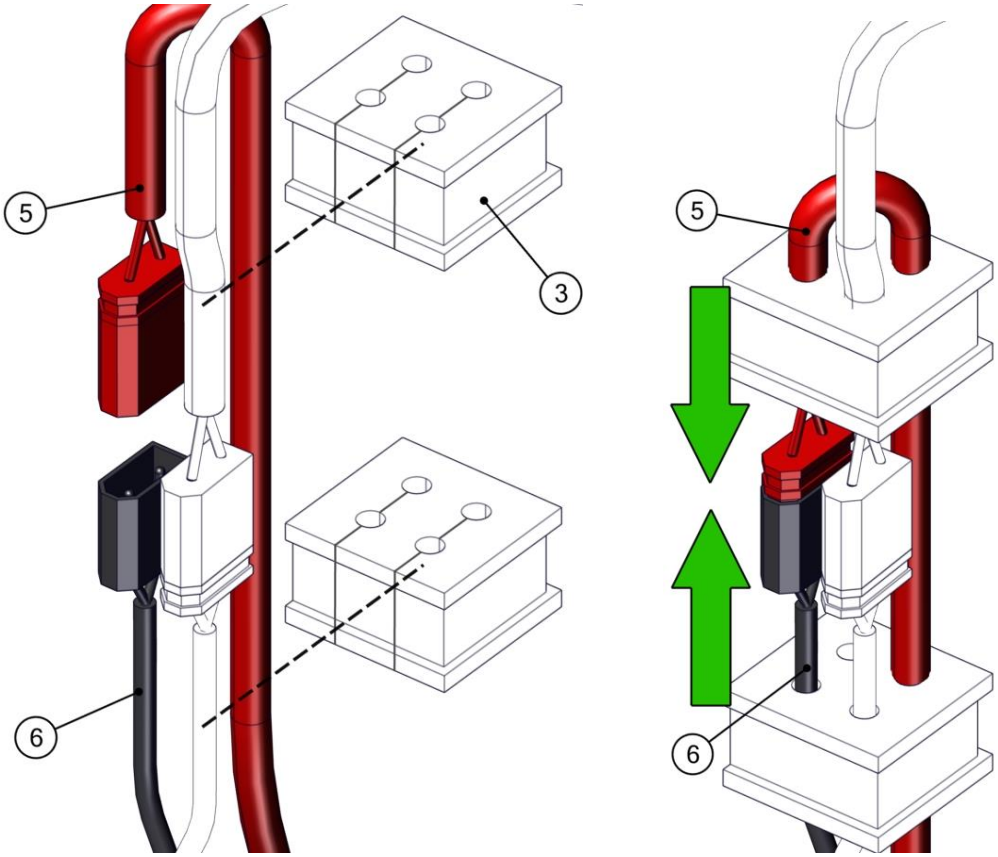


3.7.4 EGT sensor assembly

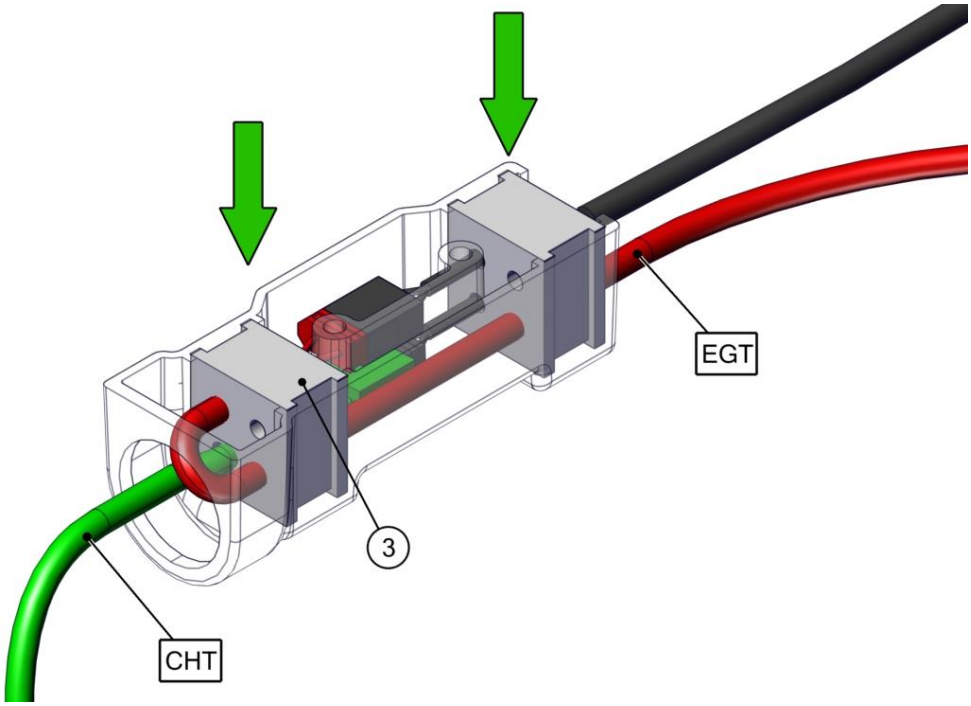
Insert the EGT sensor (5) with Interflon paste HT1200 on the EGT sensor thread and tighten with the torque shown in the figure.



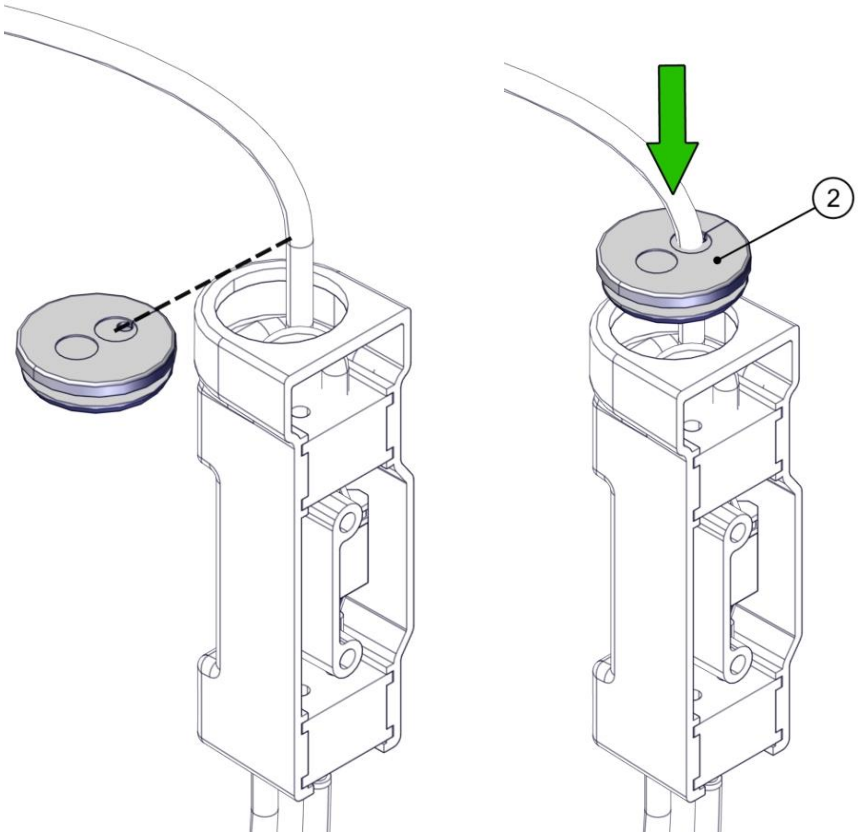
Connect the EGT sensor cable (5) with the power supply cable (6).
Insert the cables inside the rubber blocks (3) following the scheme shown in the figure.



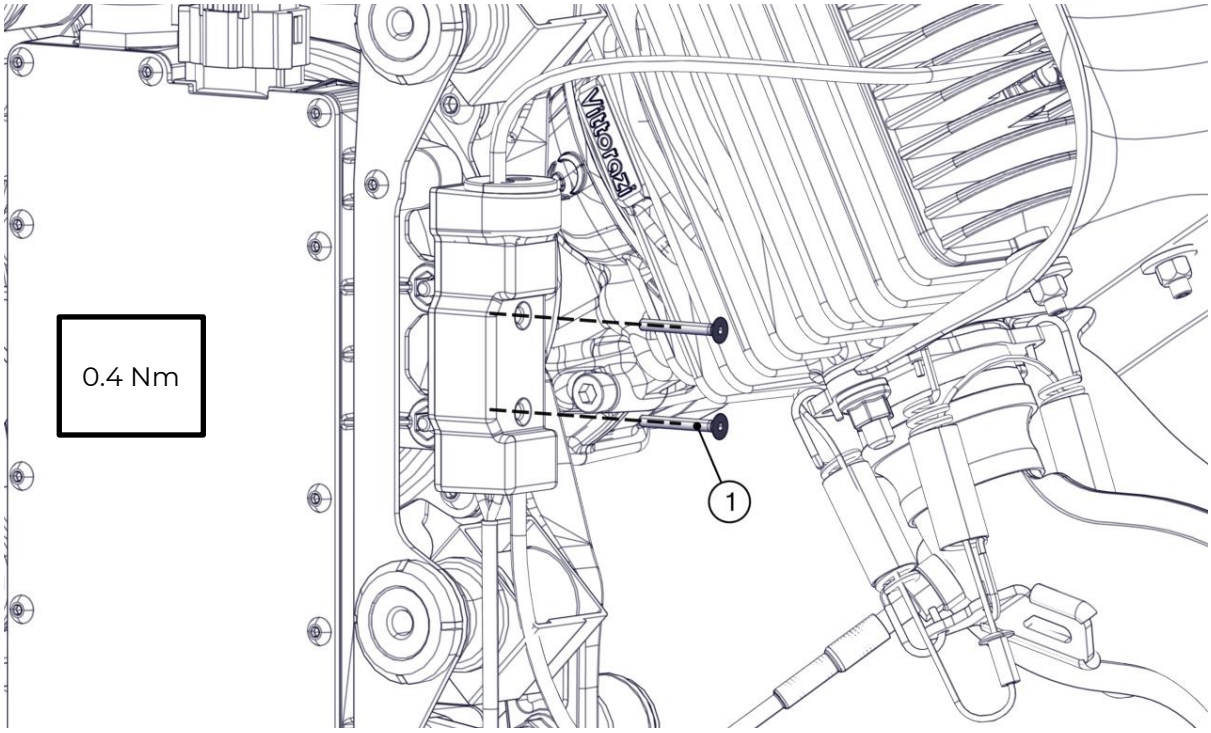
Insert the rubber blocks (3) inside their seats in the sensors support as shown in the figure.



Insert the rubber stopper (2).



Insert the 2 screws M3x25 (1) with threadlocker (recommended Loxeal 55-03/Loctite 243) and tighten with the torque shown in the figure.



3.8 Air rotary valve

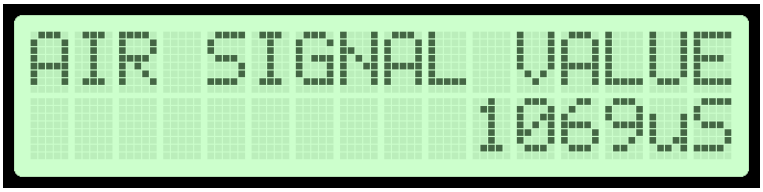
<table>
<tr><td>Components to replace</td><td>
<table>
<tr><th></th><th>Time limit</th></tr>
<tr><td>Lever kit (MI502)</td><td>100 h</td></tr>
<tr><td>O-ring (MI091a)</td><td>On condition</td></tr>
<tr><td>Air rotary valve (MI501)</td><td>On condition</td></tr>
<tr><td>Gasket (MI080k) *</td><td>On condition</td></tr>
<tr><td>Loxeal 55-03/Loctite 243 *</td><td></td></tr>
</table>
</td></tr>
<tr><td>Special tools</td><td>Not required.</td></tr>
<tr><td>Values</td><td>Screws M6x60: 6 Nm
Screw M4X8: 2.5 Nm.</td></tr>
</table>

*Always replace it when disassembled.

3.8.1 Air rotary valve disassembly

Before disassembling the air rotary valve, remove the airbox (see chapter 3.3 Airbox) and the fuel injector (see chapter 3.4.2 fuel injector disassembly) and carry out the following checks to determine which parts require maintenance.

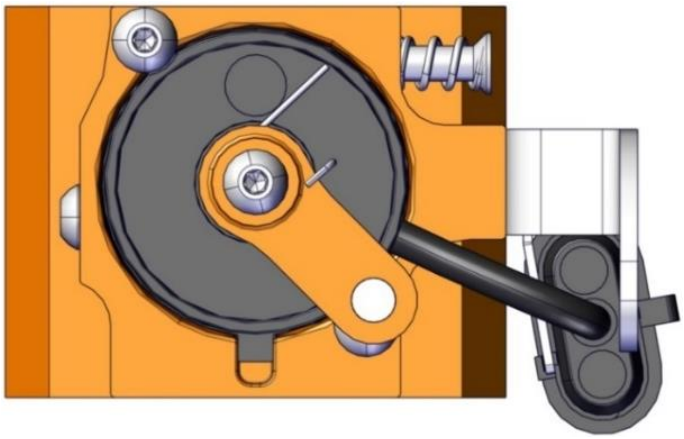
Check the movement of the valve lever: if there are signs of friction or discontinuity of movement, replace the air rotary valve.
Check the air signal value shown on the display in the “Air signal value” screen of the info menu:

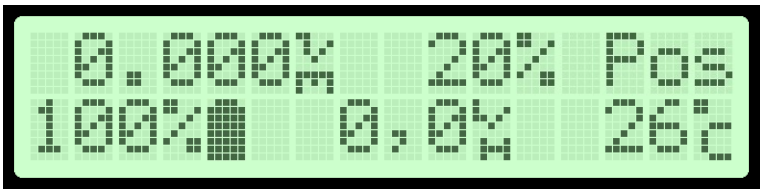


The value should be stable over the entire lever movement range, otherwise replace the RJ-45 cable and repeat this check, if the problem persists replace the air rotary valve.

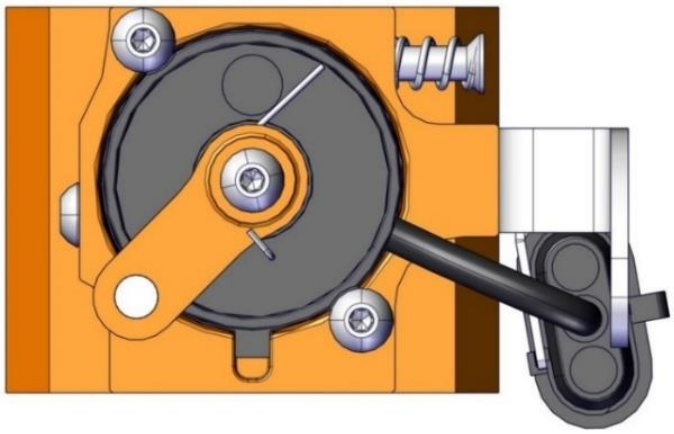
Check the opening percentages shown on the top right corner of the display in the Run screen at idle and maximum position:

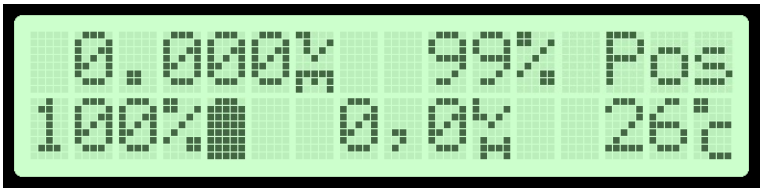
- idle position should corrispond to around 20%;





- maximum position should corrispond to around 99%.



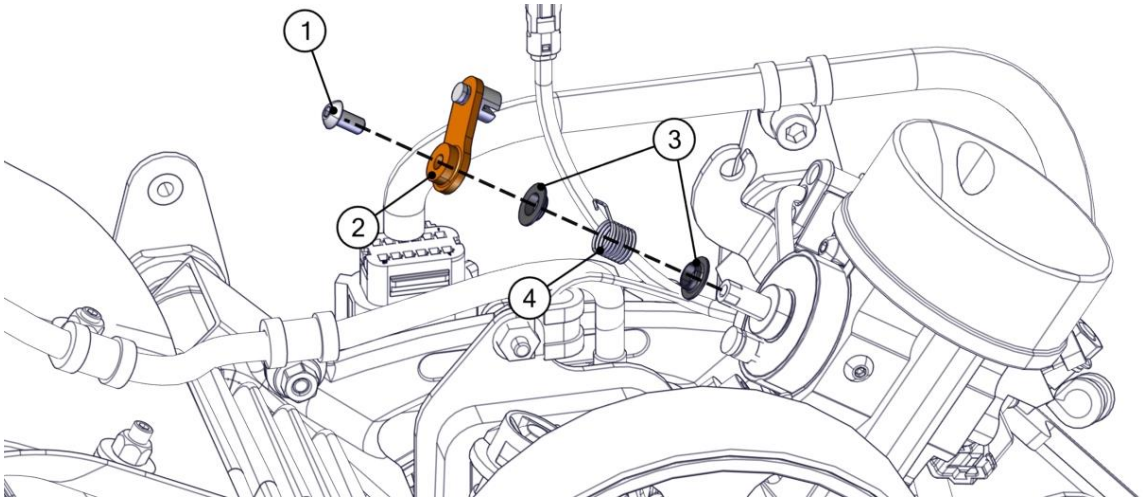


Check that the lever returns to the idle position as soon as it is released, otherwise replace the lever spring.
Remove the bowden cable and check the bowden cable and the 2 nipples: if there are sings of wear, replace them.
Remove the throttle swivel and check the throttle swivel hole on the lever: if it shows signs of wear, replace the throttle swivel.

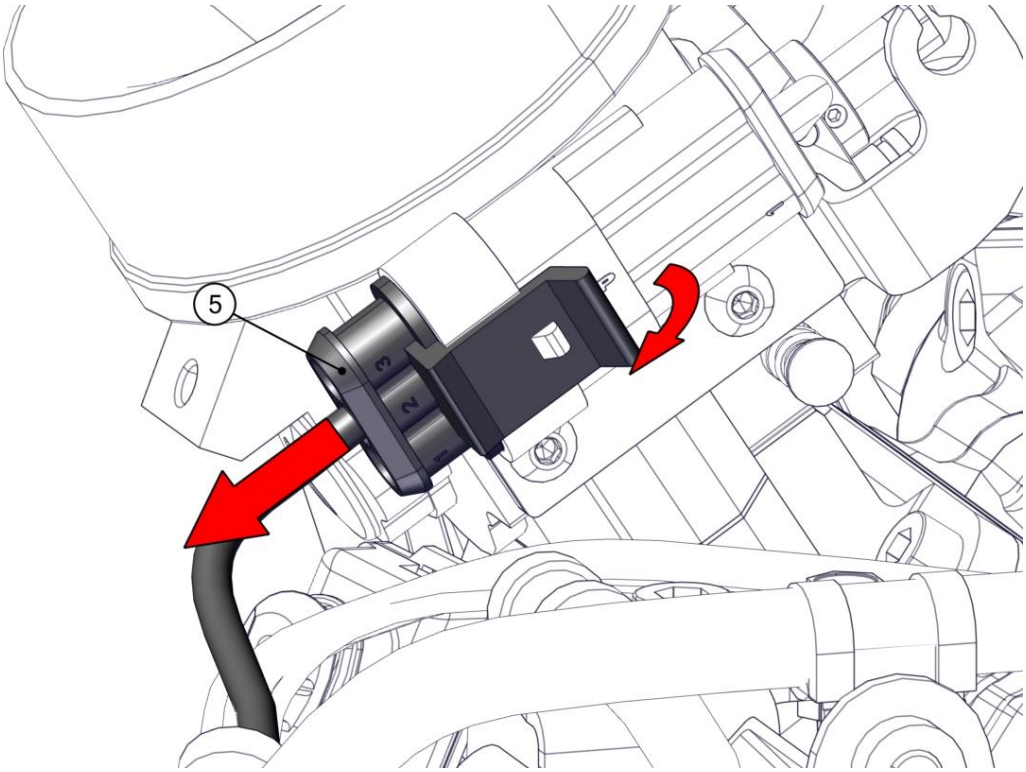
Unplug the start/stop button cable.
Remove the bowden air rotary valve cable.

Remove the air rotary valve lever only if it needs to be replaced, otherwise proceed with the next operation.

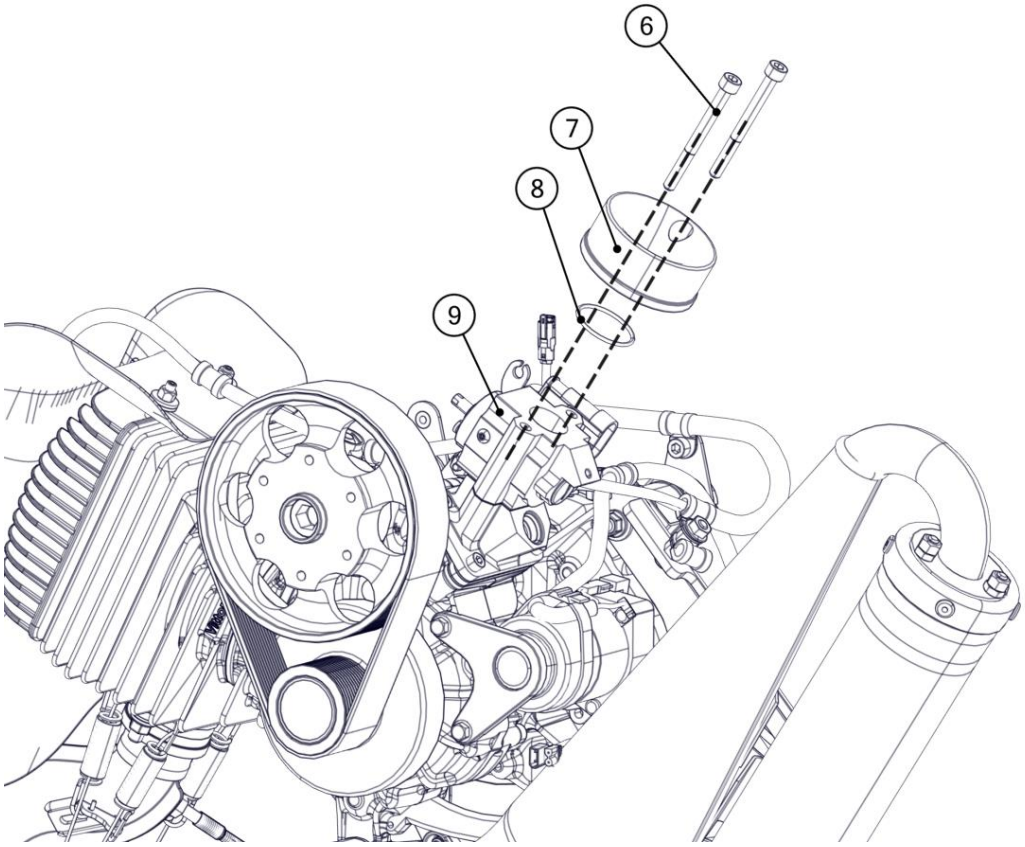
Remove the screw M4X8 (1), the lever (2) the 2 IGUS bushings (3) and the return spring (4).



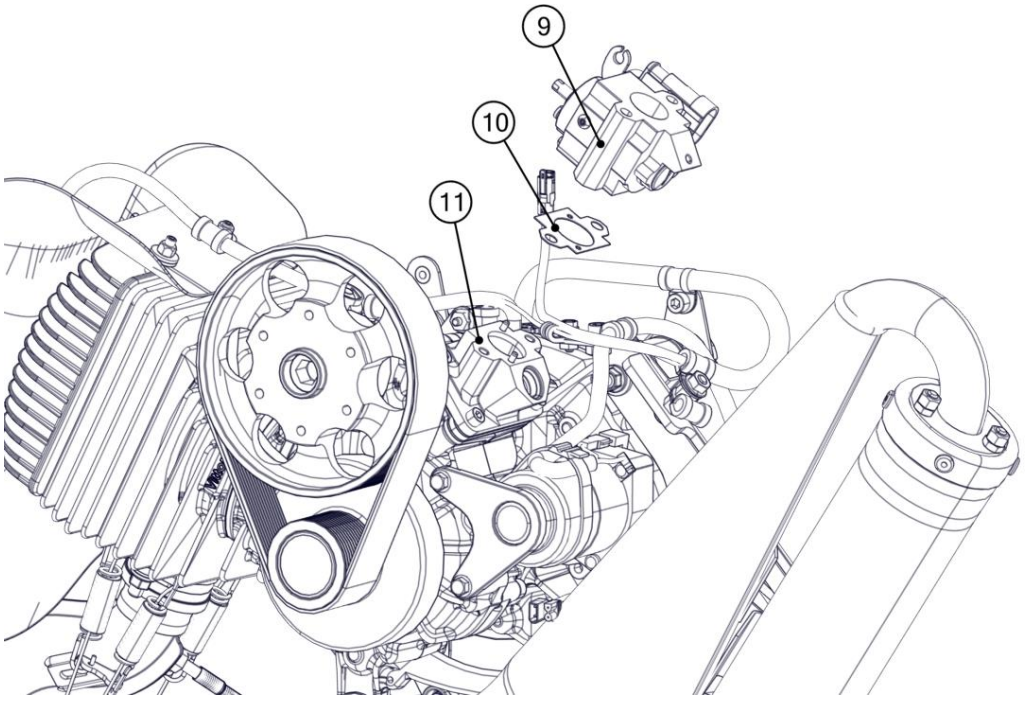
Remove the air rotary valve signal cable (5).



Remove the 2 Allen screws M6x60 (6), the airbox connector (7) and the O-ring (8).



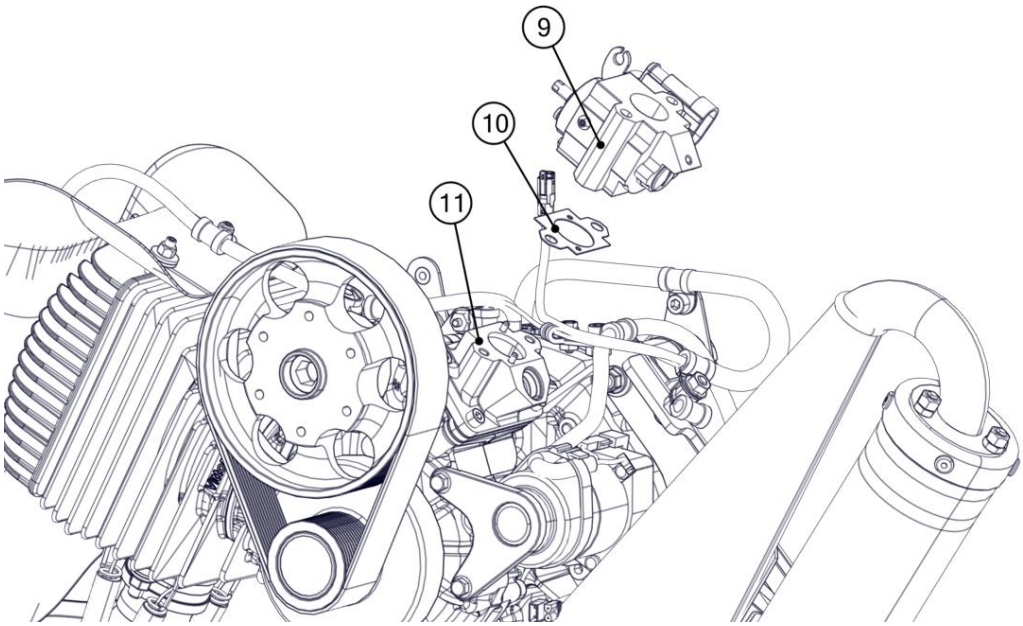
Remove the air rotary valve (9) and the gasket (10).



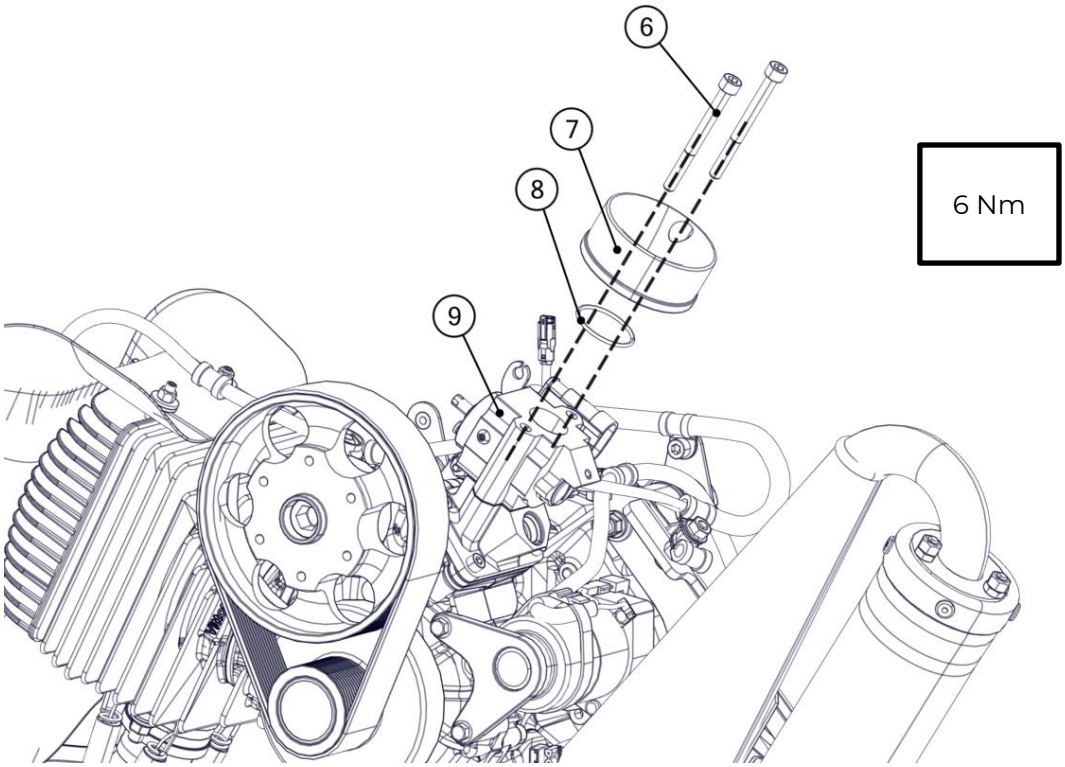
3.8.2 Air rotary valve assembly

Replace the gasket (10) each time it is disassembled.

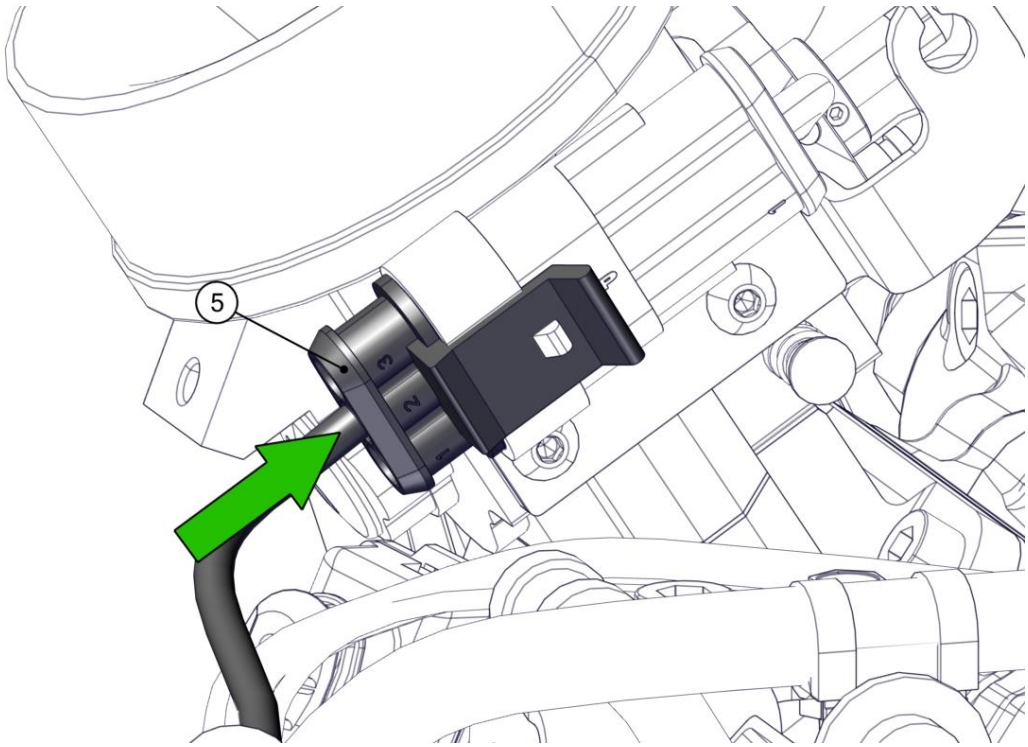
Place the gasket (10) and the air rotary valve (9) on the air rotary valve flange (11).



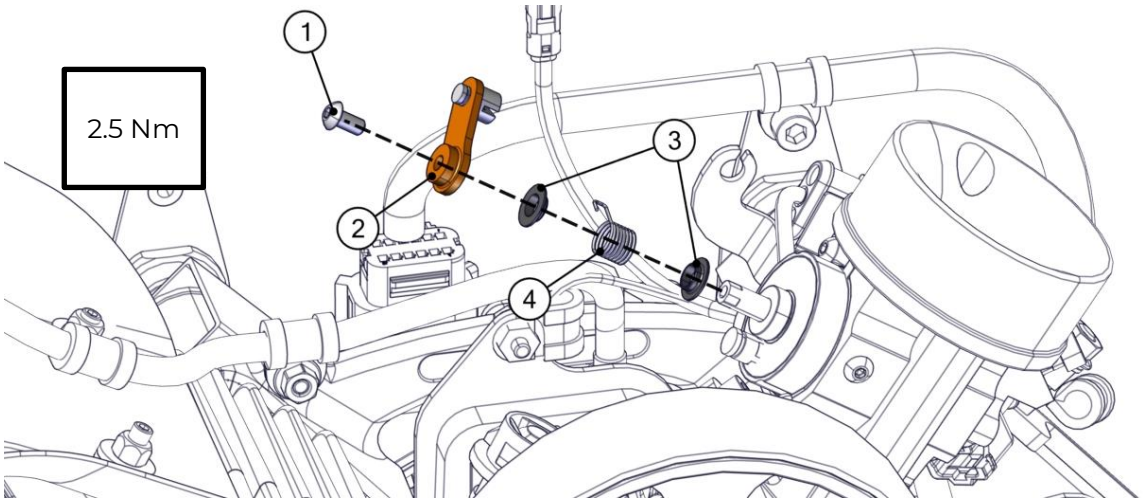
Place the airbox connector (7), with the O-rign (8).
Insert the 2 Allen screws M6x60 (6) with threadlocker (recommended Loxeal 55-03/Loctite 243) in the airbox connector (7), screw progressively, then tighten with the torque shown in the figure.



Connect the air rotary valve signal cable (5).



Insert the return spring (4) with the 2 IGUS bushings (3), the lever (2) and the screw M4X8 (1) as shown in the figure and tighten with the torque shown in the figure.



Insert the fuel injector (see chapter 3.4.4 Fuel injector assembly), the bowden air rotary valve cable, plug the start/stop button cable and insert the airbox (see chapter 3.3 Airbox),

3.9 Reed valve

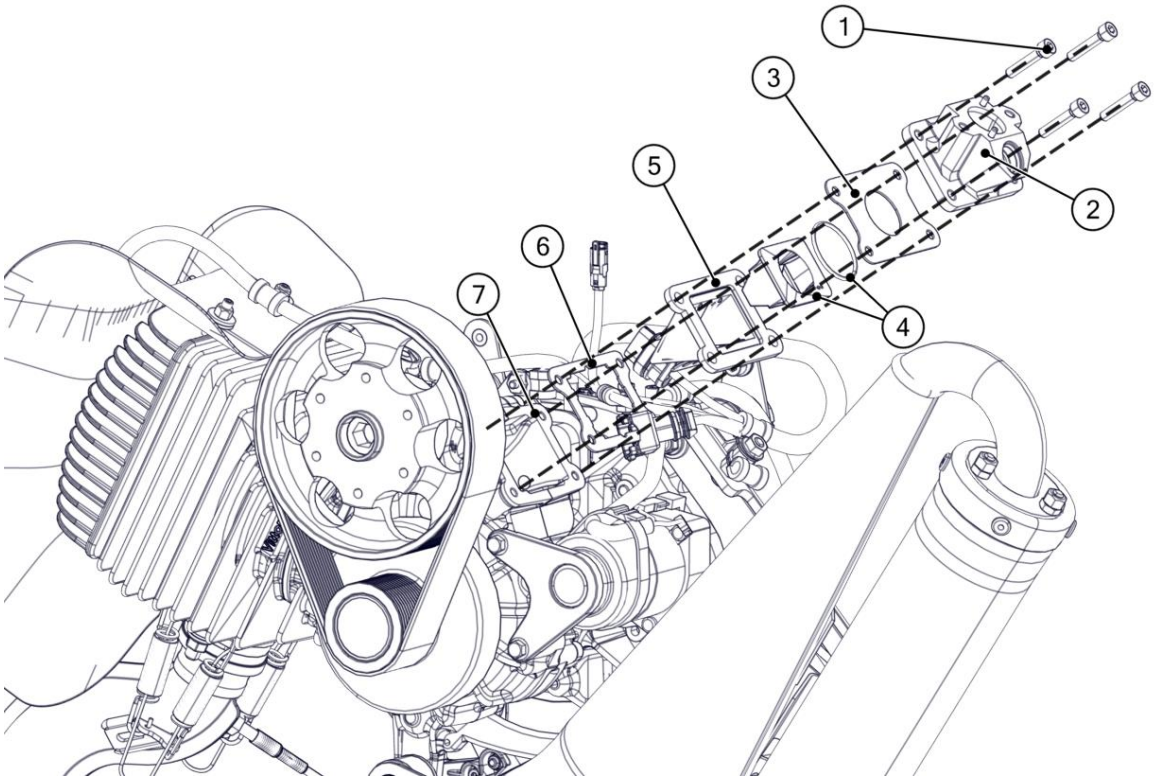
Components to replace	<table><tr><th></th><th>Time limit</th></tr><tr><td>Petals (M082)</td><td>150h</td></tr><tr><td>Gaskets (MI080k) *</td><td>150h</td></tr></table>
Special tools	Not required.
Values	Screws M5x25: 8 Nm. Screws M3x5: 1.5 Nm.

*Always replace it when disassembled.

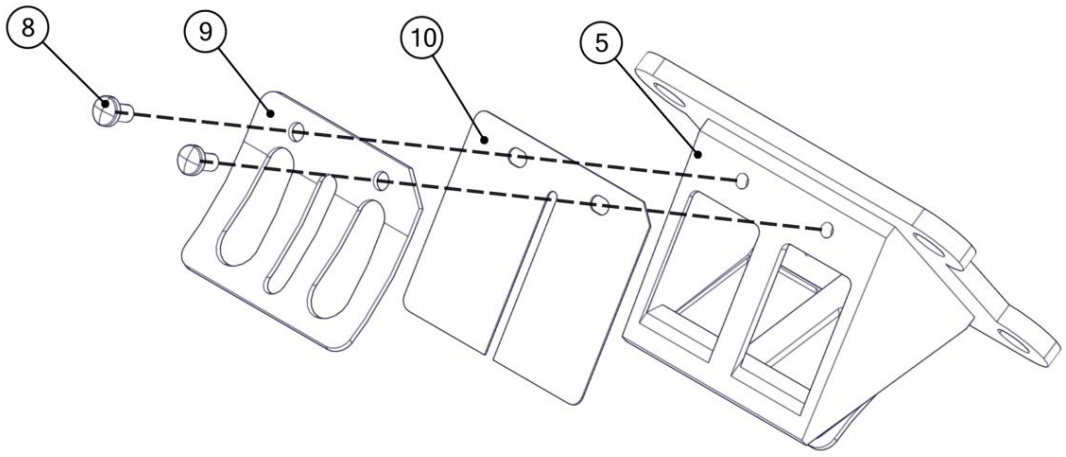
3.9.1 Reed valve disassembly

Before disassembling the reed valve, remove the airbox (see chapter 3.3 Airbox), the fuel injector (see chapter 3.4.2 fuel injector disassembly) and the air rotary valve (see chapter 3.8 Air rotary valve).

Remove the 4 Allen screws M5x25 (1) from the air rotary valve flange (2).
Remove the following components from the crankcase (7): air rotary valve flange (2), gasket (3), flow guide with O-ring (4), reed valve (5), gasket (6).



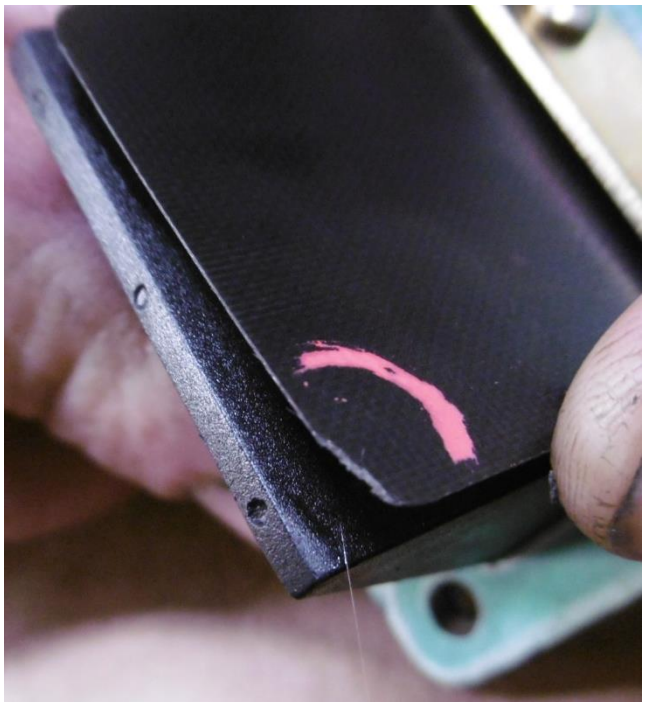
Remove the 2 screws (8) from one side of the reed valve (5).
Remove the stoppers (9) and petals (10).



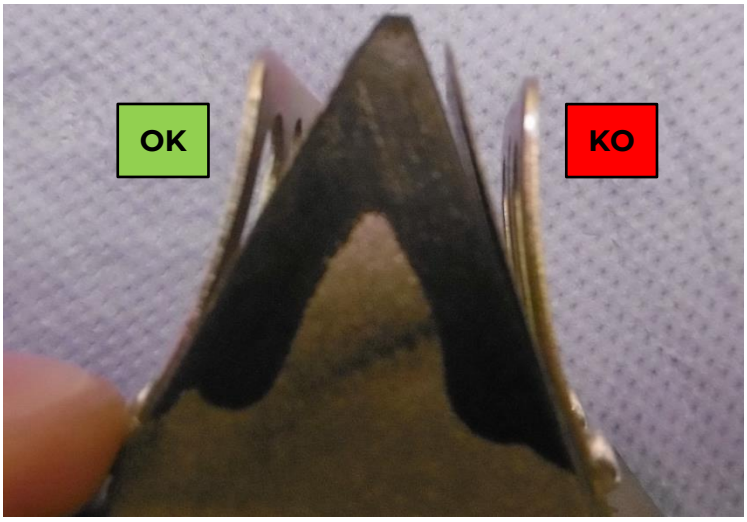
Carry out the same operations on the other side of the reed valve.

3.9.2 Reed valve maintenance

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



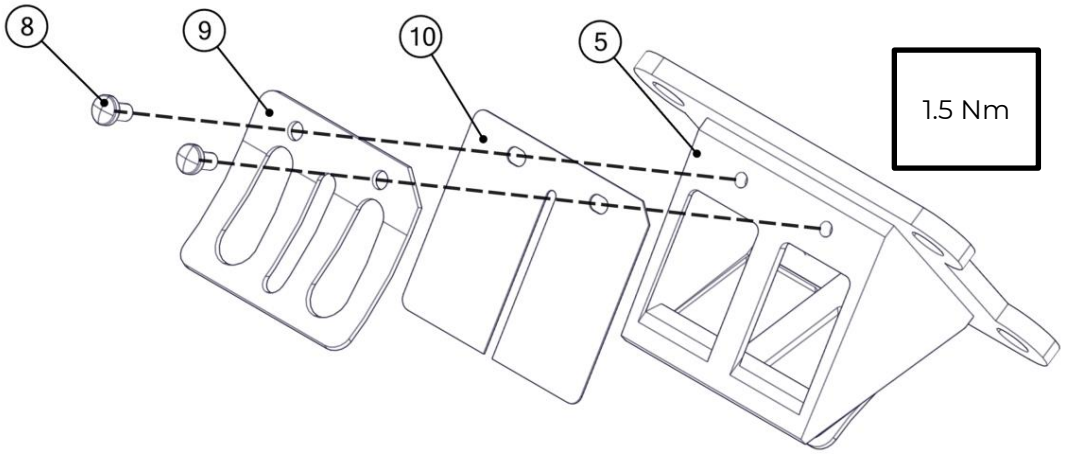
Check that the petals are not deformed: looking at the inside of the reed valve, the petals should close the opening perfectly (left side of the photo). In the right side of the photo, you can see a deformed petal that remain slightly raised.



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

3.9.3 Reed valve assembly

Place the petals (10) against the bearing surface (5), position the stoppers (9), insert the 2 screws M3x5 (8) and tighten with the torque shown in the figure.

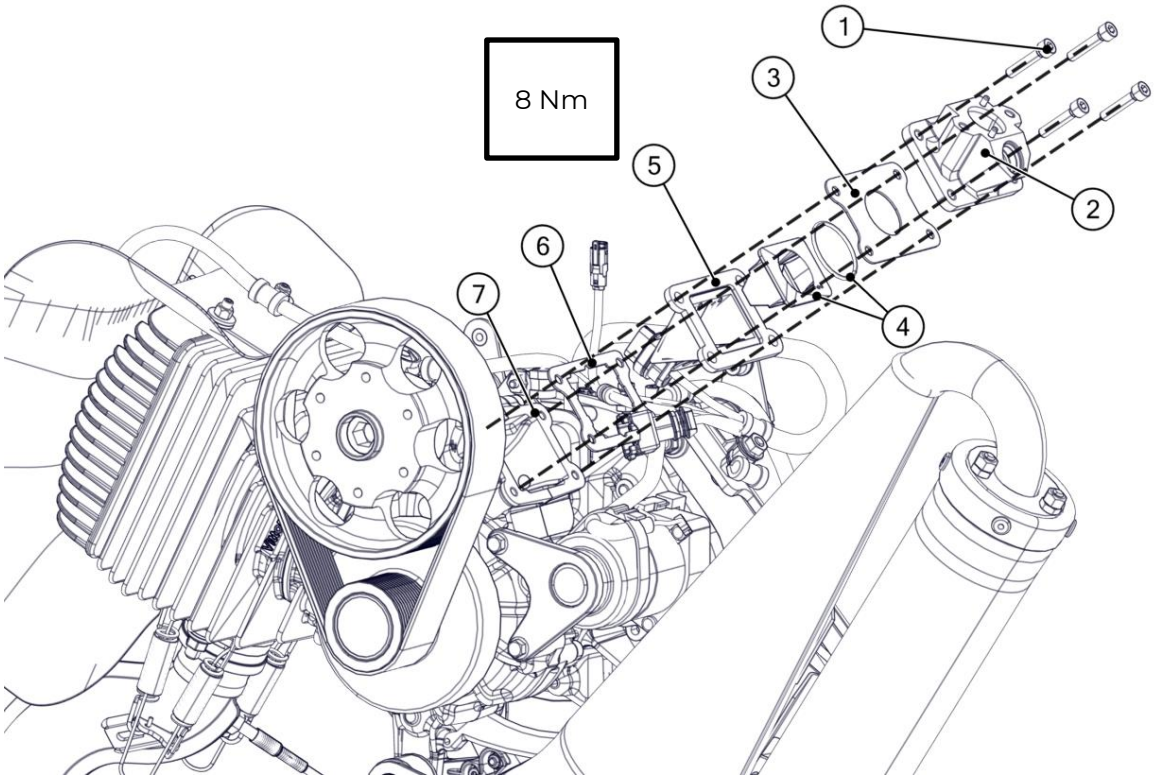


Check that the petals rest perfectly on the surface of the reed valve (see previous photos).

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

Replace the gaskets (3, 6) each time they are disassembled.

Place the gasket (6), the reed valve (5), the flow guide with O-ring (4) and the gasket (3) on the crankcase (7).
Insert the air rotary valve flange (2).
Insert the 4 Allen screws M5x25 (1) into the air rotary valve flange (2), tighten progressively, then with the torque shown in the figure.



Insert the air rotary valve (see chapter 3.8 Air rotary valve) and the airbox (see chapter 3.3 Airbox).

3.10 Battery

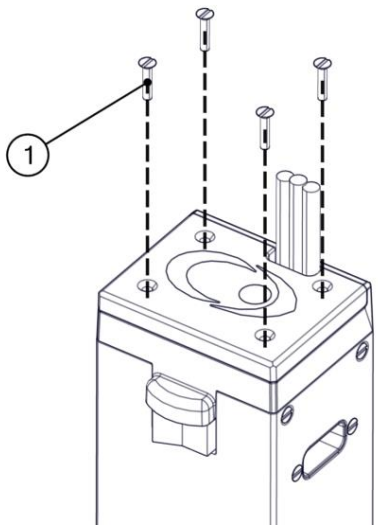
Components to replace	<table><tr><th></th><th>Time limit</th></tr><tr><td>Battery (MI700)</td><td>200 h or 300 charging cycles or 3 years</td></tr><tr><td>60A fuse (MI702)</td><td>On condition</td></tr></table>
Special tools	Not required.
Values	Self-locking nuts M5: 5 Nm

*Always replace it when disassembled.

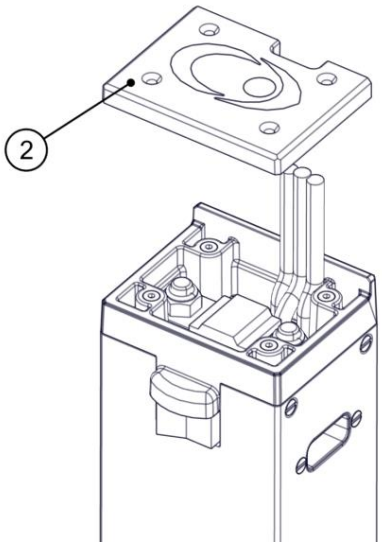
3.10.1 Electric starter 60A fuse disassembly

Make sure the battery is turned off and disconnected from the charger and from the engine.

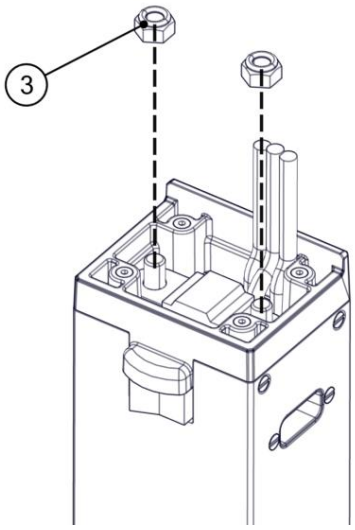
Remove the 4 screws M2X10 (1) from the upper battery cover.



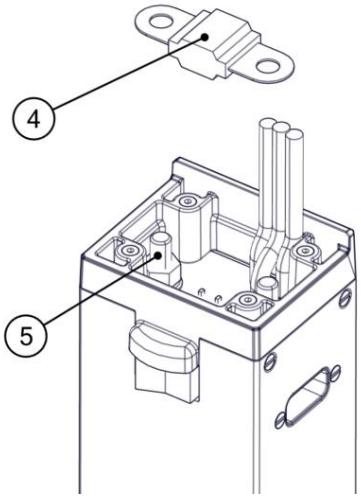
Remove the upper battery cover (2).



Remove the 2 self-locking nuts M5 (3).



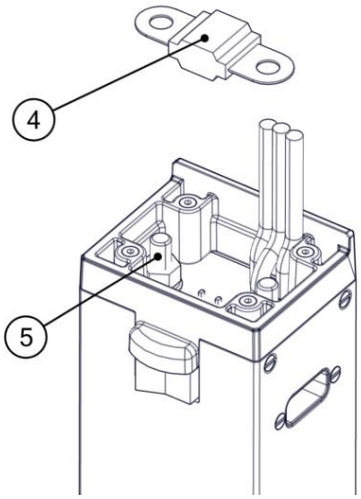
Remove the 60A fuse (4).



3.10.2 Electric starter 60A fuse assembly

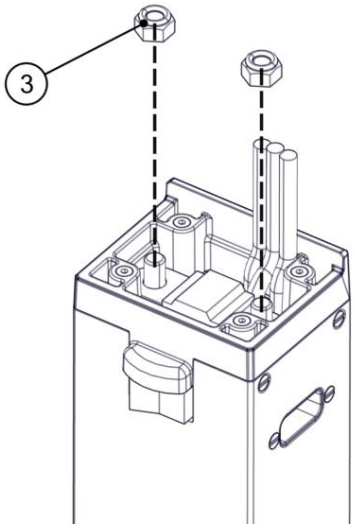
Make sure the battery is turned off and disconnected from the charger and the engine.

Place the electric starter 60A fuse (4) on the 2 screws M5x12 (5).

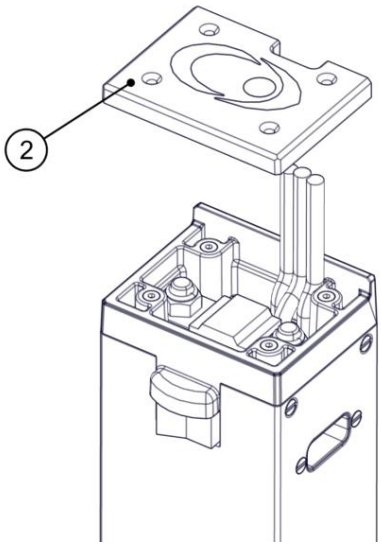


Insert the 2 self-locking nuts M5 (3) and tighten with the torque shown in the figure.

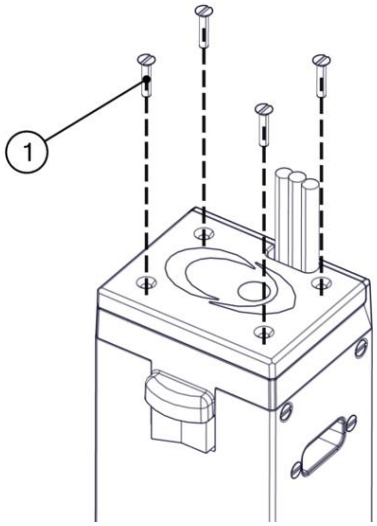
5 Nm



Place the upper battery cover (2).



Insert the 4 screws M2x10 (1) and carefully tighten by hand.



3.11 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: 3.8 Air rotary valve, 3.9 Reed valve, 3.12 Exhaust system and 3.17 Piston, cylinder, head.

3.12 Exhaust system

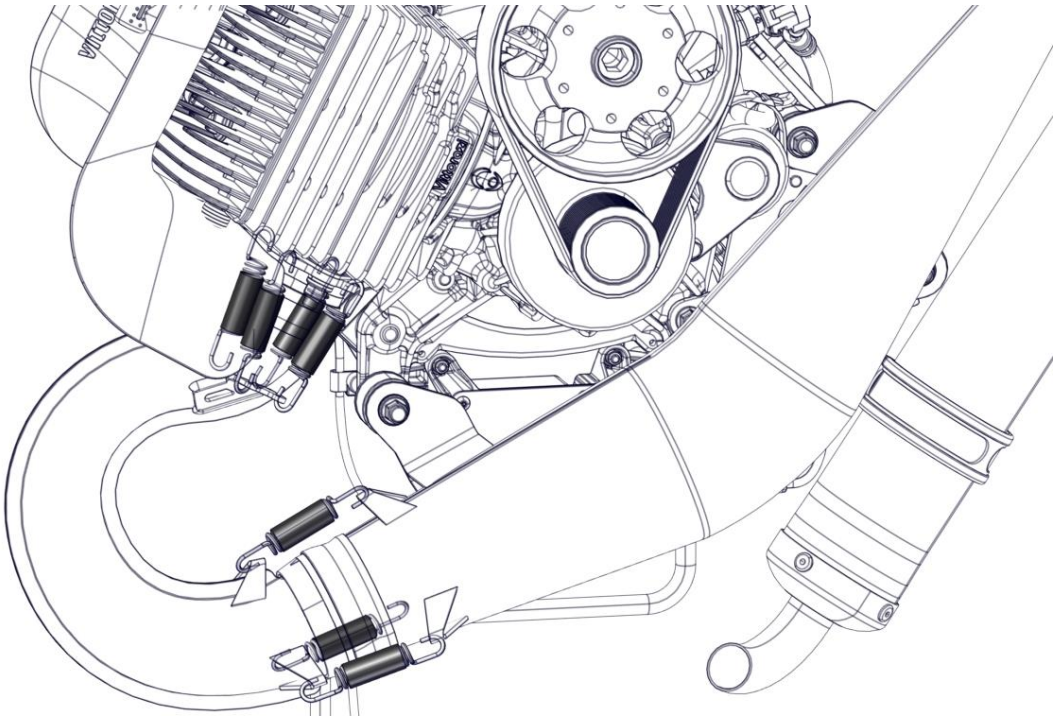
<table>
<tr><td>Components to replace</td><td>
<table>
<tr><th></th><th>Time limit</th></tr>
<tr><td>Exhaust bushing (1st joint, MY202a).</td><td>50h</td></tr>
<tr><td>Gaskets (M137, MP155) *</td><td>100h</td></tr>
<tr><td>Springs (M139, MP140, MP141) *</td><td>150h</td></tr>
<tr><td>Self-locking nuts M8 (M019) *</td><td>150h</td></tr>
<tr><td>Exhaust bushing (2nd joint, MI203).</td><td>150h</td></tr>
<tr><td>Exhaust manifold (MY200b).</td><td>150h</td></tr>
<tr><td>Silencer rubber (M141a).</td><td>150h or 1 year</td></tr>
<tr><td>Silencer soundproofing material (MP159).</td><td>150h</td></tr>
<tr><td>Silicone (LOCTITE 5900) *</td><td></td></tr>
<tr><td>Molykote grease. *</td><td></td></tr>
<tr><td>Loxeal 83-55/Loctite 270. *</td><td></td></tr>
</table>
</td></tr>
<tr><td>Special tools</td><td>Not required.</td></tr>
<tr><td>Values</td><td>Self-locking nuts M8: 32 Nm.
Silencer nuts: 10 Nm
Screw M8x25: 14 Nm.</td></tr>
</table>

*Always replace it when disassembled.

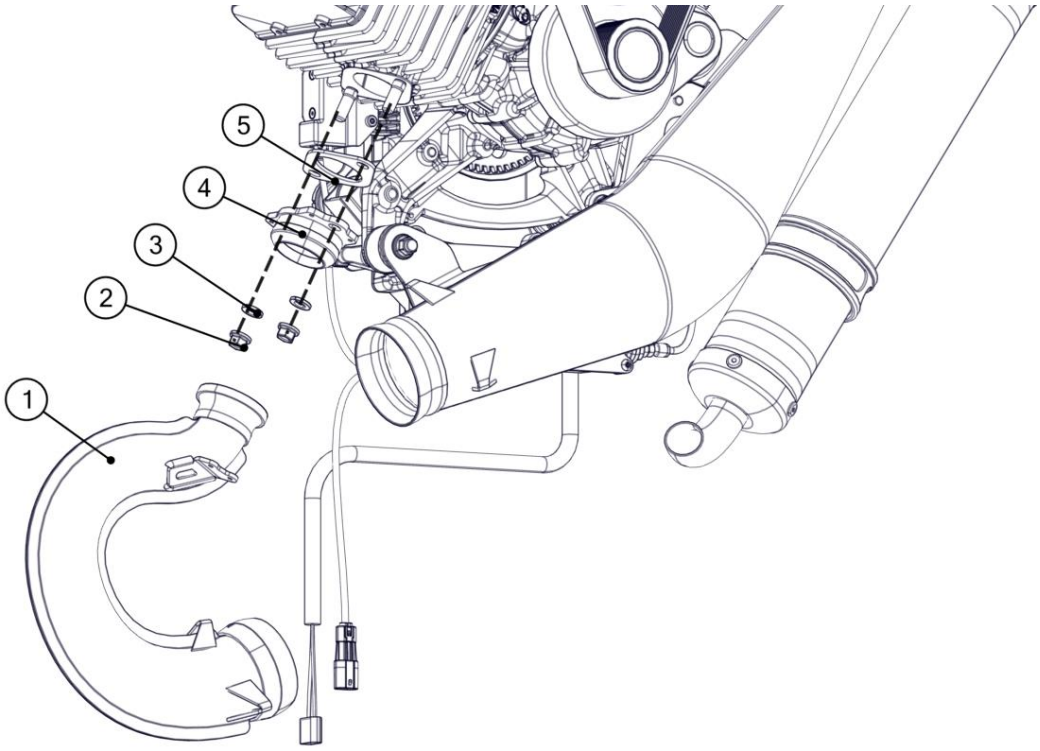
3.12.1 Manifold, exhaust bushings disassembly

Before proceeding with the next operations, remove the EGT sensor (see chapter 3.7.3 EGT sensor disassembly).

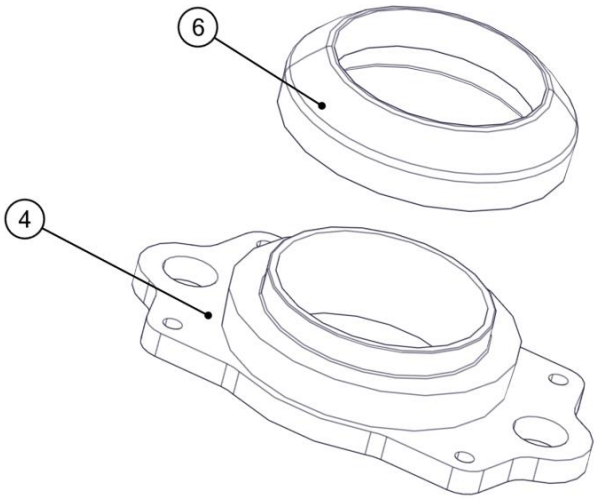
Remove the safety cables around the springs.
Remove the 4 bushing springs and the 3 exhaust manifold springs.



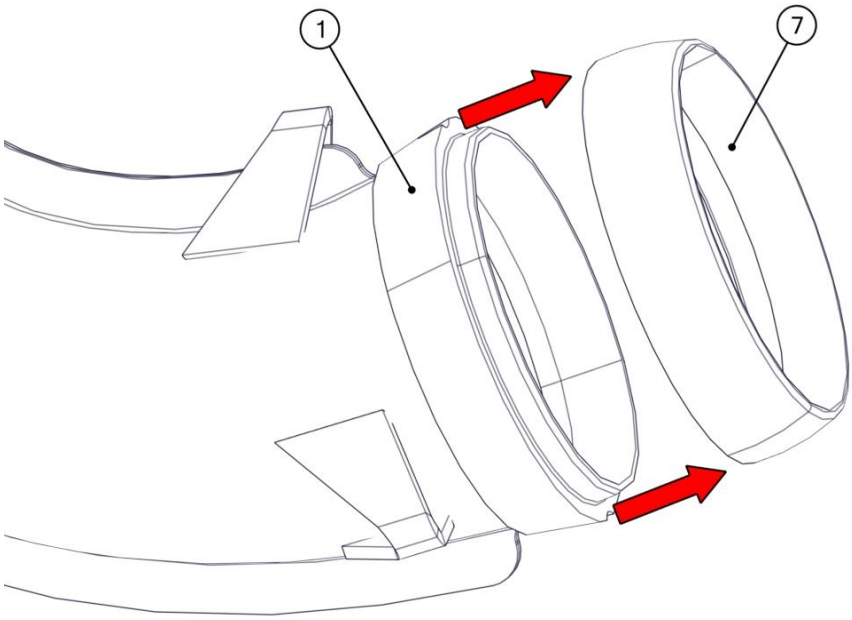
Remove the exhaust manifold (1), the 2 self-locking nuts M8 (2) with the washers (3), the exhaust flange with bushing (4) and the gasket (5).



Remove the bronze ring (6) from the exhaust flange (4).



Remove the bronze ring (7) from the exhaust manifold (1) by pushing from the two notches in the exhaust manifold (1).



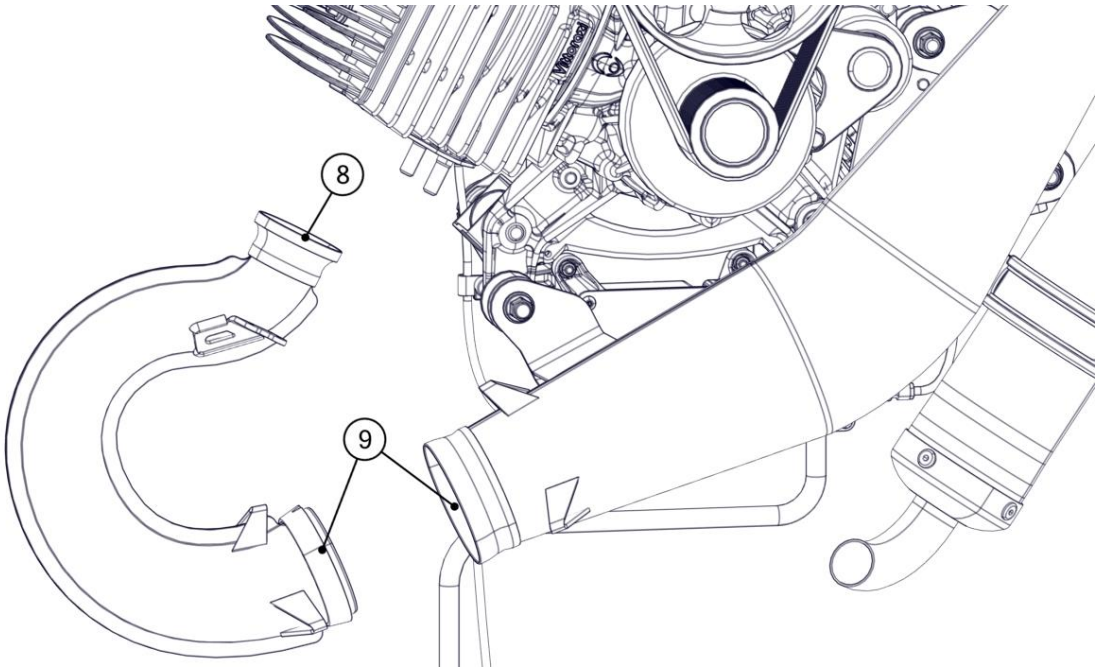
3.12.2 Manifold, exhaust bushings maintenance

Clean the flange contact surface with the cylinder from any gasket or silicone residue and check that it is flat.

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.

Check that the exhaust joints are regular. Small defects on the surface (sticking marks, cracks, steps) must not prevent a regular motion of the joint.

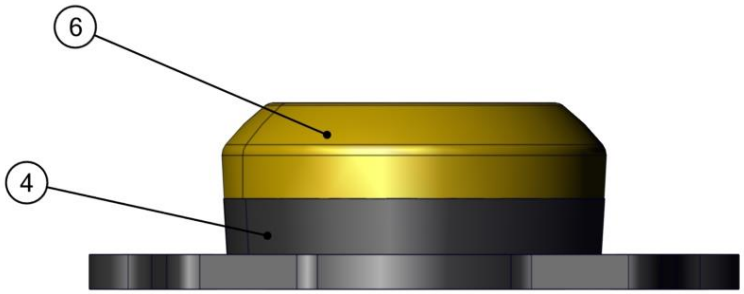
Clean the bushing and cylinder from gasket residue.
Clean the end of the exhaust manifold (8), sand it with sandpaper and apply Molykote grease.
Clean the second joint (9) with an abrasive sponge (e.g. Scotch-Brite), degrease it with solvent and apply Molykote grease.



3.12.3 Manifold, exhaust bushings assembly

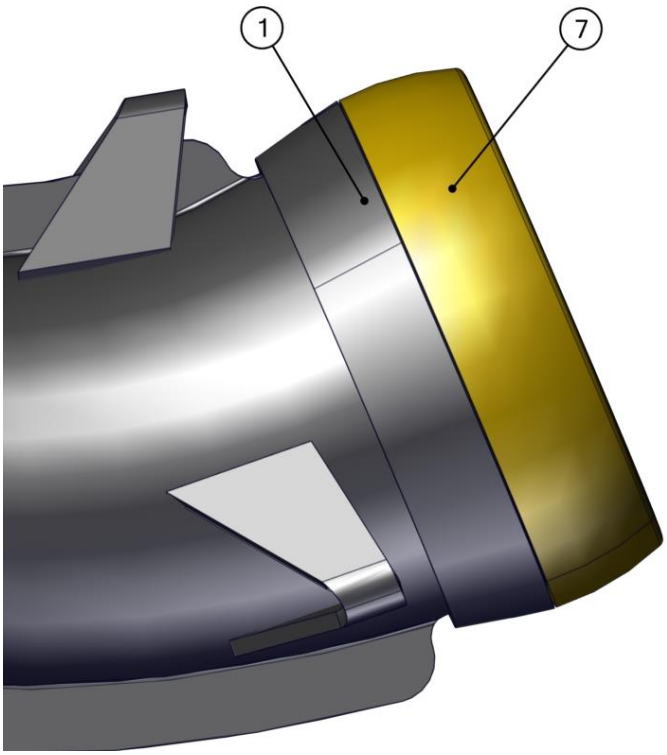
Press the bronze ring (6) on the exhaust flange (4).

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



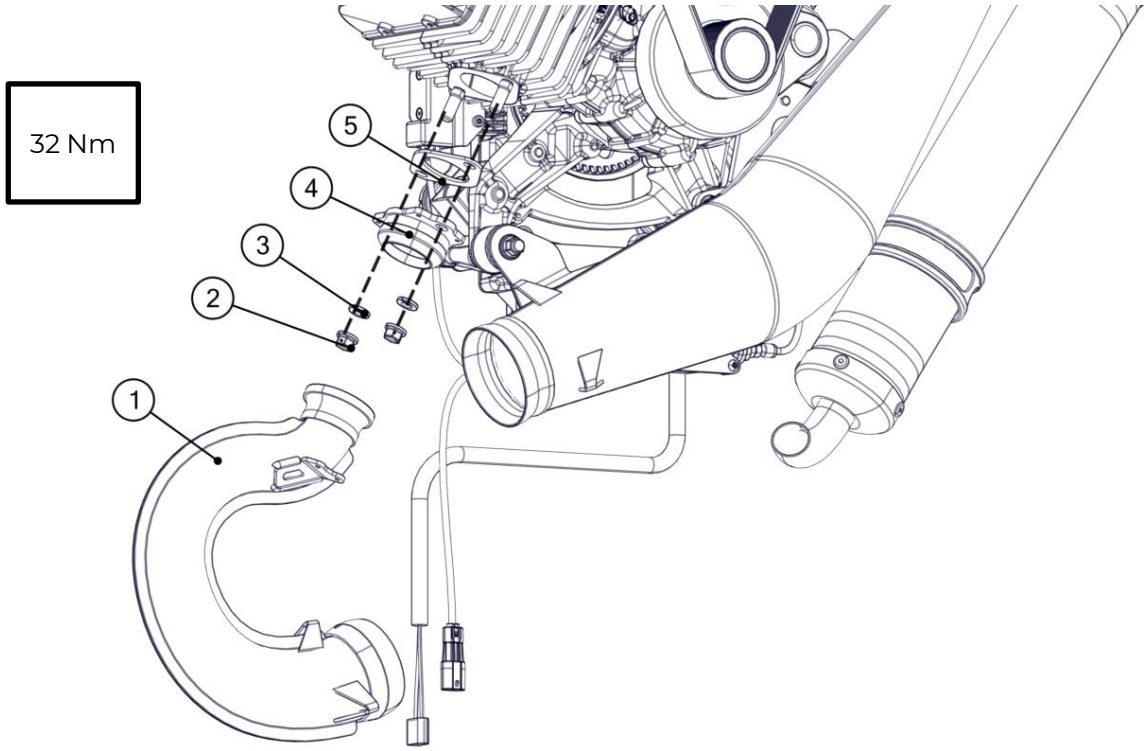
Press the bronze ring (7) on the exhaust manifold (1).

Check that the bronze ring (7) comes into contact with the seat of the exhaust manifold (1) to prevent leakage from the exhaust system.

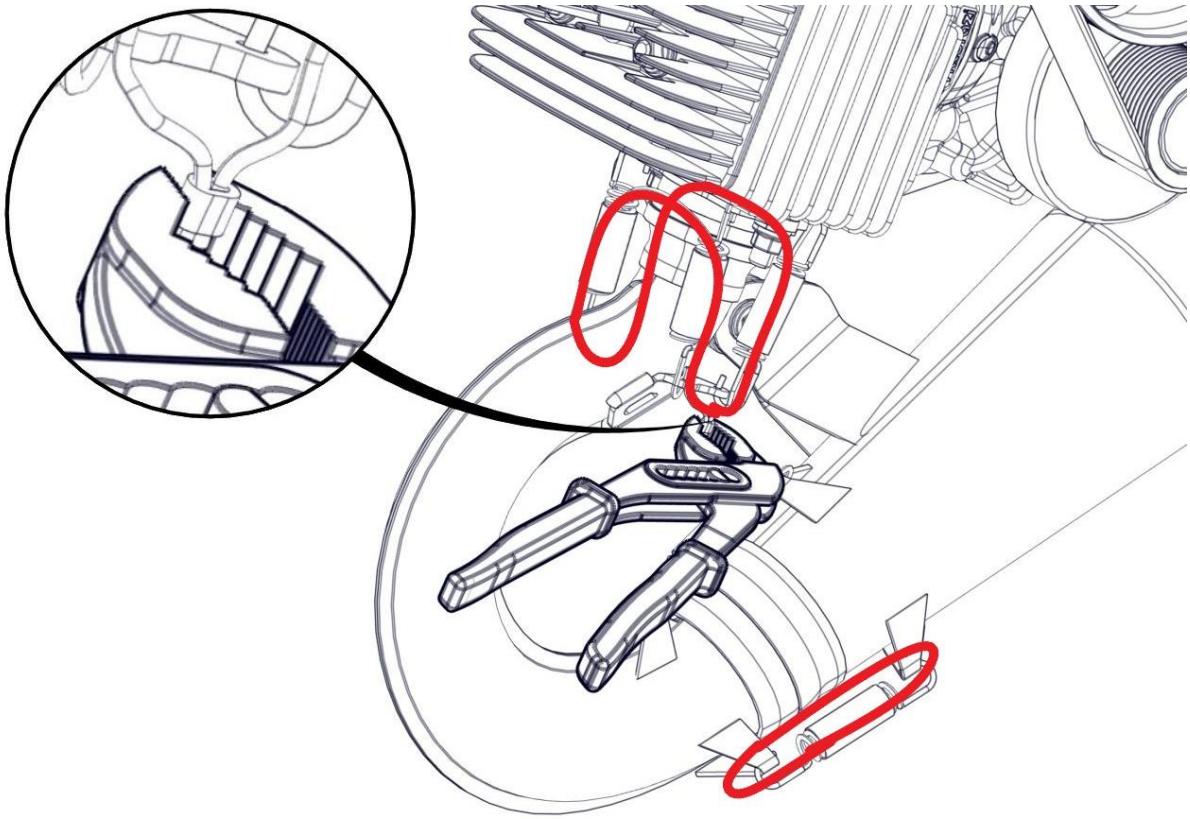


Replace the gasket (5), the 2 self-locking nuts M8 (2) and the 2 washers (3) each time they are disassembled.

Insert the gasket (5) and the exhaust flange with bushing (4).
Add copper paste to the nuts.
Insert the 2 self-locking nuts M8 (2) with the washers (3) and tighten with the torque shown in the figure.
Position the exhaust manifold (1).



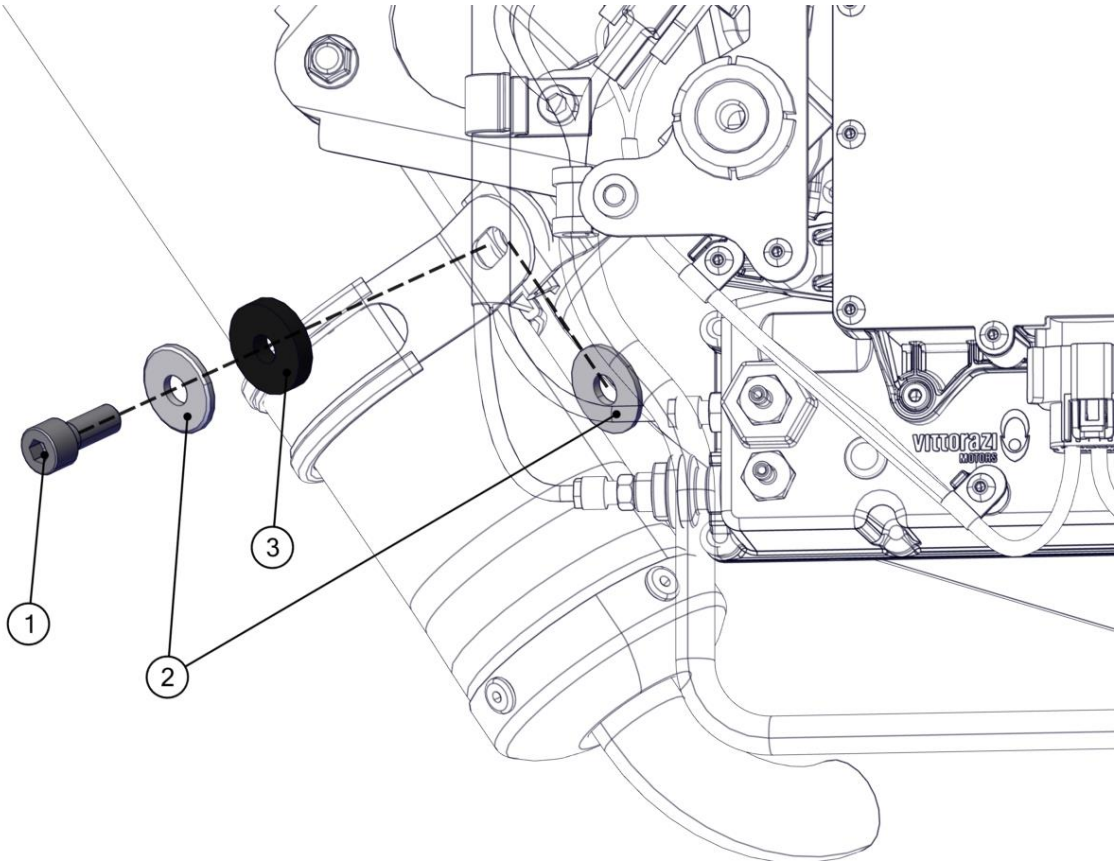
Hook the 3 springs onto the second joint.
Run 3 cables around the springs of the joint (one cable for each spring), insert a clamp on the ends and tighten with pliers.
Hook in the 4 springs of the bushing.
Run one cable around the 4 bush springs, insert a clamp at each end and tighten with pliers.
Apply heat shrinkable hoses.



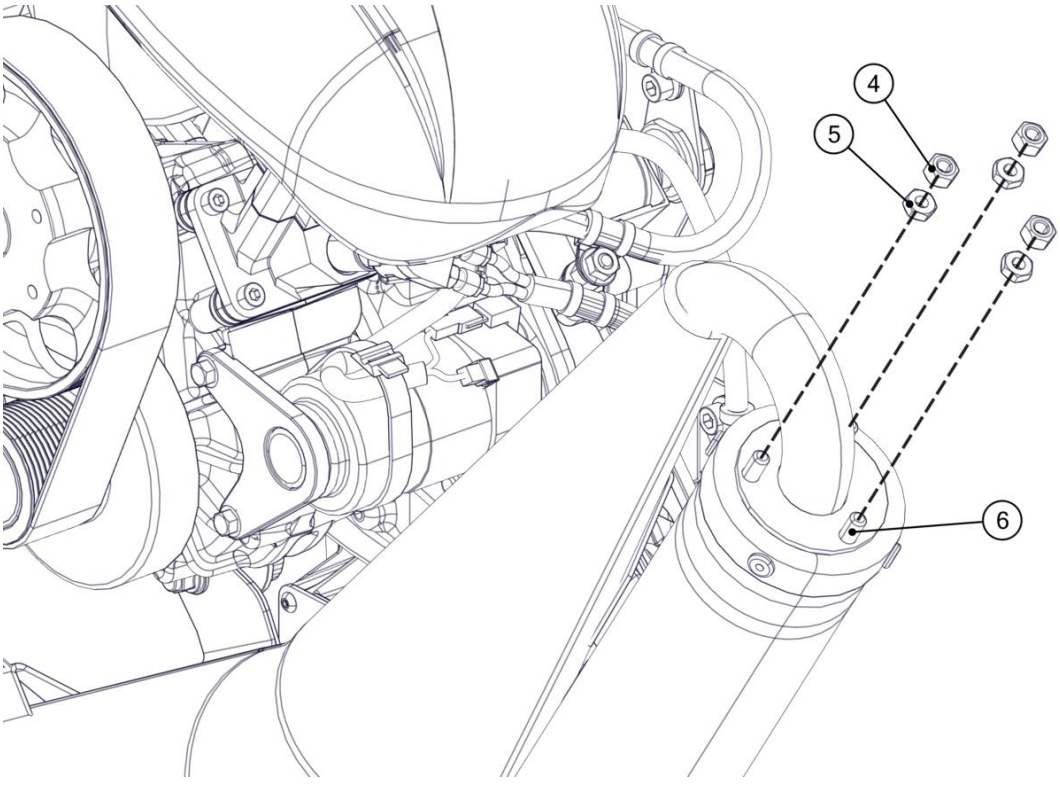
Insert the EGT sensor (see chapter 3.7.4 EGT sensor assembly).

3.12.4 Silencer disassembly

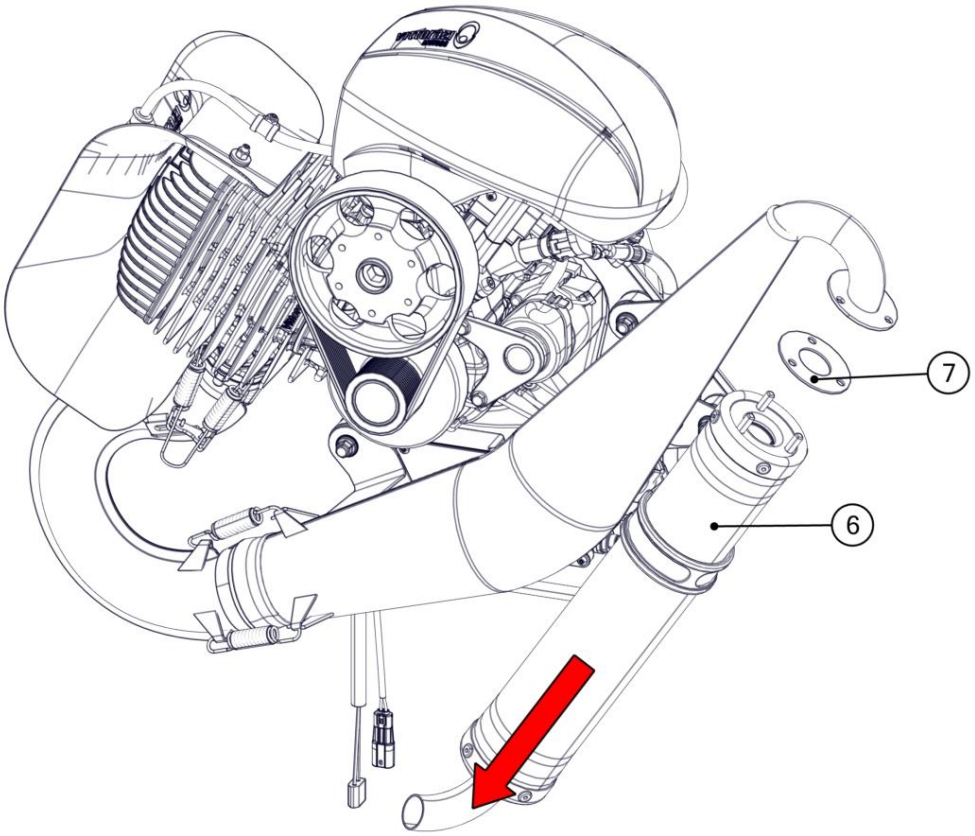
Remove the Allen screw M8x25 (1), the 2 washers (2) and the rubber (3) from the silencer support.



Remove the 3 self-locking nuts M6 (4) and the 3 nuts M6 (5) from the upper end of the silencer (6).

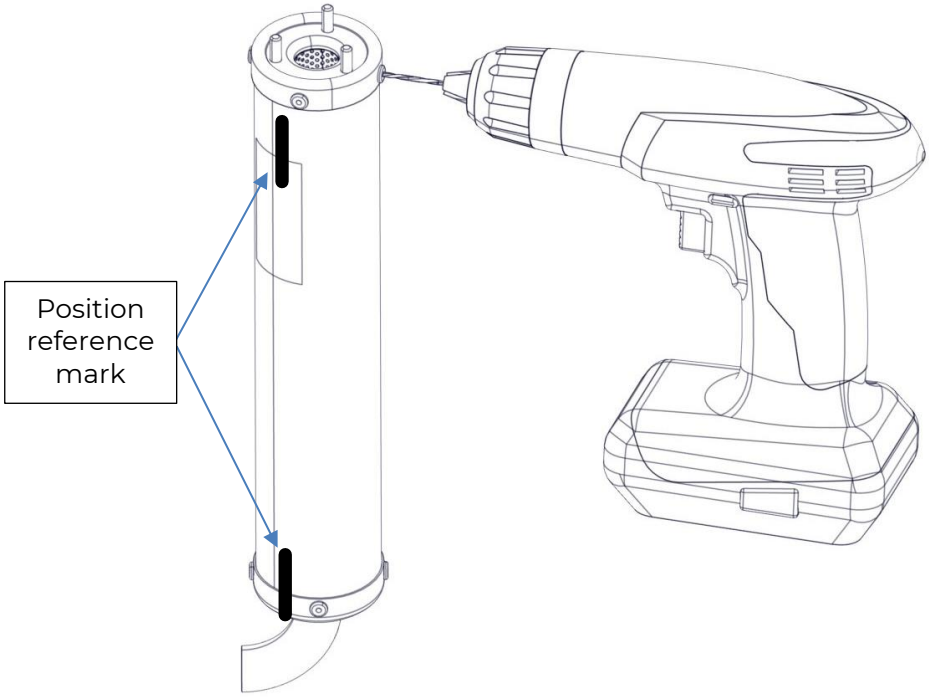


Disconnect the silencer (6) from the exhaust pipe and remove the gasket (7).

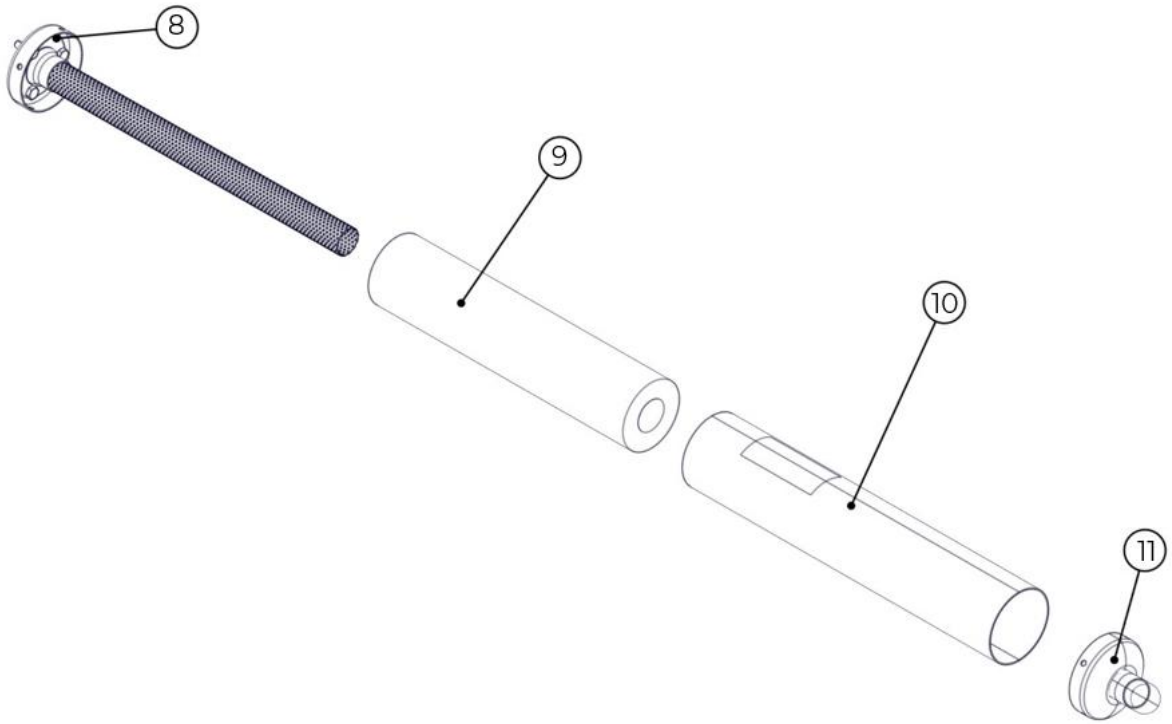


Before disassembling the silencer mark the position of the end caps with an erasable marker

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

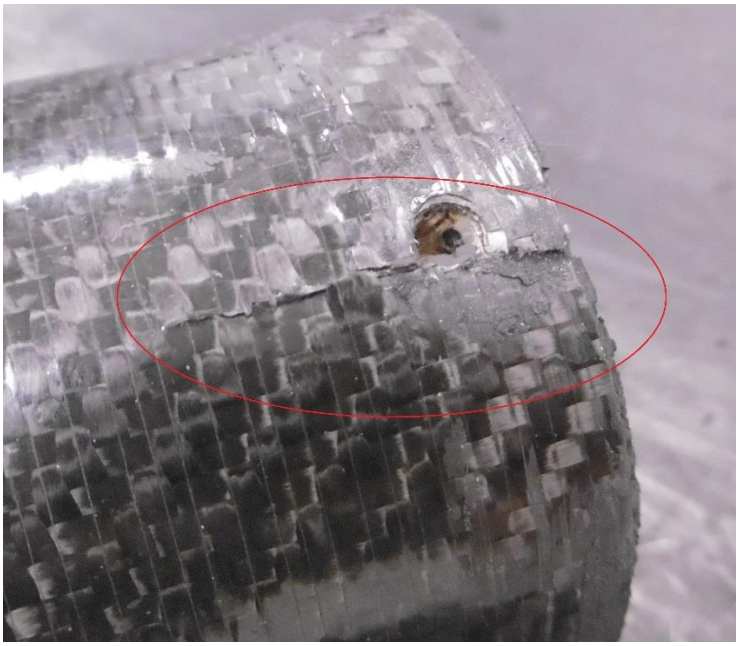


Use a heat gun to heat the end caps (8, 11) in order to facilitate the release of the silicone.
Remove the following components from the silencer housing (10): the end caps (8, 11) and the sound-absorbing material (9).

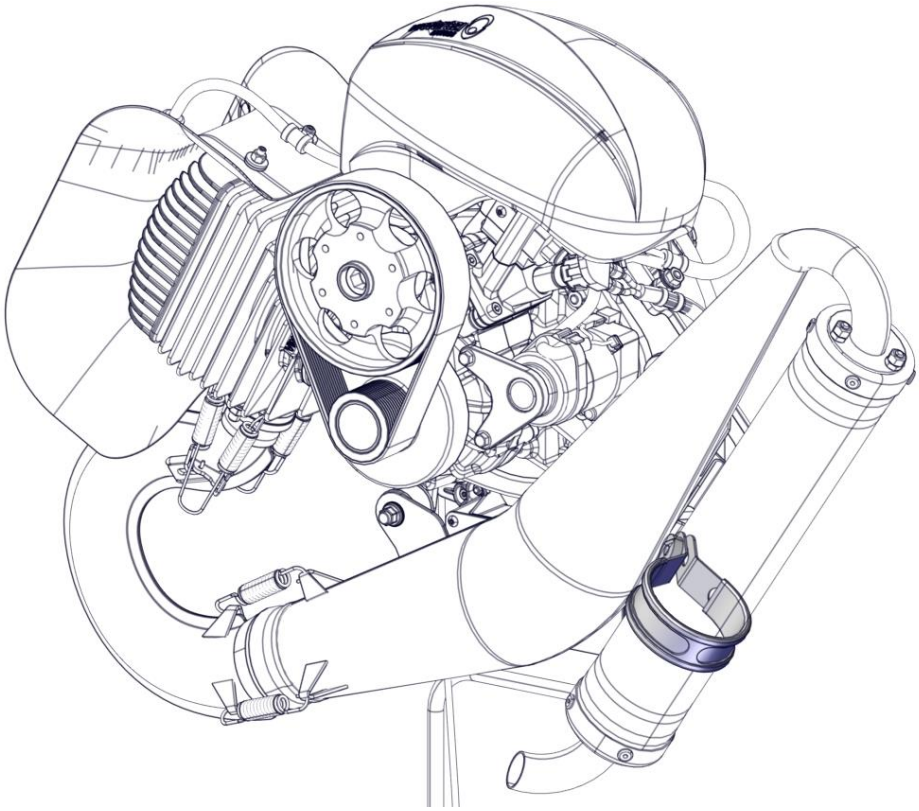


3.12.5 Silencer maintenance

Remove silicone and gasket residue from the end caps.
Thoroughly clean and degrease the ends and body of the silencer with a cloth.
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.

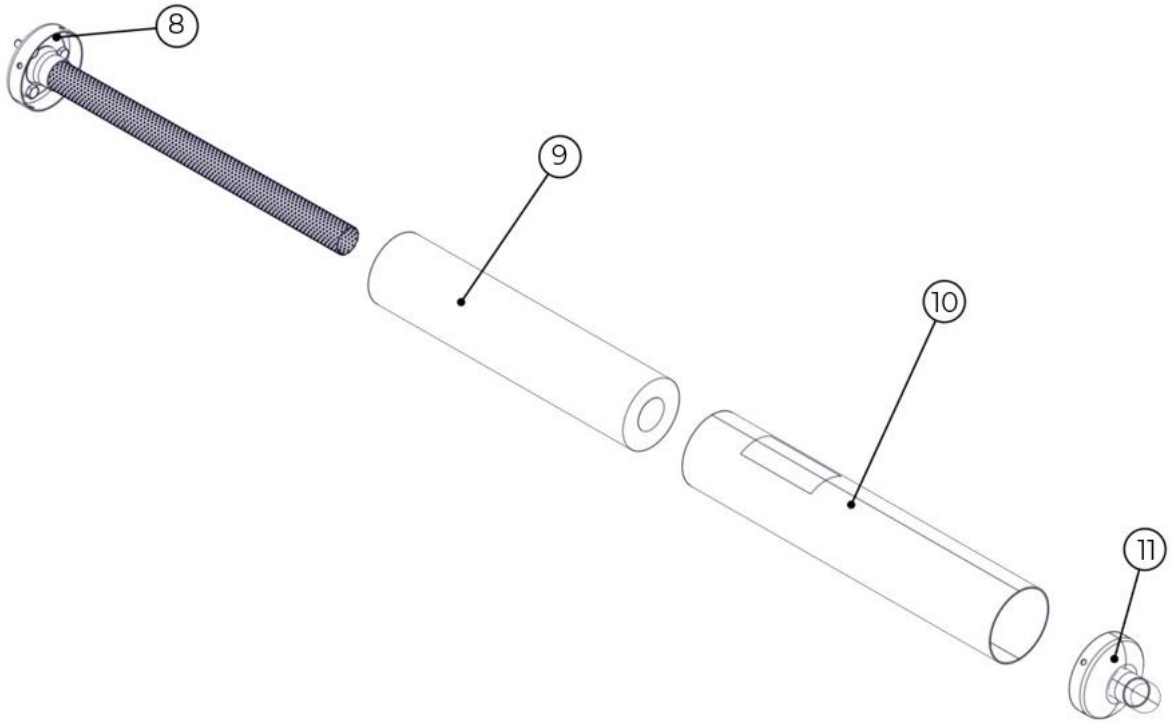


Check the integrity of the silencer band, otherwise replace it.



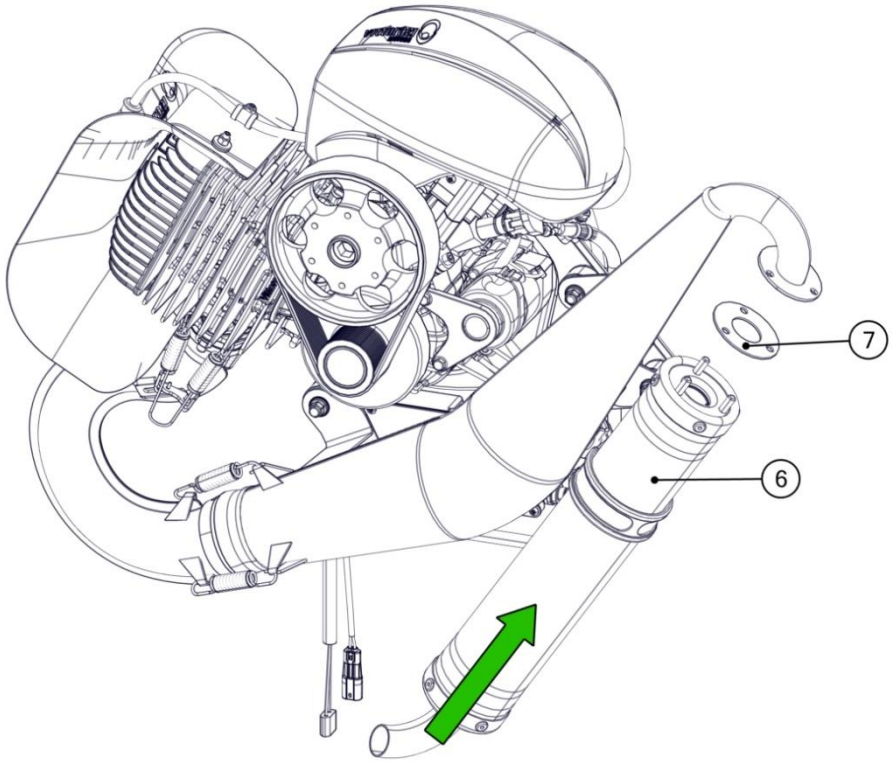
3.12.6 Silencer assembly

Put high-temperature silicone (Loctite 5900) on the inside edge of the end caps (8, 11).
Wrap the sound-absorbing material (9) around the inner tube (8) then position them in the silencer body (10).
Fix the end caps on the body with 8 rivets respecting the references taken during disassembly.
Make sure that the end caps are fully inserted before fixing.
Wet the rivets with high-temperature silicone (Loctite 5900) before fastening and fix the end caps (8, 11) on the body.

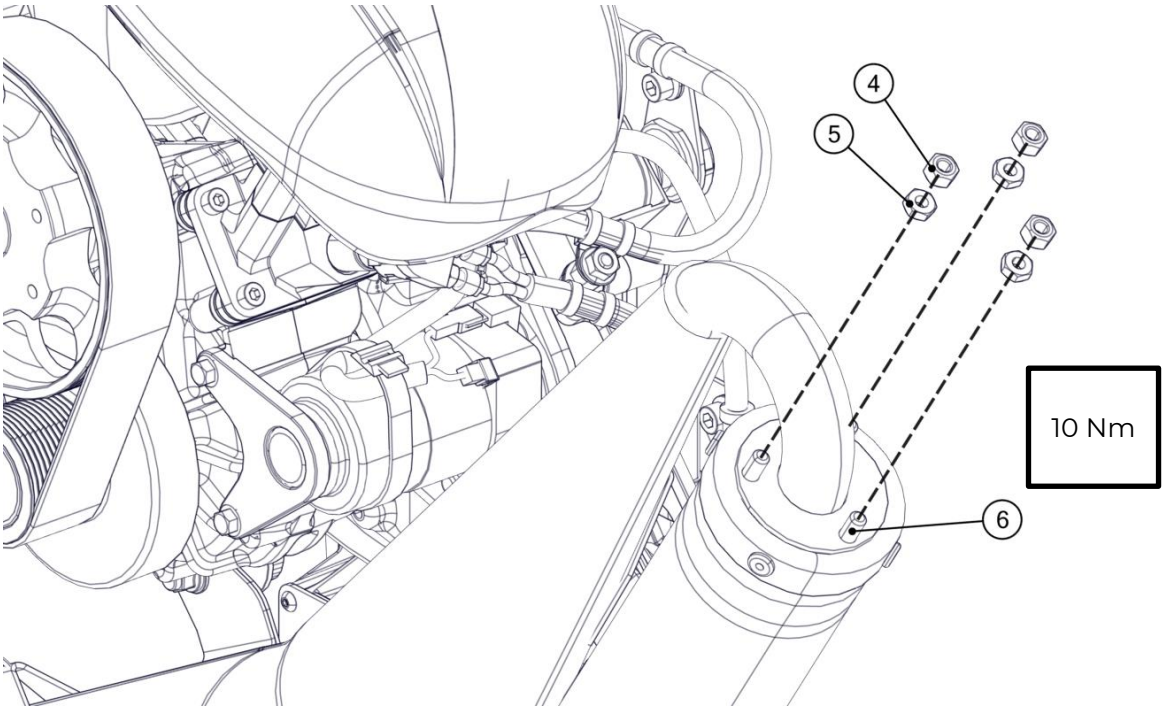


Replace the gasket (7) each time it is disassembled.

Connect the silencer (6) to the exhaust pipe, inserting the gasket (7).

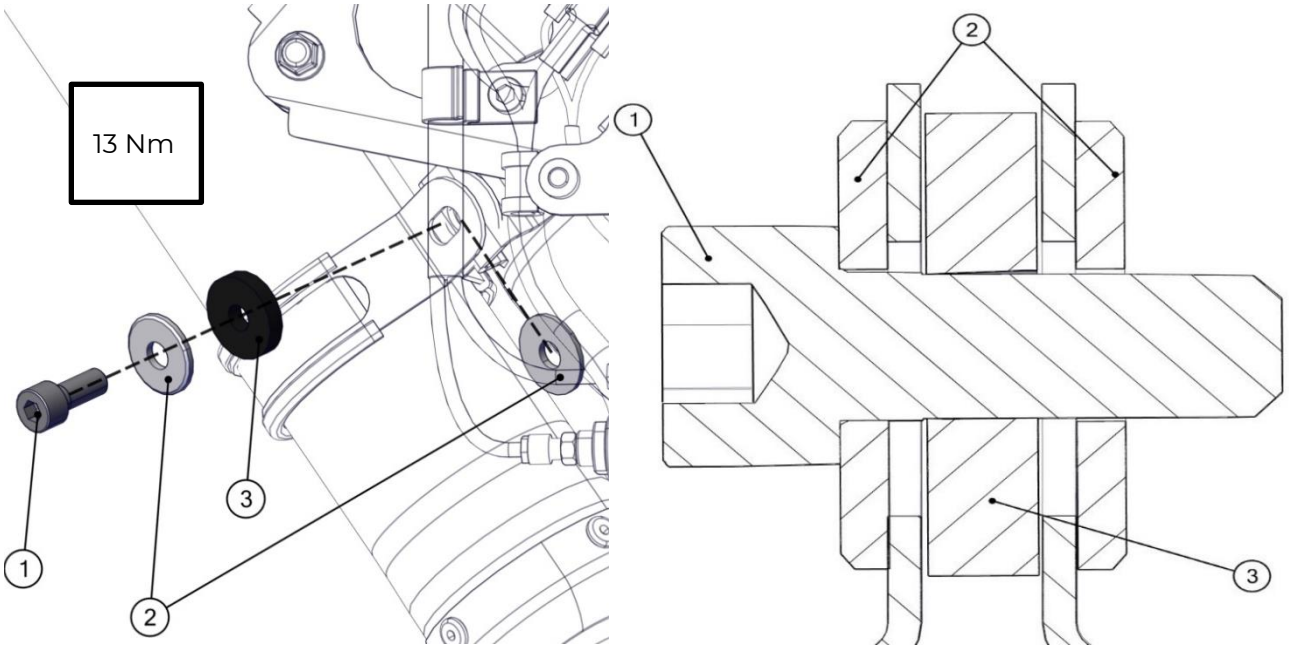


Insert the 3 nuts M6 (5) on the silencer then the 3 self-locking nuts M6 (4). Tighten the with the torque shown in the figure.
Tighten the first 3 nuts progressively to guarantee a correct alignment of the silencer.



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 with the torque shown in the figure.



Insert the EGT sensor (see chapter 3.7.4 EGT sensor assembly).

3.13 Rubber mountings

<table>
<tr>
<td> 
Components to replace</td>
<td>
<table>
<tr><th></th><th>Time limit</th></tr>
<tr><td>Engine rubber mountings (M021a, M021b).</td><td>150h or 1 year</td></tr>
<tr><td>Exhaust system rubber mountings (M151a, M151c).</td><td>150h or 1 year</td></tr>
<tr><td>Loxeal 55-03/Loctite 243. *</td><td></td></tr>
</table>
</td>
</tr>
<tr>
<td> 
Special tools</td>
<td>Not required.</td>
</tr>
<tr>
<td> 
Values</td>
<td>Self-locking nuts M6 (rubber mountings M021a, M021b): 18 Nm.
Ring nuts DIN 981 - KM4: 20 Nm
Screws M4x6: 1.6 Nm
Self-locking nuts M8 (rubber mountings M151c): 18 Nm
Self-locking nuts M8 (rubber mountings M151a): 15 Nm.</td>
</tr>
</table>

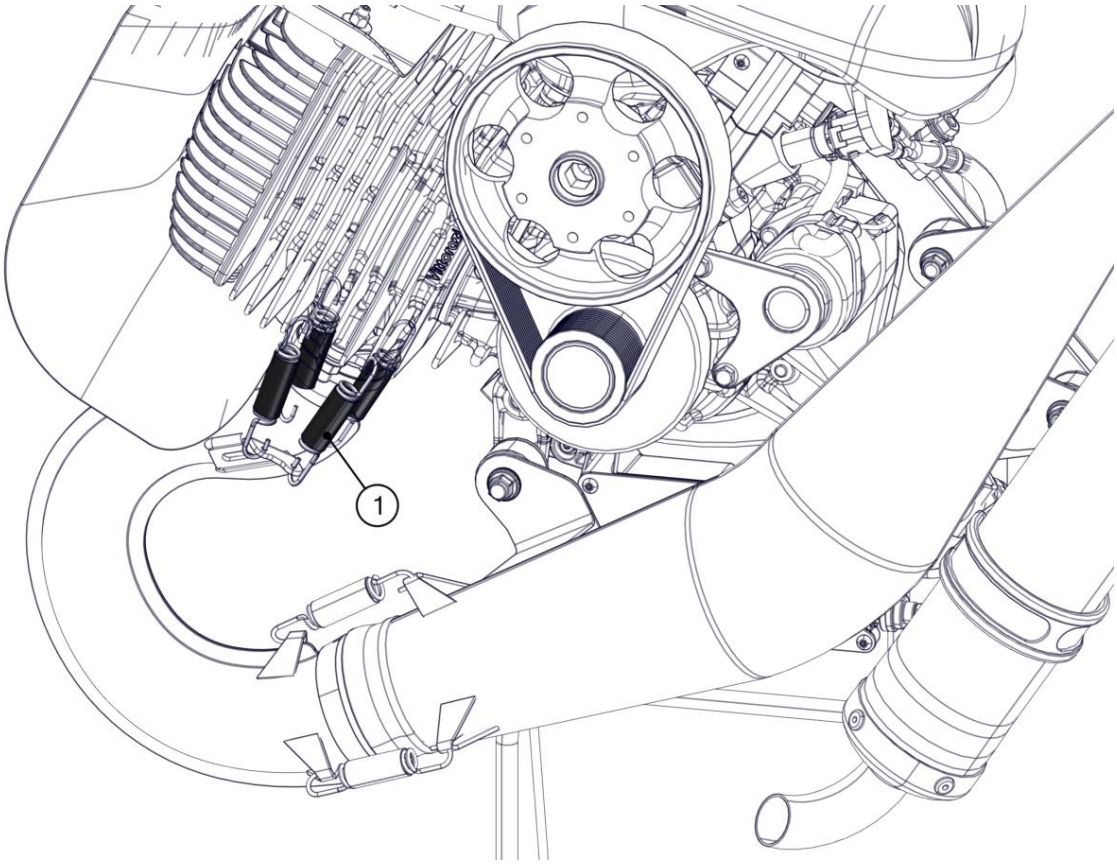
*Always replace it when disassembled.

3.13.1 Rubber mountings disassembly

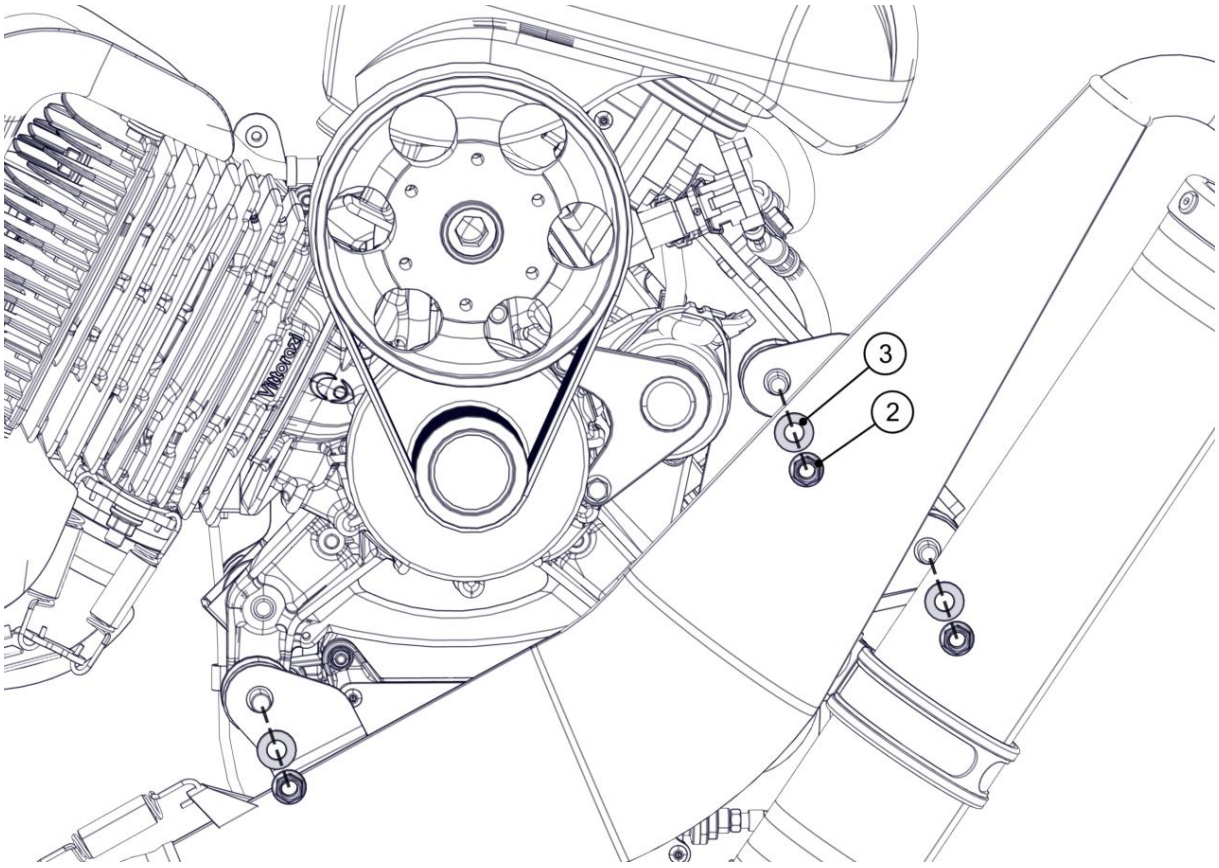
Before proceeding with the next operations, remove the EGT sensor (see chapter 3.7.3 EGT sensor disassembly).

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

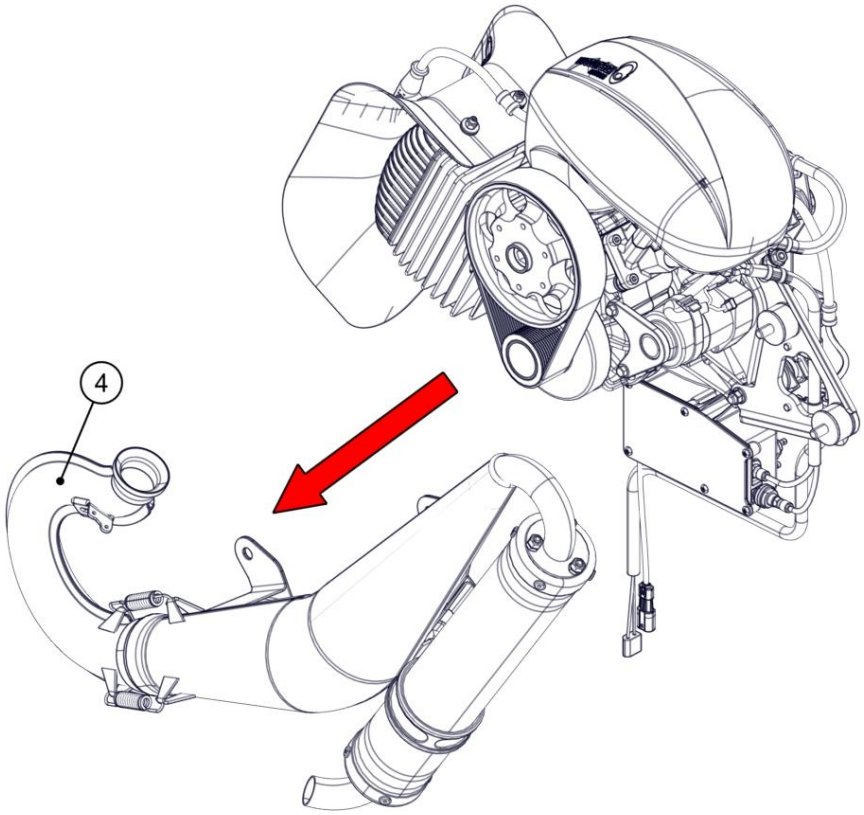
Remove the safety cable around the springs.
Remove the 4 bushing springs (1).



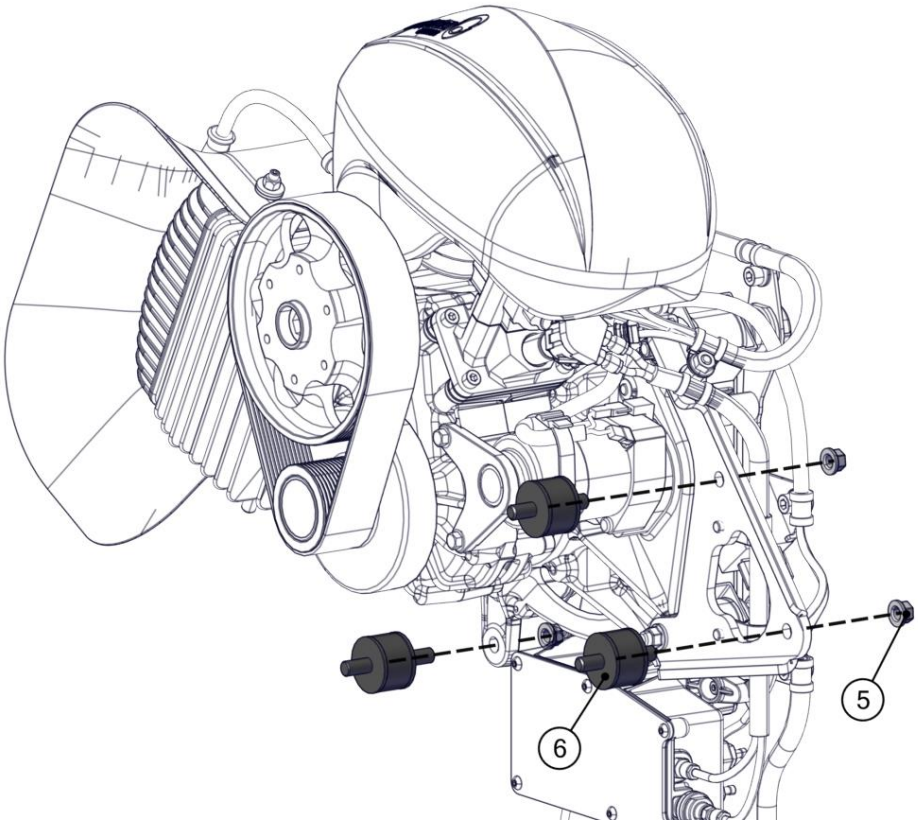
Remove the 3 self-locking nuts M8 (2) with washers (3).



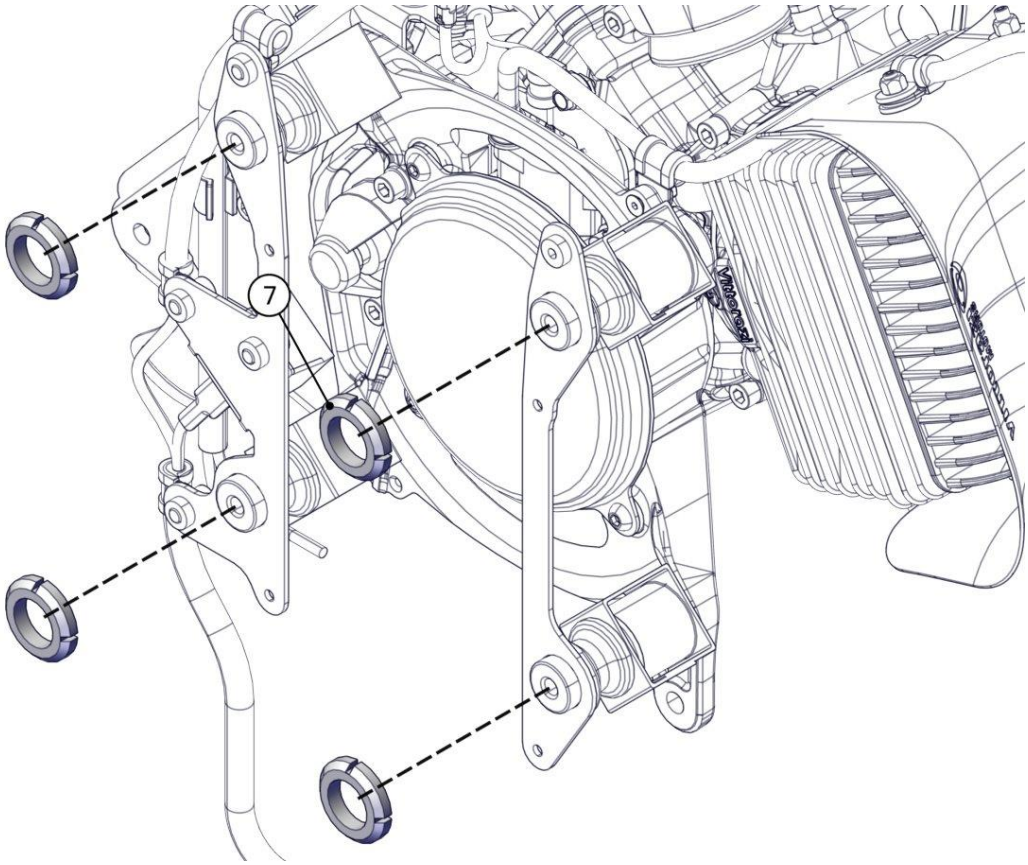
Remove the exhaust system (4).



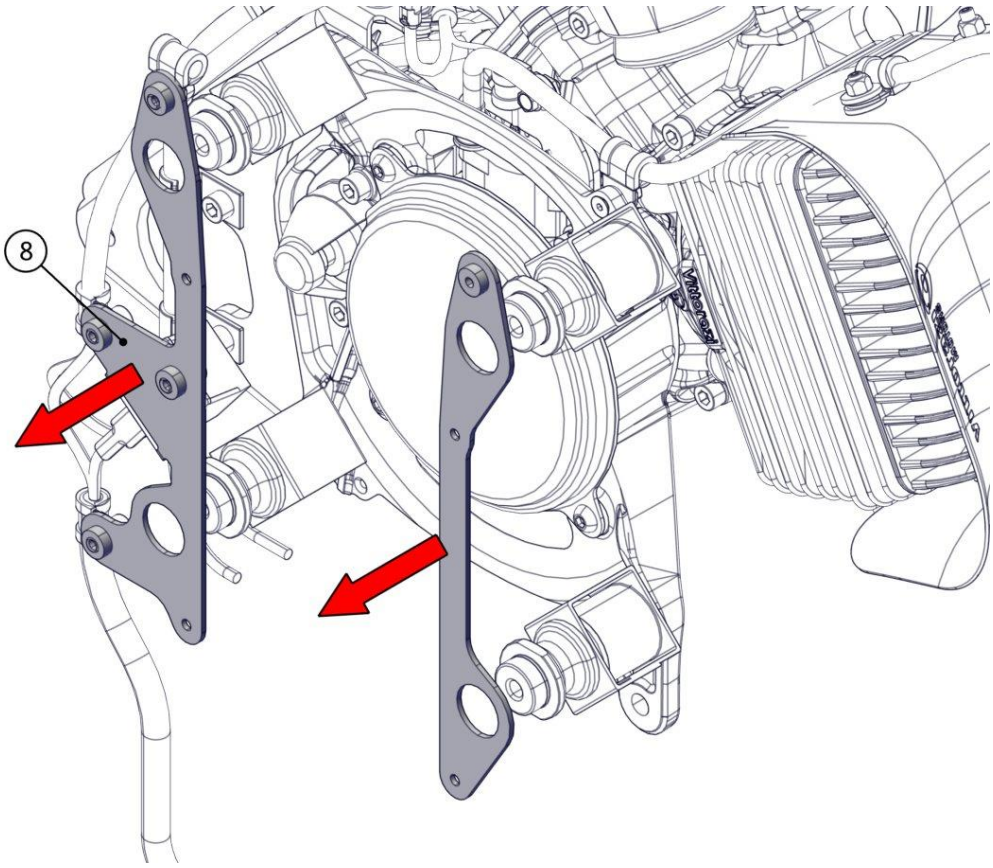
Remove 3 self-locking nuts M8 (5) and 3 rubber mountings of the exhaust system (6).



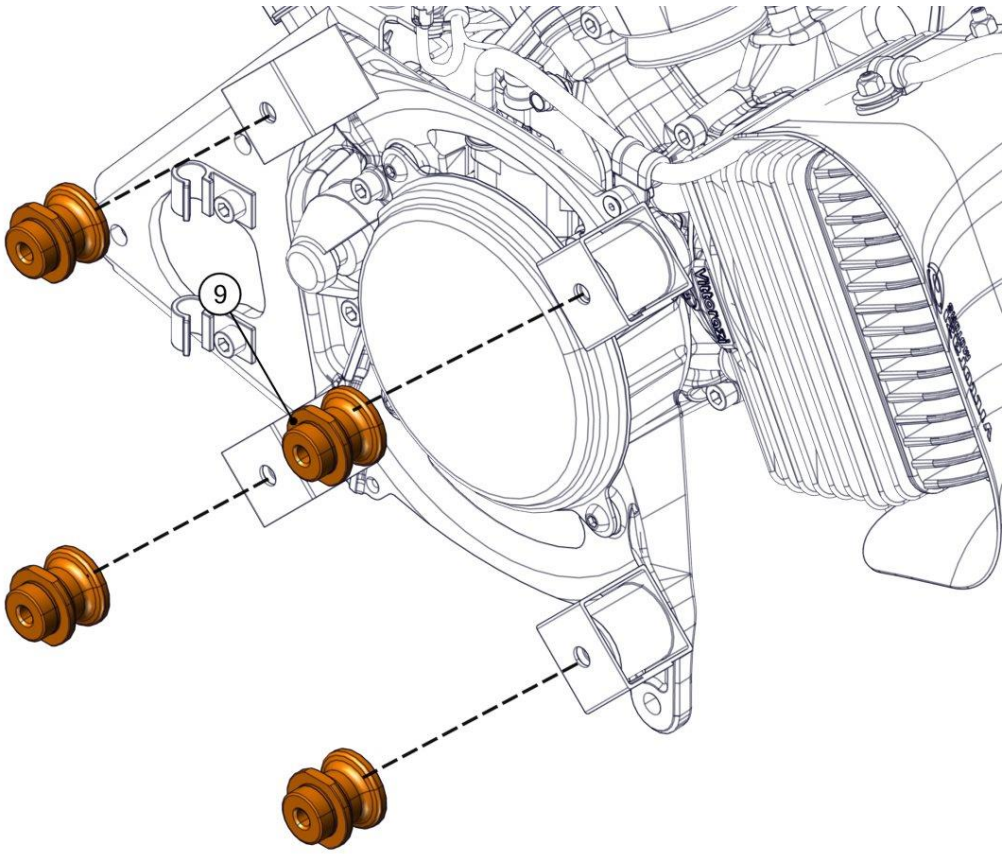
Remove the FIU (see chapter 3.5.1 FIU disassembly).
Remove the 4 ring nuts DIN 981 - KM4 (7).



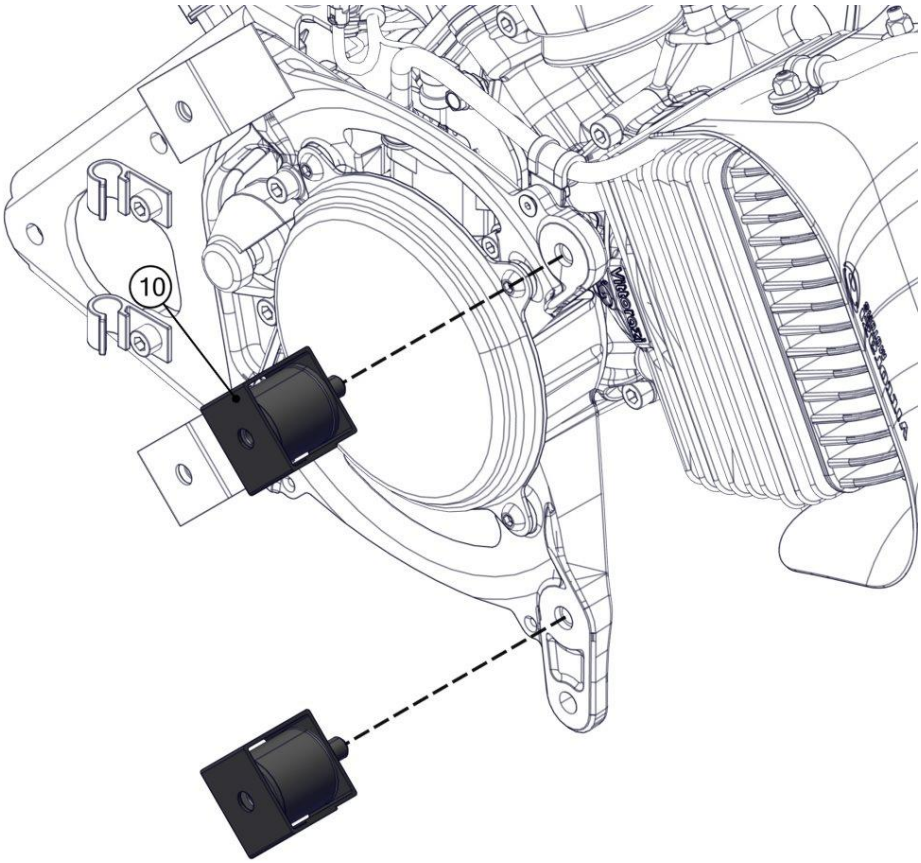
Remove the 2 steel brackets (8).



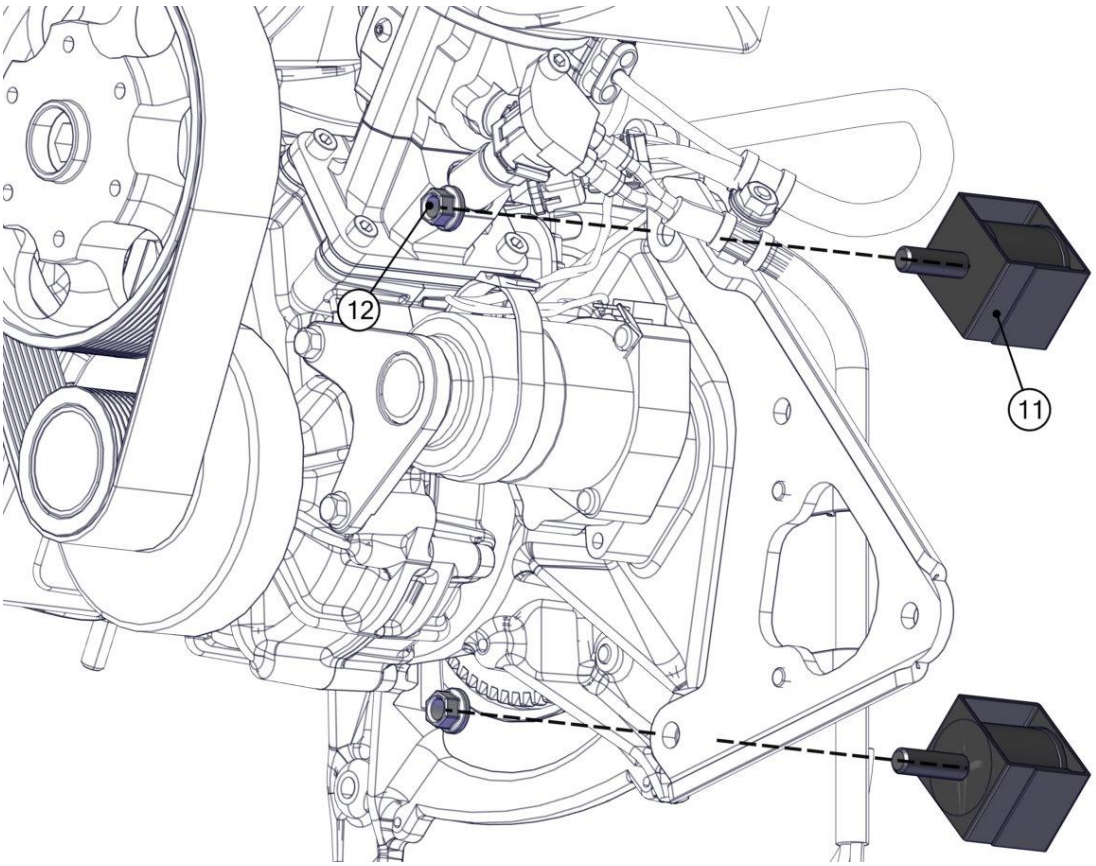
Remove the 4 FIU spacers (9).



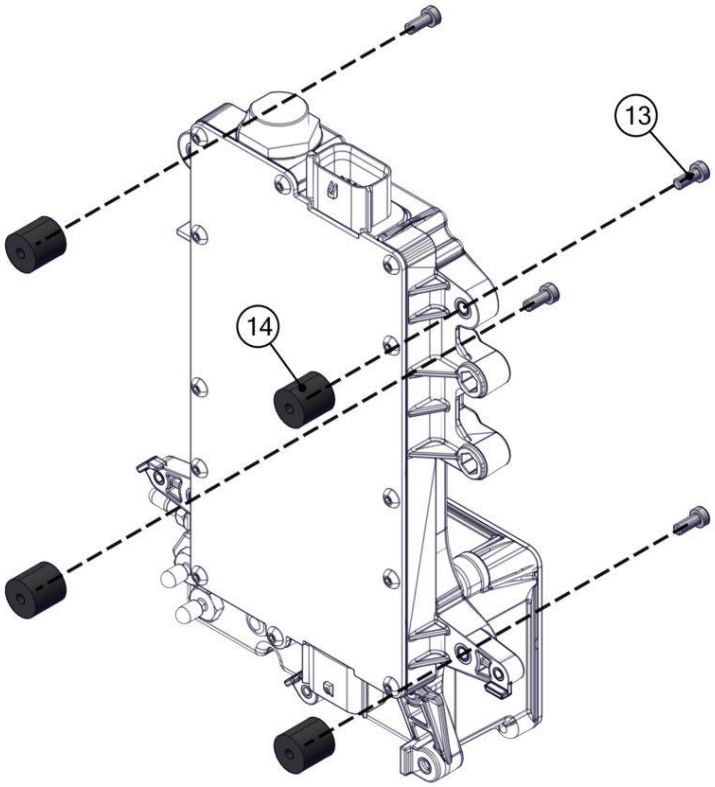
Remove the 2 engine rubber mountings (10).



Remove the 2 remaining engine rubber mountings (11) and the 2 self-locking nuts M6 (12).



Remove the 4 screws M4x10 (13) and the 4 FIU rubber mountings (14).

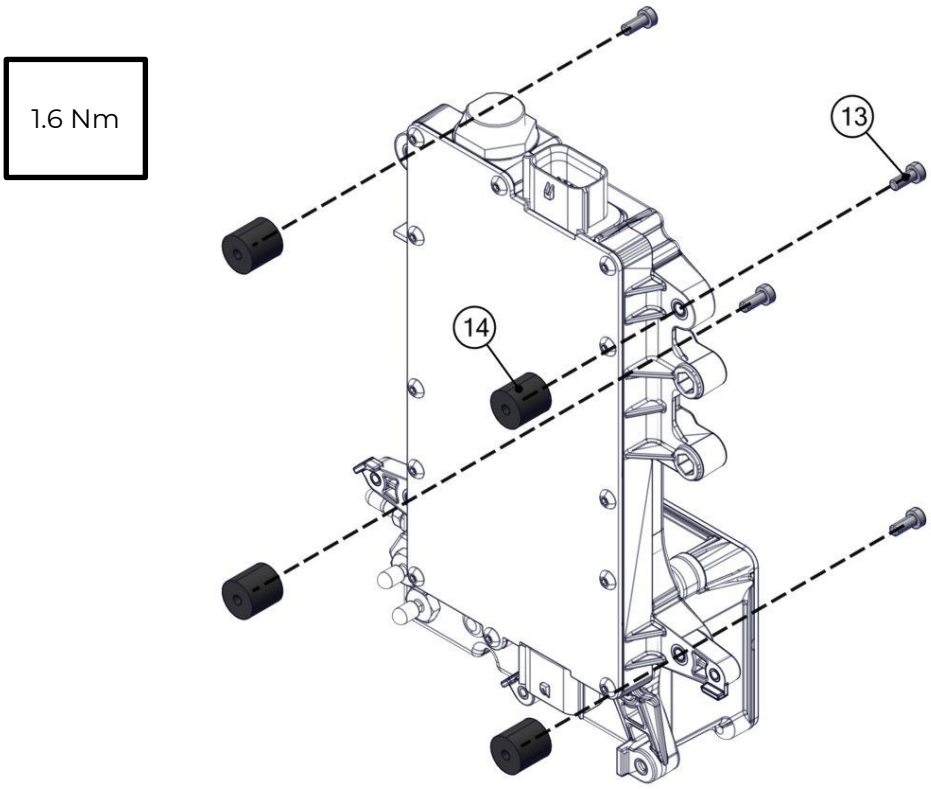


3.13.2 Rubber mountings maintenance

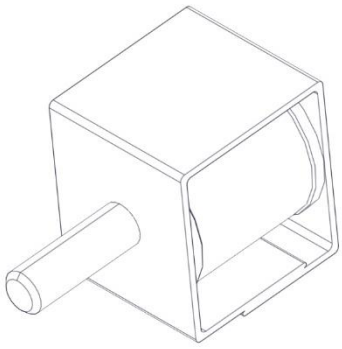
Check the integrity of the rubber mountings: there must be no cracks or detachment of material, otherwise they must be replaced. For routine maintenance, follow the table.

3.13.3 Rubber mountings assembly

Place the 4 FIU rubber mountings (14) and insert the 4 screws M4x10 (13) with threadlocker (recommended Loxeal 55-03/Loctite 243) and tighten with the torque shown in the figure.

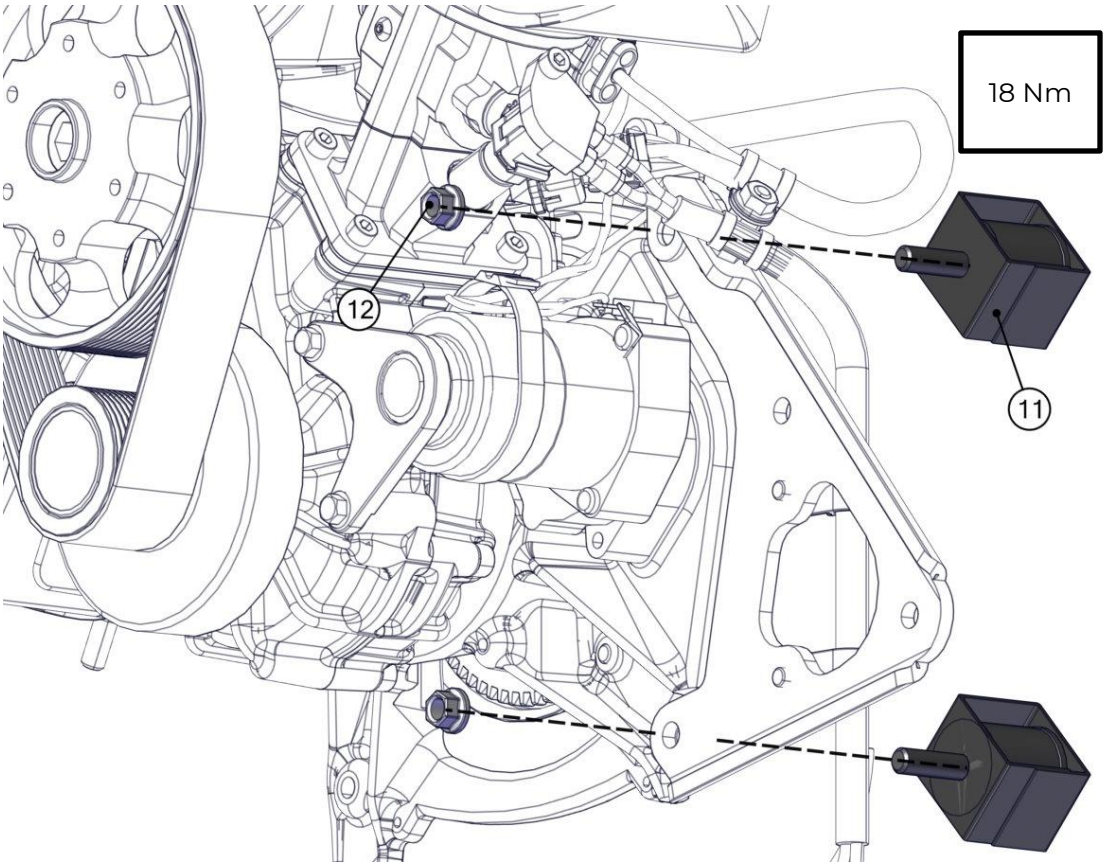


Replace the safety belts, the 4 rubber mountings of the engine mount (11) and the 3 rubber mountings of the exhaust system (6).

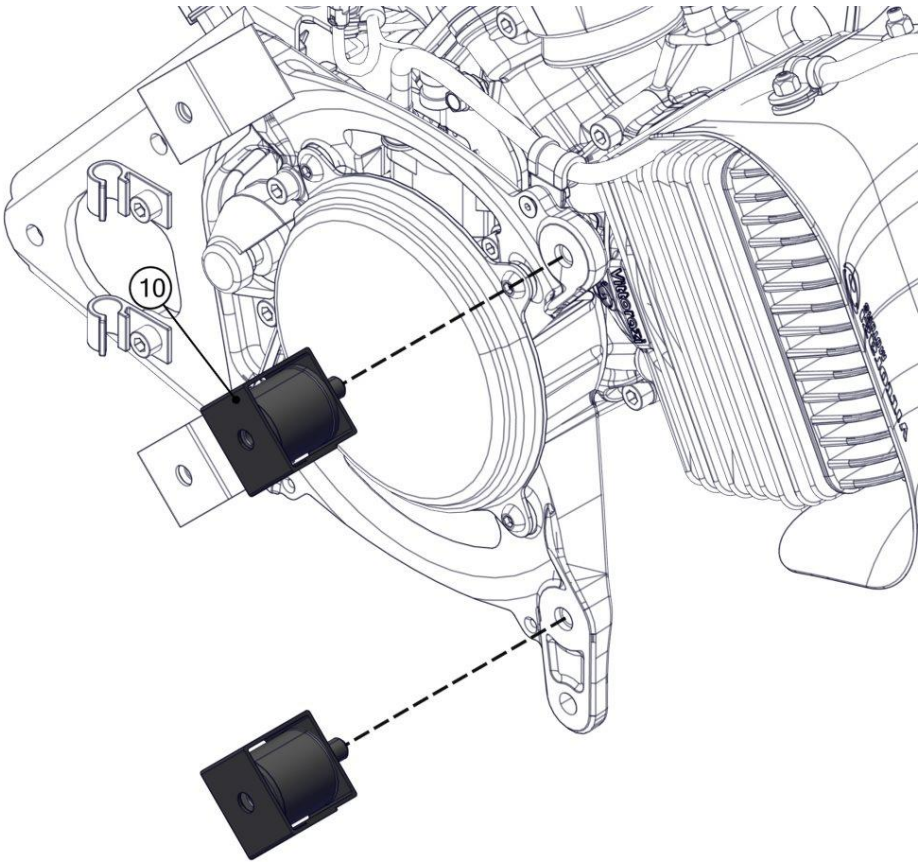


Replace the 2 self-locking nuts M8 (12).

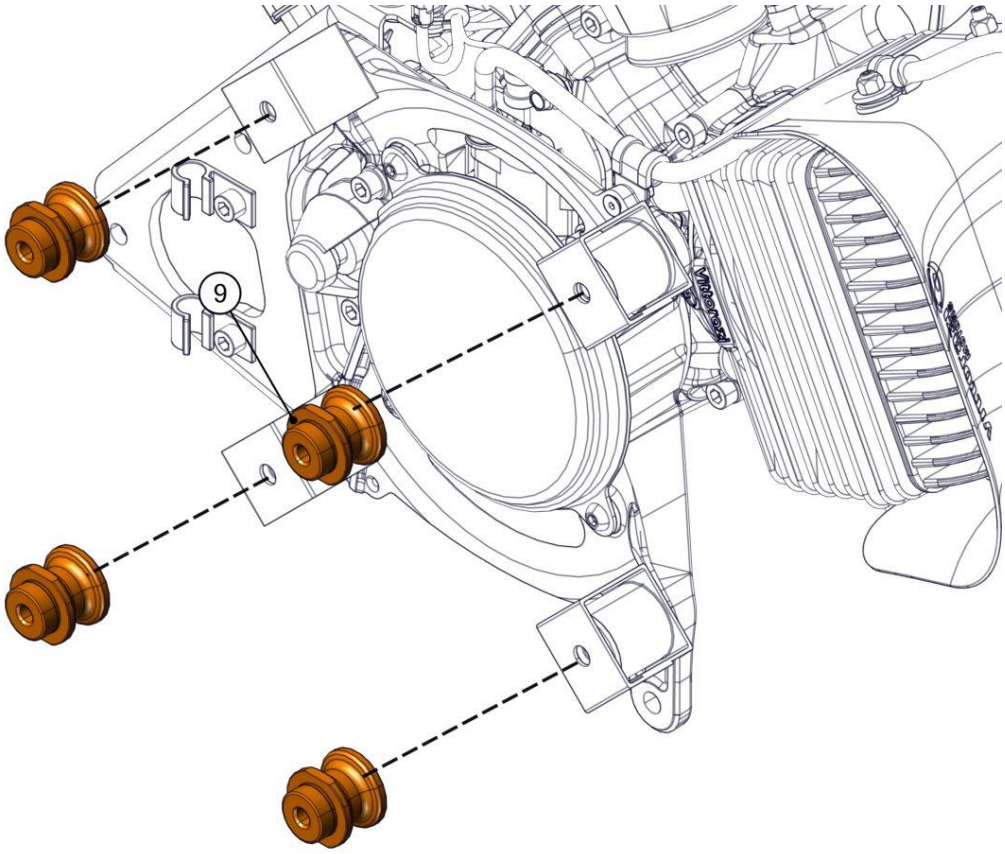
Insert the 2 self-locking nuts M6 (12), the 2 engine rubber mountings (11) and tighten with the torque shown in the figure.



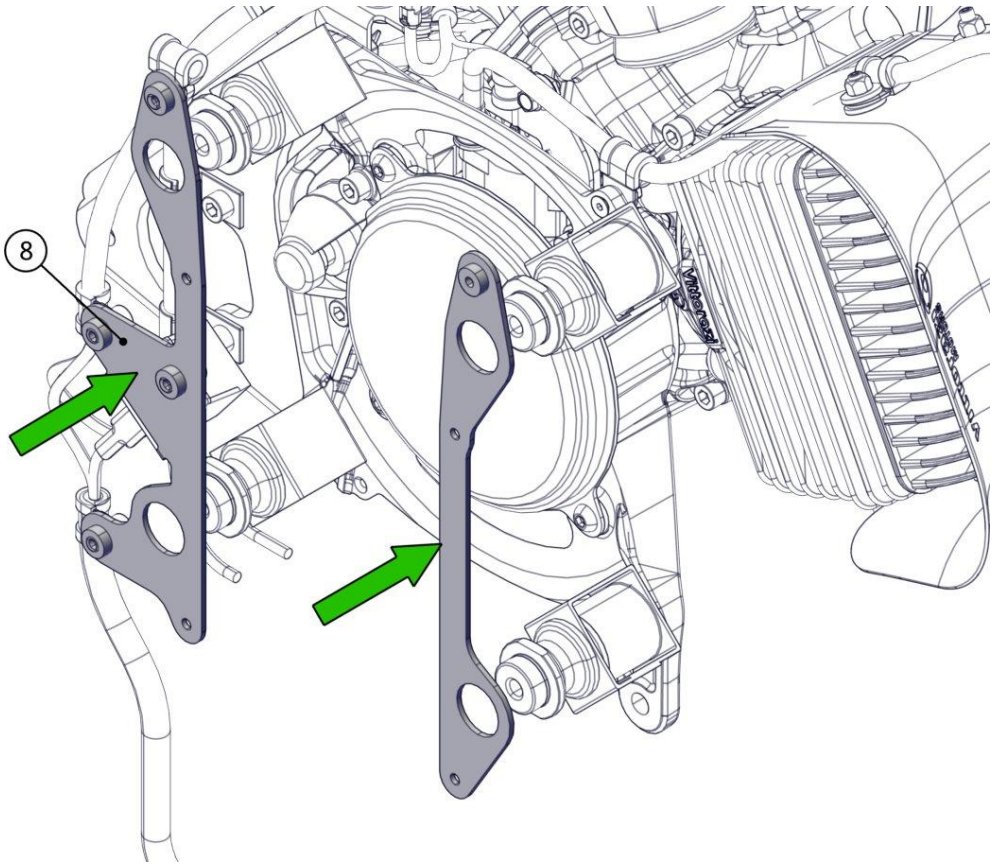
Insert the 2 remaining engine rubber mountings (10) and tighten by hand.



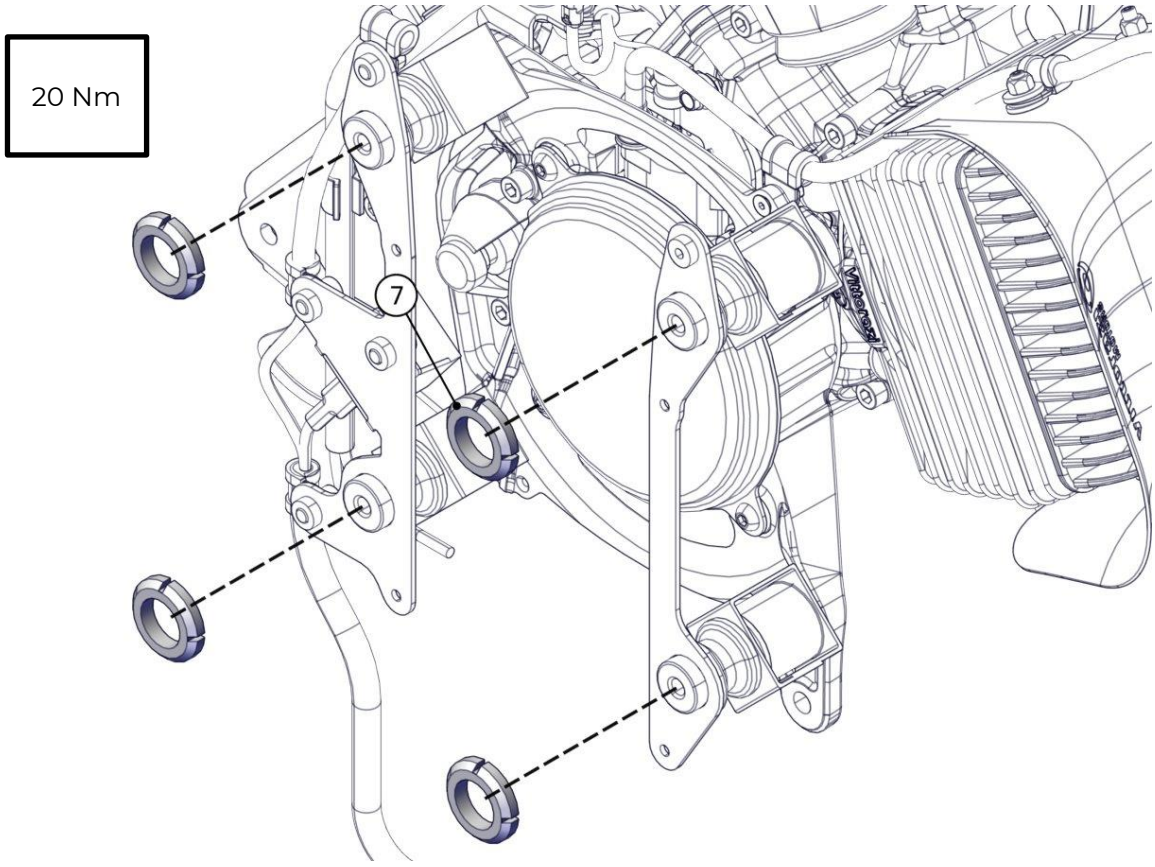
Insert the 4 spacers (9) with threadlocker (recommended Loxeal 55-03/Loctite 243). Bring them into contact with the engine rubber mountings (10) and then tighten 45° making sure to block the rotation of the engine rubber mountings (10).



Place the 2 steel brackets (8).



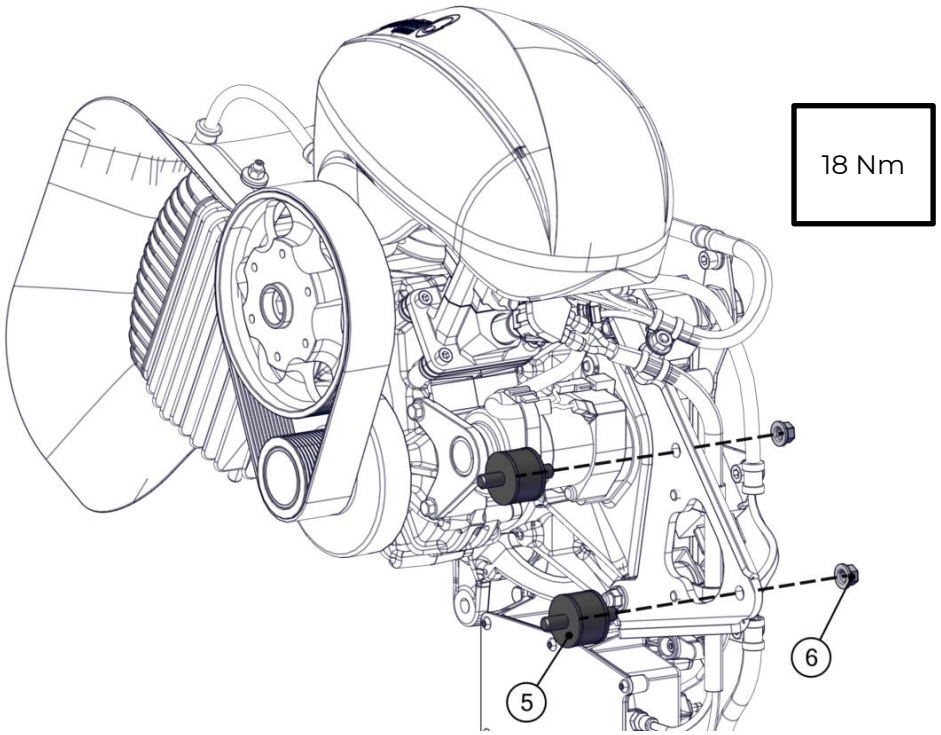
Insert the 4 ring nuts DIN 981 - KM4 (7) and tighten with the torque shown in the figure.



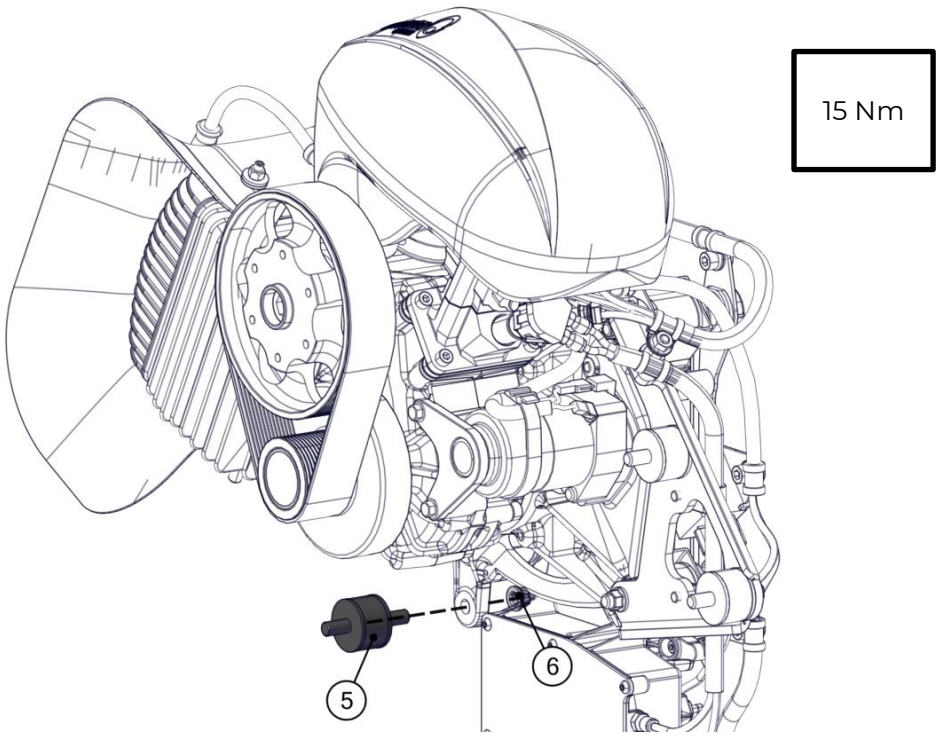
Insert the FIU (see chapter 3.5.3 FIU assembly).

Replace the 3 self-locking nuts M8 (5).

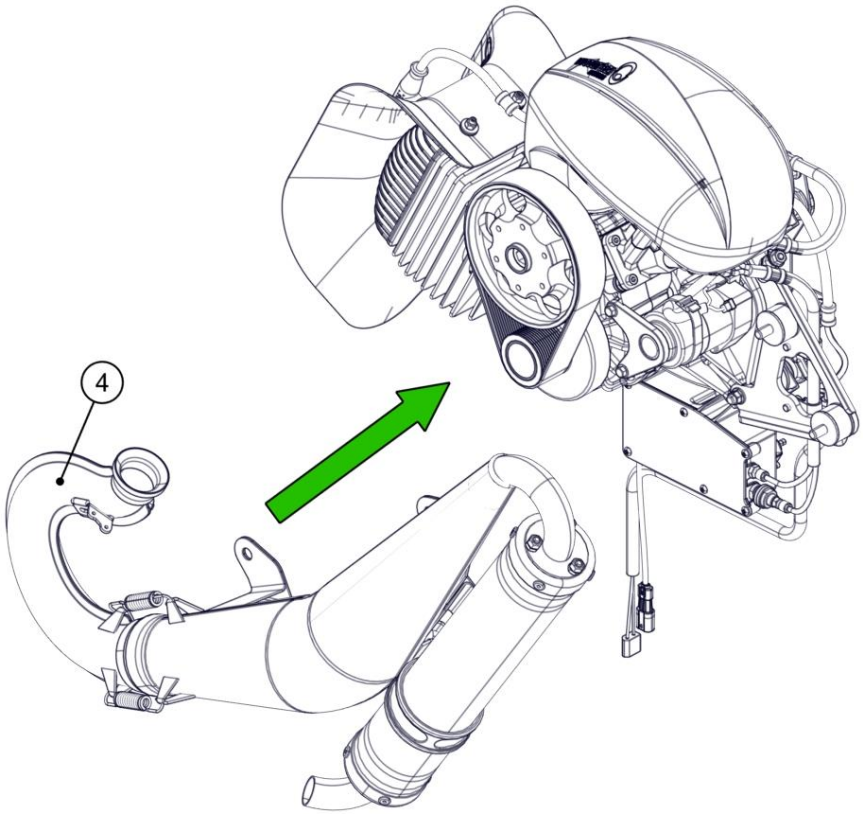
Insert the 2 rubber mountings of the exhaust system (5) shown in the figure (rubber 14/14 hard M151c), the 2 self-locking nuts M8 (6) and tighten with the torque shown in the figure.



Insert the rubber mounting of the exhaust system (5) shown in the figure (rubber 14/20 soft M151a), the self-locking nut M8 (6) and tighten with the torque shown in the figure.

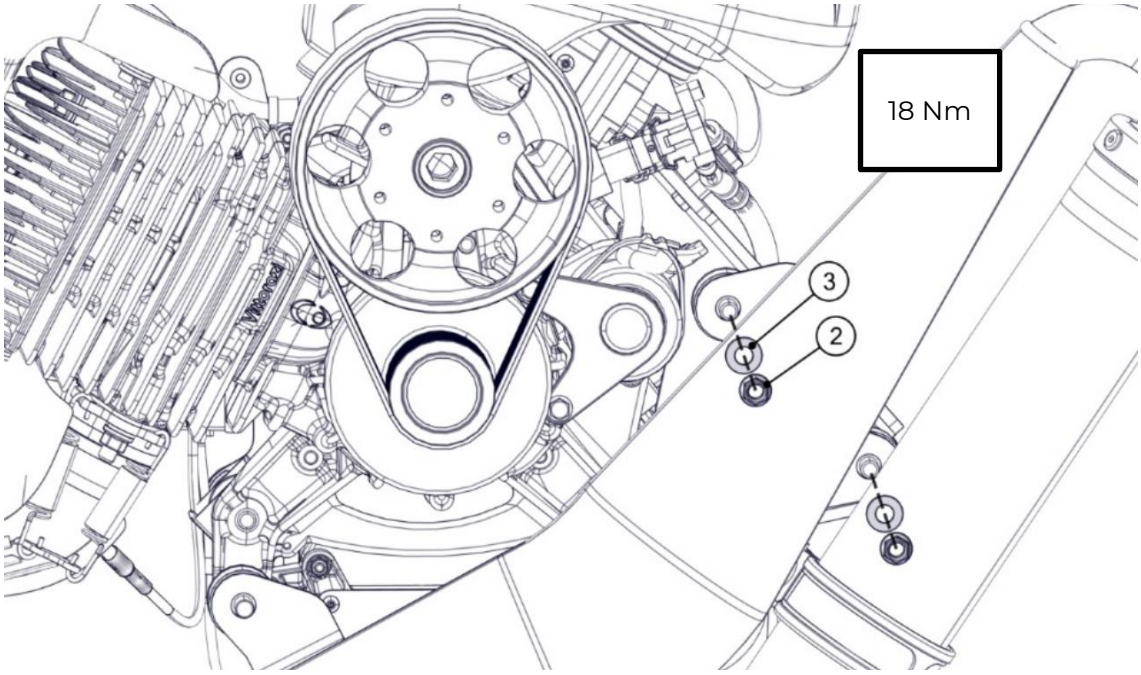


Insert the exhaust system (4).

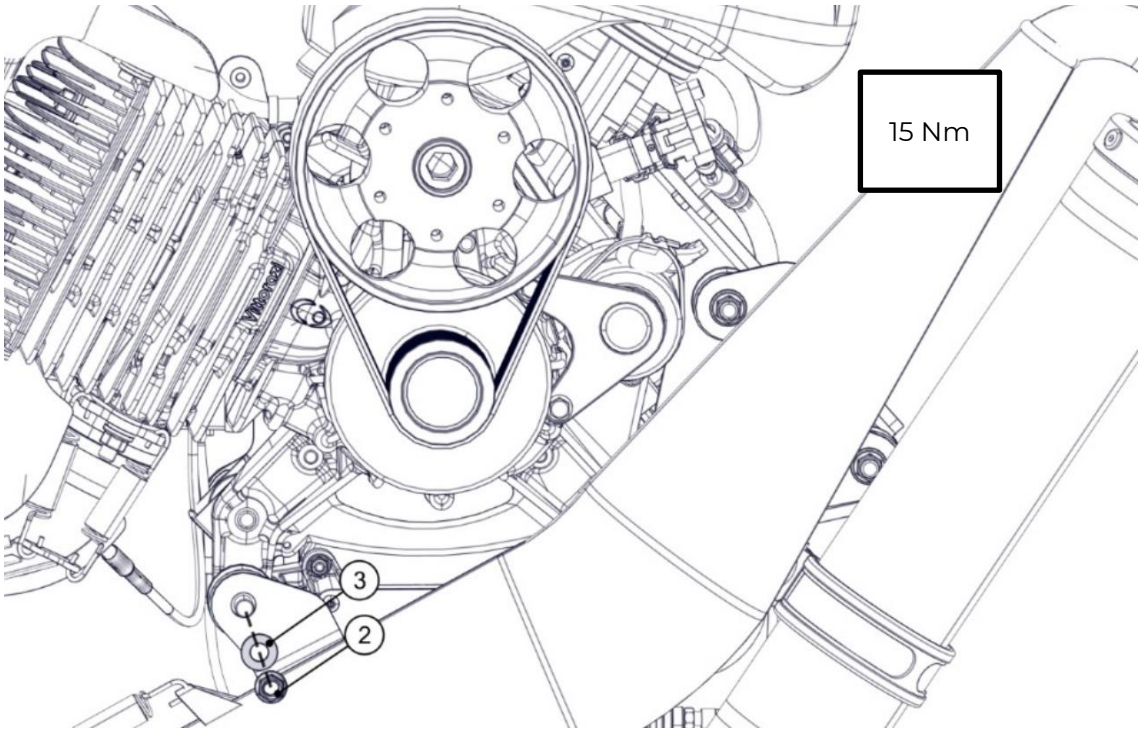


Replace the 3 self-locking nuts M8 (2).

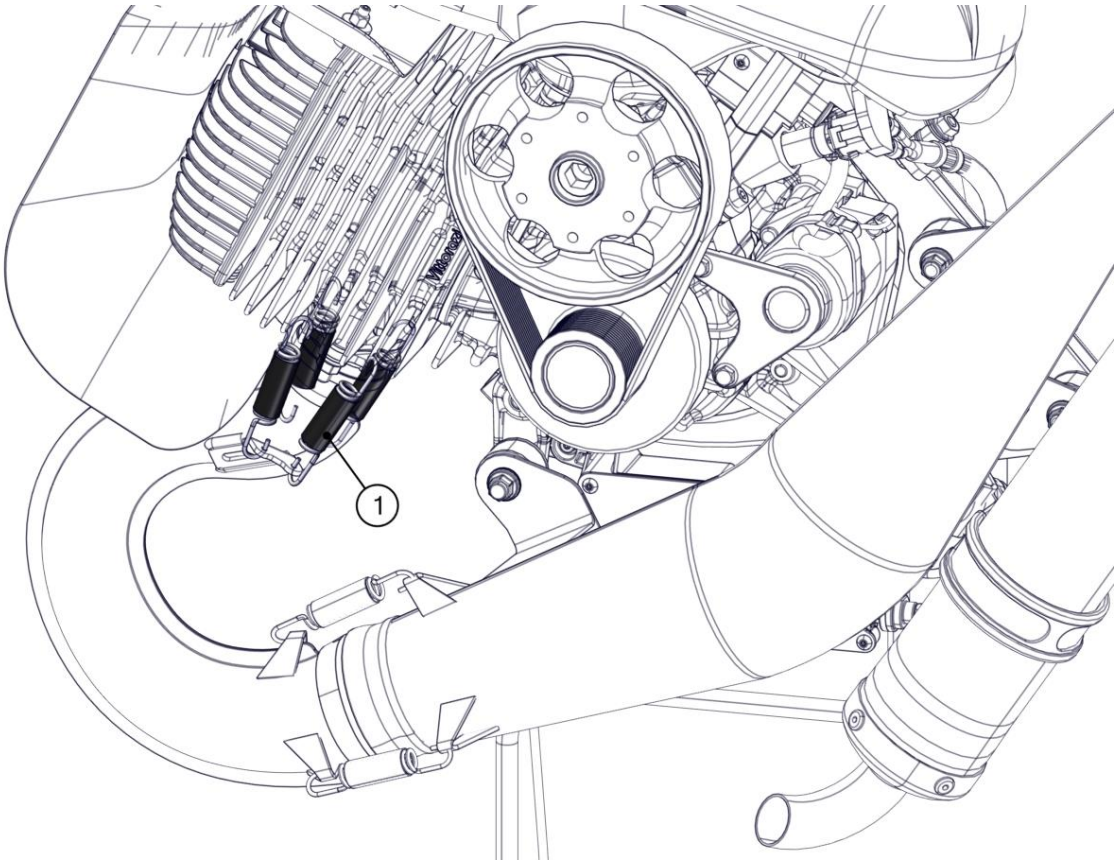
Insert the 2 self-locking nuts M8 (2) with washers (3) on the rubber mountings shown in the figure and tighten with the torque shown in the figure.



Insert the self-locking nut M8 (2) with washer (3) on the rubber mounting shown in the figure and tighten with the torque shown in the figure.



Insert the EGT sensor (see chapter 3.7.4 EGT sensor assembly).
Hook in the 4 bushing springs (1).



Run a cable around the 4 bushing springs, insert a clamp on the ends and tighten with pliers. (see chapter 3.12.3 for spring assembling operations)
Insert the EGT sensor (see chapter 3.7.4 EGT sensor assembly).

3.14 Electric starter

<table>
<tr><td>Components to replace</td><td><table>
<tr><th></th><th>Time limit</th></tr>
<tr><td>Electric starter (ME301).</td><td>100 h or 500 cycles</td></tr>
<tr><td>Cable clamp (MI309) *</td><td>100 h</td></tr>
</table></td></tr>
<tr><td>Special tools</td><td>Not required.</td></tr>
<tr><td>Values</td><td>Screws M6x25: 10 Nm.
Screws M6x10: 10 Nm.</td></tr>
</table>

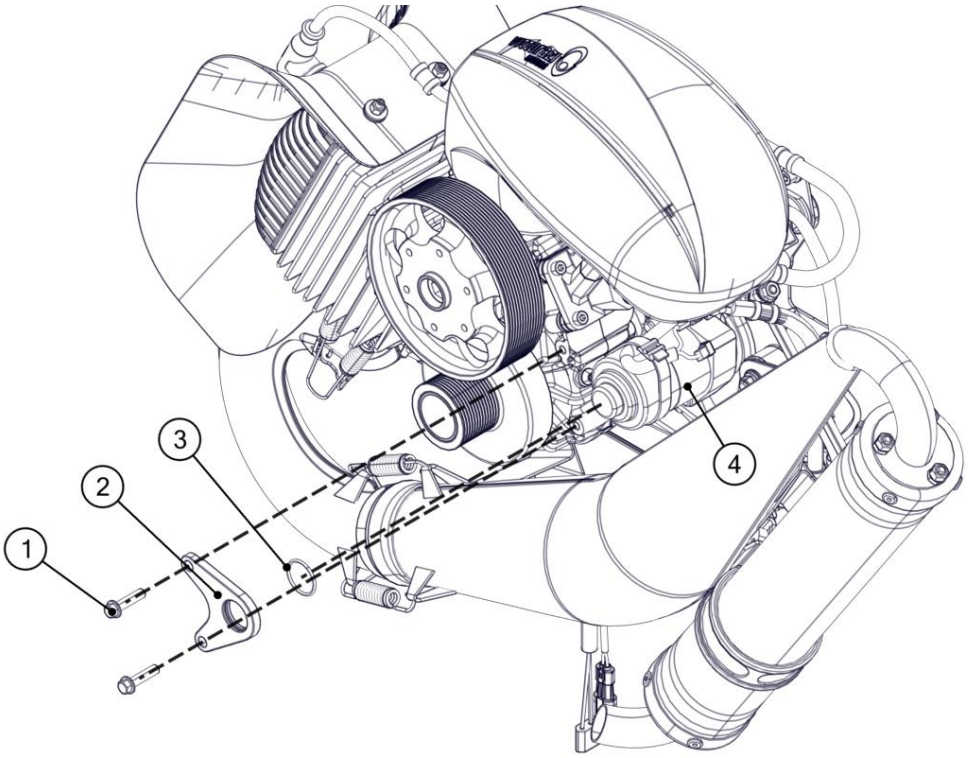
*Always replace it when disassembled.

3.14.1 Electric starter disassembly

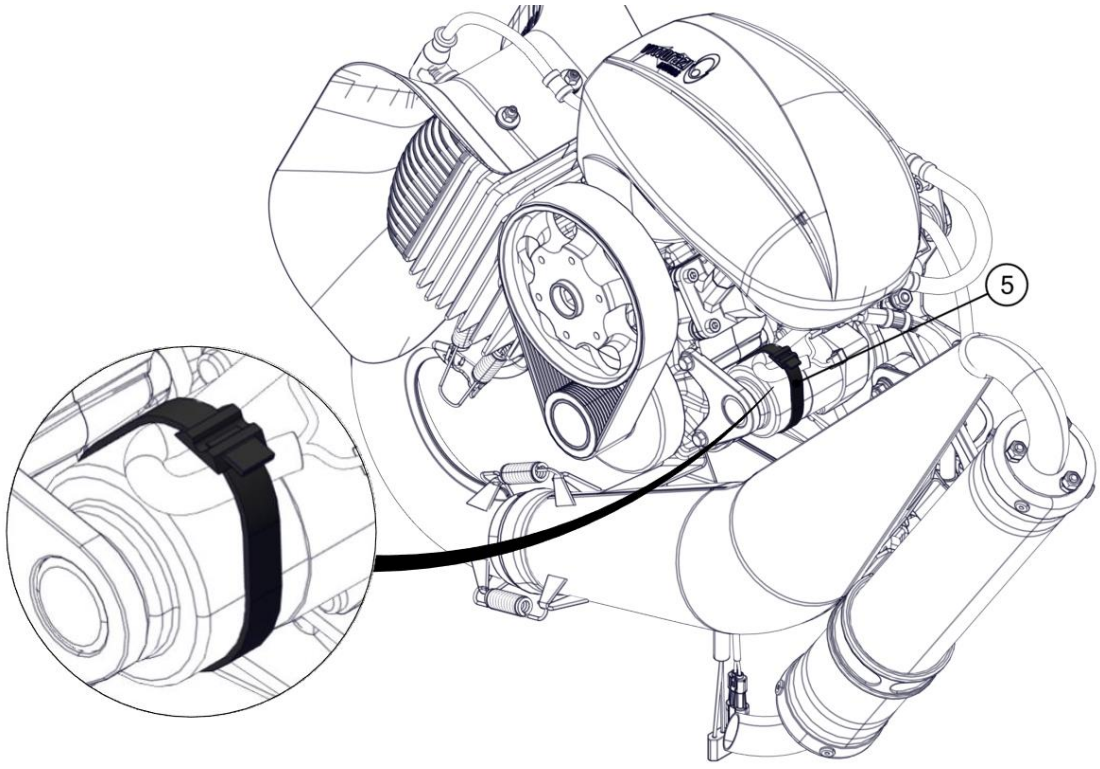
Disconnect the battery.

Before disassembling the electric starter, remove the belt (see chapter 3.16 Transmission).

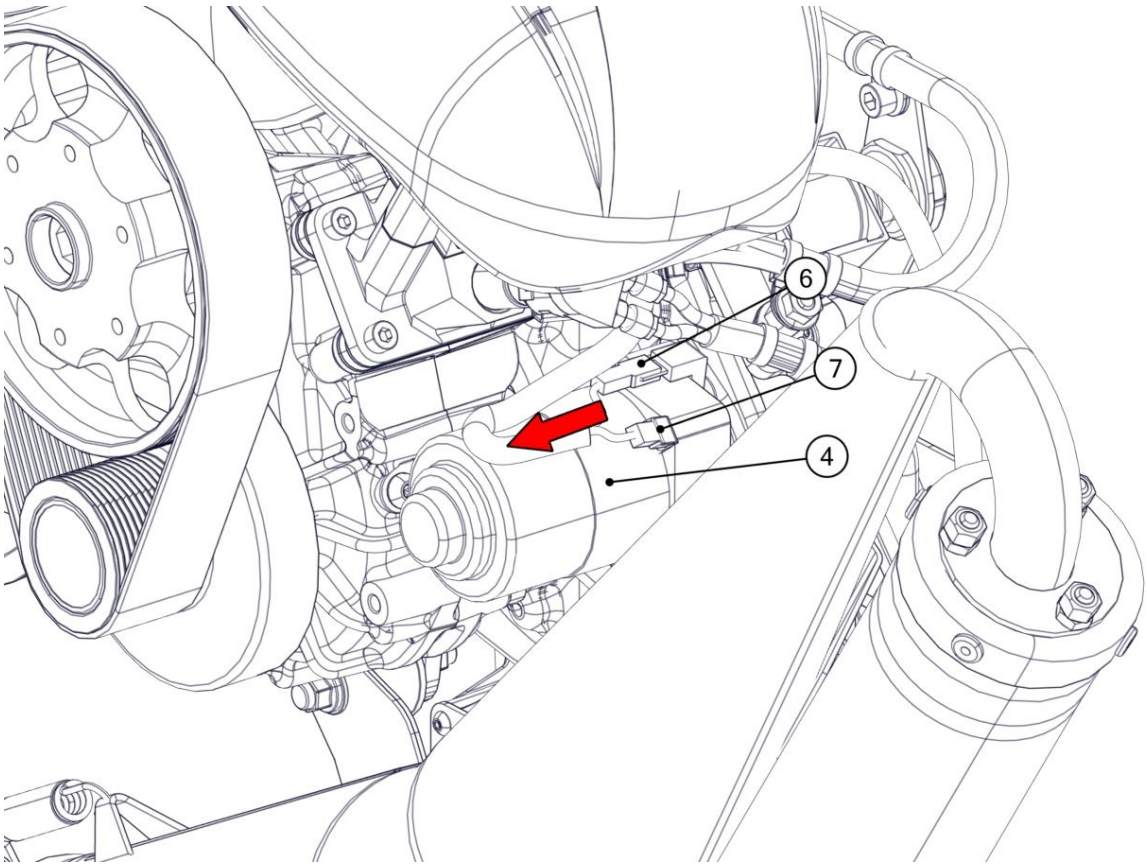
Remove the 2 flange head screws M6x25 (1) from the electric starter plate (2).
Remove the O-ring (3) from the starter plate.



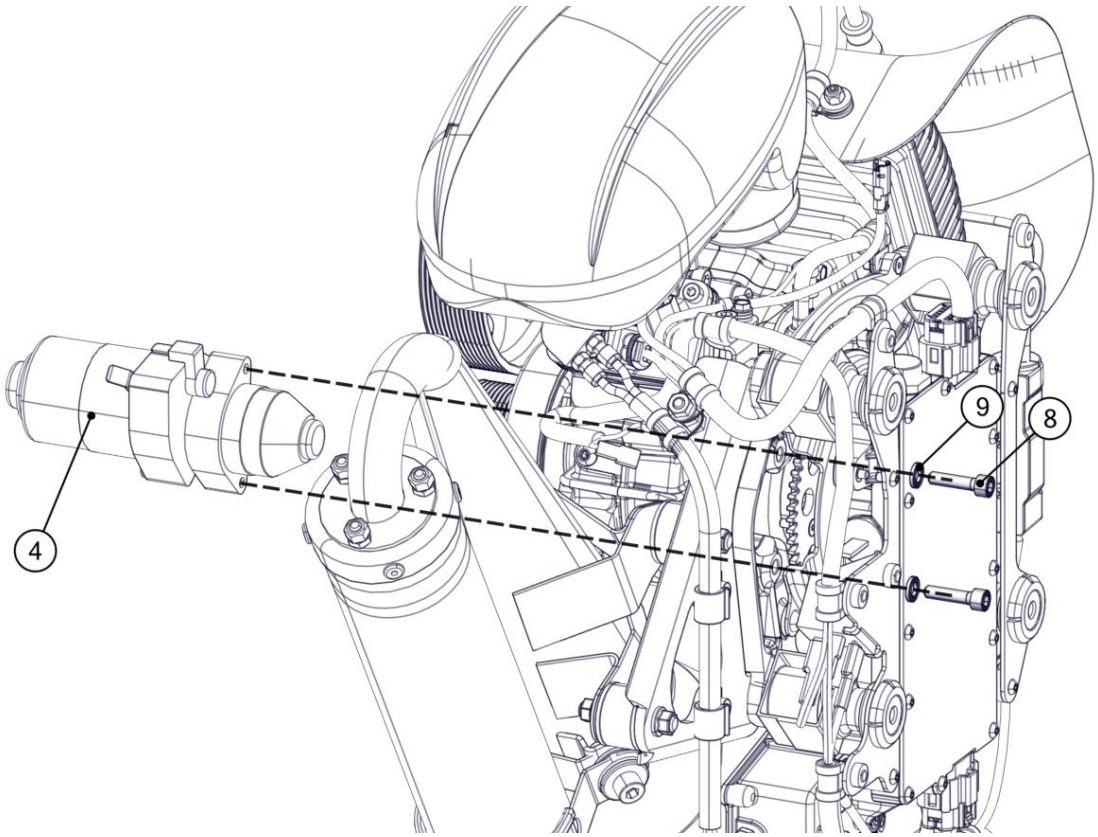
Cut the plastic clamp (5).



Remove the supply cables (6, 7).



Remove the 2 Allen screws M6x25 (8) with washers (9) from the electric starter (4).
Remove the electric starter (4).

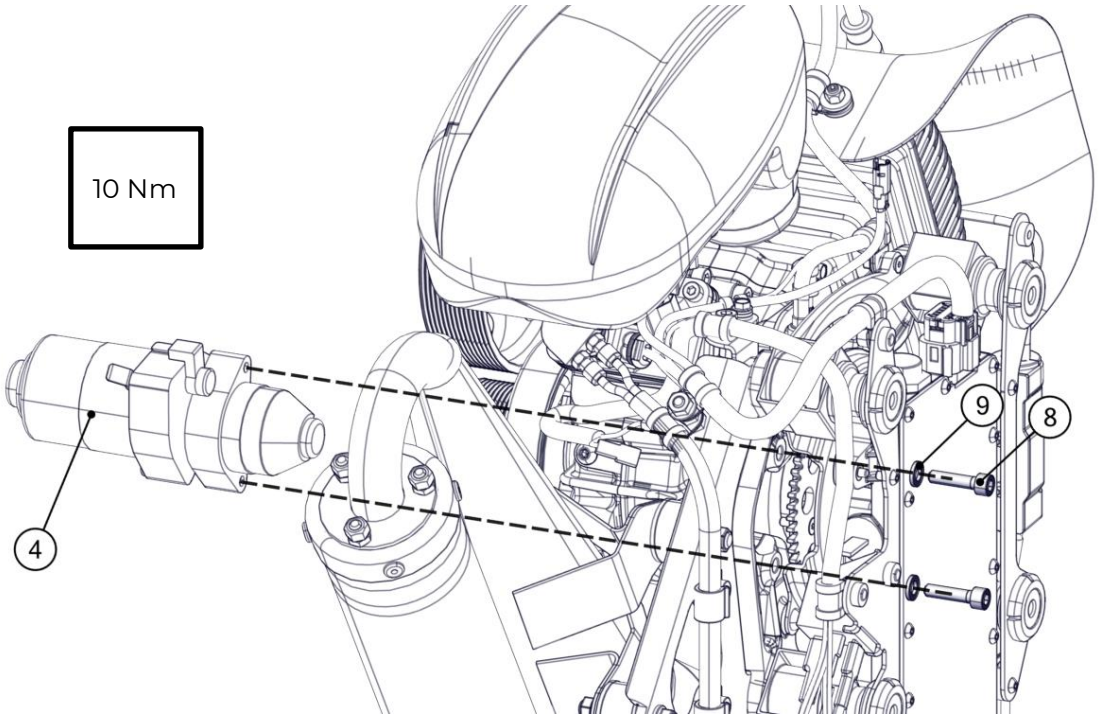


3.14.2 Electric starter maintenance

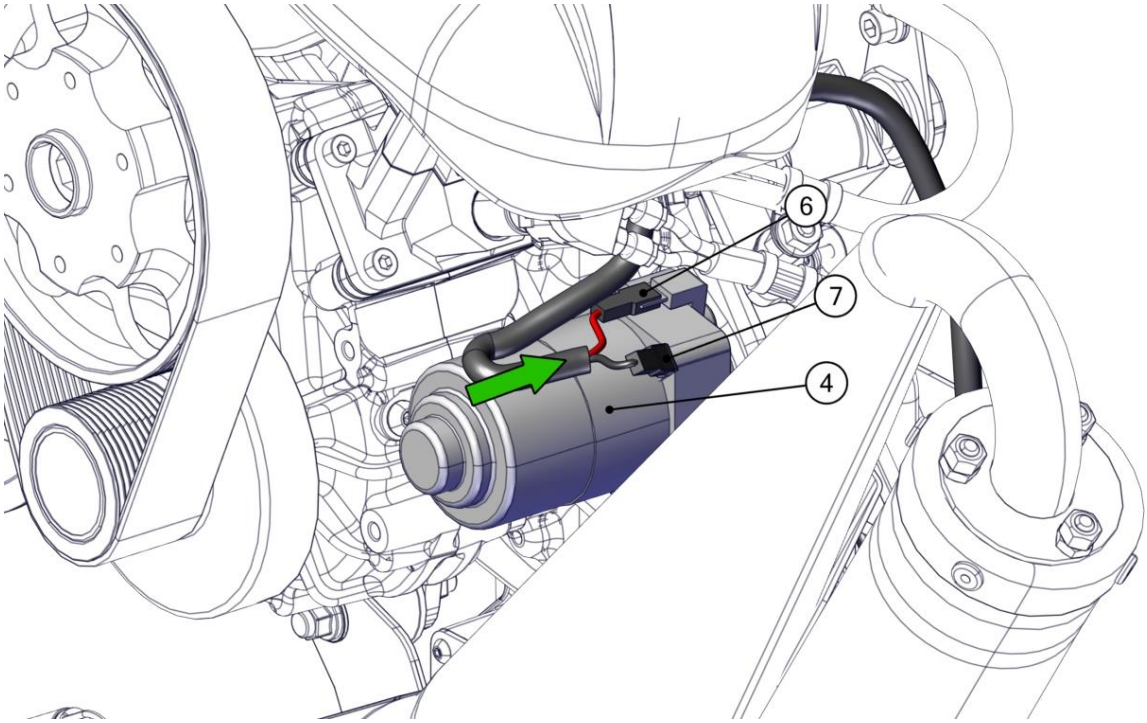
Check the electric starter teeth: if they show signs of wear, replace the electric starter.
Check that the O-ring (3) is still flexible, otherwise replace it.

3.14.3 Electric starter assembly

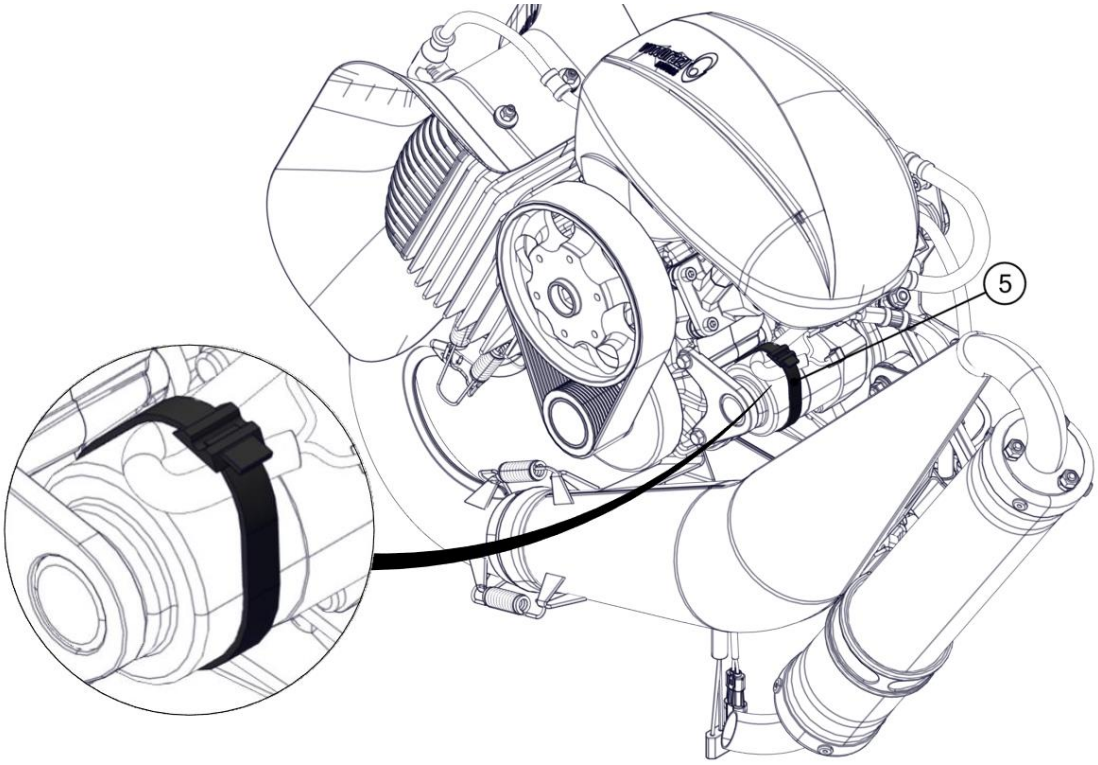
Insert the electric starter (4) into the crankcase housing.
Insert the 2 Allen screws M6x25 (8) with washers (9) into the electric starter (4) and tighten with the torque shown in the figure.



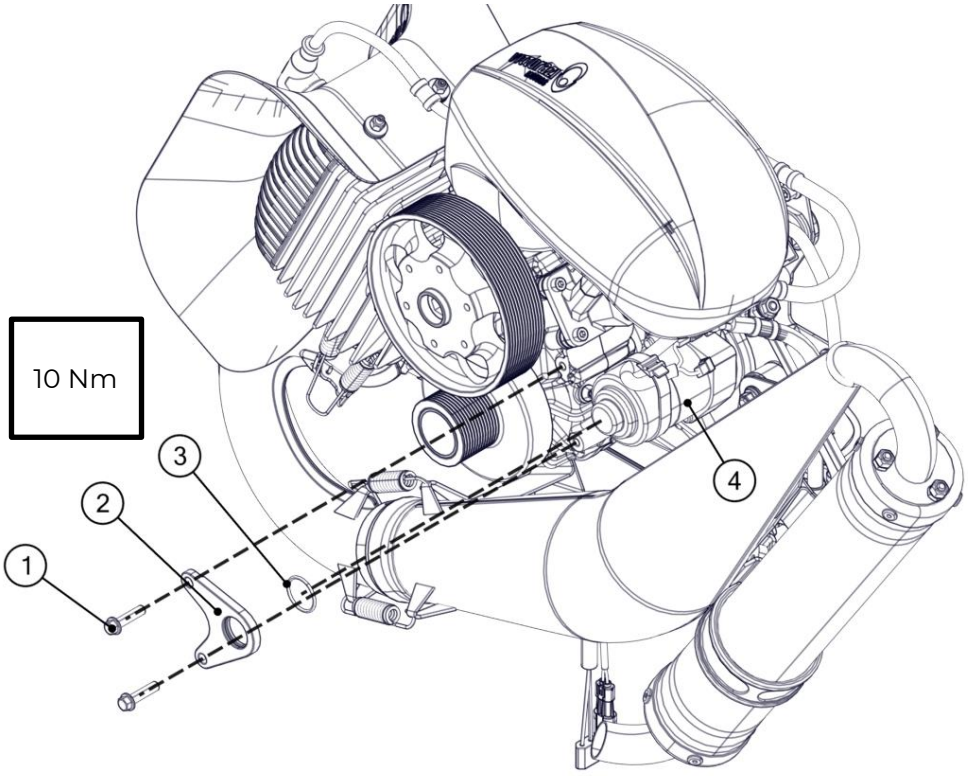
Plug the supply cables (6, 7) as shown in the figure.



Place the plastic clamp (5).



Position the O-ring (3) inside the reinforcement plate (2)
Position the reinforcement plate (2).
Insert the 2 flange-head screws M6x25 (1) in the plate (2) and tighten with the torque shown in the figure.



Insert the belt (see chapter 3.16 Transmission).

3.15 Flywheel, coil

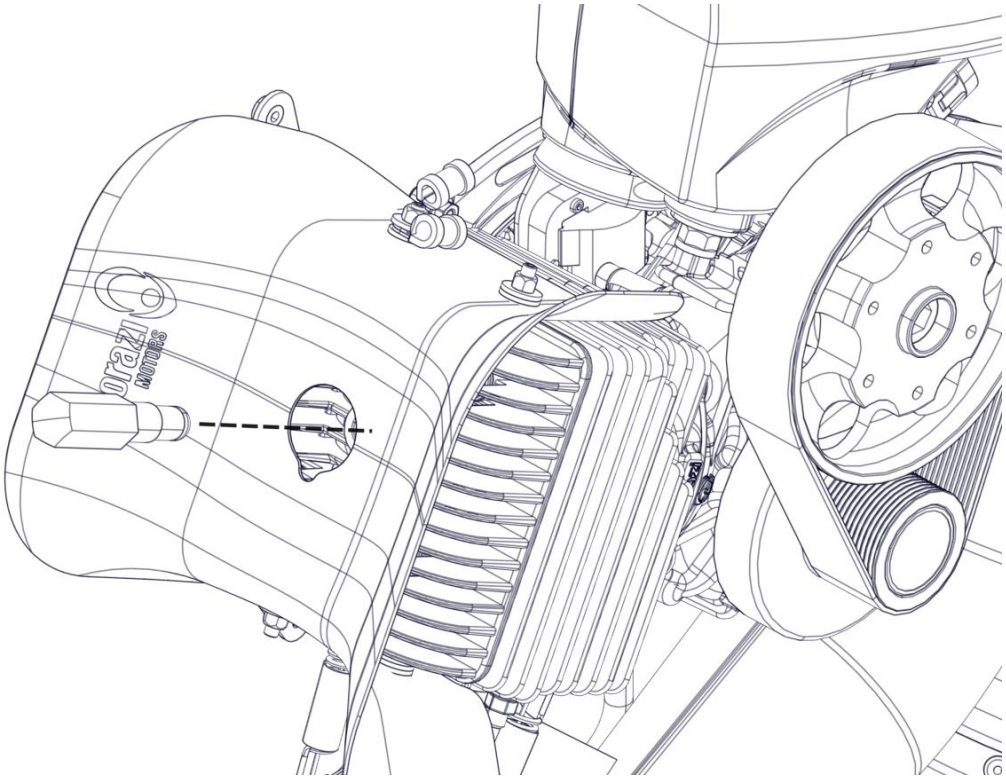
Components to replace	<table><tr><th></th><th>Time limit</th></tr><tr><td>Flywheel (ME304, M034n, ME305, ME307, ME038, M039).</td><td>on condition</td></tr><tr><td>Nut M10x1,25 (M037) *</td><td>200 h</td></tr><tr><td>Washer (M037) *</td><td>200 h</td></tr><tr><td>Coil (MI031s).</td><td>on condition</td></tr><tr><td>Loxeal 55-03/Loctite 243. *</td><td></td></tr></table>
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.

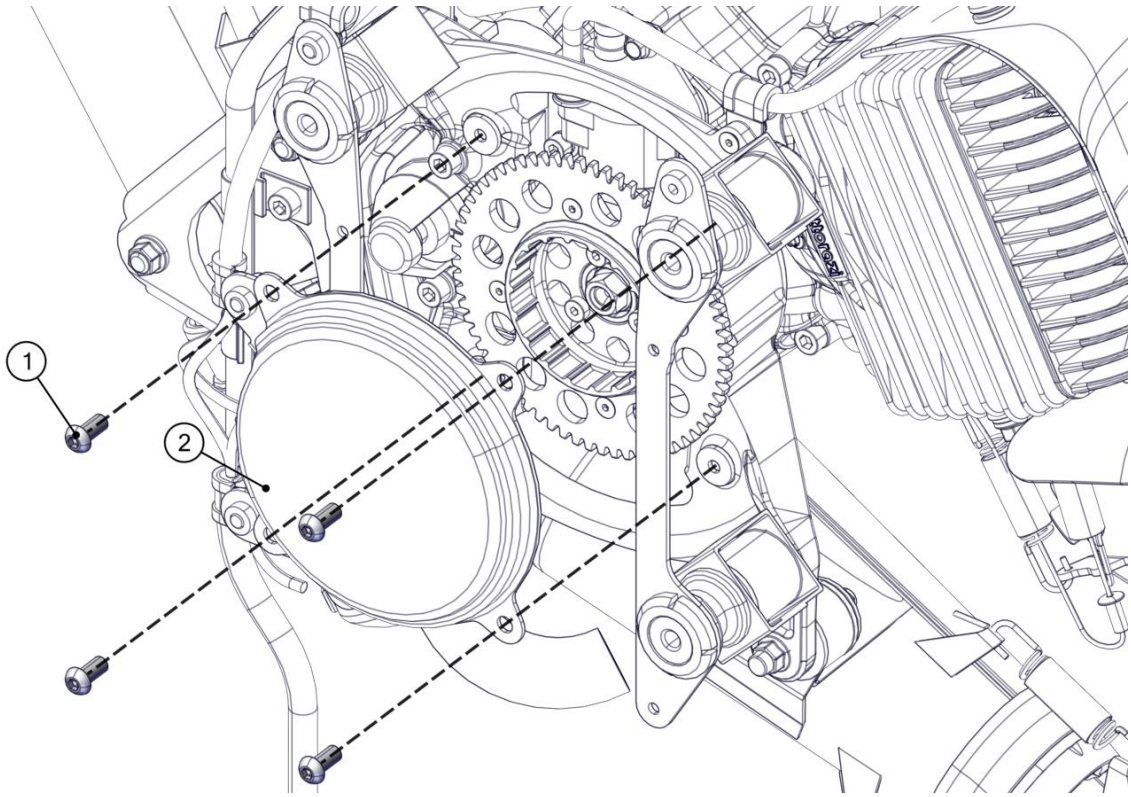
3.15.1 Flywheel, coil disassembly

Before disassembling the flywheel, remove the spark plug (see chapter 3.2 Spark plug) and the FIU (see chapter 3.5 Full integrated unit (FIU)).

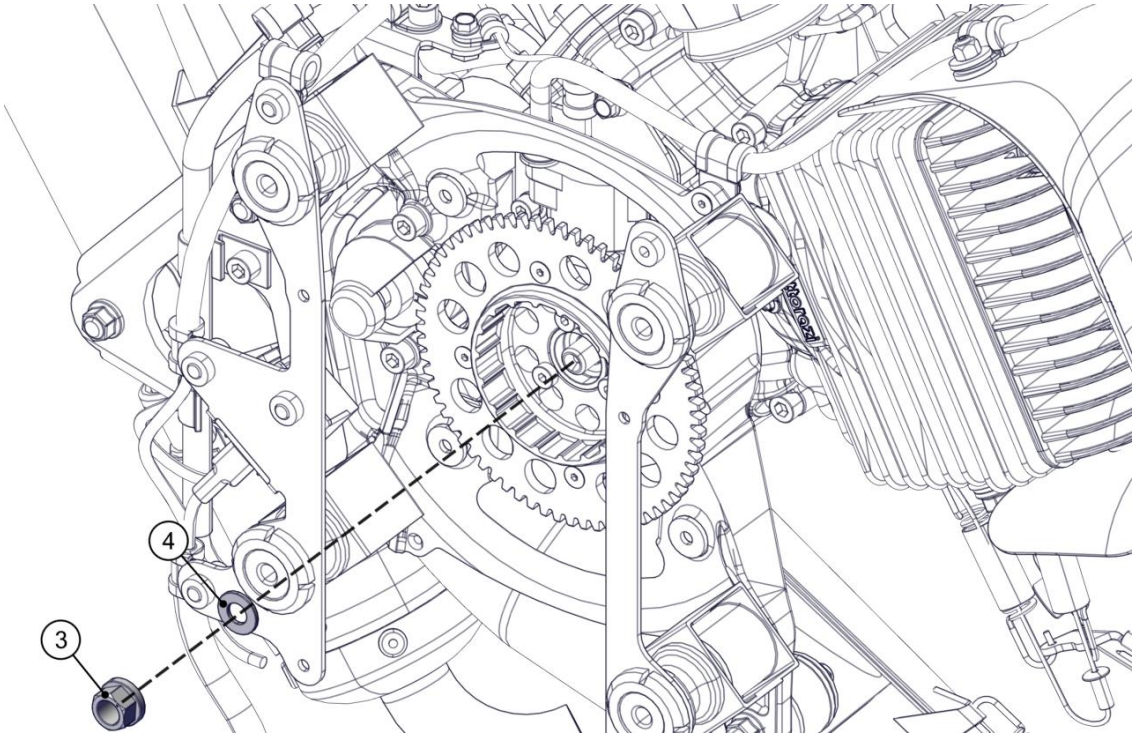
Screw the piston lock into the spark plug hole.



Remove the 4 Allen screws M6x14 (1) and the ring gear cover (2).

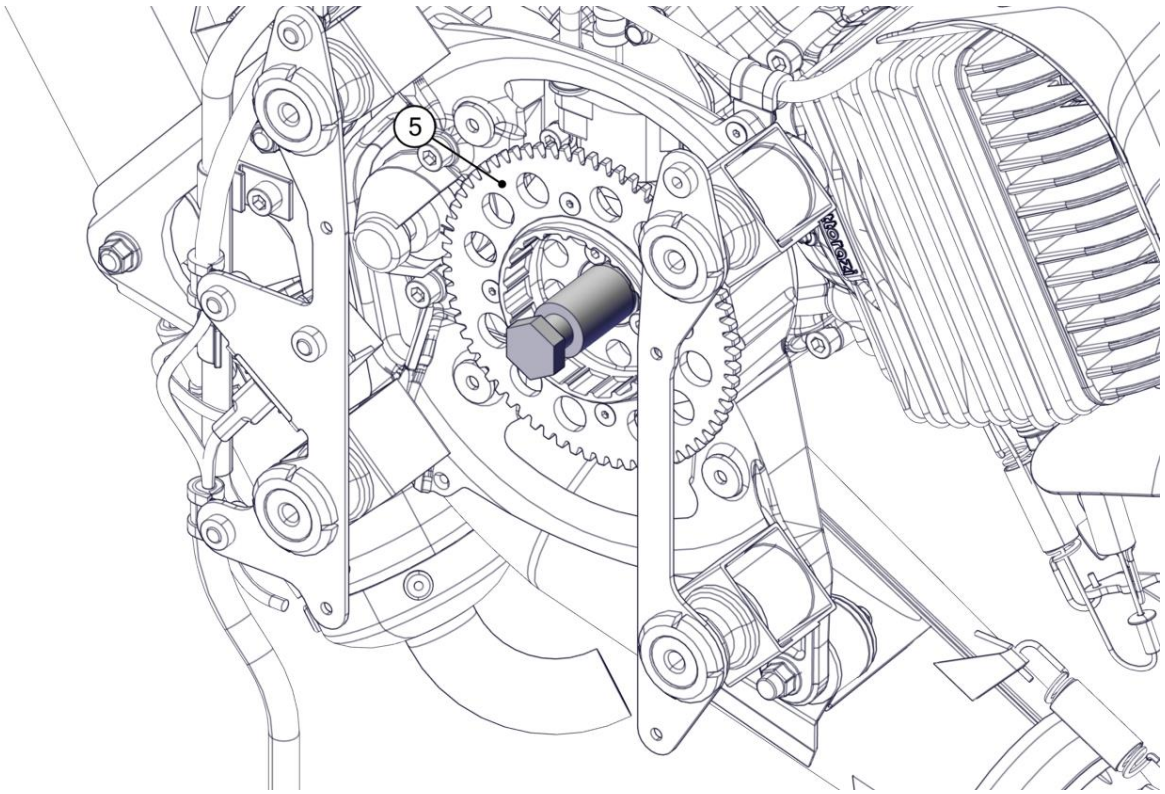


Remove the nut M10x1,25 (3) with the washer 10,5x18 (4).

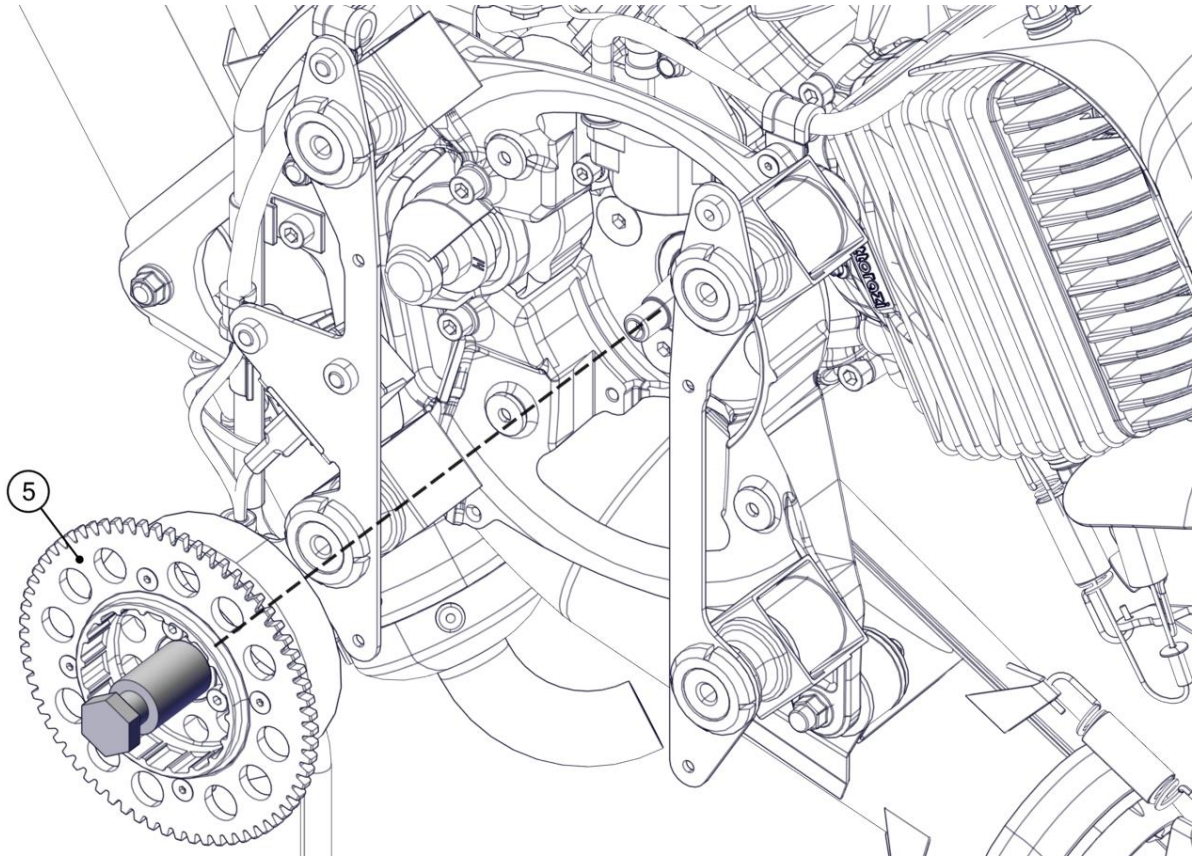


Do not use a pneumatic impact screwdriver, otherwise the piston may be damaged.

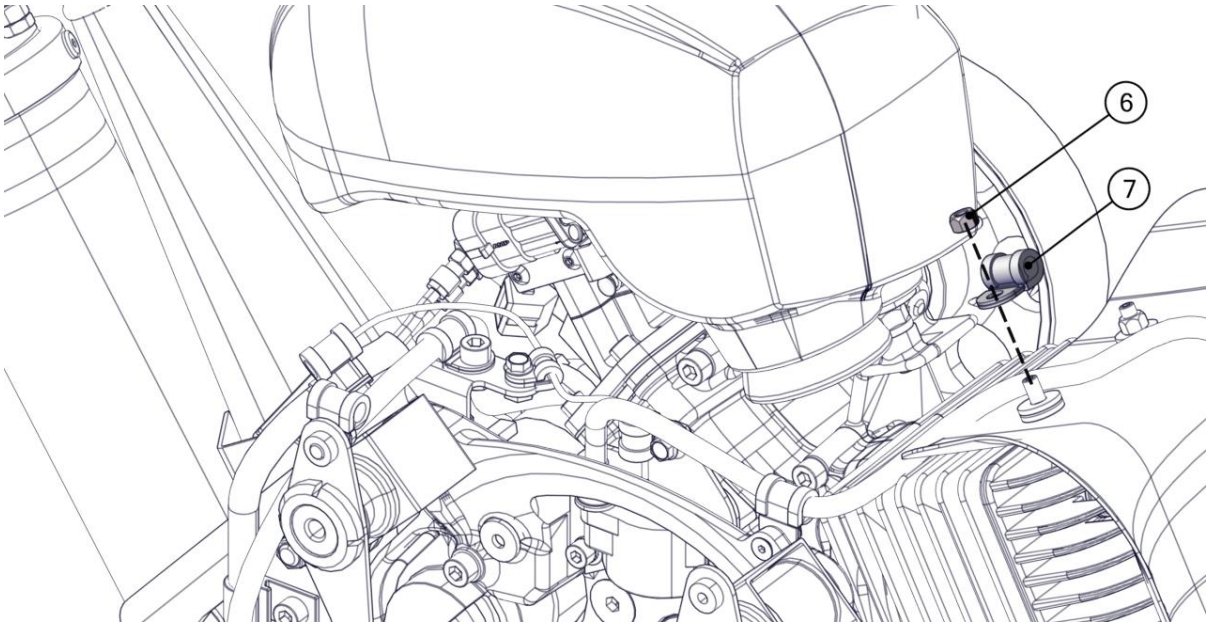
Screw the flywheel extractor into the flywheel (5).



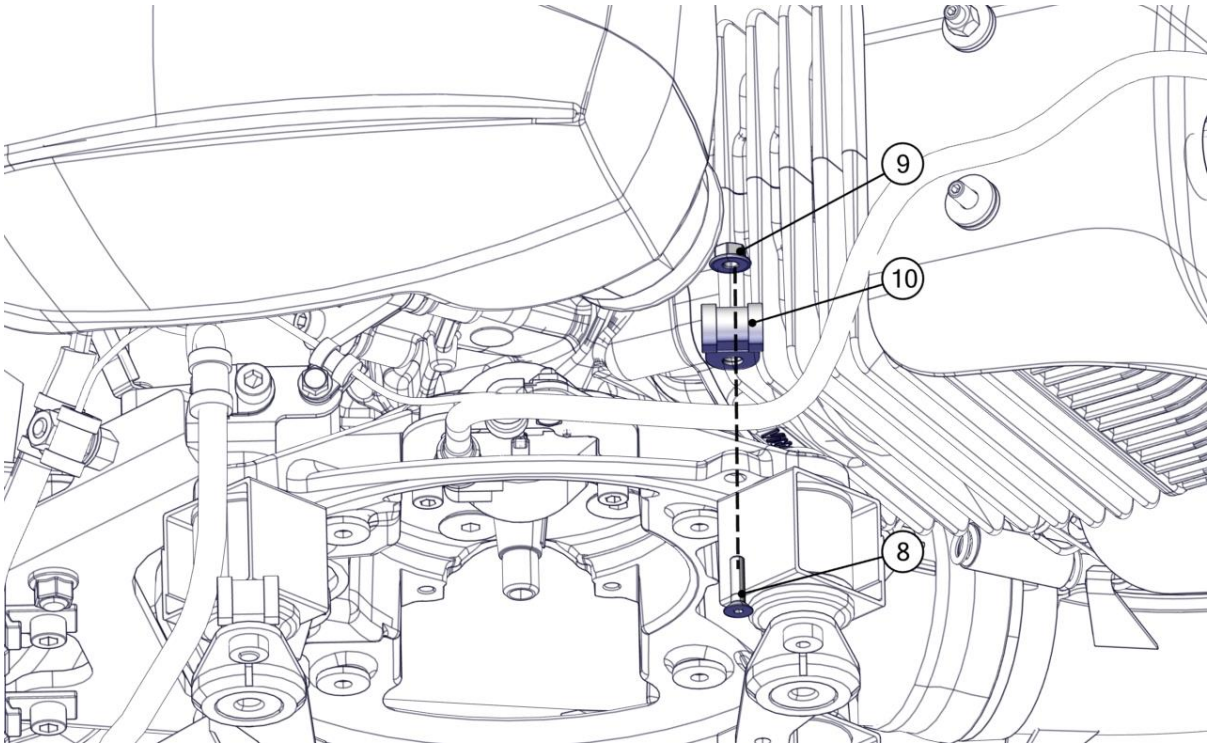
Turn the central pin of the extractor until the flywheel (5) is removed from the crankshaft.



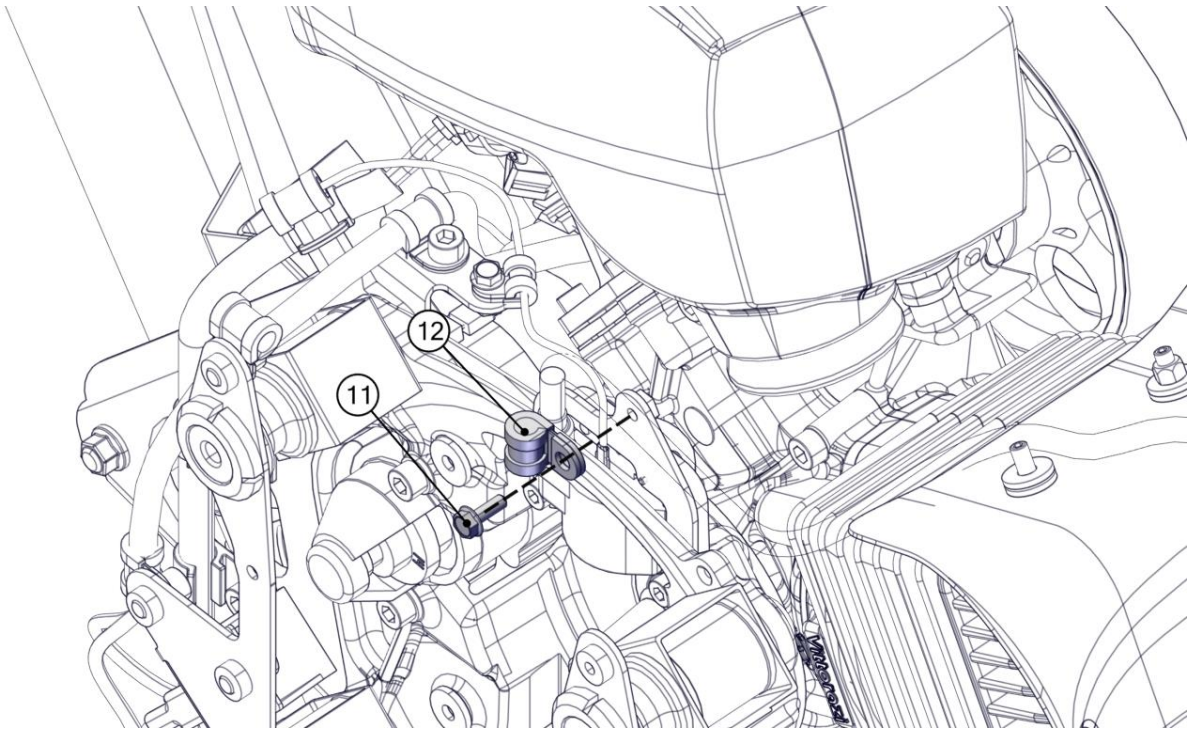
Remove the self-locking nut M4 (6) and the M5 F8 cable clamp (7).



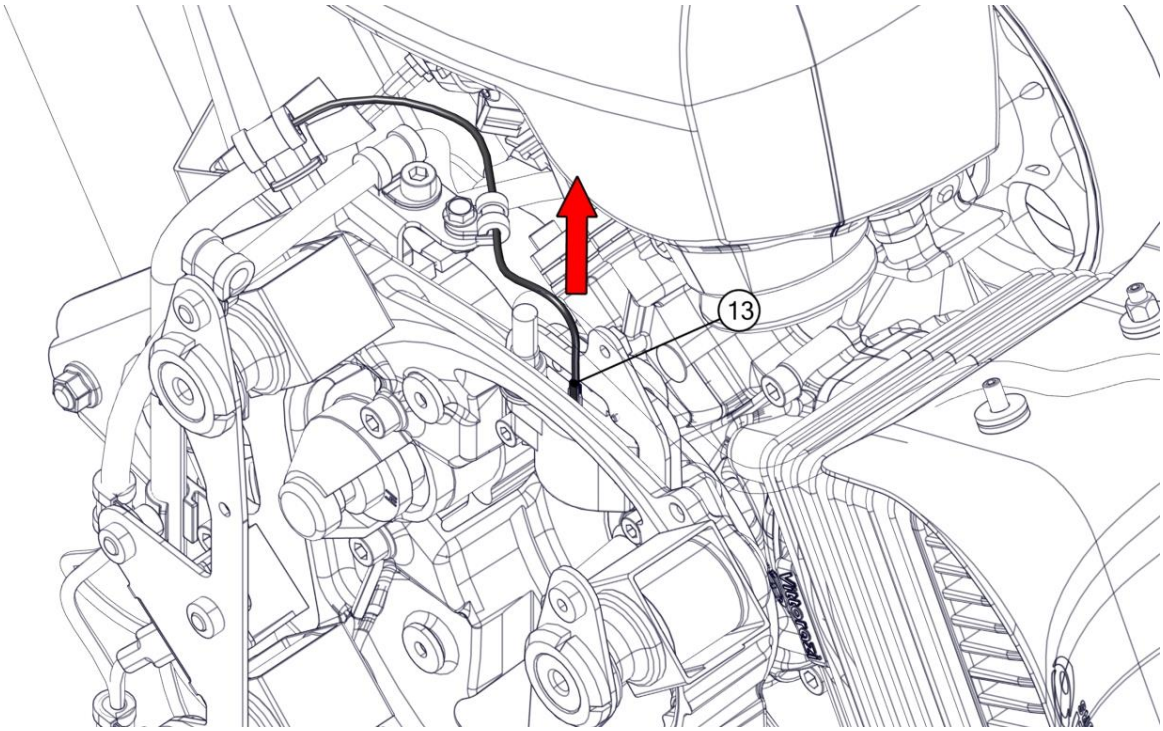
Remove the M4x20 screw (8), the self-locking nut M4 (9) and the M5 F8 cable clamp (10).



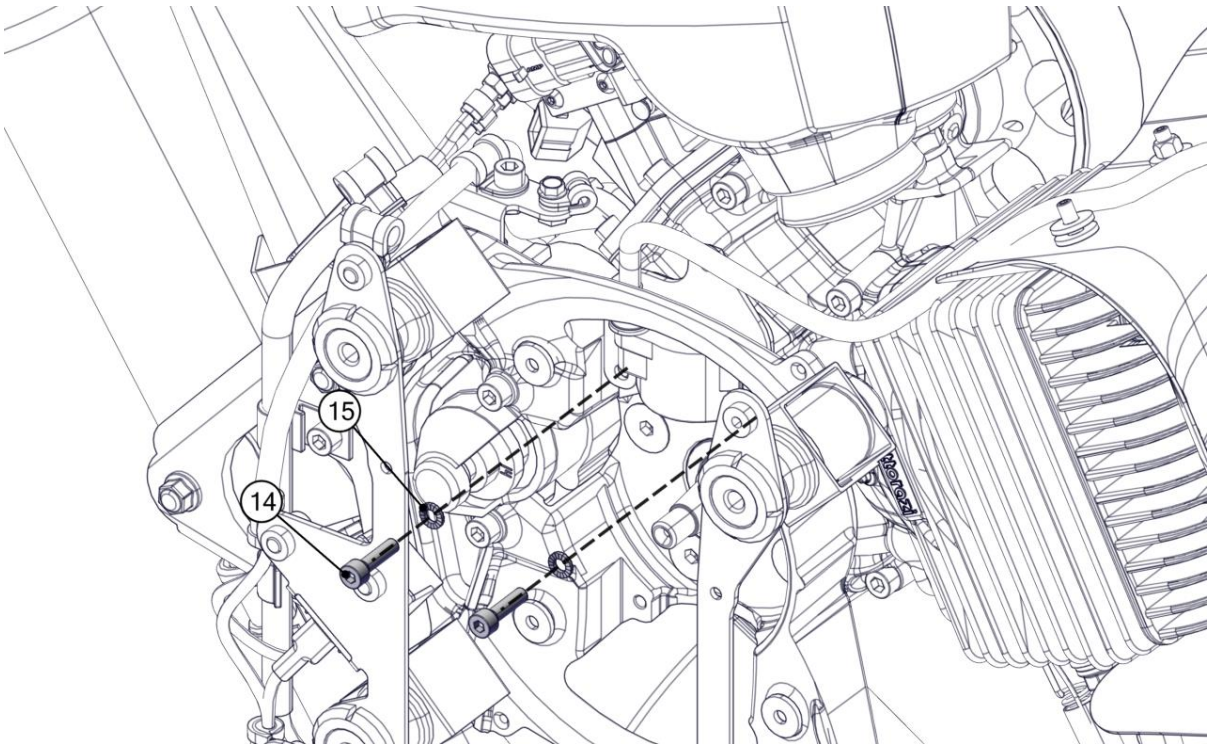
Remove the M4x12 screw (11) and the M5 F6 cable clamp (12).



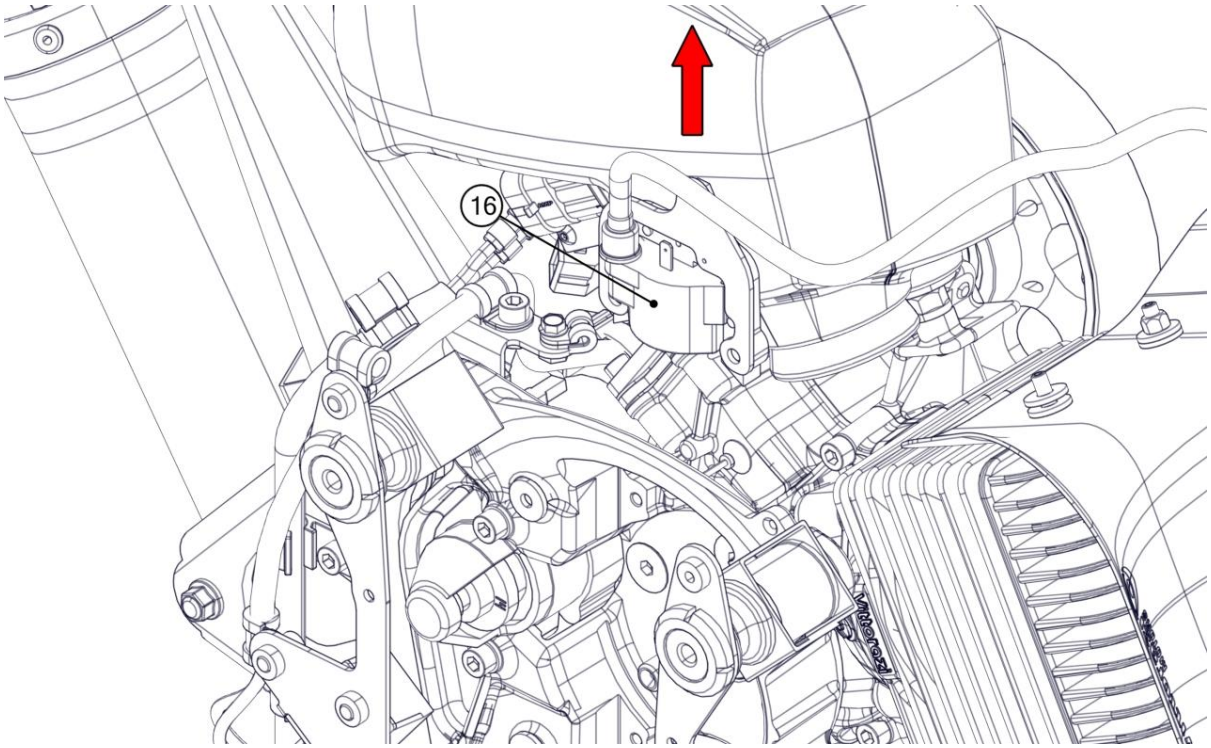
Remove the coil signal cable (13)



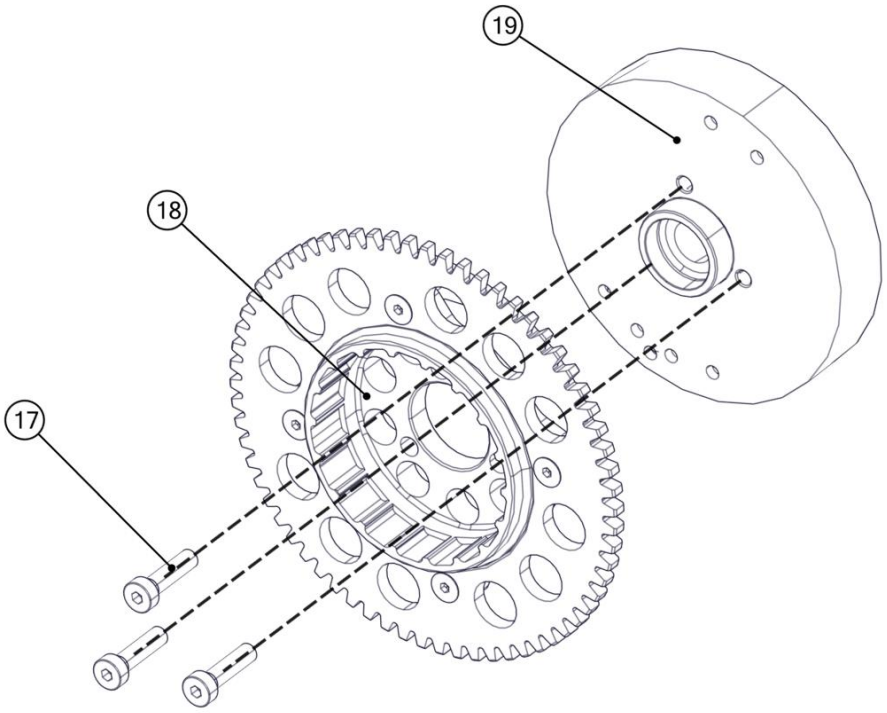
Remove the 2 Allen screws M5x20 (14) with washers (15).



Remove the ignition coil (16).



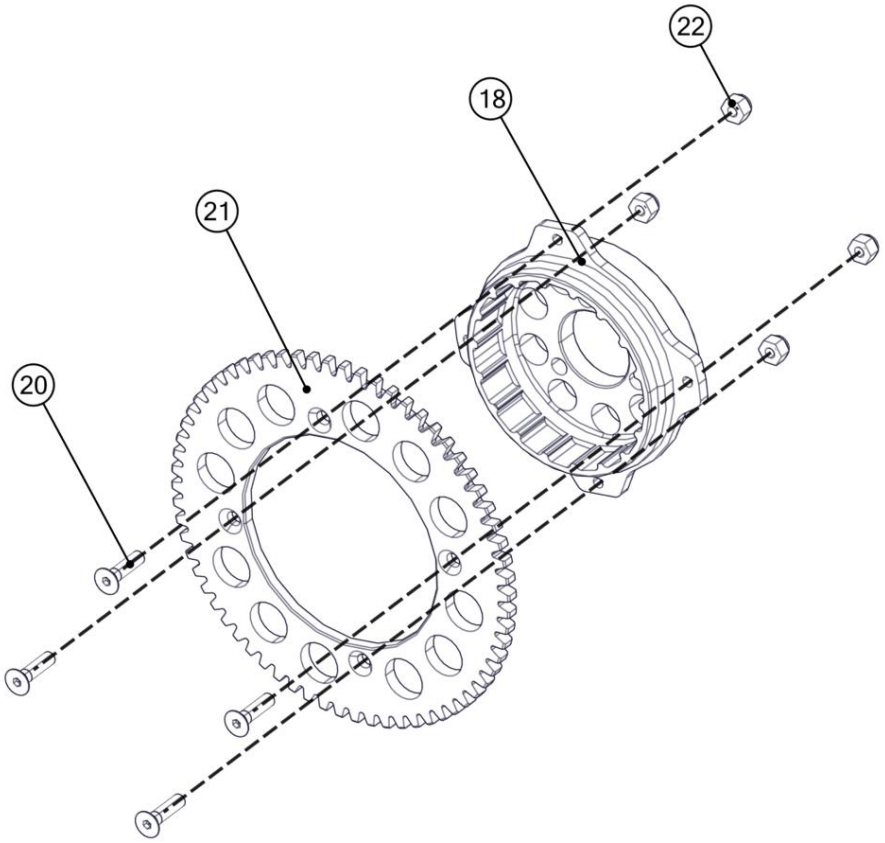
Remove the 3 Allen screws M5x20 (17) and the toothed pulley (18) from the flywheel (19).



3.15.2 Flywheel, coil maintenance

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

Check the ring gear (21) teeth: if they show signs of wear, replace the ring gear (21).
Remove the 4 nuts M4 (22), the 4 screws M4x16 (20) and the ring gear (21) from the toothed pulley (18) and replace it.

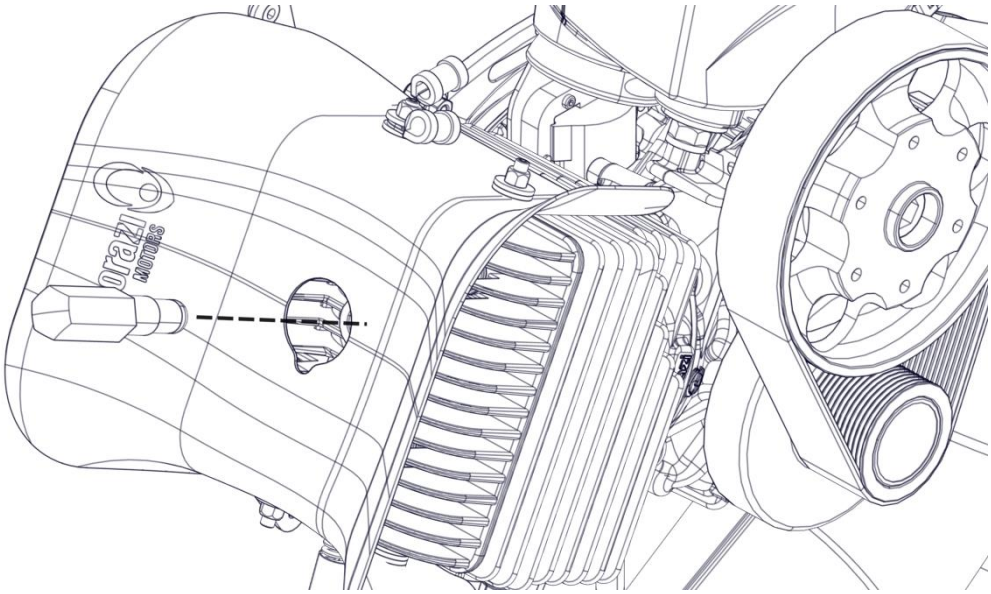


Measure the resistance of the coil: if out of tolerance replace it.

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

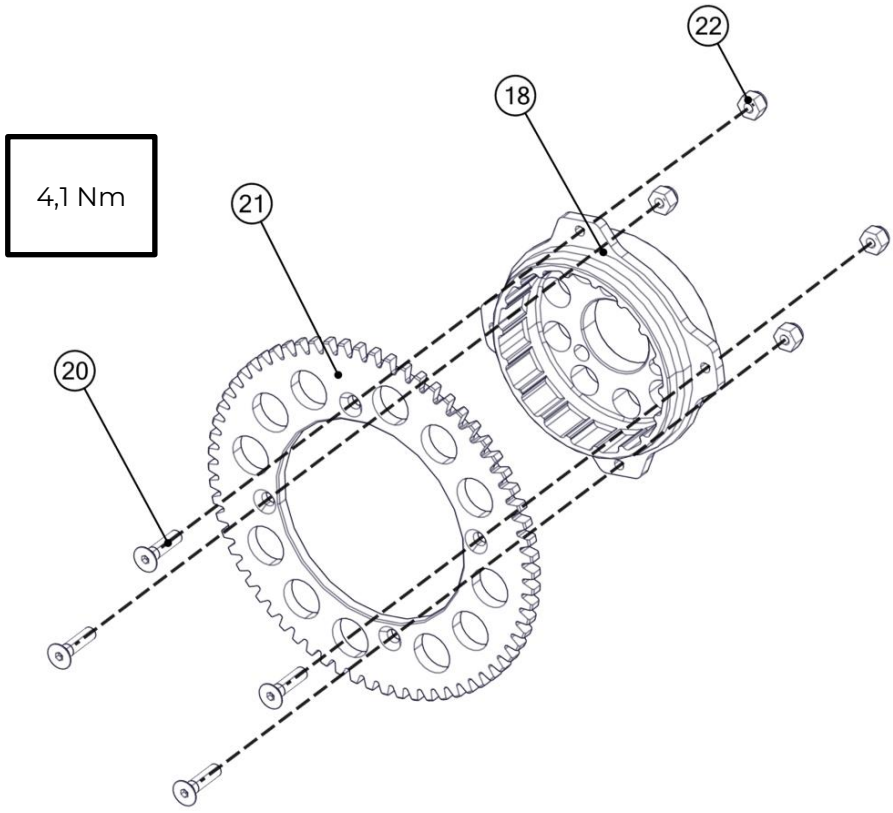
3.15.3 Flywheel, coil assembly

Screw the piston block into the spark plug hole.

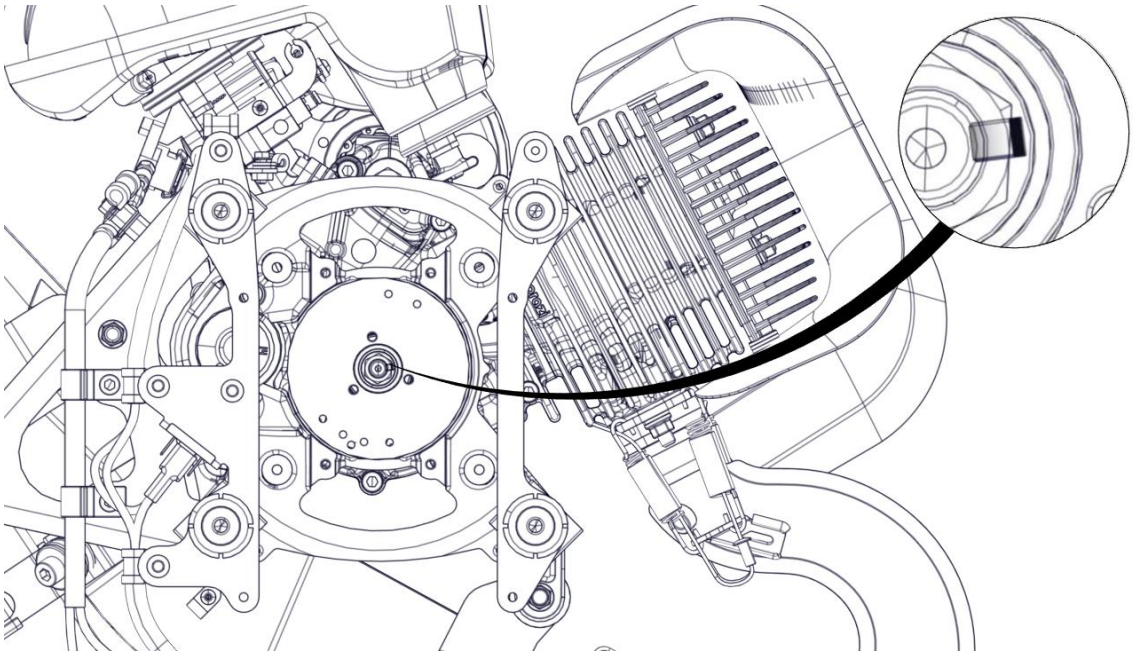


Insert the ring gear (21) on the toothed pulley (18), the 4 screws M4x16 (20) and tighten with the torque shown in the figure.
Insert the 4 nuts M4 (22).

Replace the 4 screws M4x16 (20) each time the ring gear is disassembled

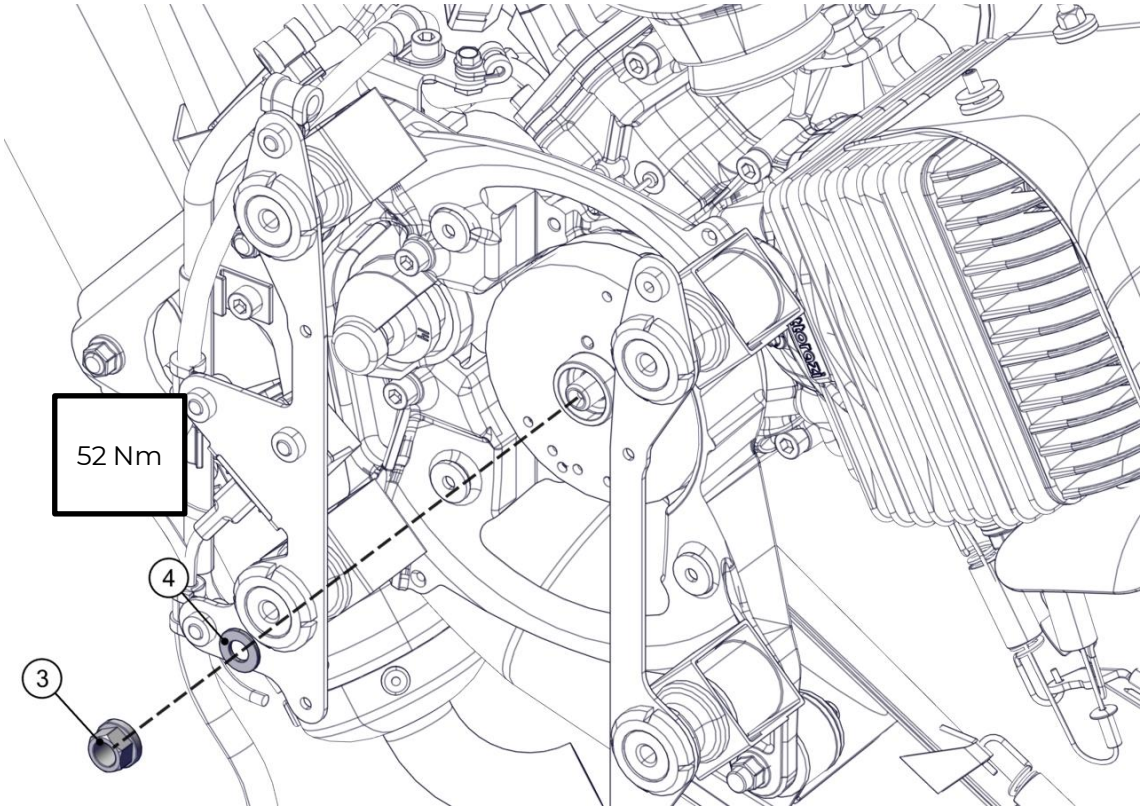


Position the flywheel on the crankshaft by aligning the key with the flywheel groove. The position of the key and therefore of the flywheel determines the timing of the engine.

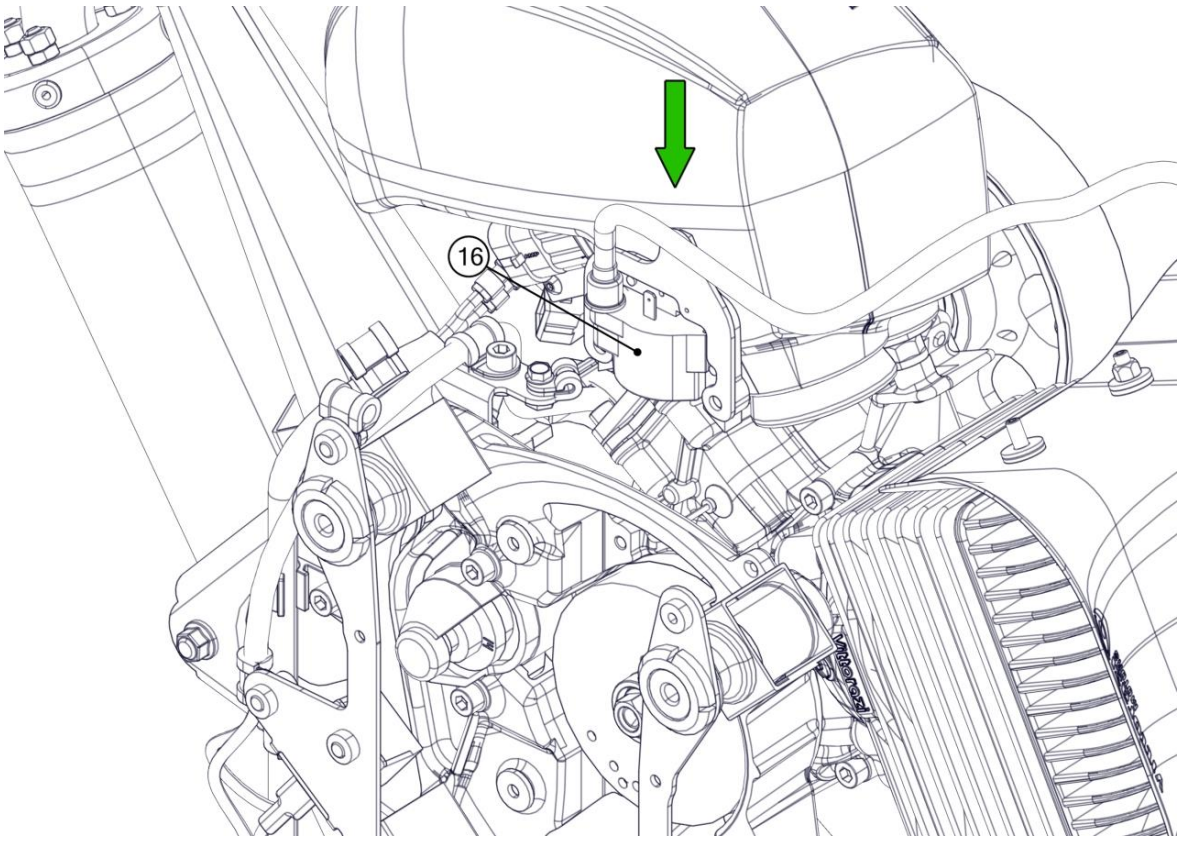


Replace nut M10x1,25 (3) and washer 10,5x18 (4).

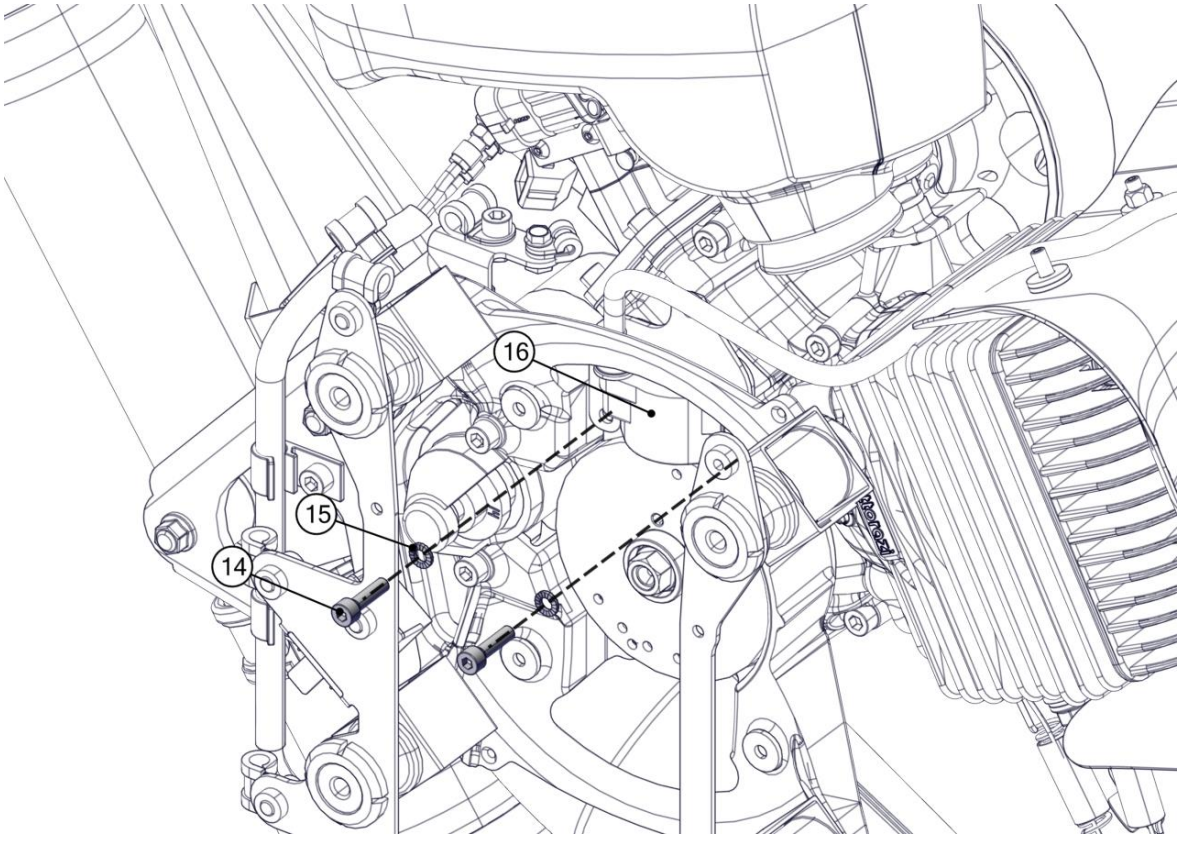
Insert the nut M10x1,25 (3) with the washer 10,5x18 (4) and tighten with the torque shown in the figure.



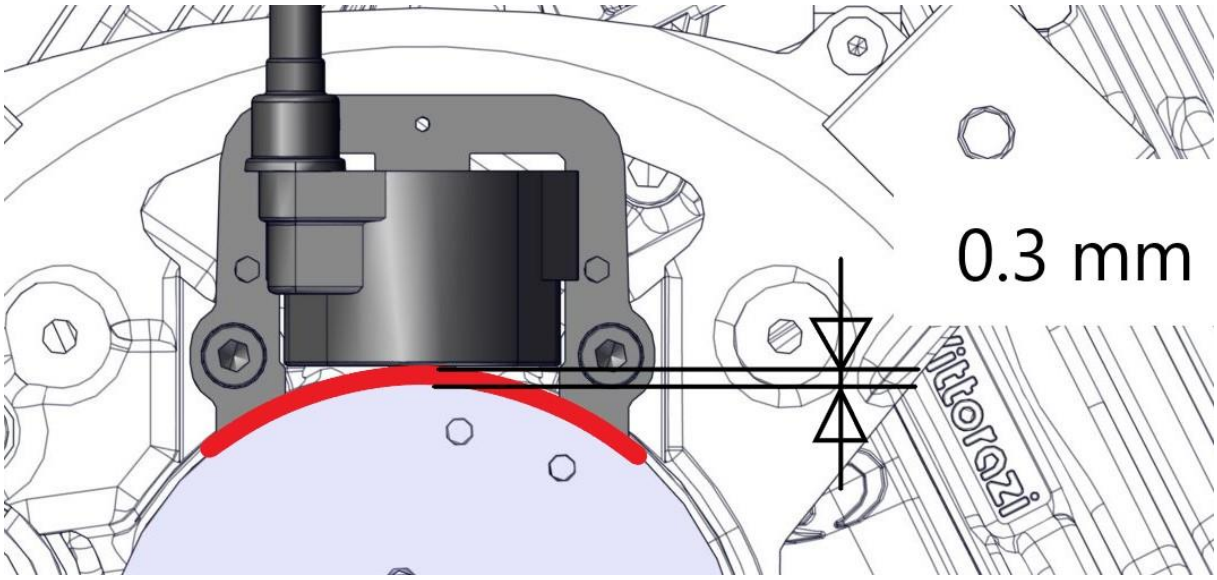
Place the ignition coil (16).



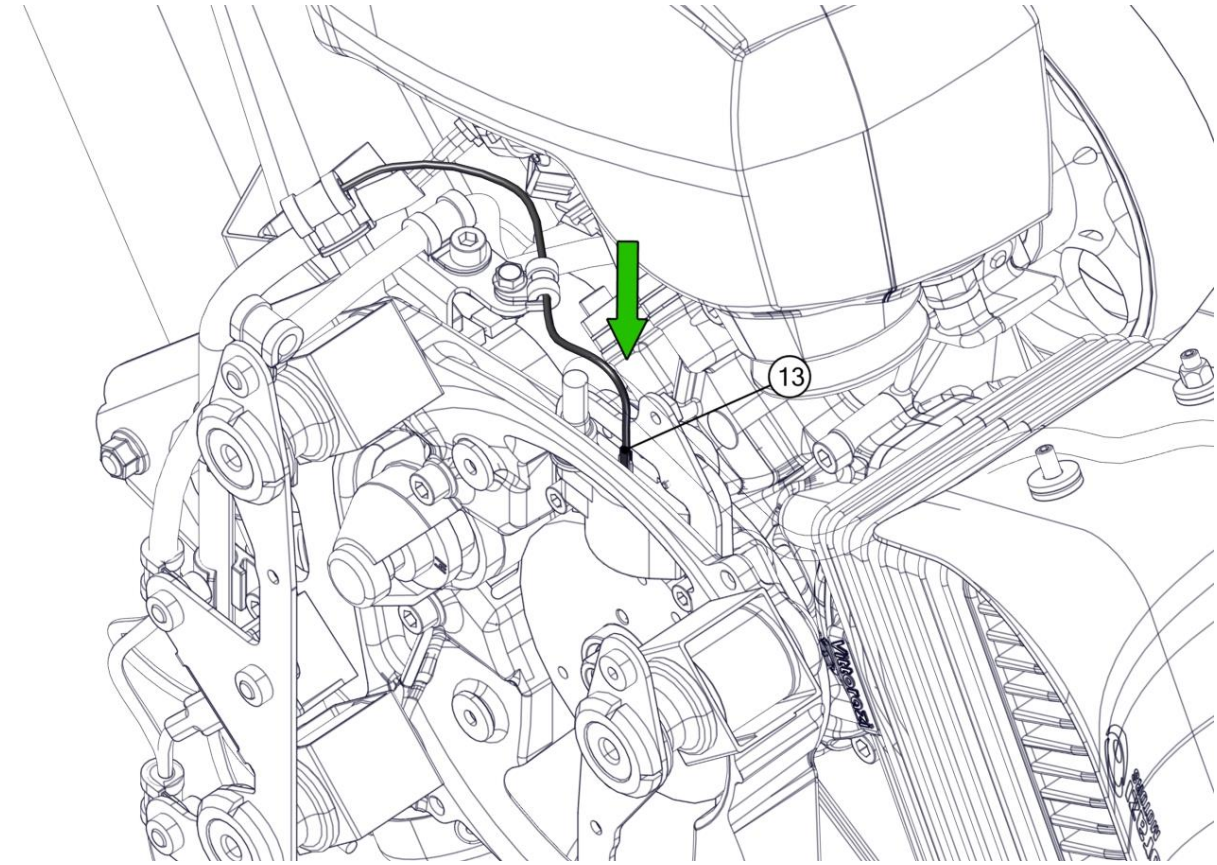
Insert the 2 Allen screws M5x20 (6) with washers (7) without tightening.



Place 0,3 mm shims between the ignition coil and the flywheel.
Tighten the ignition coil screws by hand.
Remove the shims.

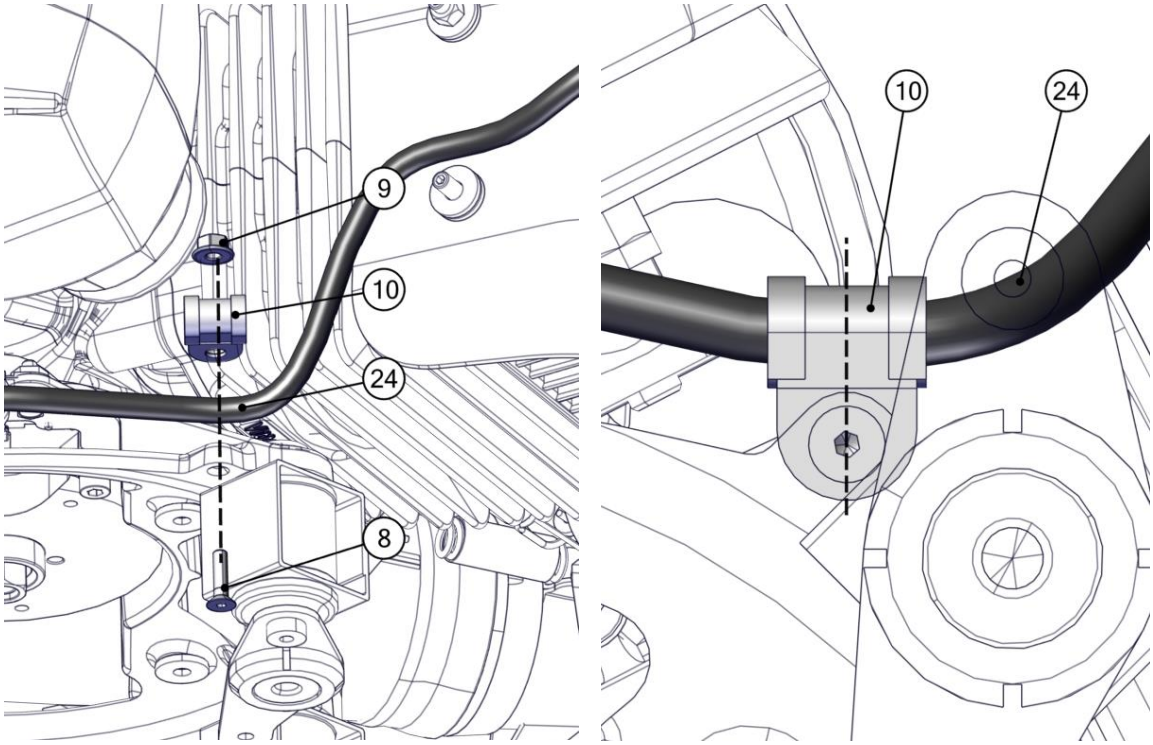


Insert the coil signal cable (13).

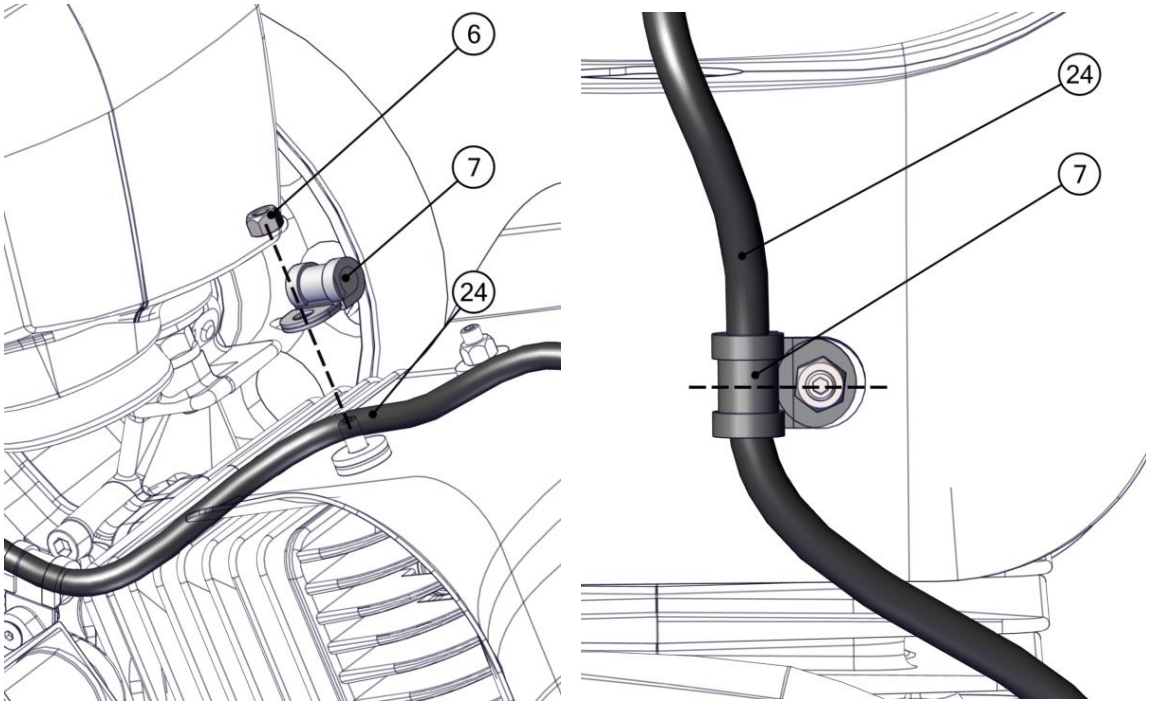


Fix the coil cable (13) with the M5 F6 cable clamp (12) and the screw M4x12 (11) in the position shown in the figure with threadlocker (recommended Loxeal 55-03/Loctite 243) on the coil flange (23) and tighten with the torque shown in the figure.

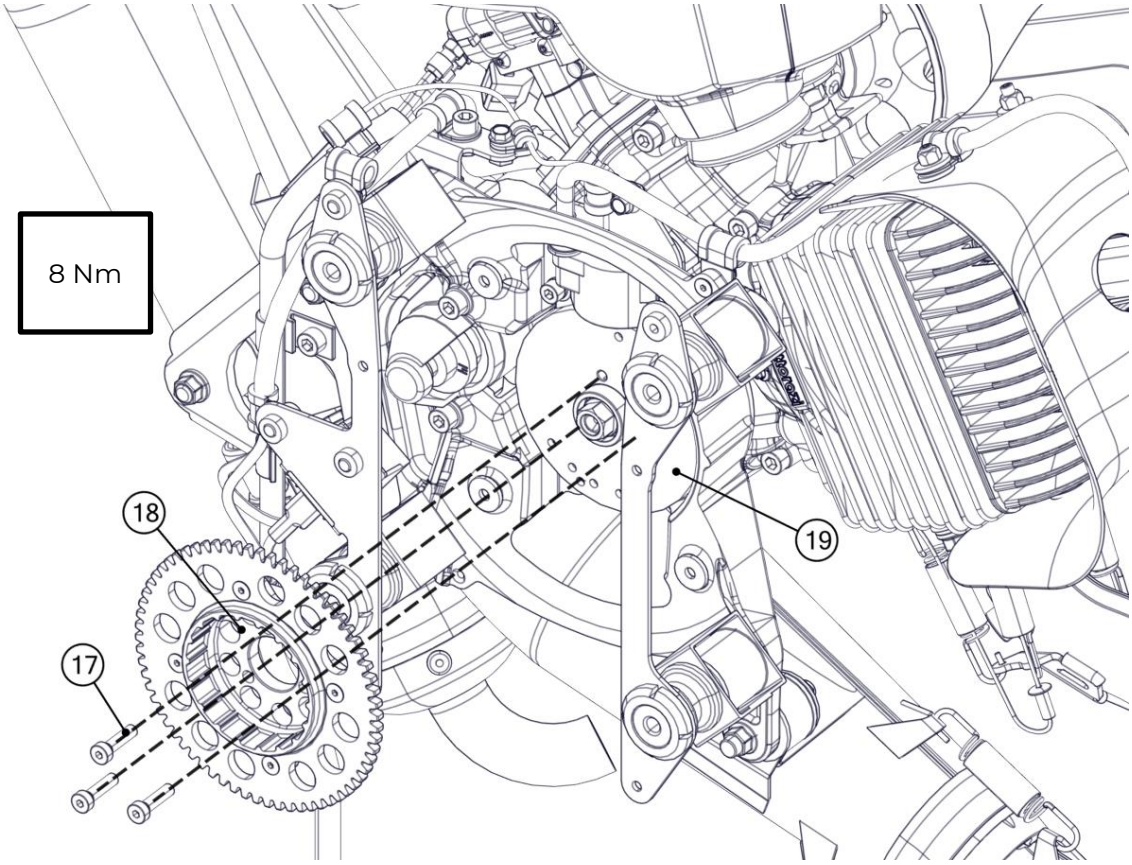
Fix the spark plug cable (24) with the M4x20 screw (8), the self-locking nut M4 (9) and the M5 F8 cable clamp (10) in the position shown in the figure and tighten by hand.



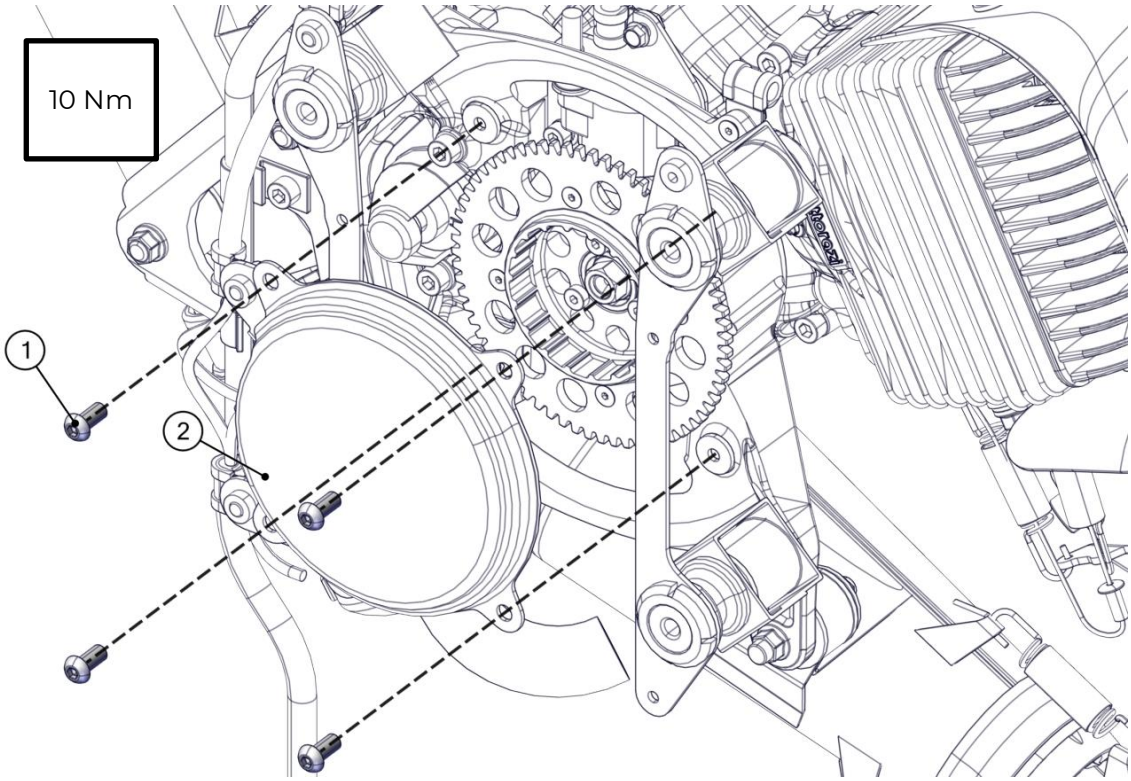
Fix the spark plug cable (24) with the self-locking nut M4 (6) and the M5 F8 cable clamp (7) in the position shown in the figure making sure that the spark plug cable doesn't touch the cylinder and tighten with the torque shown in the figure and tighten by hand.



Insert the toothed pulley (18) on the flywheel (19), the 3 Allen screws M5x20 (17) with threadlocker (recommended Loxeal 55-03/Loctite 243) and tighten with the torque shown in the figure.



Insert the 4 Allen screws M6x14 (1) and the ring gear cover (2) and tighten with the torque shown in the figure.



Insert the FIU (see chapter 3.5 Full integrated unit (FIU)) and the spark plug (see chapter 3.2 Spark plug)

3.16 Transmission

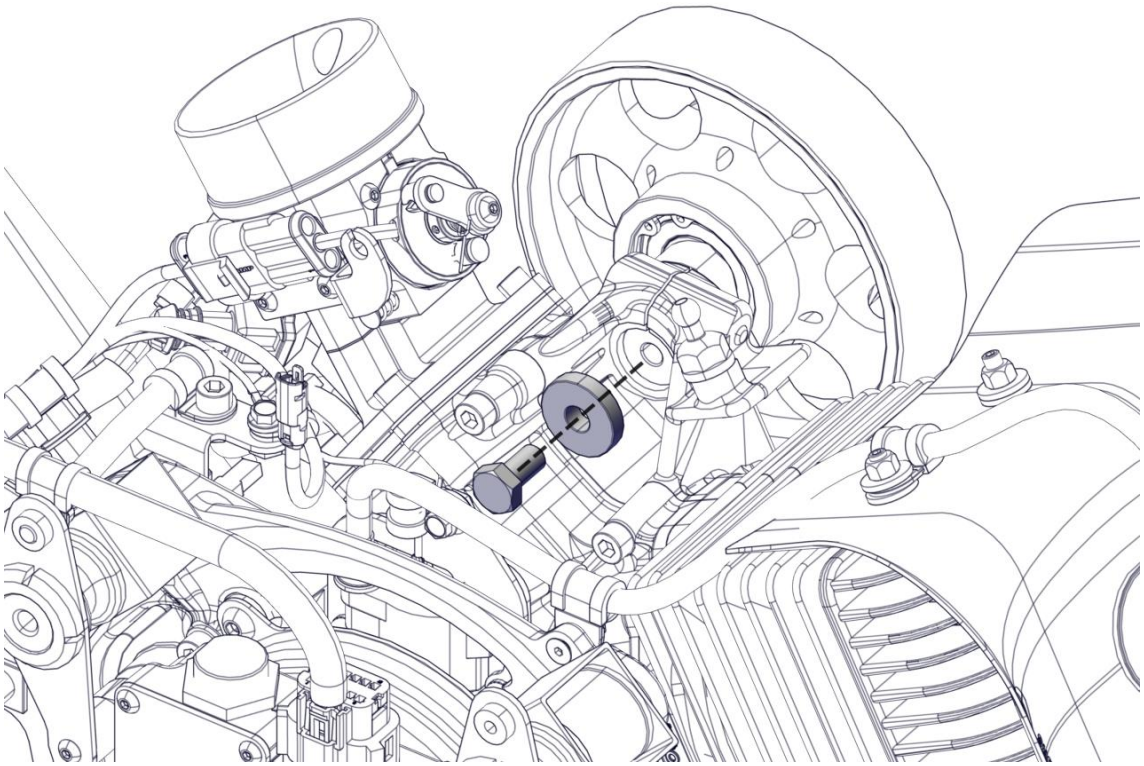
Components to replace	<table><tr><th></th><th>Time limit</th></tr><tr><td>Transmission bearings (MP106, M114)</td><td>150 h</td></tr><tr><td>Centrifugal clutch (MP102)</td><td>150 h</td></tr><tr><td>Belt (MP117)</td><td>100 h</td></tr><tr><td>Clutch bell (MP104)</td><td>on condition</td></tr></table>
Special tools	Clutch bell extractor. Piston lock (ACC104).
Values	Clutch: 20 Nm Screw M8x16: 25 Nm. Screw M6x35: 12 Nm.

*Always replace it when disassembled.

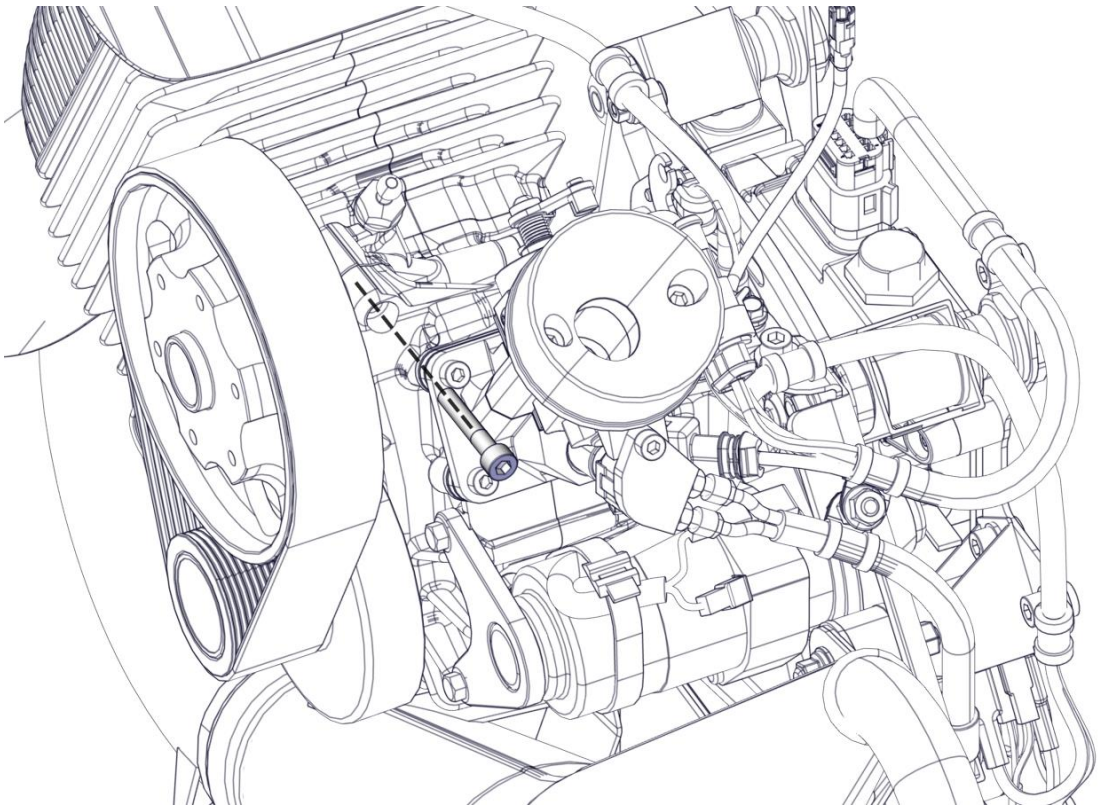
Before proceeding with the next operations on the transmission, remove the airbox (see chapter 3.3 Airbox).

3.16.1 Belt removal

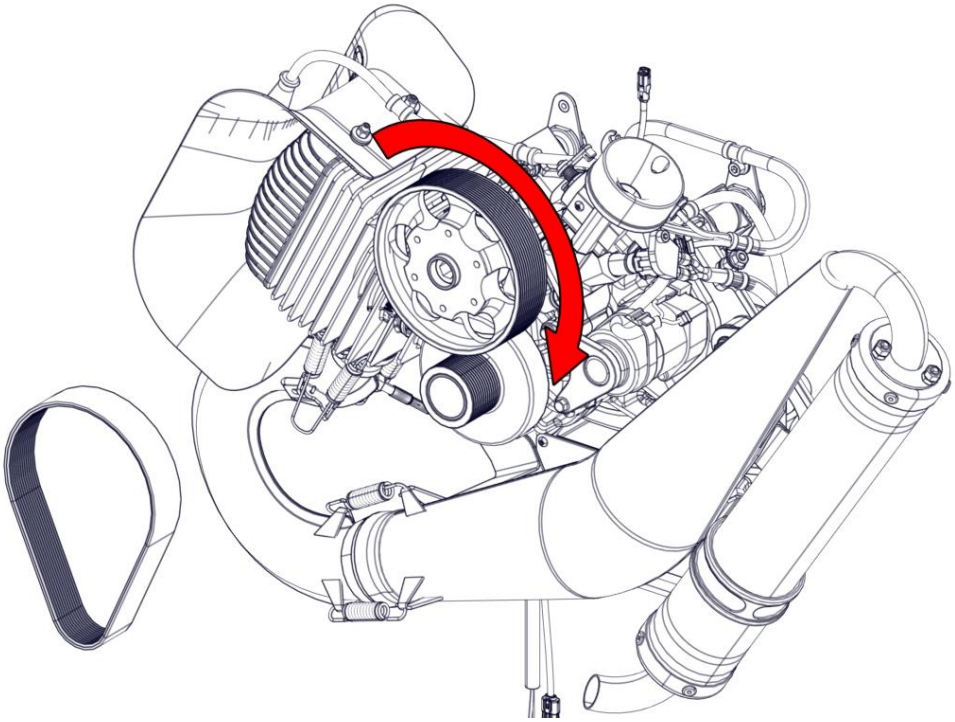
Remove the hexagonal screw M8x16 with washer from the pulley eccentric.



Remove the Allen screw M6x35 on the eccentric side.

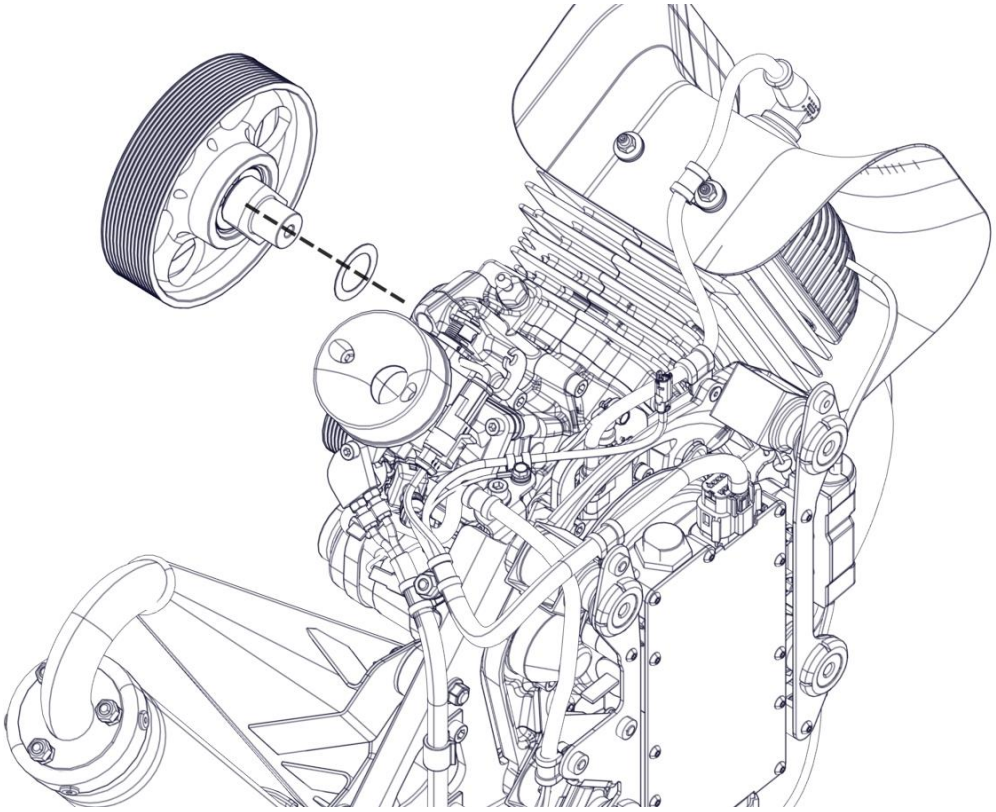


Turn the eccentric clockwise to release the belt tension.
Remove the belt from the pulley.

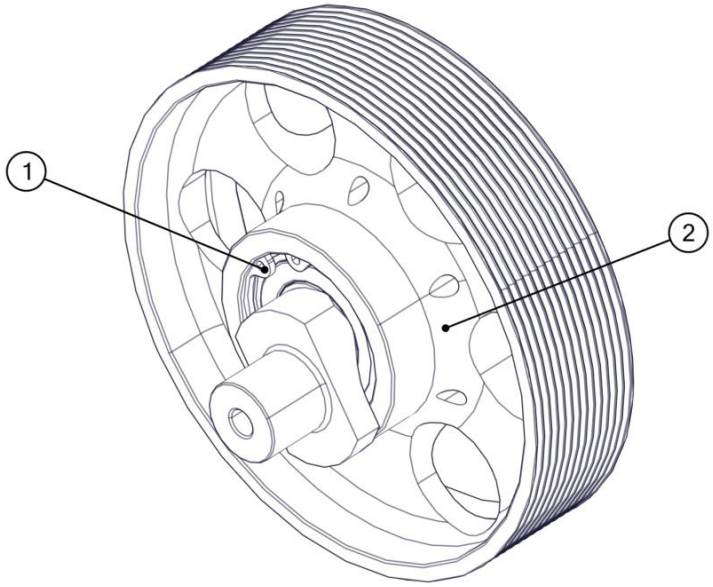


3.16.2 Belt disassembly

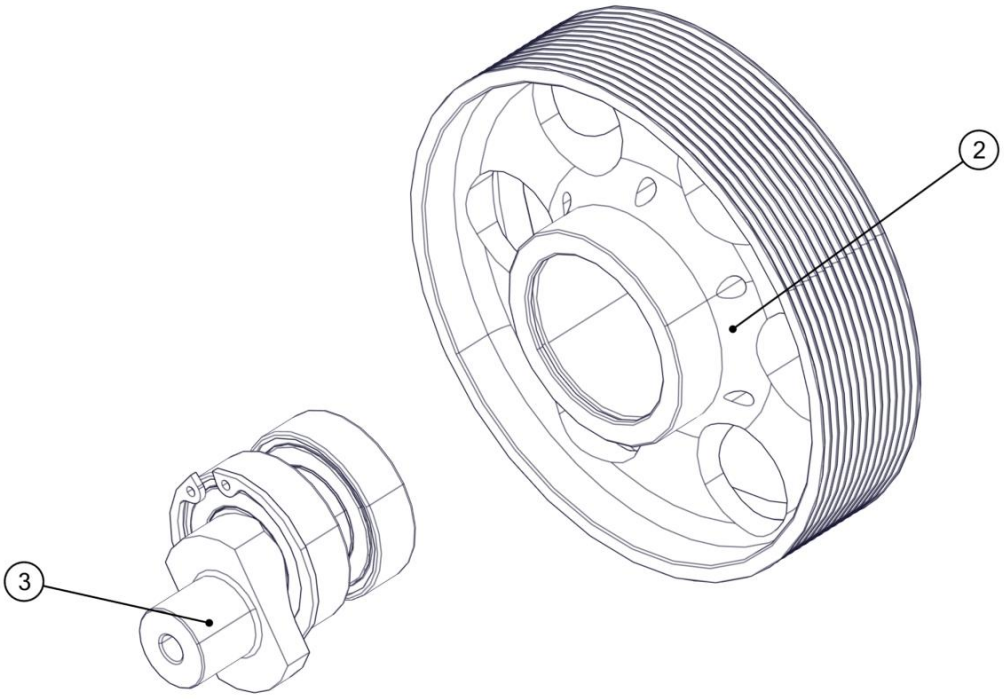
Remove the pulley and washer.



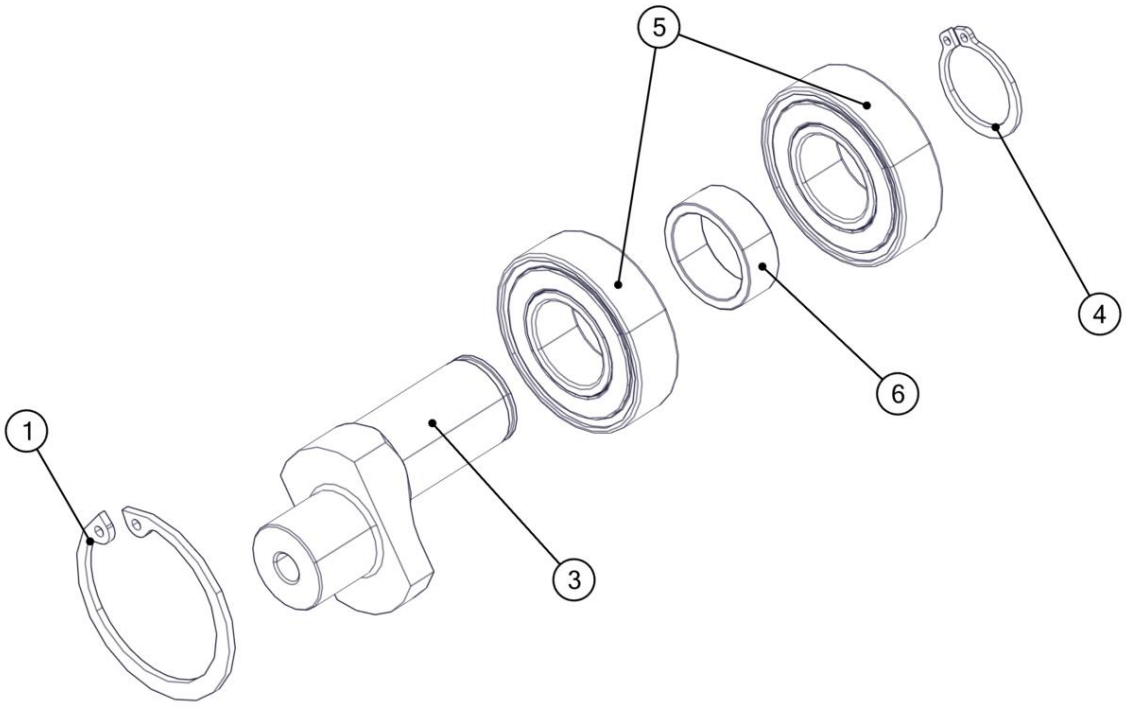
Remove Seeger ring (1) from the seat on the pulley (2).



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

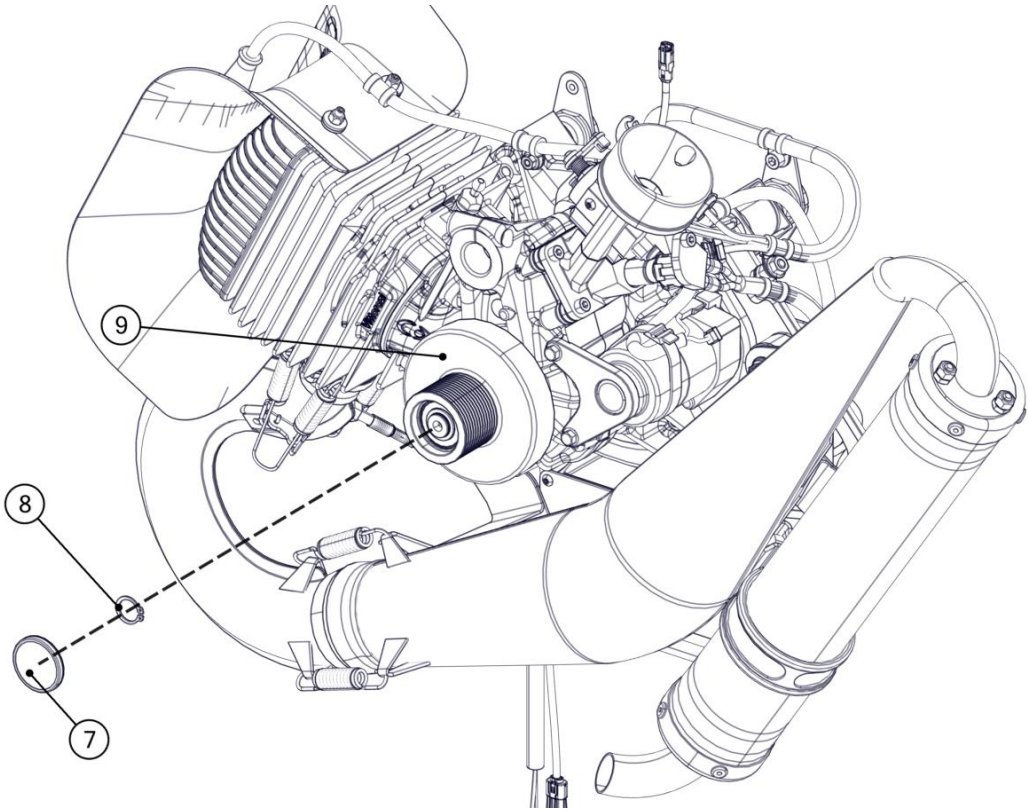


Remove the 2 Seeger rings (1, 4), the 2 bearings (5) with a bearing extractor and the spacer (6) from the eccentric (3).

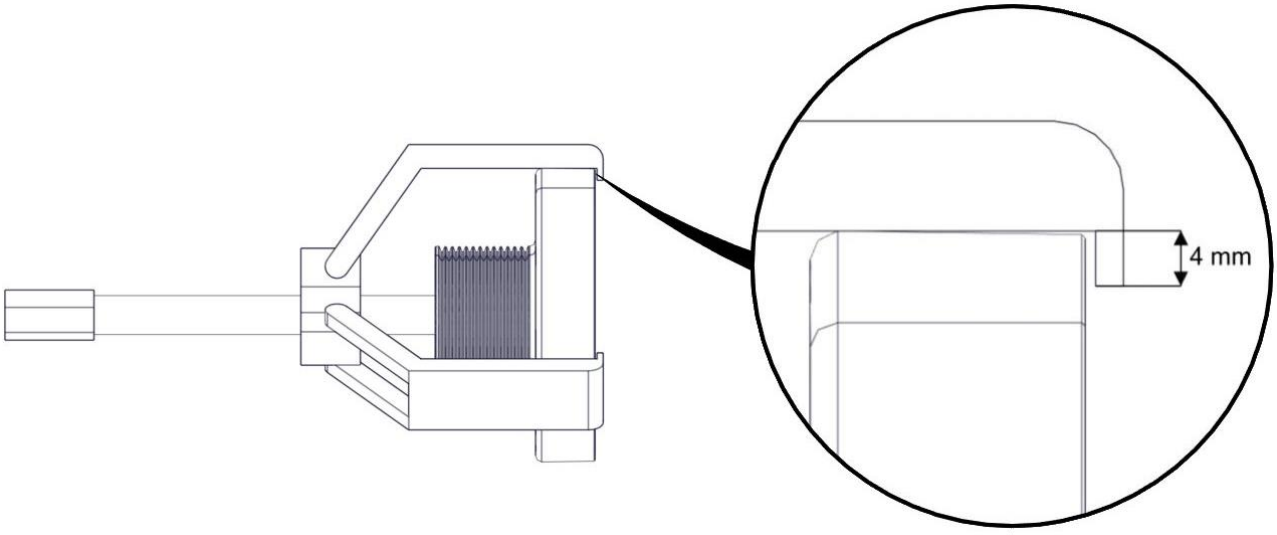


3.16.3 Bell, clutch disassembly

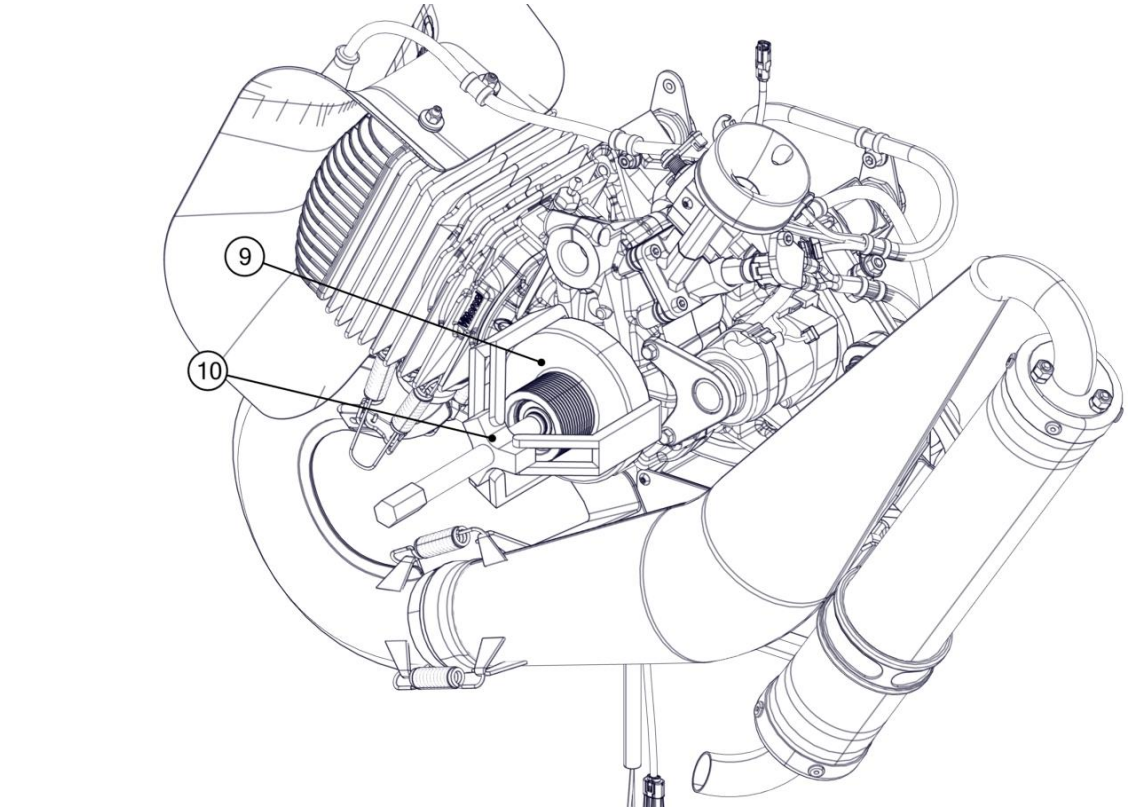
Remove the cover (7) from the clutch bell (9): for removal, insert a self-tapping screw M4x35 in the centre of the cover (7).
Remove the Seeger ring (8).



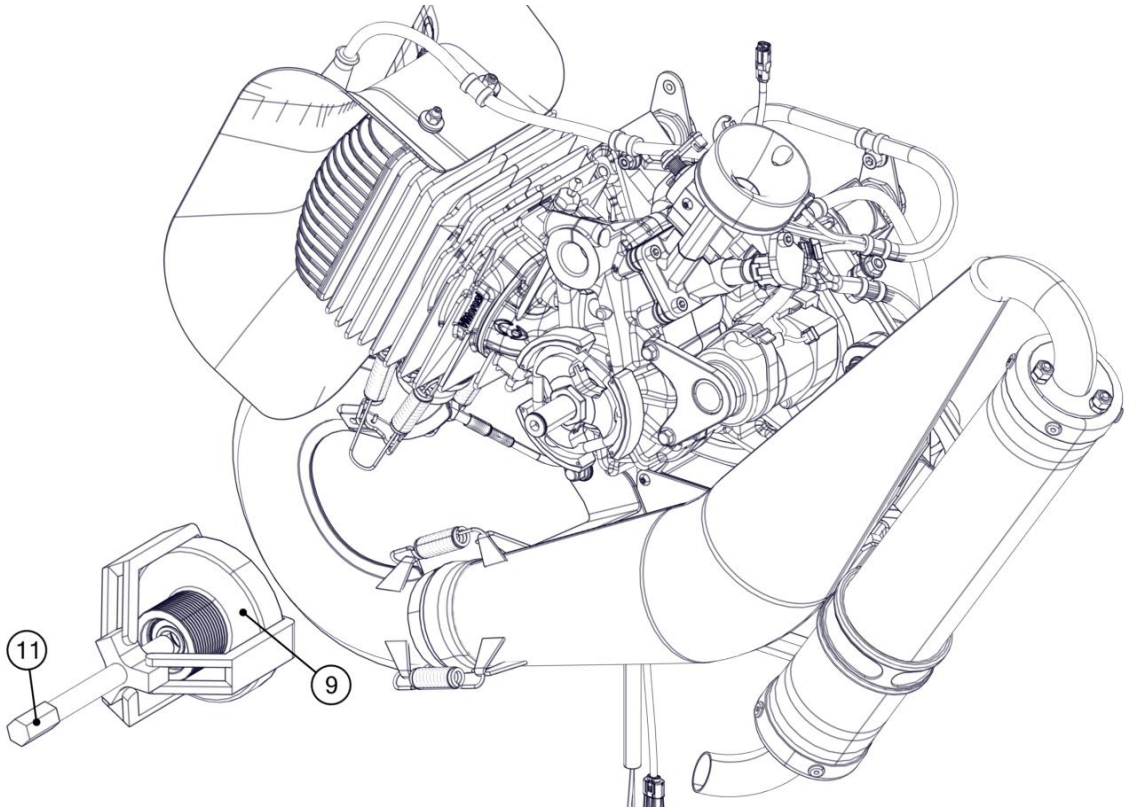
Use an extractor with a maximum hook length of 4 mm.



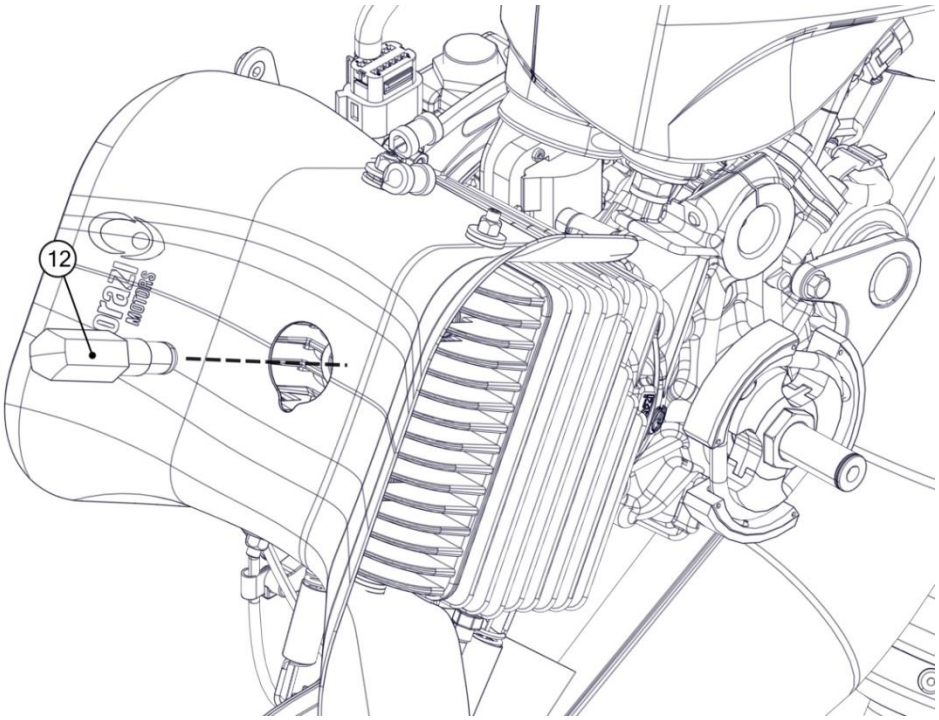
Position the extractor (10) on the clutch bell (9).



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

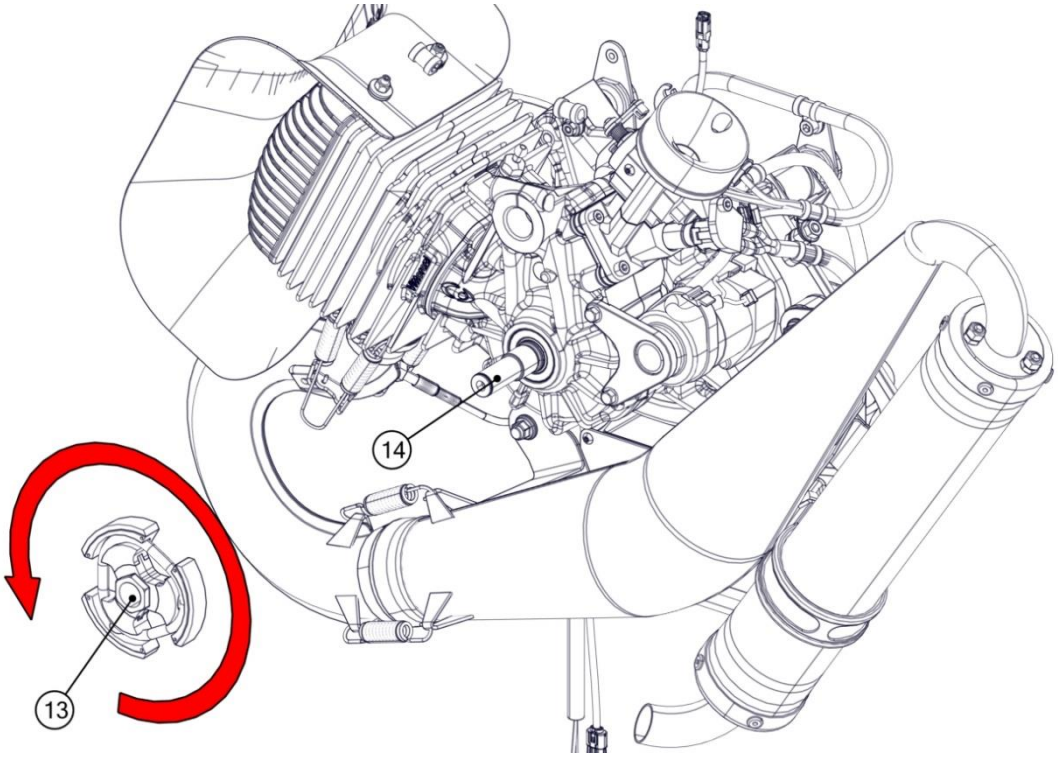


Remove the spark plug (see chapter 3.2.1 Spark plug disassembly).
Screw the piston lock (12) into the spark plug hole.

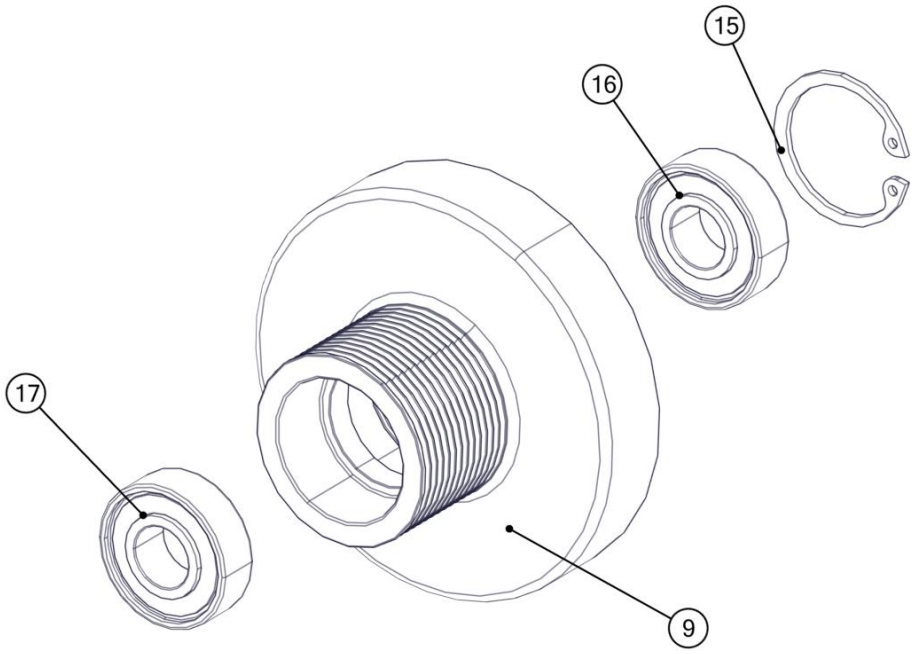


Turn the crankshaft anti-clockwise until the piston is in contact with the piston lock.
Heat the clutch to facilitate disassembly.
Unscrew the clutch (13) until it is removed from the crankshaft (14).

Do not use a pneumatic impact screwdriver, otherwise the piston may be damaged.

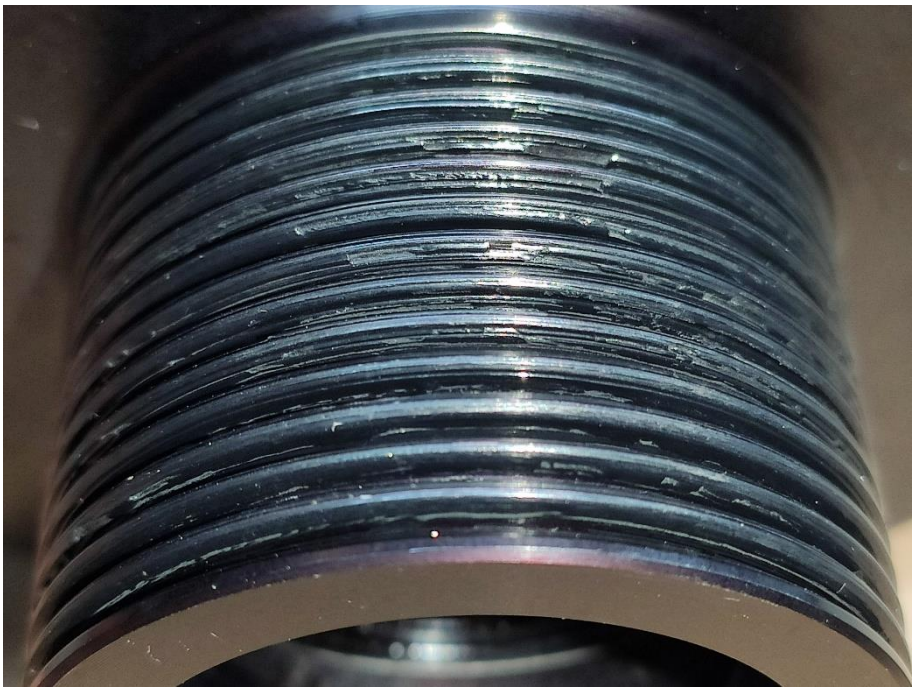


Heat the clutch bell to 120 °C.
Remove the Seeger ring (15) and the 2 bearings (16, 17) from the clutch bell (9).



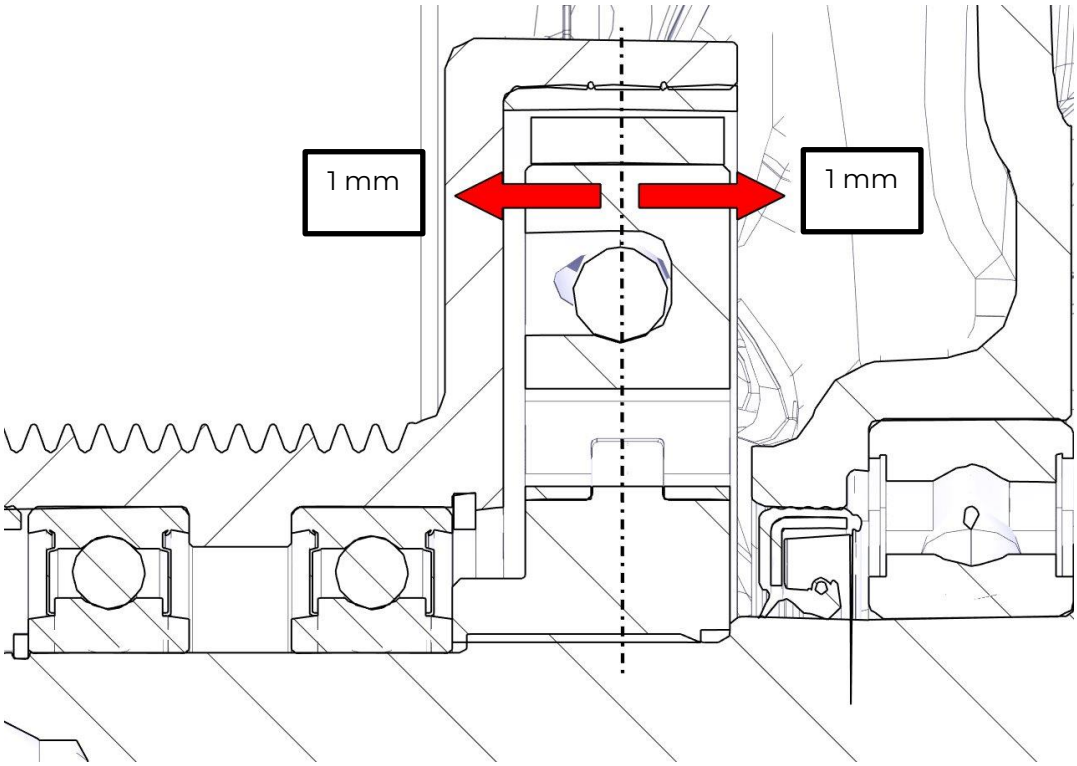
3.16.4 Transmission maintenance

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.



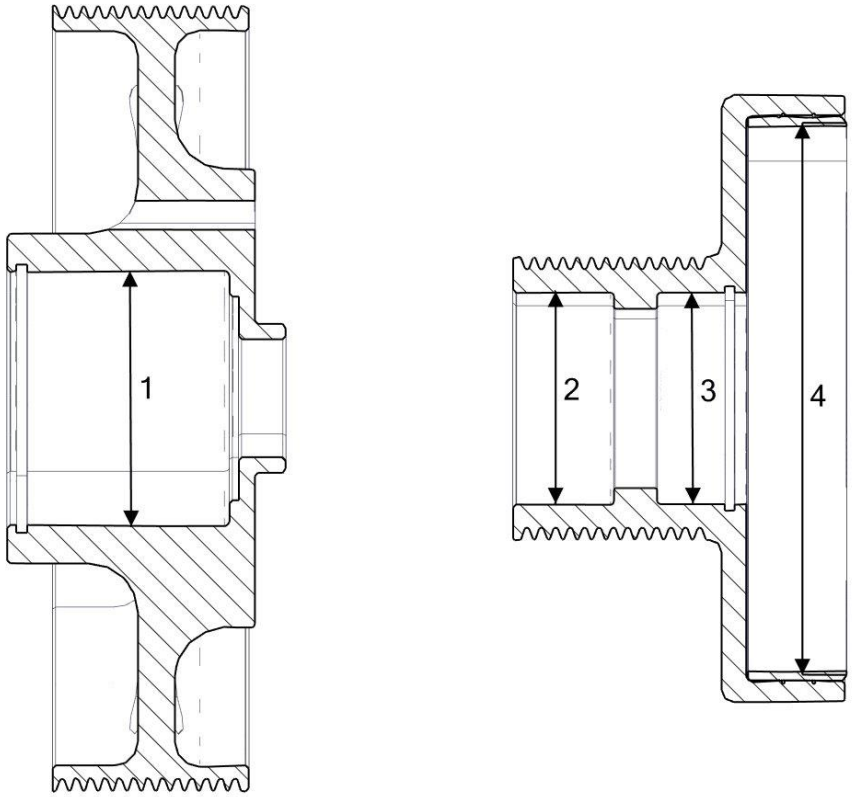
Check that the belt does not show signs of wear or damage (as in photo), otherwise it must be replaced. If the belt has not been used for a long time, check that it is soft, otherwise it must be replaced. For routine maintenance, follow the table.

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.



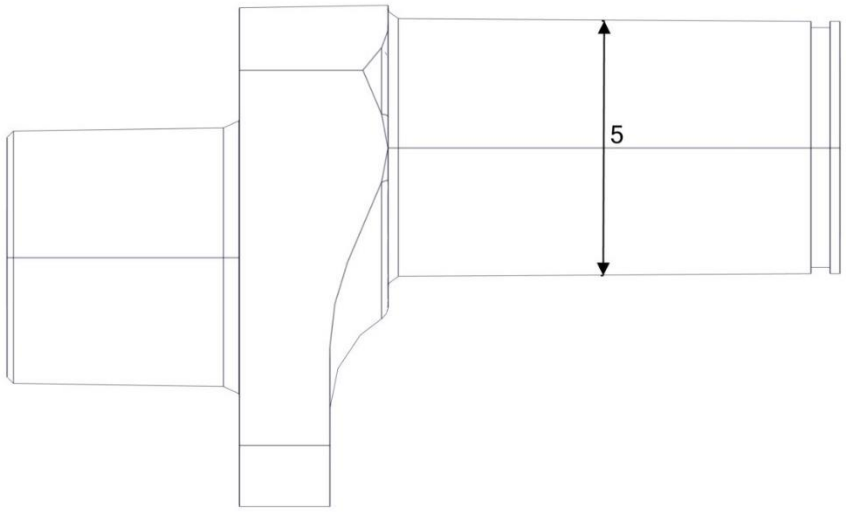
The photo shows a damaged clutch bell due to excessive axial play in the clutch pads.

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

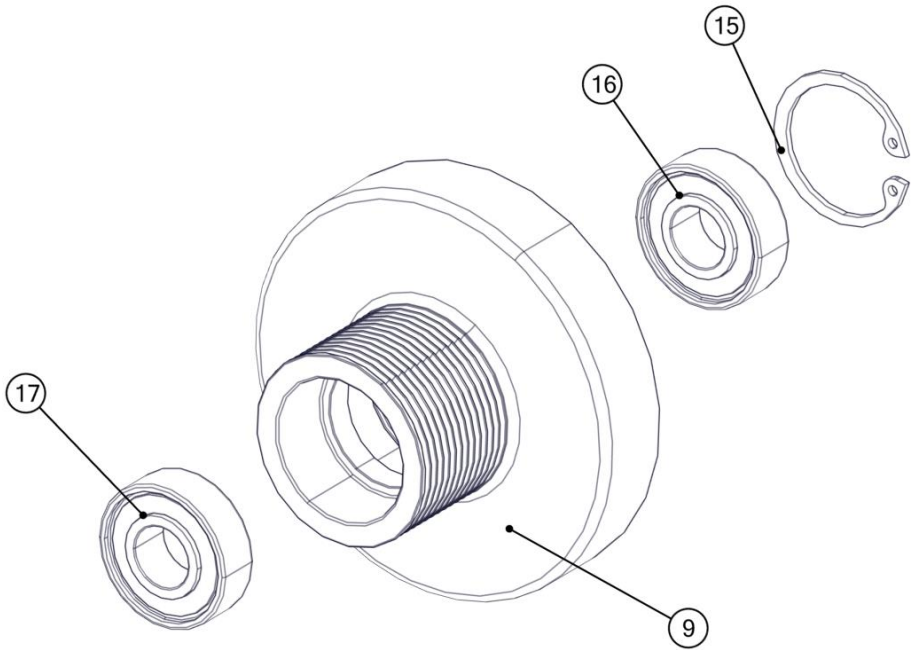
3.16.5 Bell, clutch assembly

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.

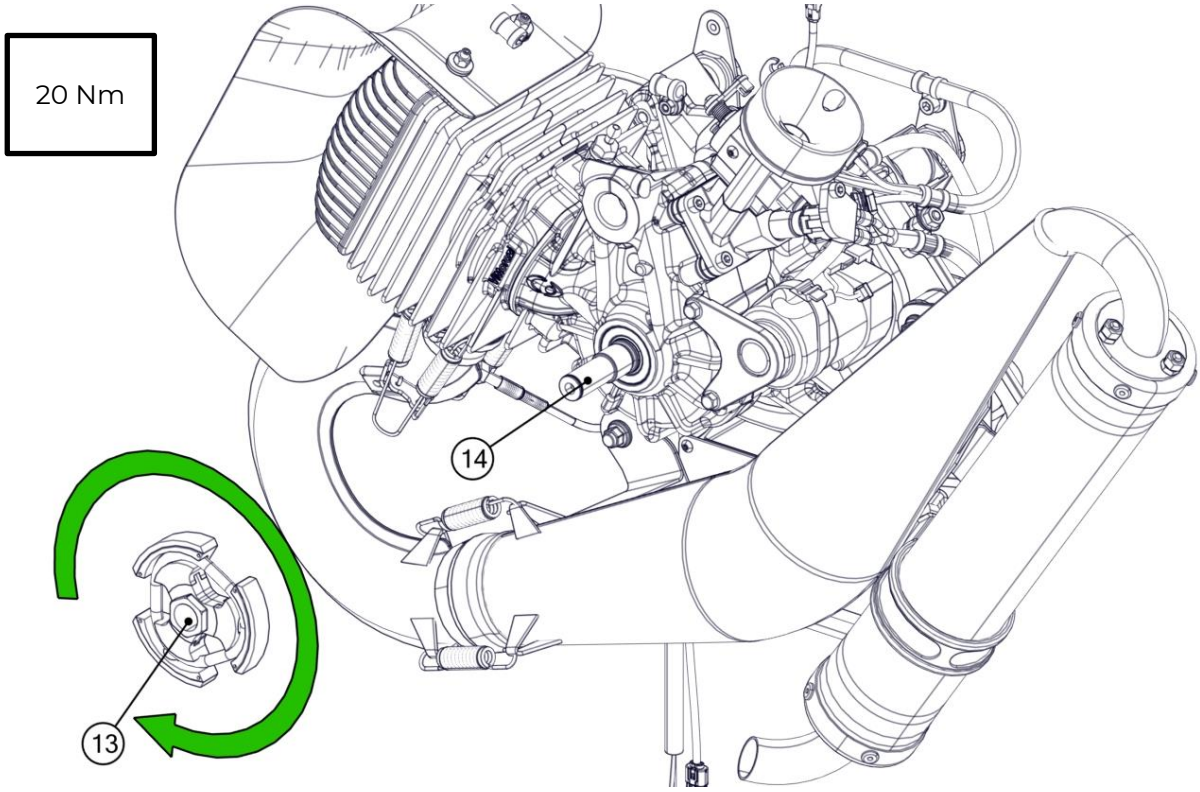
Insert the Seeger ring (15).

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.

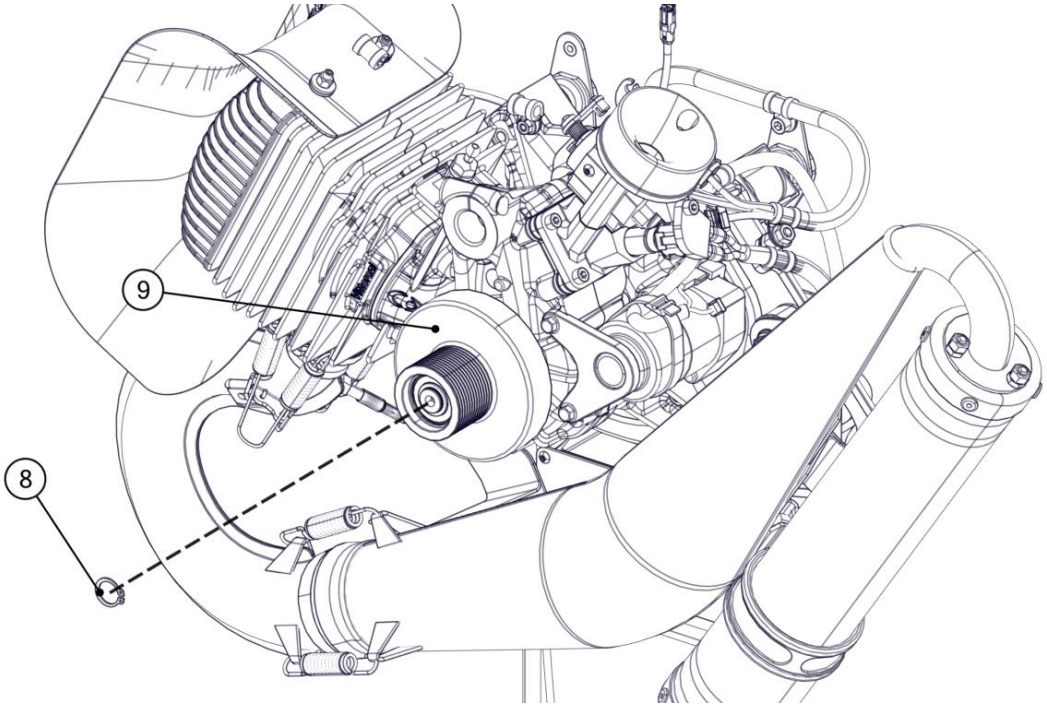
Screw the clutch (13) onto the shaft (14) and tighten with the torque shown in the figure.



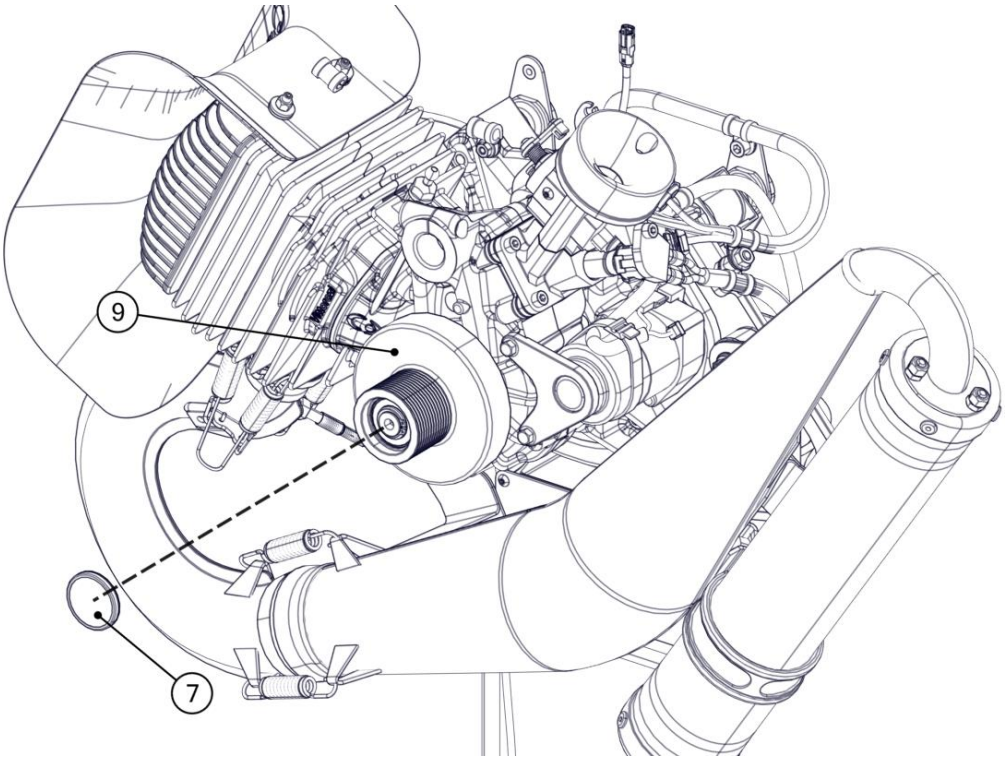
Heat both inner rings of the bearings (16, 17 of the previous image) simultaneously up to 80 °C.

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

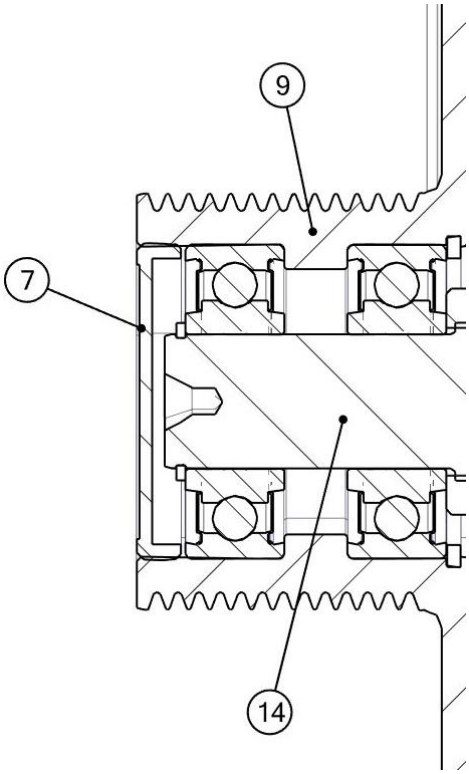
Place the clutch bell (9) and the Seeger ring (8) on the shaft.



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).

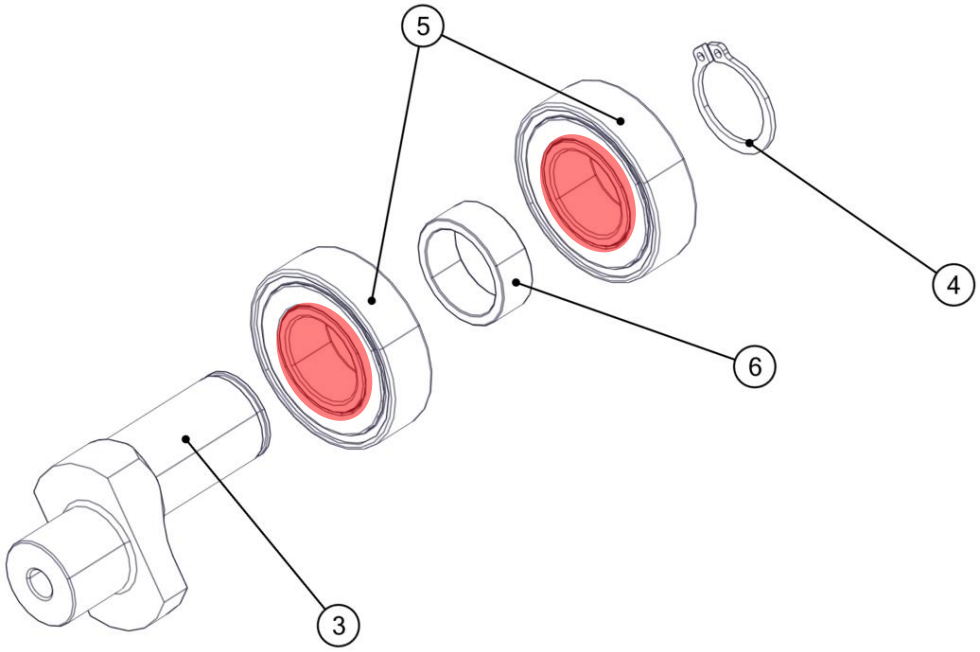


3.16.6 Pulley assembly

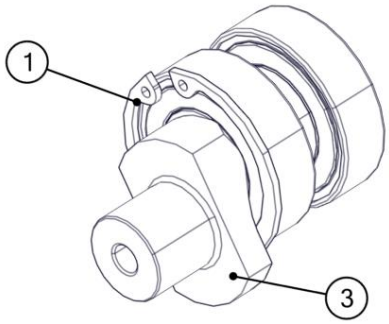
Heat both inner rings of the bearings (5) simultaneously up to 120 °C.

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

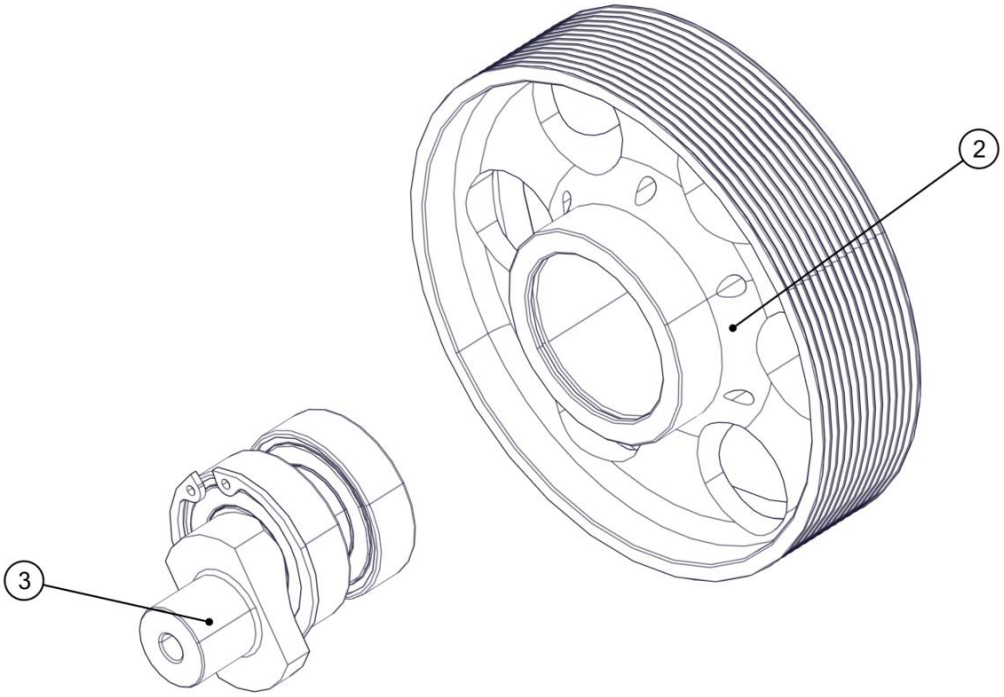
Place the bearings (5), spacer (6), bearing (5) and Seeger ring (4) on the eccentric (3).



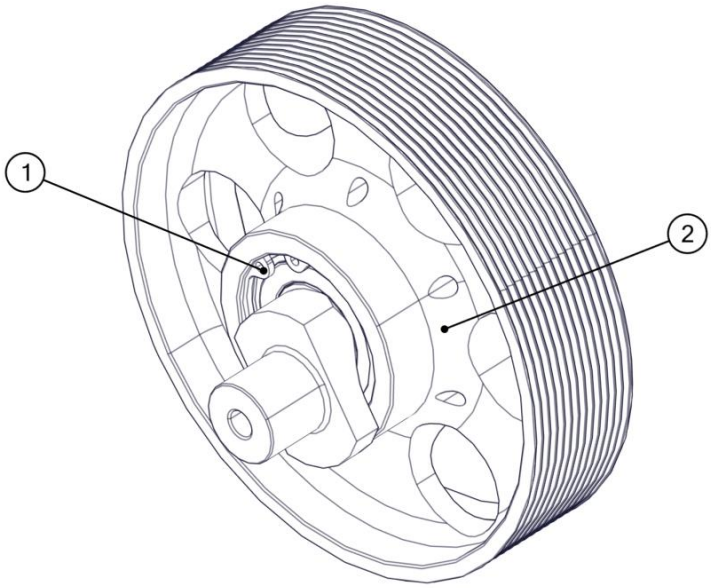
Position the Seeger ring (1) on the eccentric (3).



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

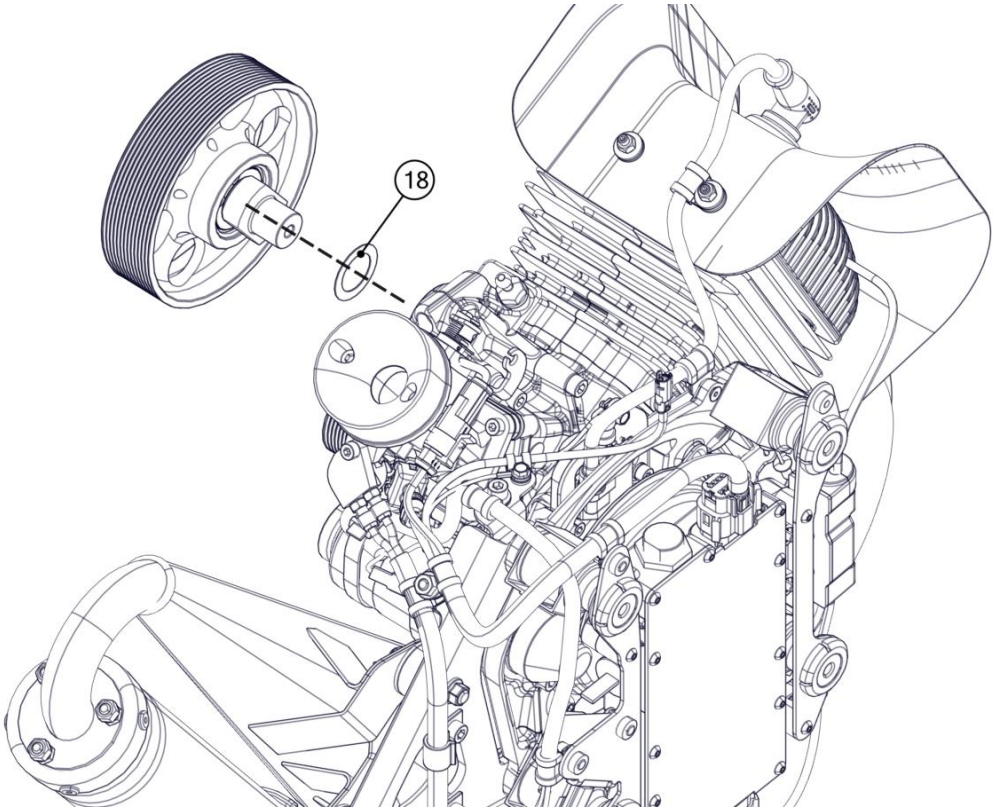


Position the Seeger ring (1) in the seat inside the pulley (2).



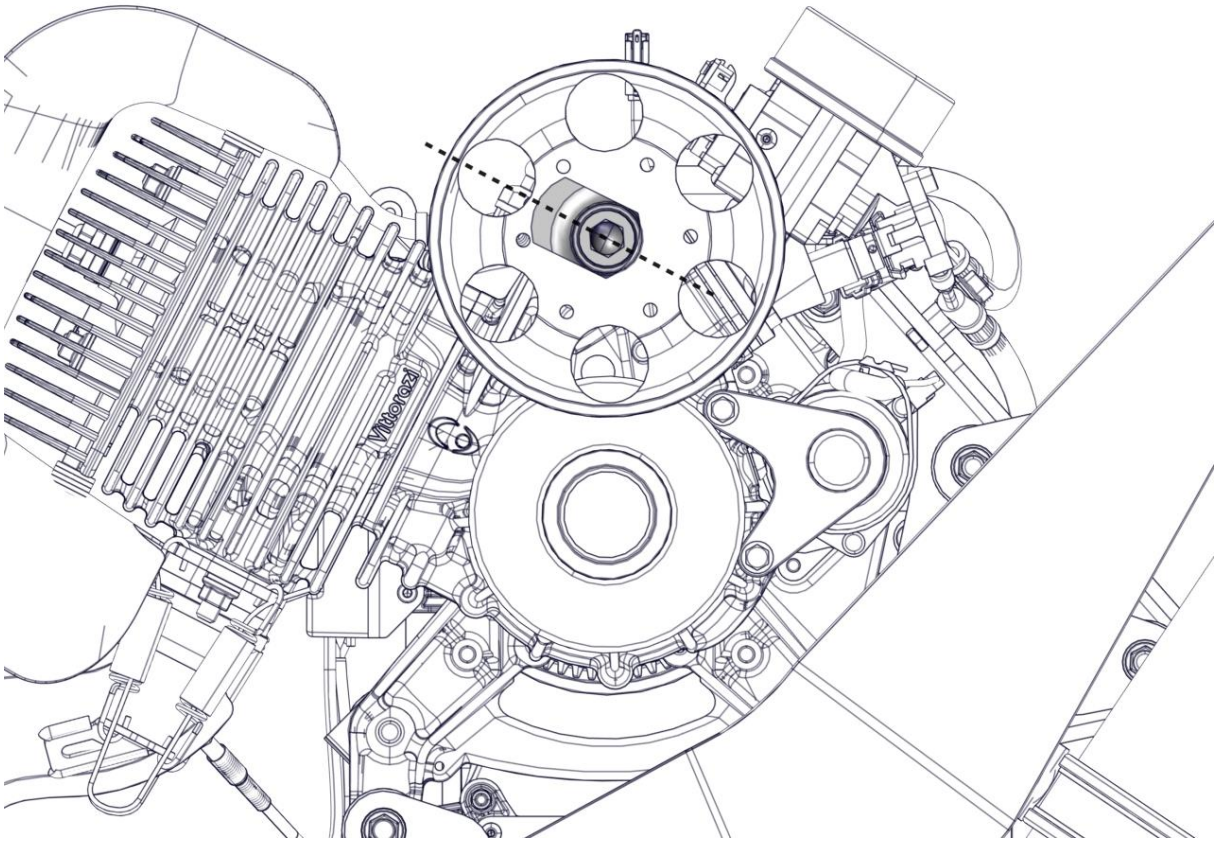
Replace the washer (18) with the same thickness as the ones replaced.
Possible sizes range from 0 mm (no washer) to 0,6 mm.

Insert eccentric with pulley and washer (18).

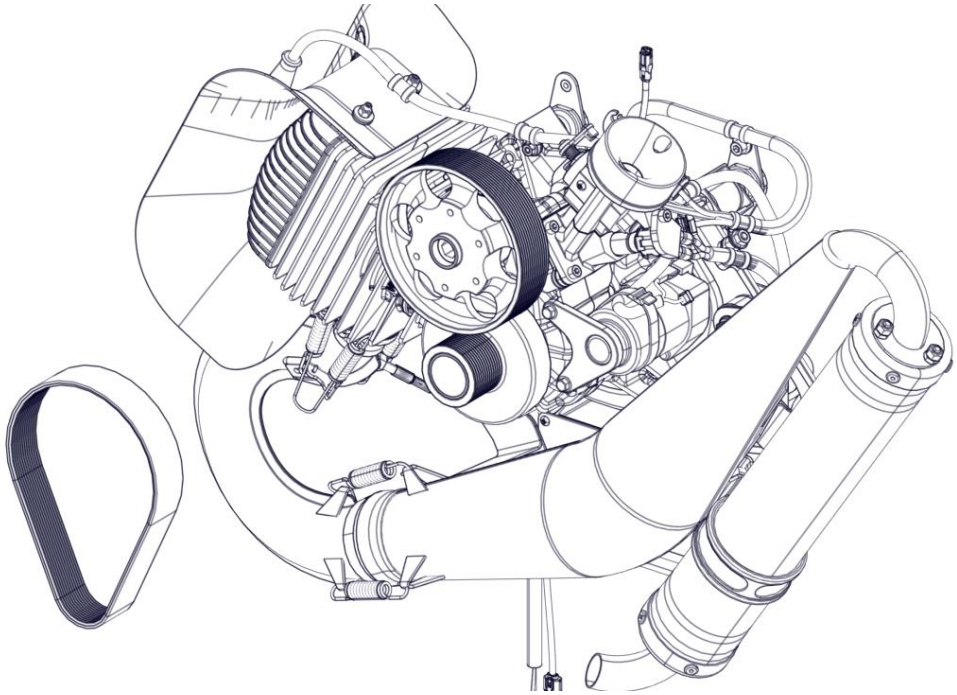


3.16.7 Belt insertion

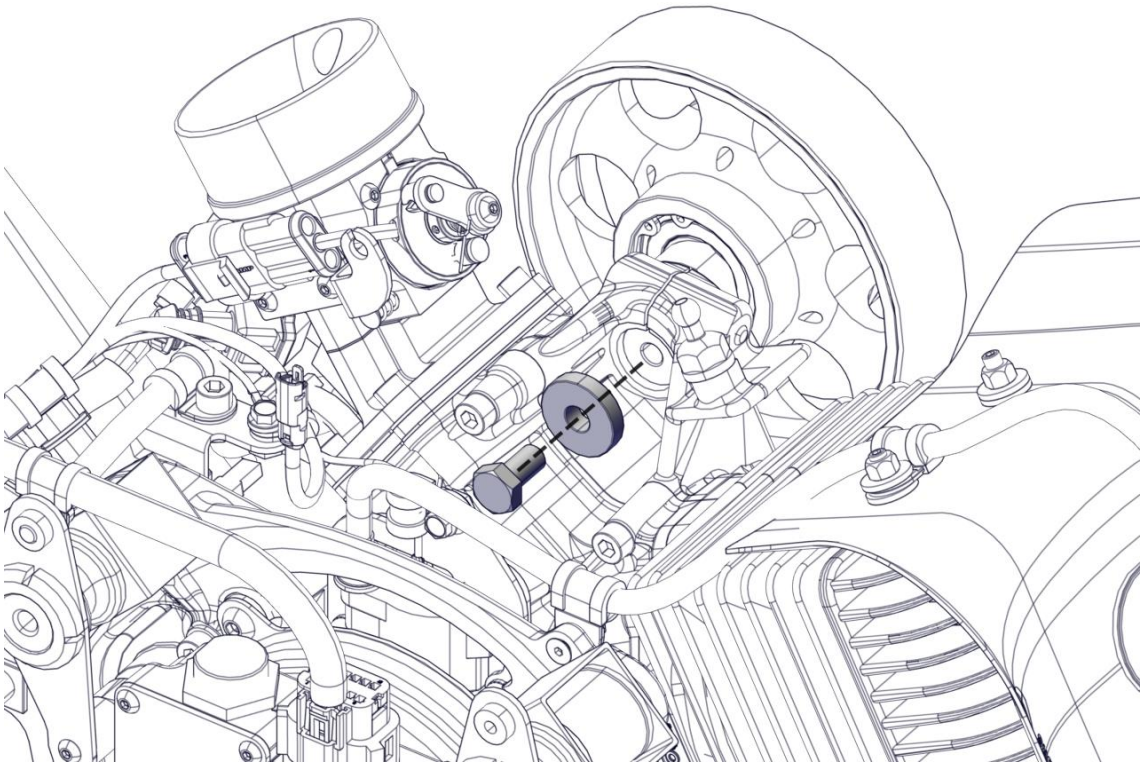
Turn the eccentric to position it as in the figure. This position facilitates the insertion of the belt.



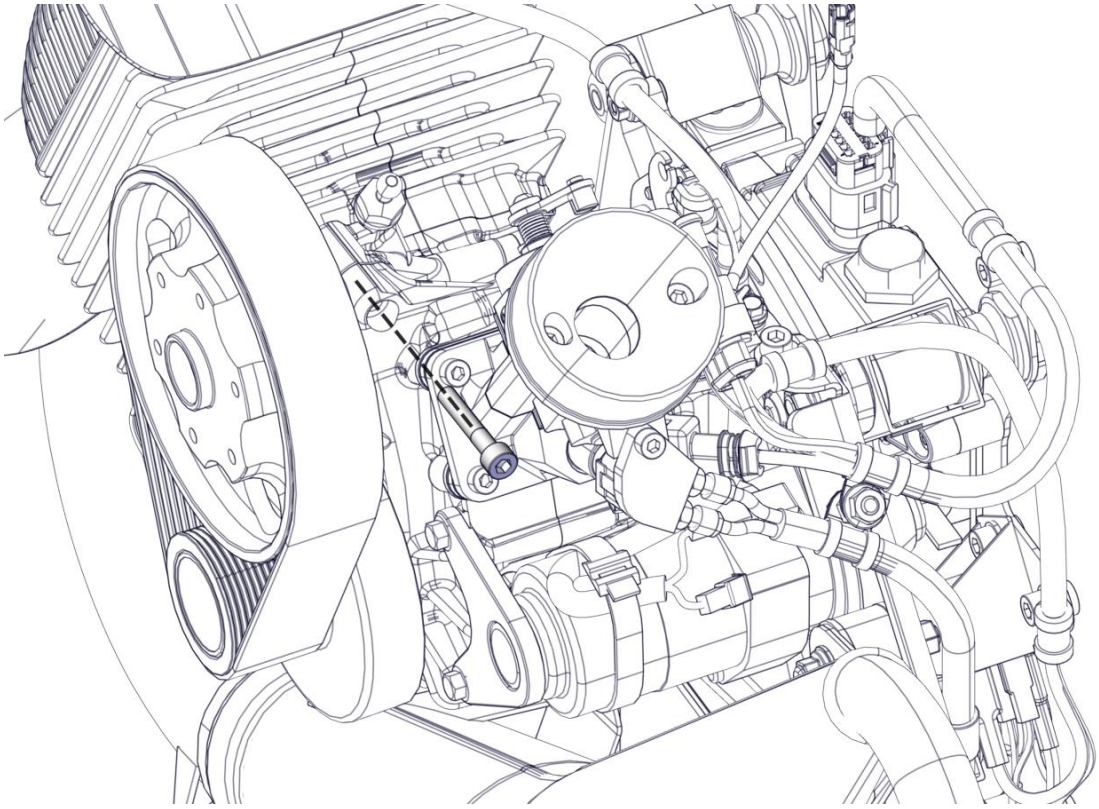
Place the belt on the pulley and clutch bell.



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



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



3.16.8 Belt tensioning

Loosen the hexagonal screw M8x16 on the eccentric.
Loosen the Allen screw M6x35 on the side of the eccentric.
Tighten the eccentric to tension the belt until the oscillation frequencies indicated in the table are achieved (use a frequency meter or mobile phone application).

First installation	Retensioning
500-520 Hz	430-450 Hz

Tighten the hexagonal screw M8x16 to 25 Nm.

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

Tighten the Allen screw M6x35 to 12 Nm.
Manually turn the pulley a few turns.
Check the belt tension again, retighten if necessary.
Insert the airbox (see chapter 3.3 Airbox).

3.17 Piston, cylinder, head

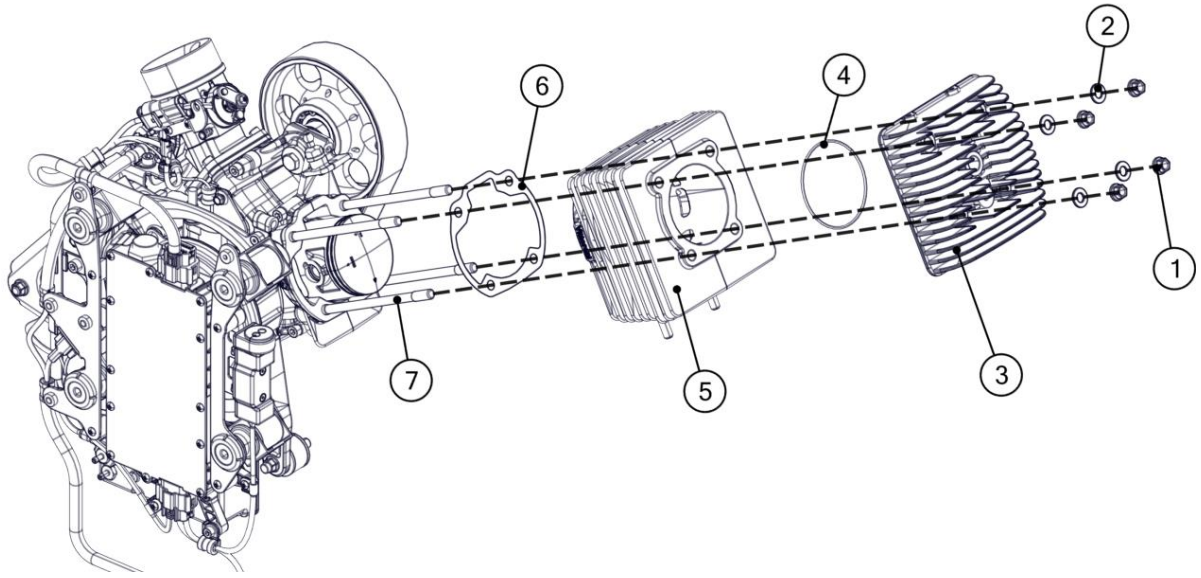
Components to replace	<table><tr><th></th><th>Time limit</th></tr><tr><td>Self-locking nuts M8 (M019) *</td><td>100 h</td></tr><tr><td>O-ring head (M016) *</td><td>100 h</td></tr><tr><td>Gaskets (M014) *</td><td>100 h</td></tr><tr><td>Piston (M010) includes: pin (M011k), piston rings (M013)</td><td>150 h</td></tr><tr><td>Roller bearing (M009)</td><td>150 h</td></tr><tr><td>Cylinder (M015)</td><td>on condition</td></tr><tr><td>Copper paste *</td><td>100 h</td></tr></table>
Special tools	Not required.
Values	Self-locking nuts M8: 16 Nm.

*Always replace it when disassembled.

3.17.1 Piston, cylinder, head disassembly

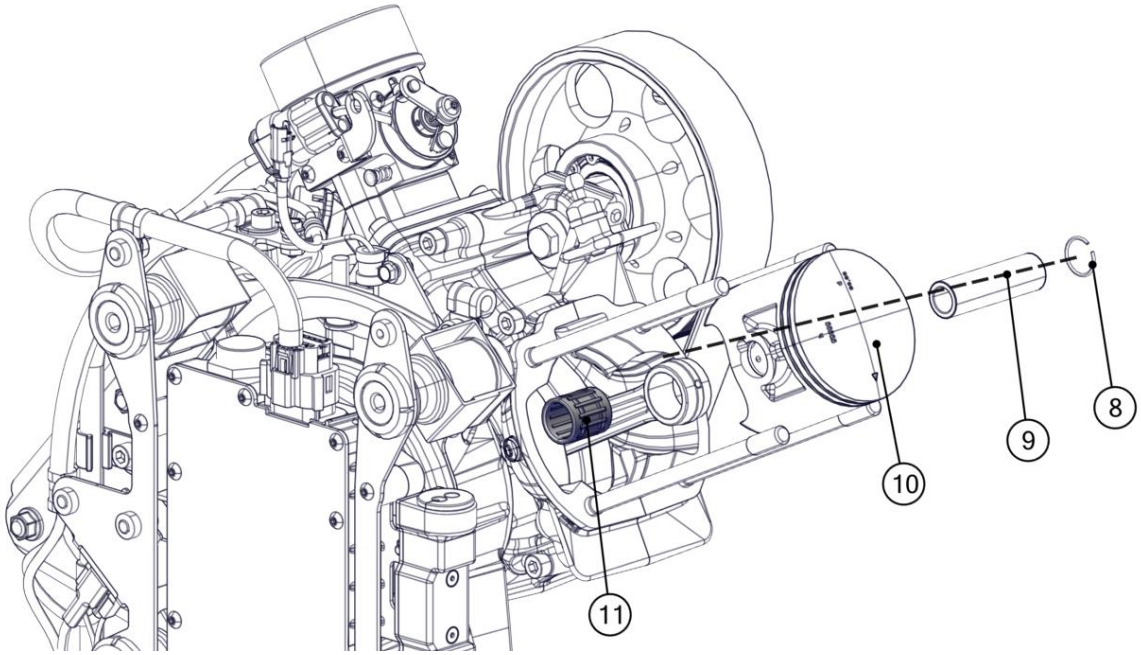
Before disassembling the cylinder unit, remove the spark plug (see chapter 3.2 Spark plug), the airbox (see chapter 3.3 Airbox), the CHT sensor (see chapter 3.7.1 CHT sensor disassembly) and the exhaust system (see chapter 3.12 Exhaust system).

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).

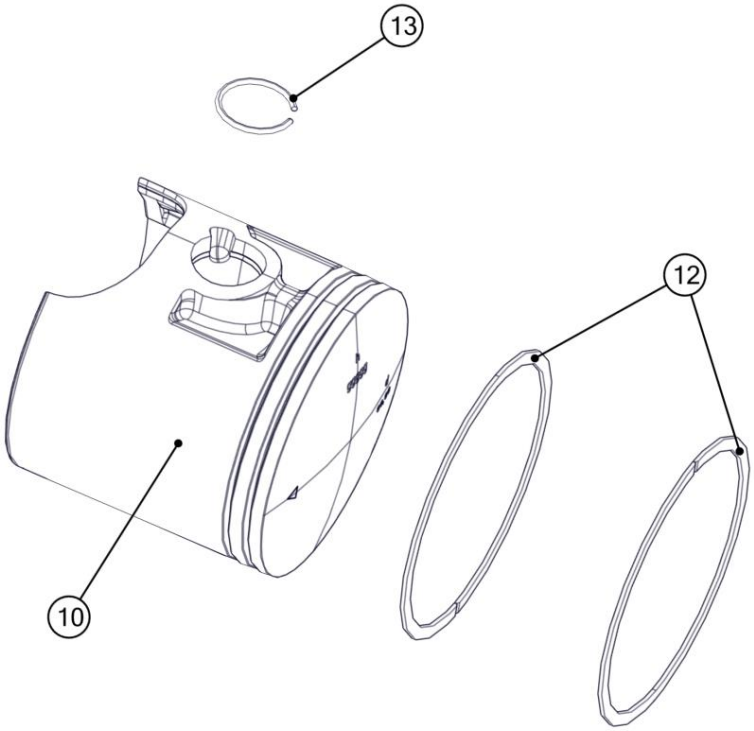


Cover the inside of the crankcase with paper to prevent foreign bodies from accidentally falling into the engine.

Remove the circle clip (8), the pin (9), the piston (10) and the roller bearing (11).



Remove the 2 piston rings (12) and the circle clip (13) from the piston (10).

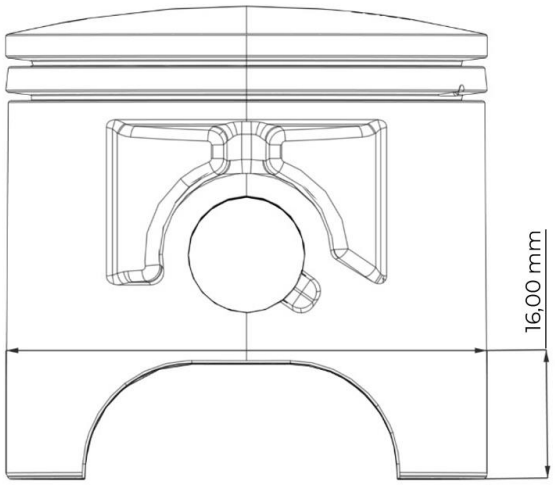


3.17.2 Piston, cylinder, head maintenance

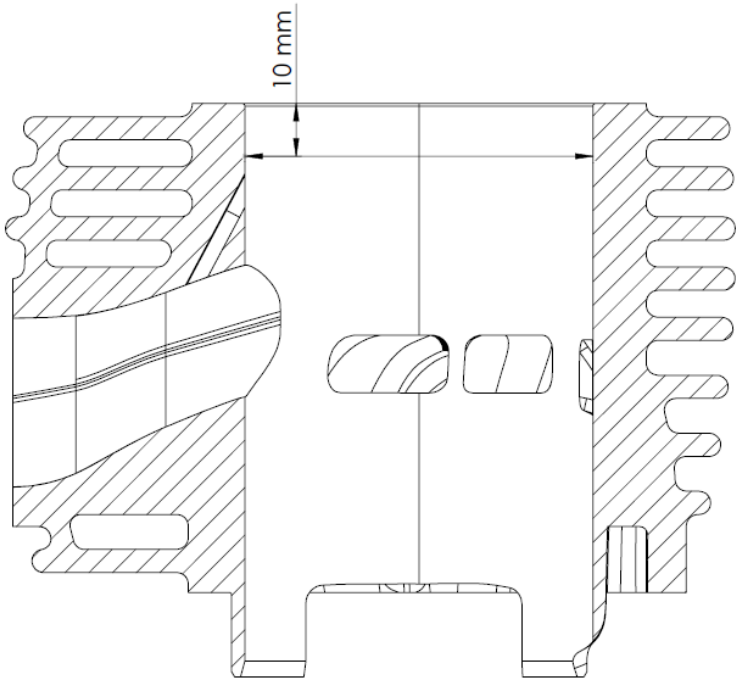
Do not use abrasive tools and corrosive liquids that may damage the surface.

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 aluminium.

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 16 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 ø* (mm)	Piston ø* (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		

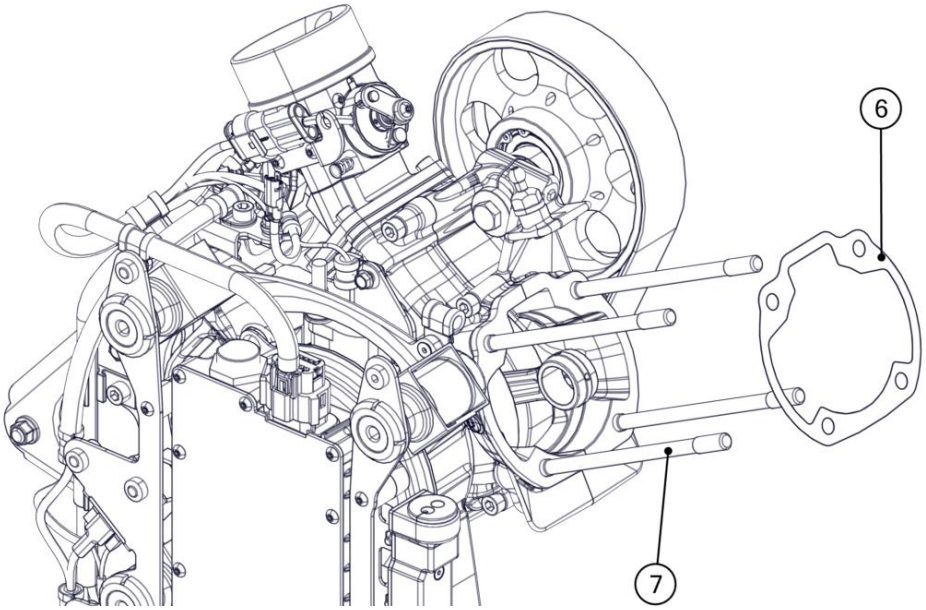
* at 20 °C

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.

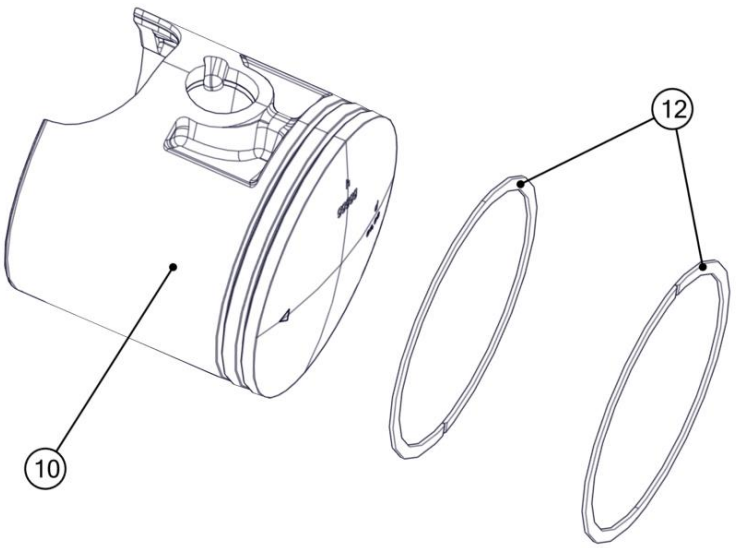
Replace the gasket (6) each time it is disassembled (possible gasket thickness: 0,2-0,3-0,5 mm).

Insert the gasket (6).

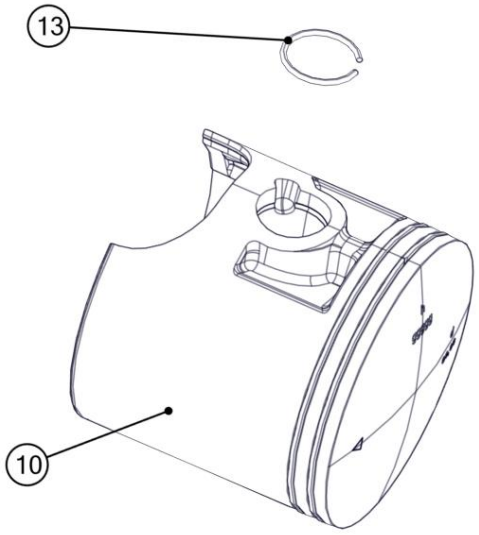


Oil the following components with the oil used for the mixture: the roller bearing (10), the pin (8), the piston rings (11) and the piston (9).

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

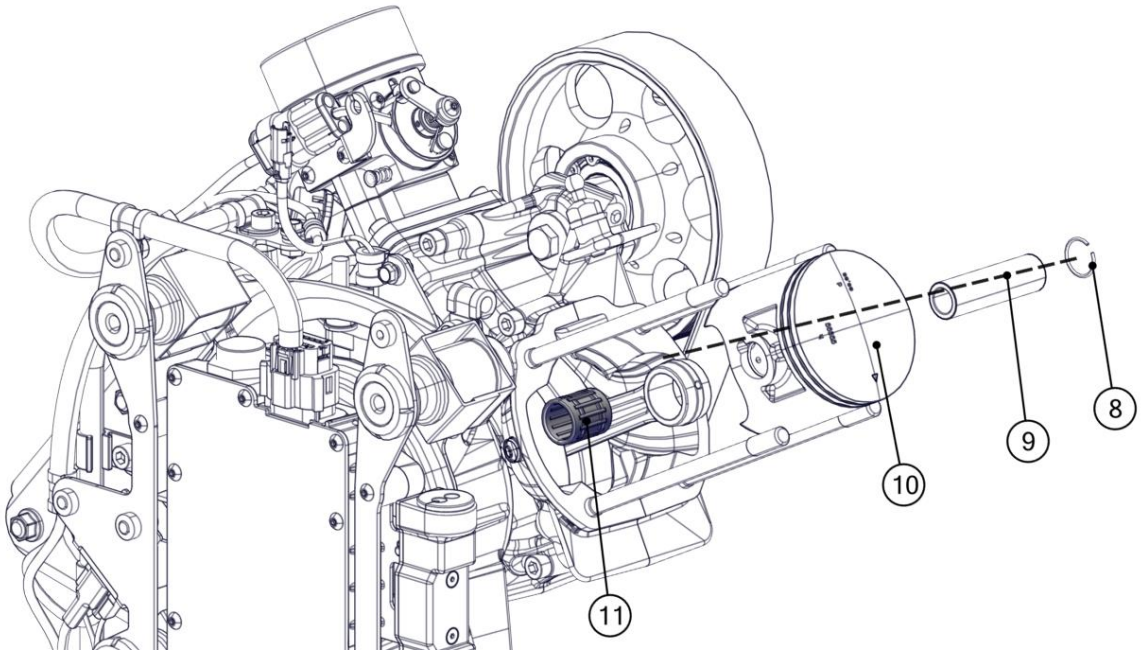


Insert the circle clip (13) on the piston (10) respecting the position shown in the photo.



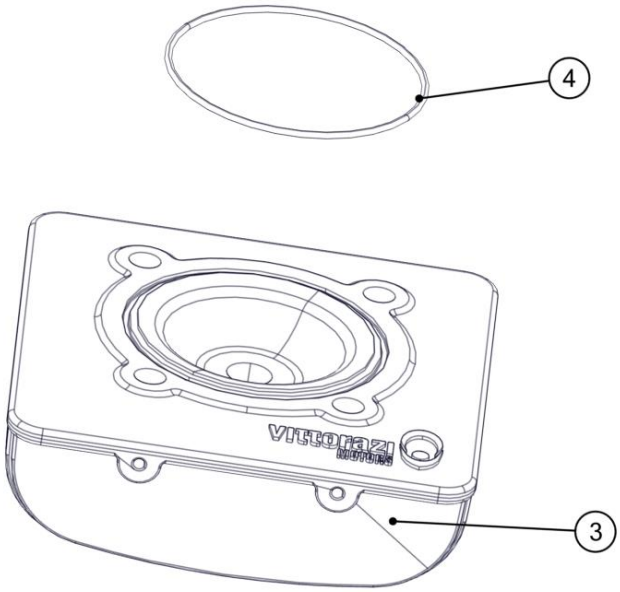
The triangle on the top of the piston indicates the exhaust side.

Insert the roller bearing (11), the piston (10), the pin (9) and the circle clip (8).

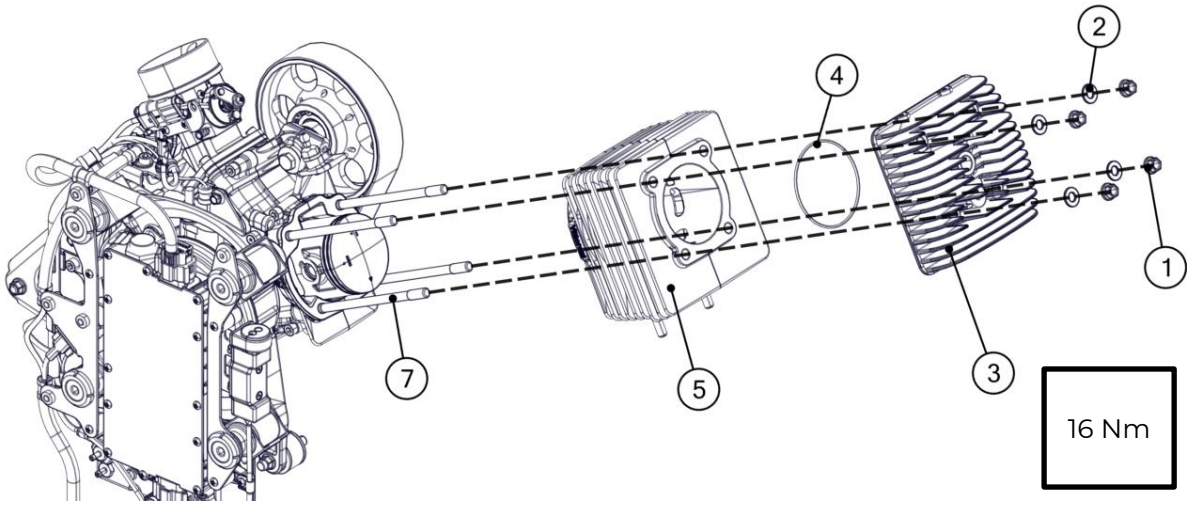


Replace the O-ring (4) and the 4 self-locking nuts M8 (1) each time they are disassembled.

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 4 self-locking nuts M8 (1) progressively, then cross-tighten with the torque shown in the figure.



Check the squish measurement on the pin axis: acceptable values range **from 1,35 mm to 1,55 mm.**
If the squish is out of tolerance, increase or decrease the thickness of the cylinder base gasket until the required result is obtained.

Insert the exhaust system (see chapter 3.12 Exhaust system), the CHT sensor (see chapter 3.7.2 CHT sensor assembly), the spark plug (see chapter 3.2 Spark plug) and the airbox (see chapter 3.3 Airbox).

3.18 Crankcase

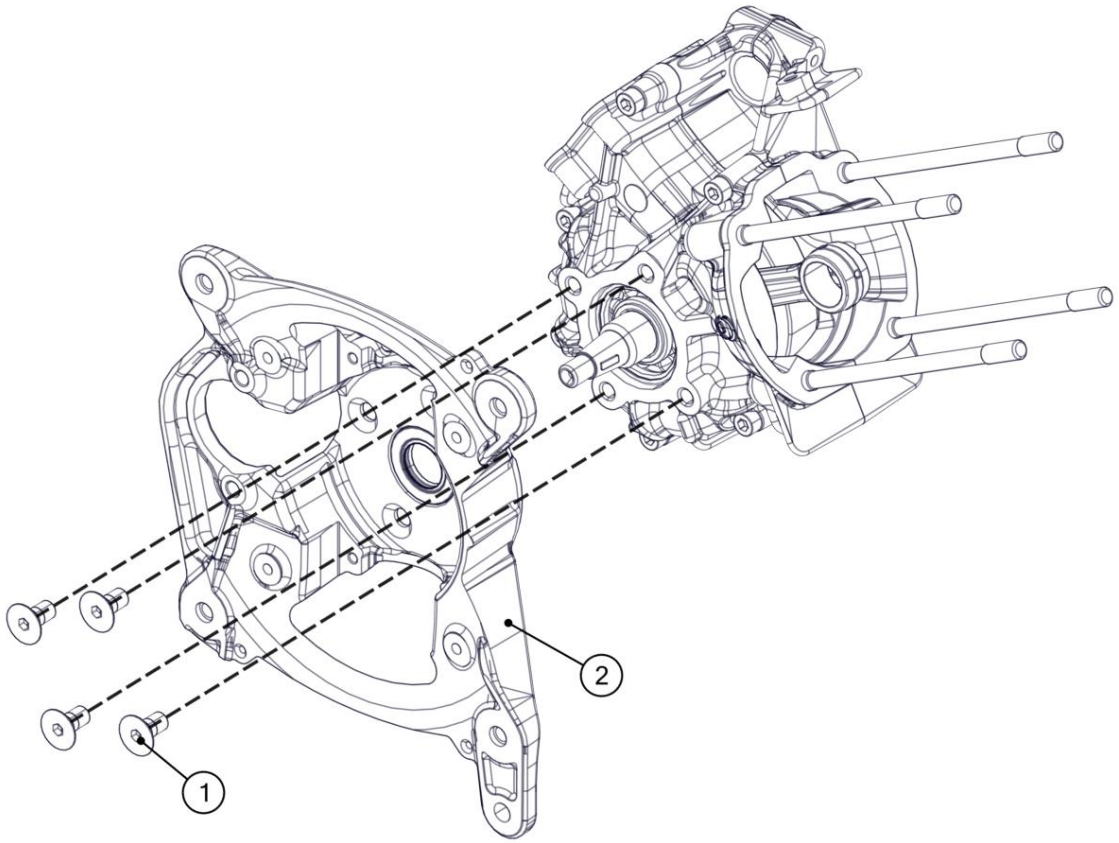
<table>
<tr><td>Components to replace</td><td>
<table>
<tr><th></th><th>Time limit</th></tr>
<tr><td>Bearings (M005). *</td><td>150 h</td></tr>
<tr><td>Crankshaft (MP001) includes: nut M10x1,25 (M037). *</td><td>on condition</td></tr>
<tr><td>Oil seals (M006). *</td><td>150 h</td></tr>
<tr><td>Crankcase (M002). *</td><td>on condition</td></tr>
<tr><td>Three Bond 1215 silicone paste *</td><td></td></tr>
<tr><td>FP Silicompound 225. *</td><td></td></tr>
</table>
</td></tr>
<tr><td>Special tools</td><td>Extractor (ACC113).
Specific tool (ACC127).
Specific tool (ACC128).</td></tr>
<tr><td>Values</td><td>Screws M6x35/40: 10 Nm.
Screws M8x16: 20 Nm.</td></tr>
</table>

*Always replace it when disassembled.

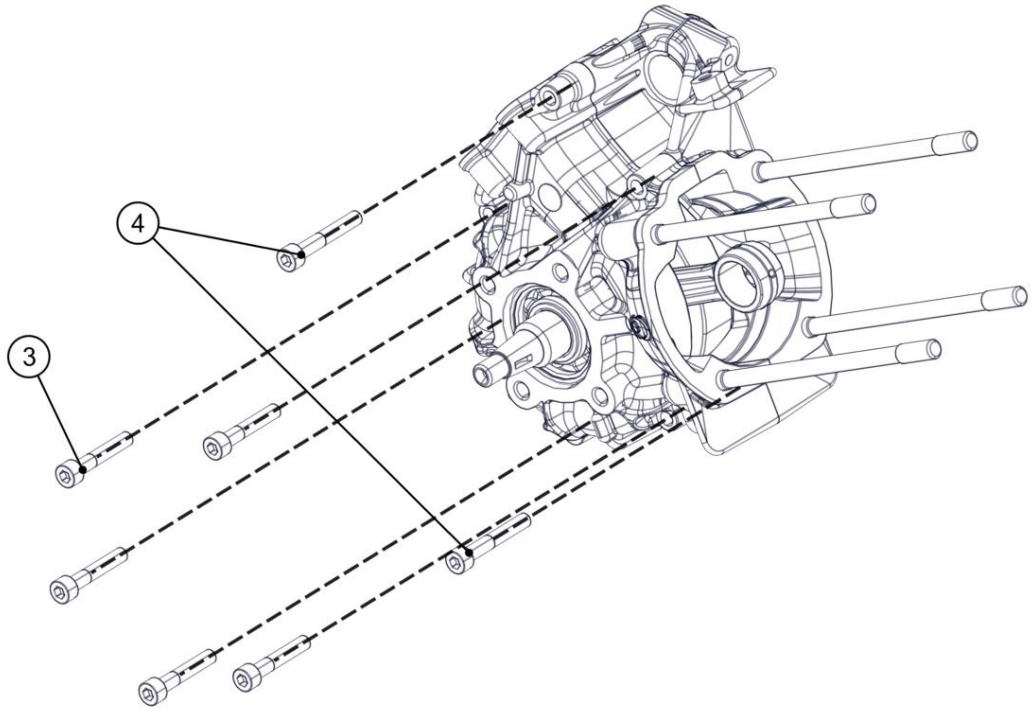
3.18.1 Crankcase disassembly

Before disassembling the crankcase, remove the airbox (see chapter 3.3 Airbox), the air rotary valve (see chapter 3.8 Air rotary valve), the CHT sensor (see chapter 3.7.1 CHT sensor disassembly), the reed valve (see chapter 3.9 Reed valve), the exhaust system (see chapter 3.12 Exhaust system), the rubber mountings (see chapter 3.13 Rubber mountings), the electric starter (see chapter 3.14 Electric starter), the FIU (see chapter 3.5 Full integrated unit (FIU)), the flywheel, the coils (see chapter 3.15 Flywheel, coil), the transmission (see chapter 3.16 Transmission) and the cylinder unit (see chapter 3.17 Piston, cylinder, head).

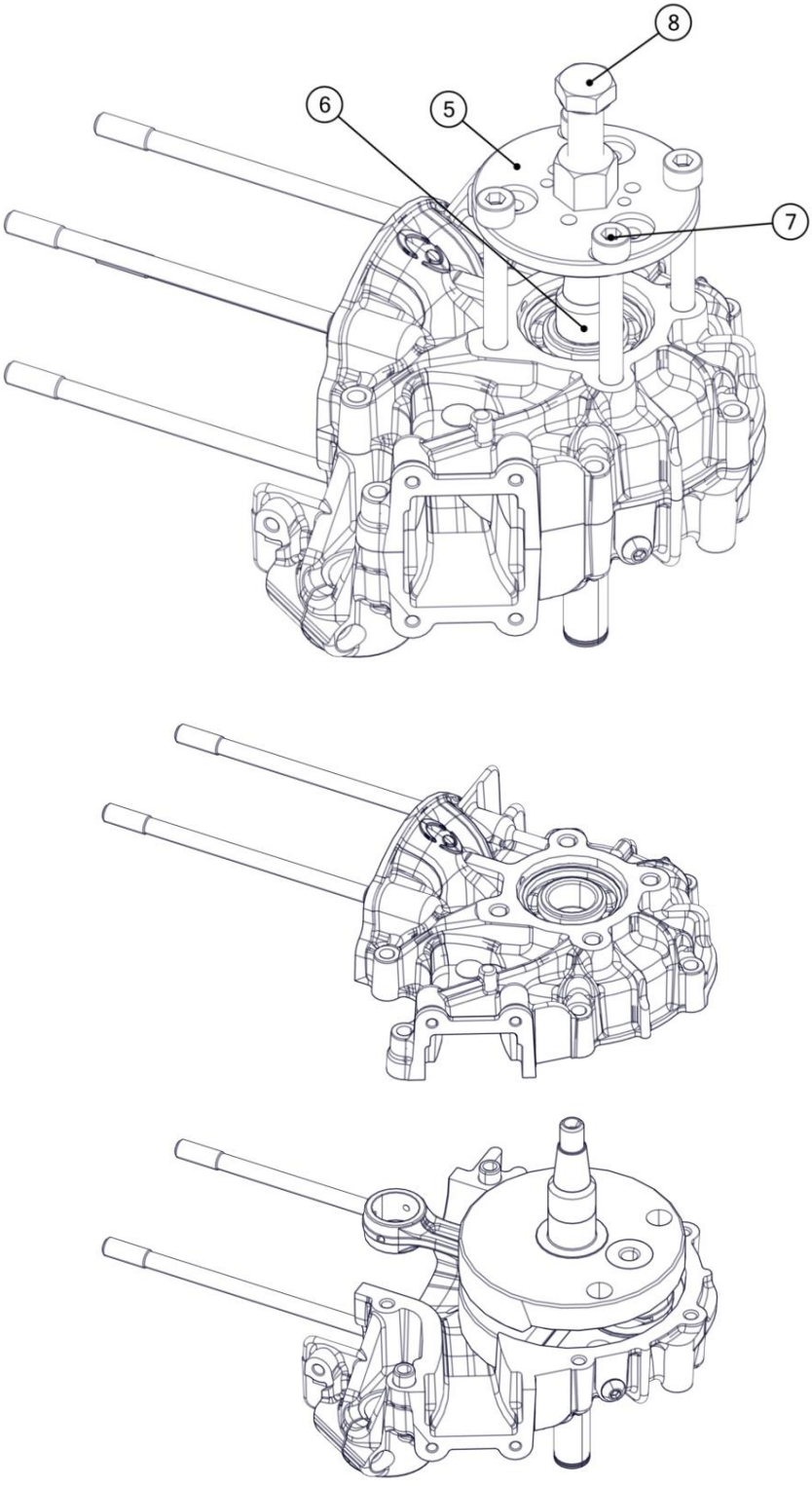
Remove the 4 countersunk head screws M8x16 (1) and the crankcase support (2).



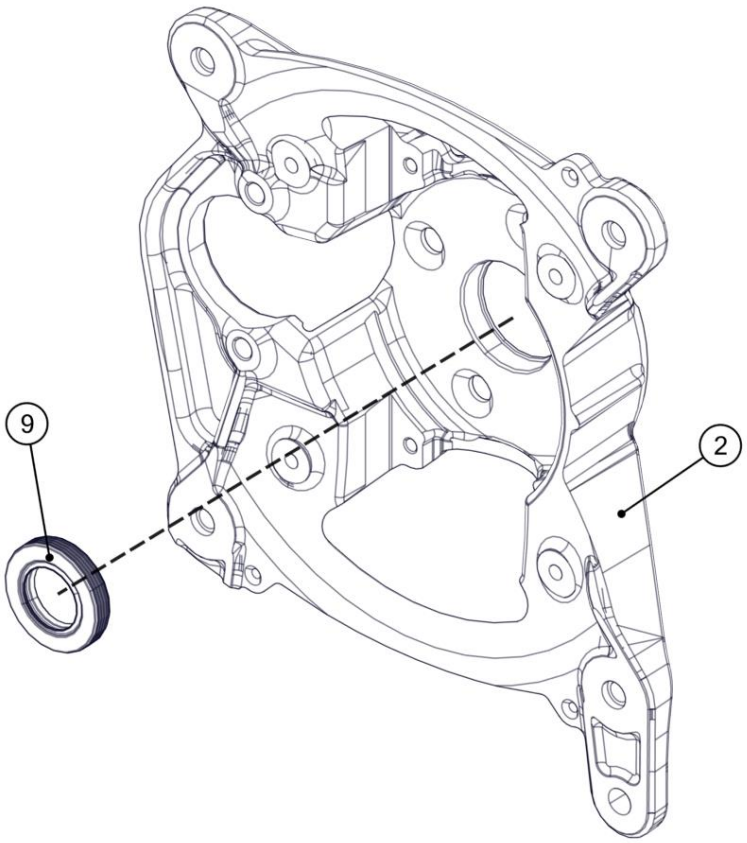
Remove the 5 Allen screws M6x35 (3) and 2 Allen screws M6x40 (4).



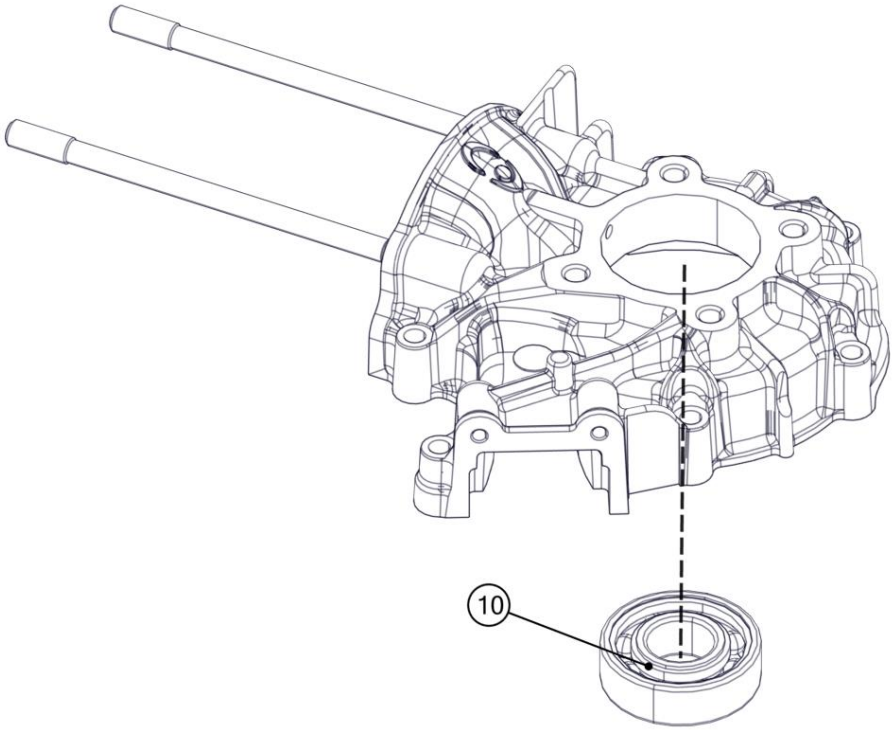
Position the extractor (5) on the crankshaft (6), tighten the 4 screws M8 (7) and turn the central pin (8) until the 2 case-half are separated.



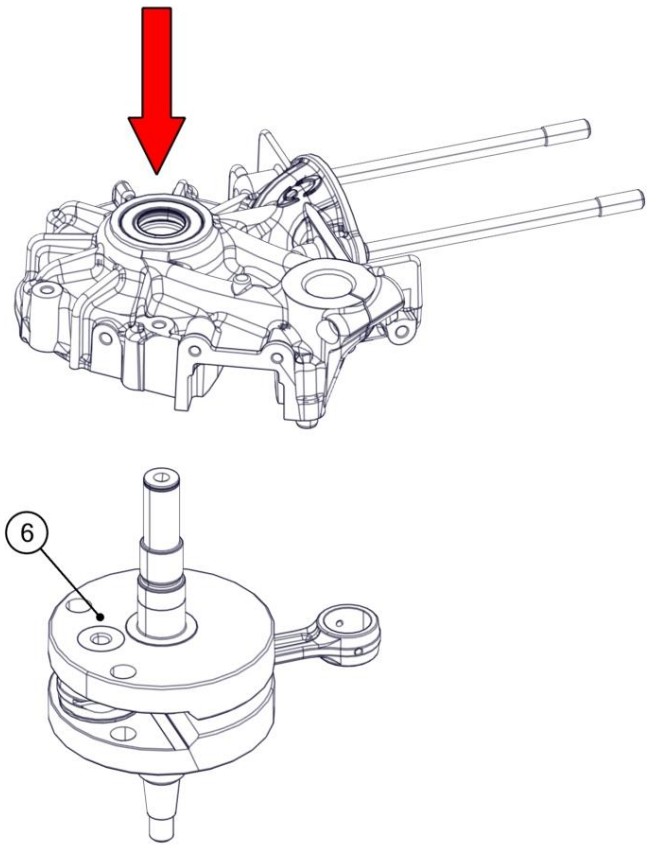
Remove the oil seal (9) from the crankcase support (2) on the side shown in the figure.



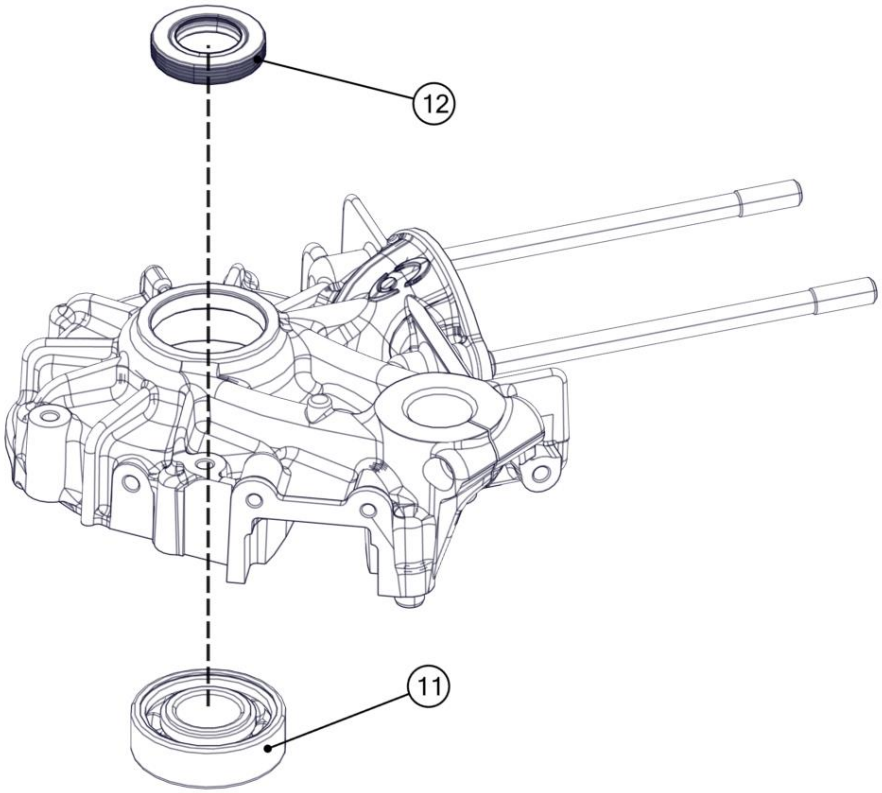
Heat the FIU side crankcase to 120 °C.
Remove the bearing (10).



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



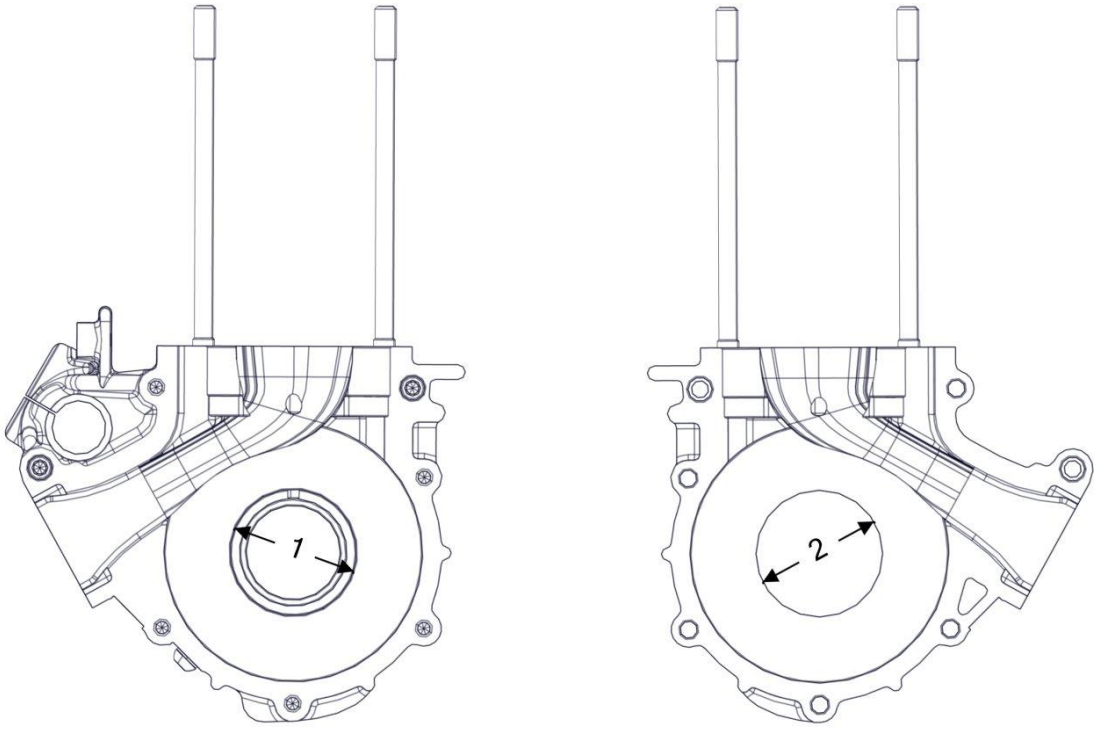
Heat the transmission side crankcase to 120 °C.
Remove the bearing (11) and the oil seal (12).



3.18.2 Crankcase maintenance

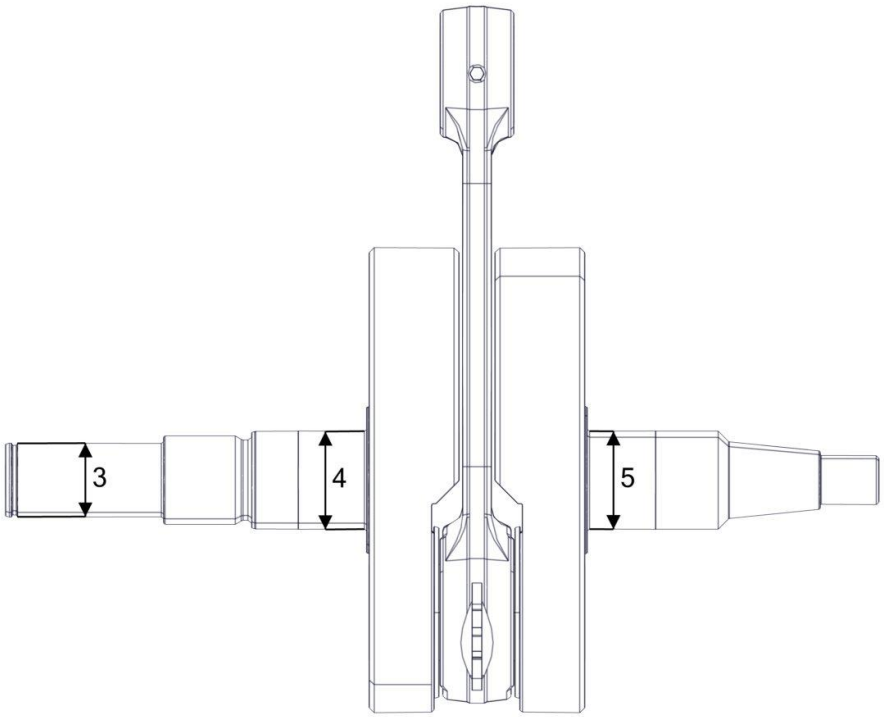
Degrease the bearing seats, the profile of the case-half and the crankcase support with specific products for aluminium.
Check the case-half: check for integrity and abnormal marks.

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

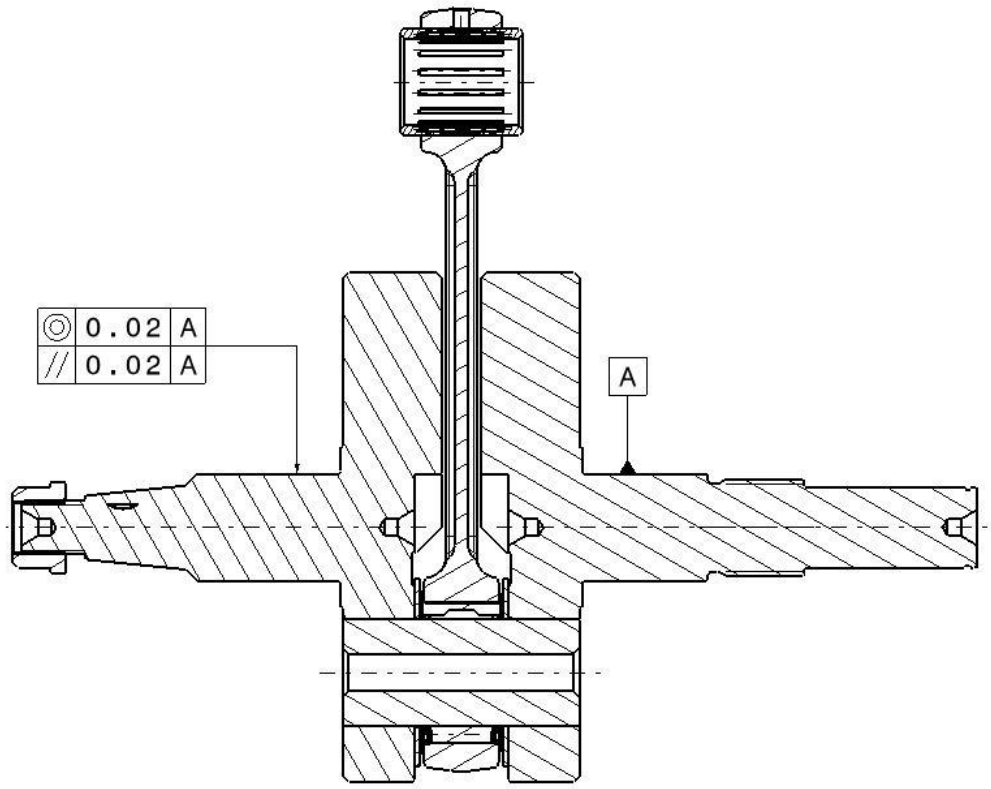
Measure the clearance at the small end and big end of the connecting rod.

	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 color due to overheating.

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

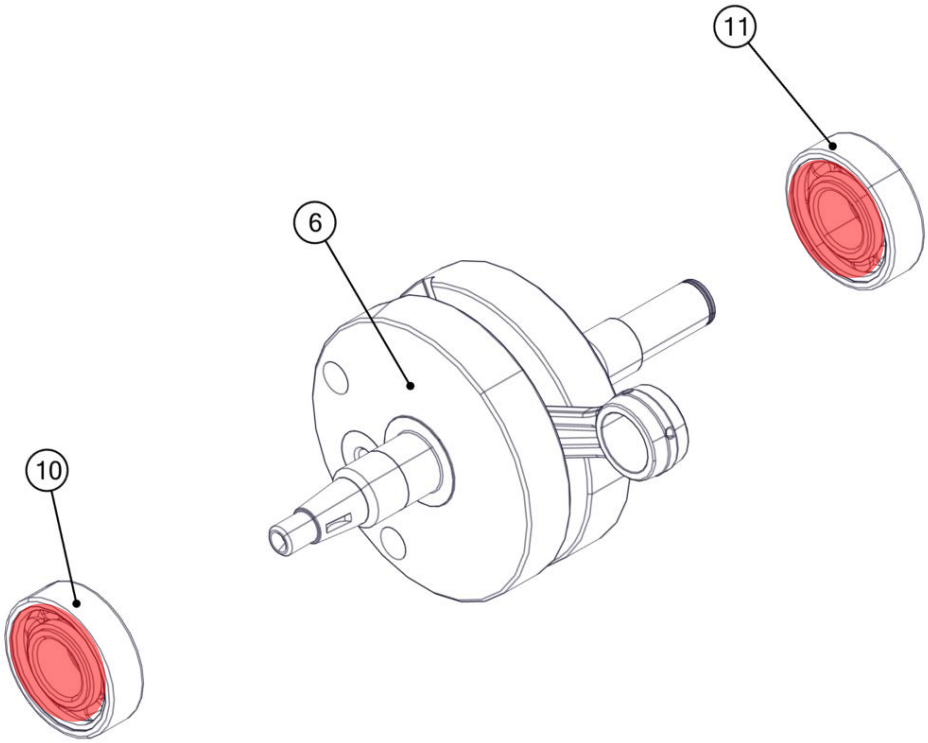


Check that the seat of the key is undamaged.

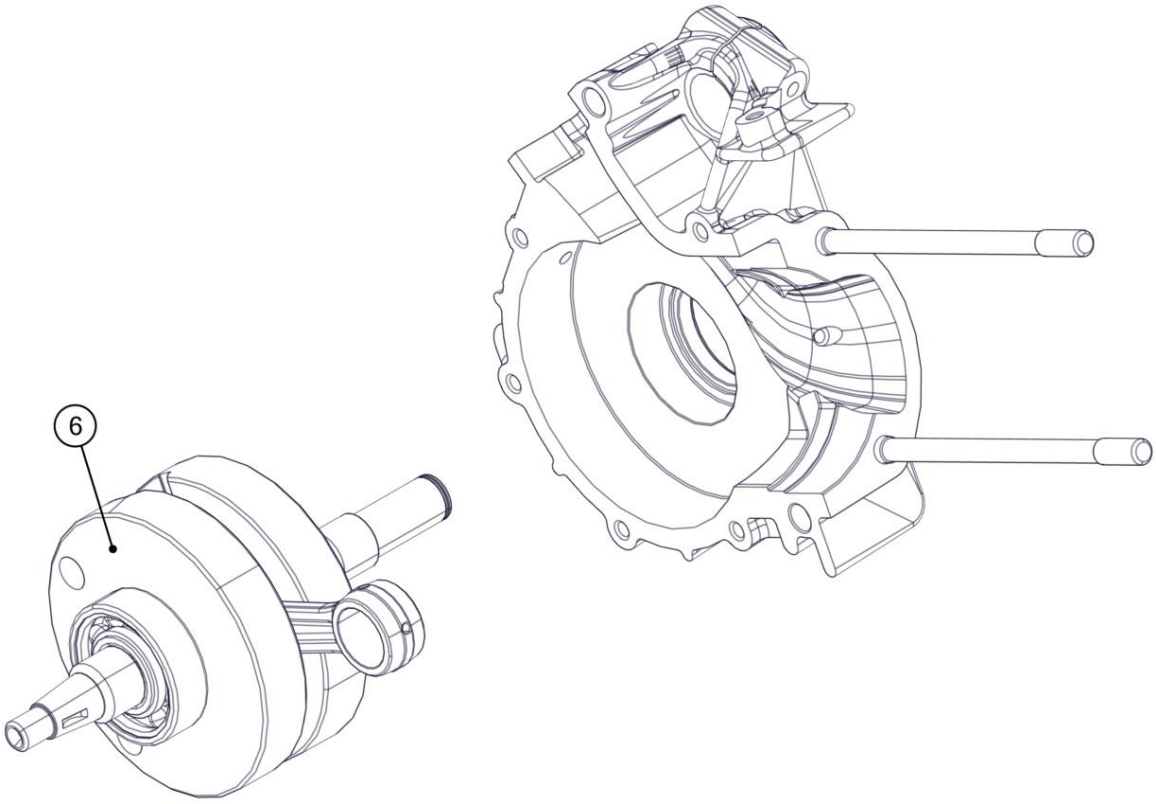
If the above checks are not passed, replace the crankshaft.

3.18.3 Crankcase assembly

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



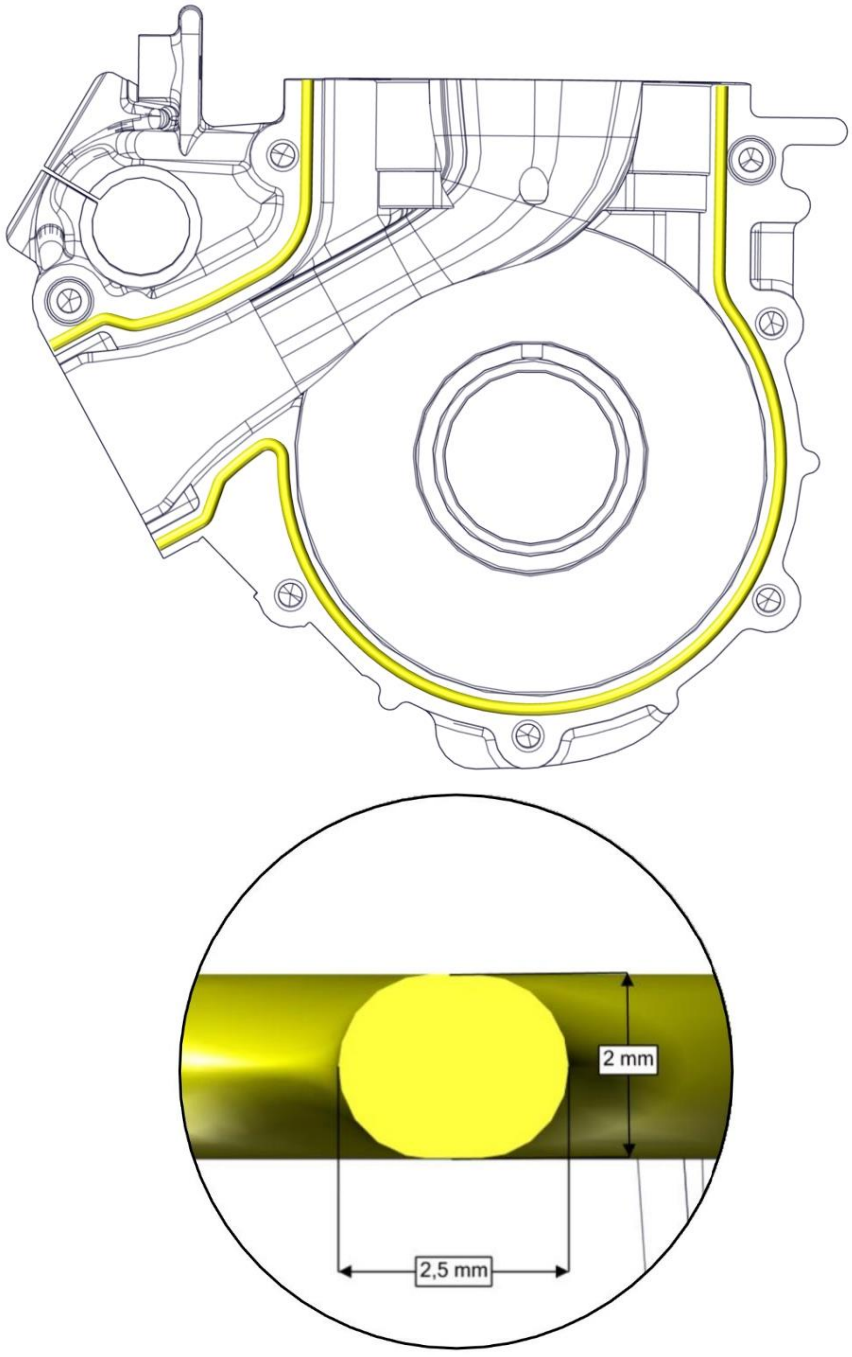
Heat the transmission side crankcase to 120 °C.
Insert the crankshaft (6) with the bearings.



Heat the FIU side crankcase to 120 °C.

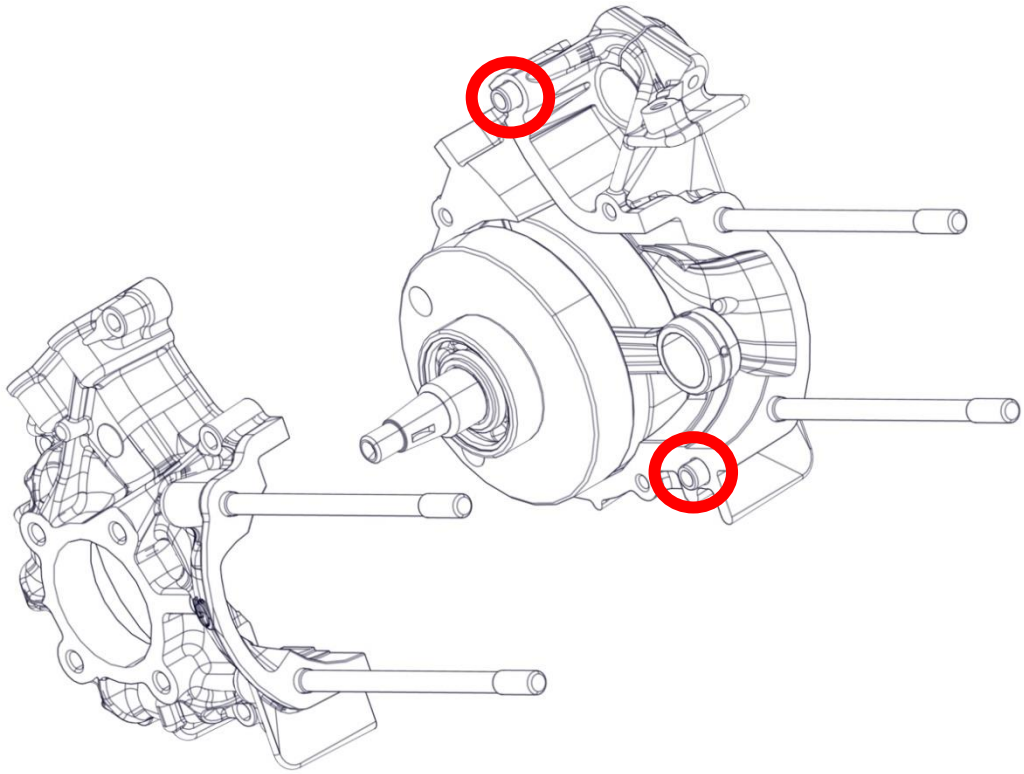
Carry out subsequent operations within a maximum of 5 minutes (application of silicone and closing of the crankcase).

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.

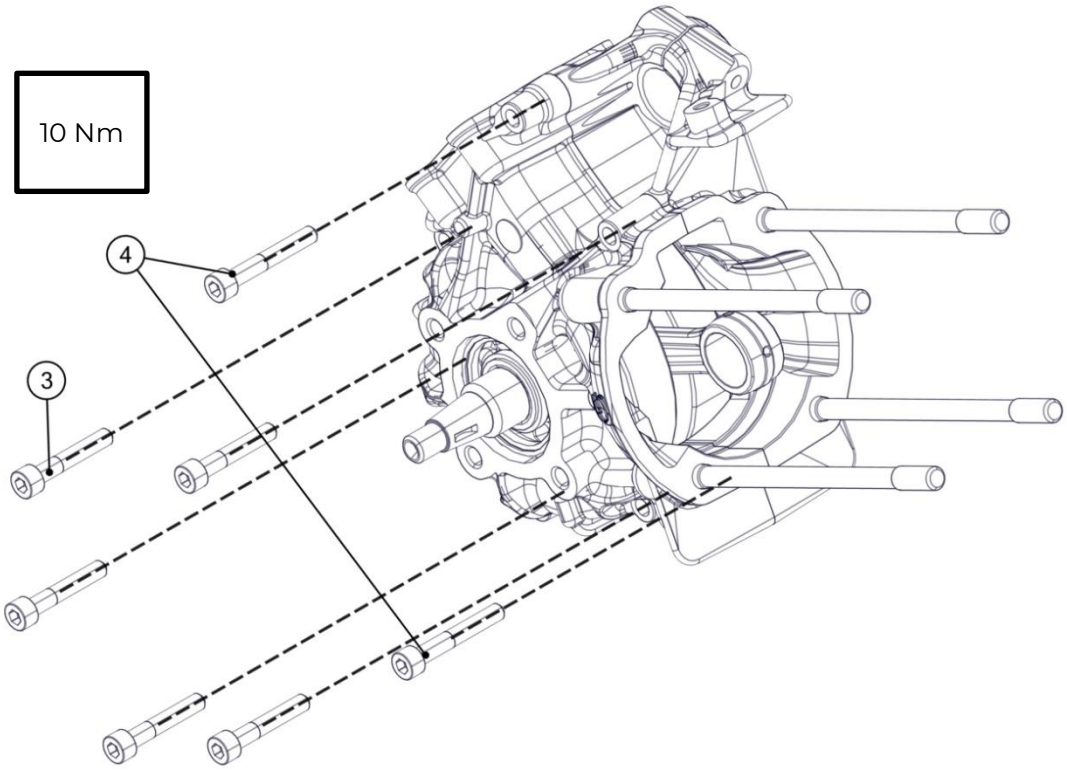


Check that the 2 bushings are in their respective seats (highlighted in the figure).

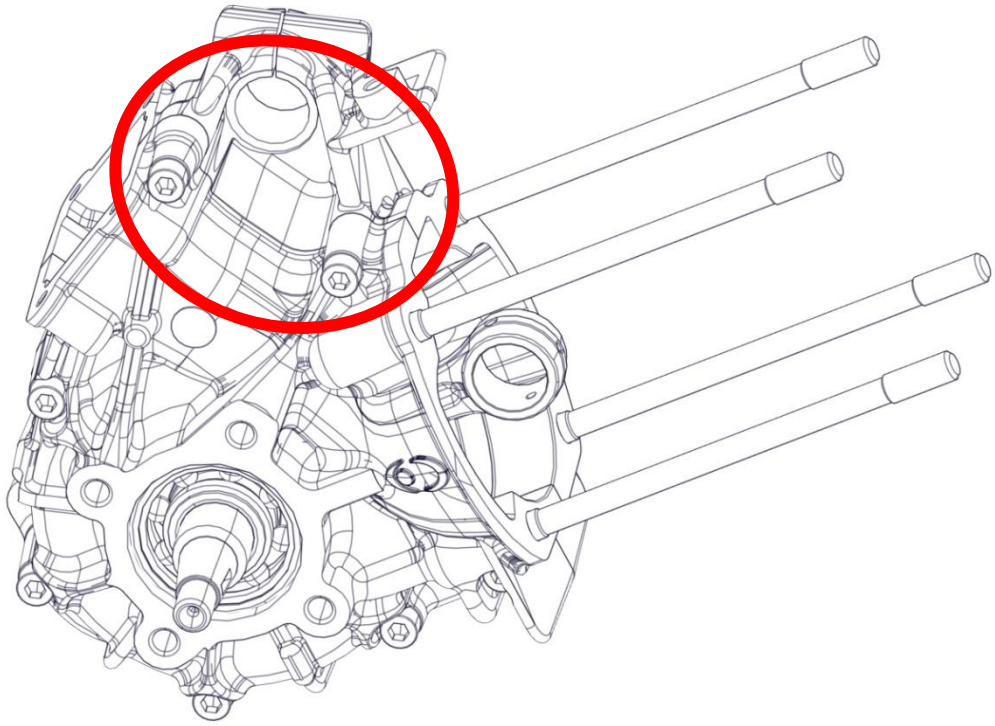
Close with the FIU side crankcase still warm at 120 °C.



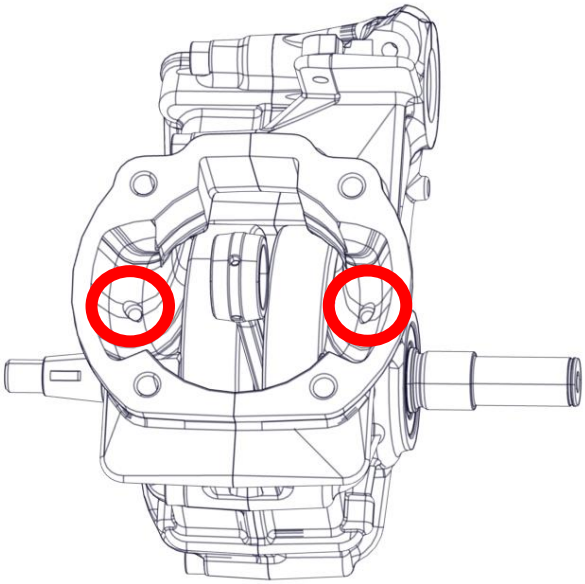
Insert the 5 Allen screws M6x35 (3), the 2 Allen screws M6x40 (4) and tighten with the torque shown in the figure.



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).



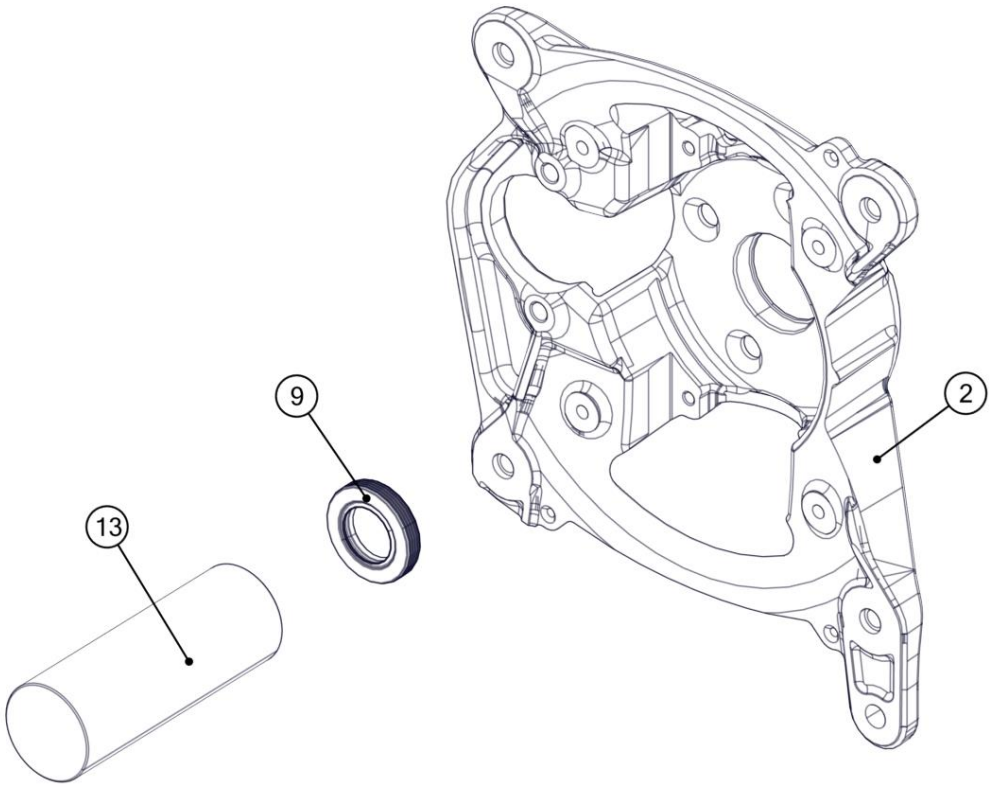
Wait for the crankcase to cool down.
Check the tightening of screws.
Insert oil into the 2 lubrication holes (highlighted in the figure).



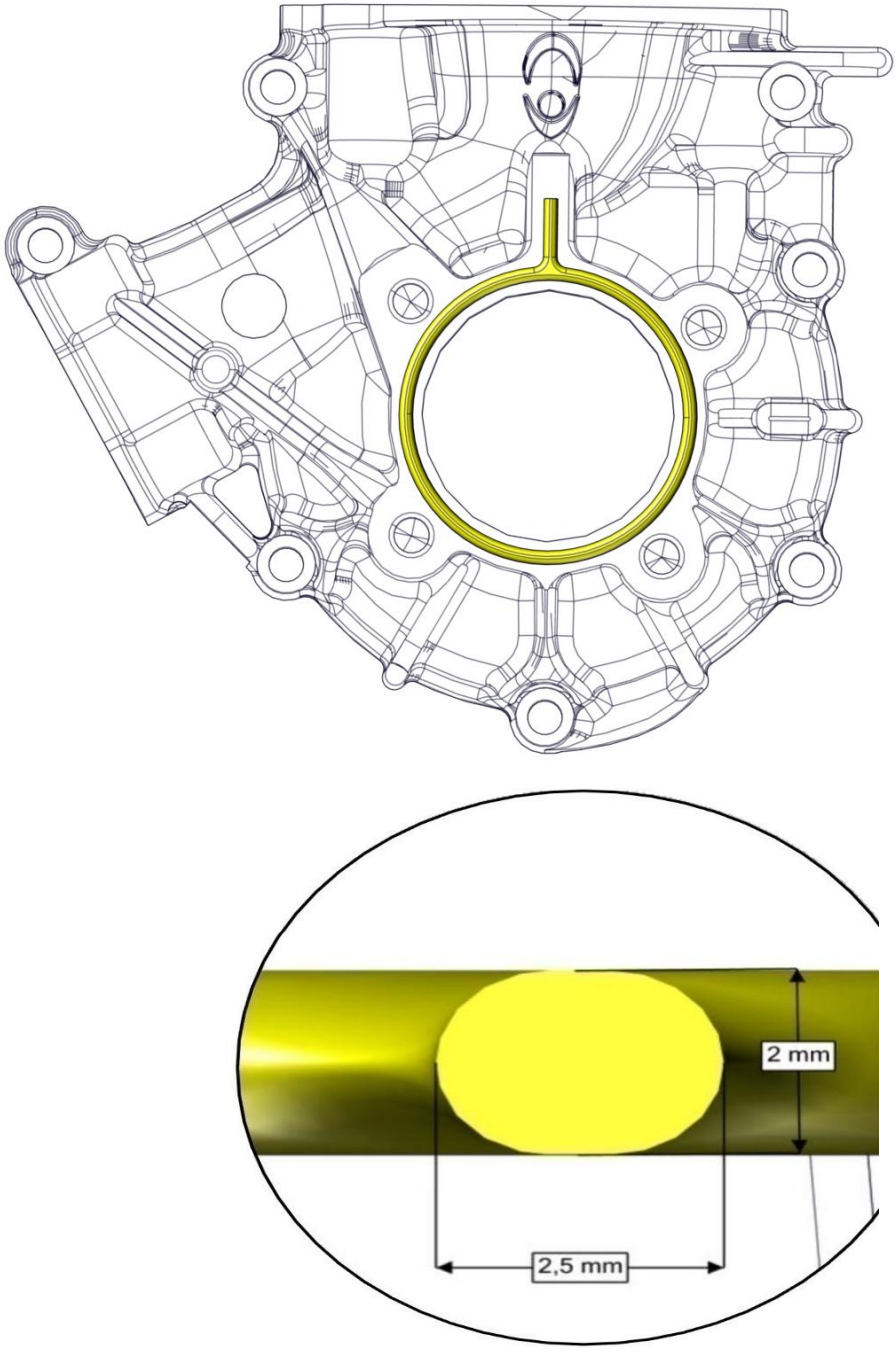
Check the sliding of crankshaft on the bearings.

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

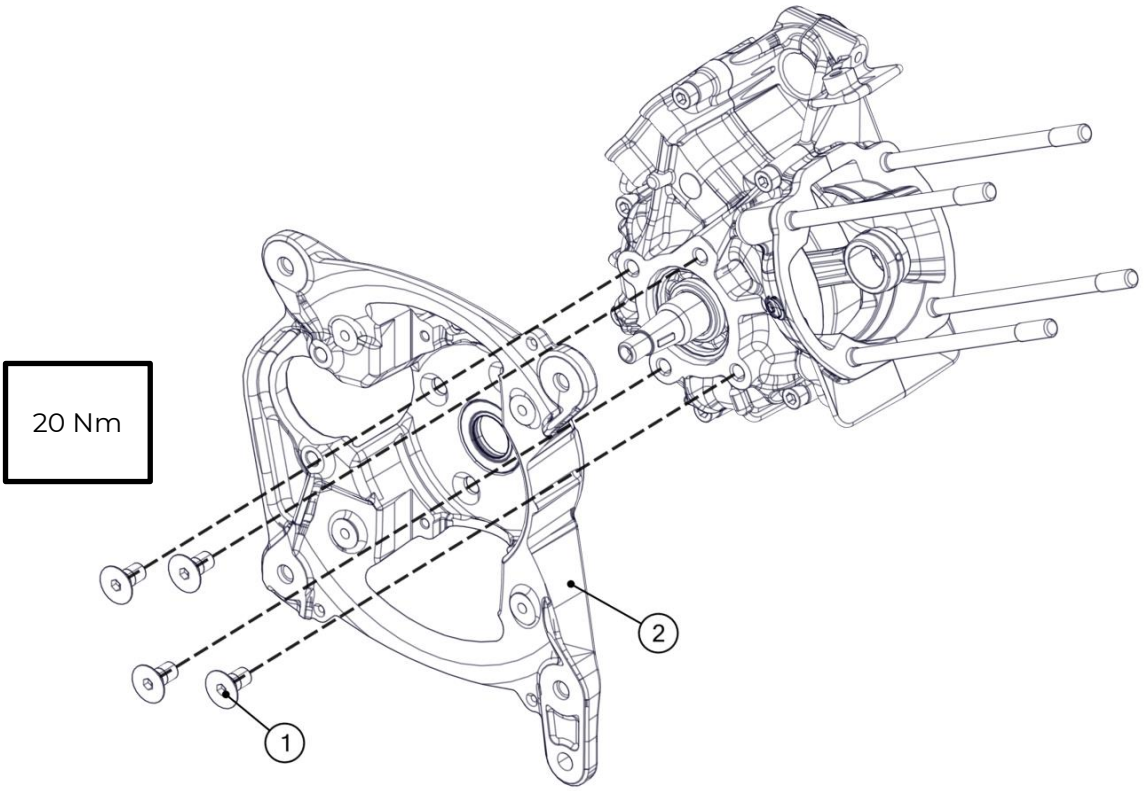
Grease the oil seal (9) with FP Silicompound 225 and place it on the crankcase support (2) using the specific tool (13) to insert it.



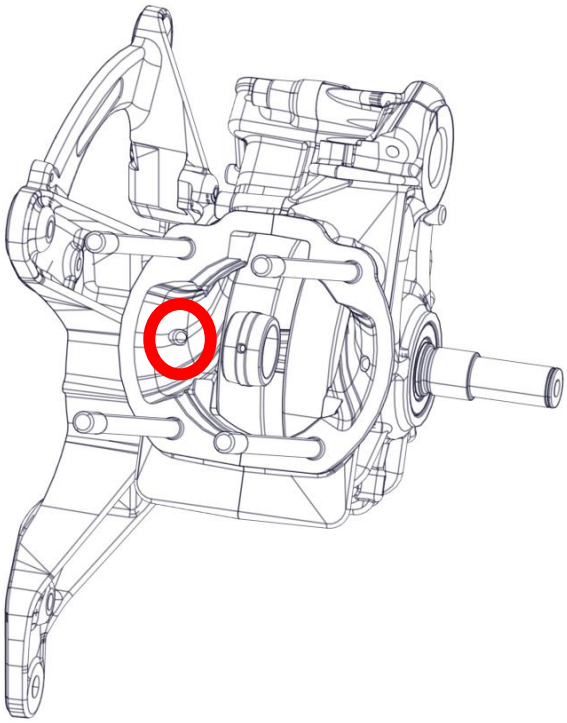
Carefully add silicone paste (Three Bond 1215) to the crankcase profile as shown in the figure.
Height, width silicone profile: 2 mm x 2,5 mm.



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

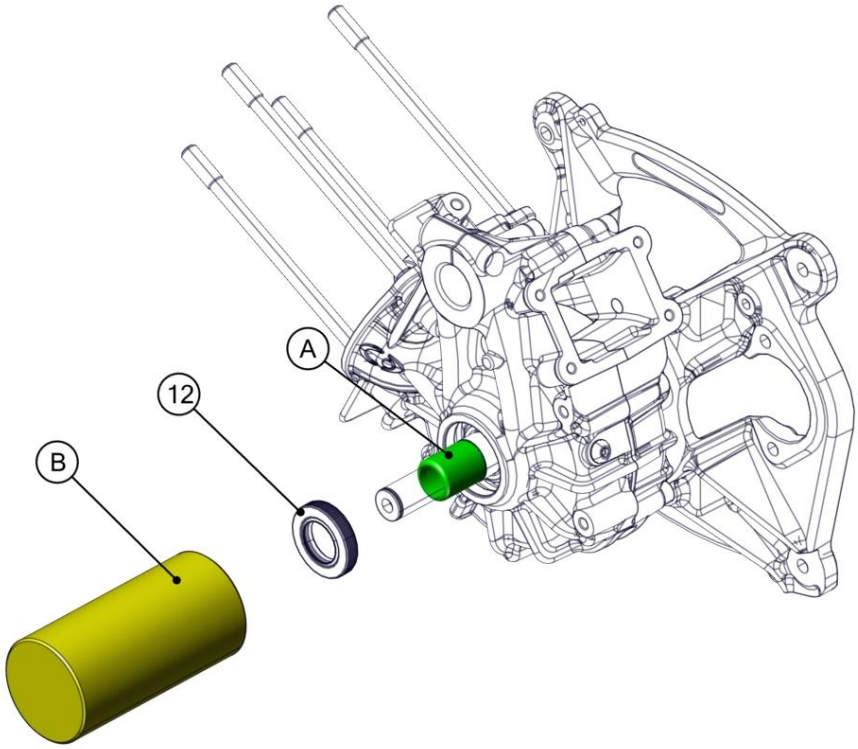


Check that the hole shown in the figure is not blocked by silicone.



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 Silicompound 225 and place it on the on the crankshaft using the part B to insert it.



Remove the part B and A.
Insert the cylinder unit (see chapter 3.17 Piston, cylinder, head), the flywheel, the coils (see chapter 3.15 Flywheel, coil), the transmission (see chapter 3.16 Transmission), the FIU (see chapter 3.5 Full integrated unit (FIU)), the electric starter (see chapter 3.14 Electric starter), the rubber mountings (see chapter 3.13 Rubber mountings), the exhaust system (see chapter 3.12 Exhaust system), the reed valve (see chapter 3.9 Reed valve), the CHT sensor (see chapter 3.7.2 CHT sensor assembly), the air rotary valve (see chapter 3.8 Air rotary valve) and the airbox (see chapter 3.3 Airbox).

3.19 Tightening values

Component	Torque value	Thread size	Lubricant/ sealant
Spark plug	25 Nm	M14x1,25	
Airbox fixing clamp	2,5 Nm	50-70 mm (clamp size)	
Injector screw	6,5 Nm	M5x12	Loxeal 55-03/ Loctite 243
Fuel pipes fixing clamp nut	10 Nm	M6	
Microfilter cap	0.3 Nm	M10x4,20	
FIU rubber mountings screws	1.6 Nm	M4x10	Loxeal 55-03/ Loctite 243
FIU mounting screws	1.6 Nm	M4x6	Loxeal 55-03/ Loctite 243
Battery and probes supply cables fixing clamp screw	5 Nm	M5x10	
Probes supply cable fixing clamp screw	0,6 Nm	M4x6	Loxeal 55-03/ Loctite 243
Relay supply cable fixing clamp screw	0,6 Nm	M4x6	Loxeal 55-03/ Loctite 243
Probes support fixing plate nuts	3 Nm	M4	
ECU signal cable fixing clamp screw	10 Nm	M6x10	Loxeal 55-03/ Loctite 243

The table follows in the next page

Component	Torque value	Thread size	Lubricant/ sealant
Ground cable fixing screw	4 Nm	M4x12	Loxeal 55-03/ Loctite 243
Coil cable fixing clamp screw	4 Nm	M4x12	Loxeal 55-03/ Loctite 243
Electric starter cable fixing clamps screws	10 Nm	M6x10	
Sensors support screws	0,4 Nm	M3x25	Loxeal 55-03/ Loctite 243
CHT sensor screw	10 Nm	M6x10	Loxeal 83-55/ Loctite 270
EGT sensor	7Nm	M8x6	Interflon paste HT1200
Air rotary valve screws	6 Nm	M6x60	Loxeal 55-03/ Loctite 243
Air rotary valve lever screw	2,5 nm	M4x8	
Air rotary valve flange screws	8 Nm	M5x25	
Reed valve petals screws	1,5 Nm	M3x5	
Battery self-locking nuts	5 Nm	M5	
Exhaust nuts	32 Nm	M8	Copper paste
Silencer nuts	10 Nm	M6	

The table follows in the next page

Component	Torque value	Thread size	Lubricant/ sealant
Silencer screw	13 Nm	M8x25	Loxeal 83-55/ Loctite 270
Rubber mounting nuts (M021a, M021b, M151c)	18 Nm	M8	
Rubber mounting nuts (M151a)	15 Nm	M8	
Exhaust support plate's nuts	15 Nm / 18 Nm	M8	
Rubber mountings ring nuts	20 Nm		
Electric starter screws	10 Nm	M6x25	
Electric starter fixing plate screws	10 Nm	M6x25	
Ring gear screws	4,1 Nm	M4x16	
Flywheel nut	52 Nm	M10x1,25	
Spark plug cable fixing clamp screw	Hand tighten	M4x20	
Aluminium toothed pulley's screws	8 Nm	M5x20	Loxeal 55-03/ Loctite 243
Ring gear cover screws	10 Nm	M6x14	
Clutch	20 Nm		

The table follows in the next page

Component	Torque value	Thread size	Lubricant/ sealant
Eccentric rear screw	25 Nm	M8x16	
Eccentric side screw	12 Nm	M6x35	
Cylinder head nuts	16 Nm	M8	Copper paste
Engine carter screws	10 Nm	M6x35/40	
Carter support screws	20 Nm	M8x16	
Carbon propeller screws	10-12 Nm	M6	