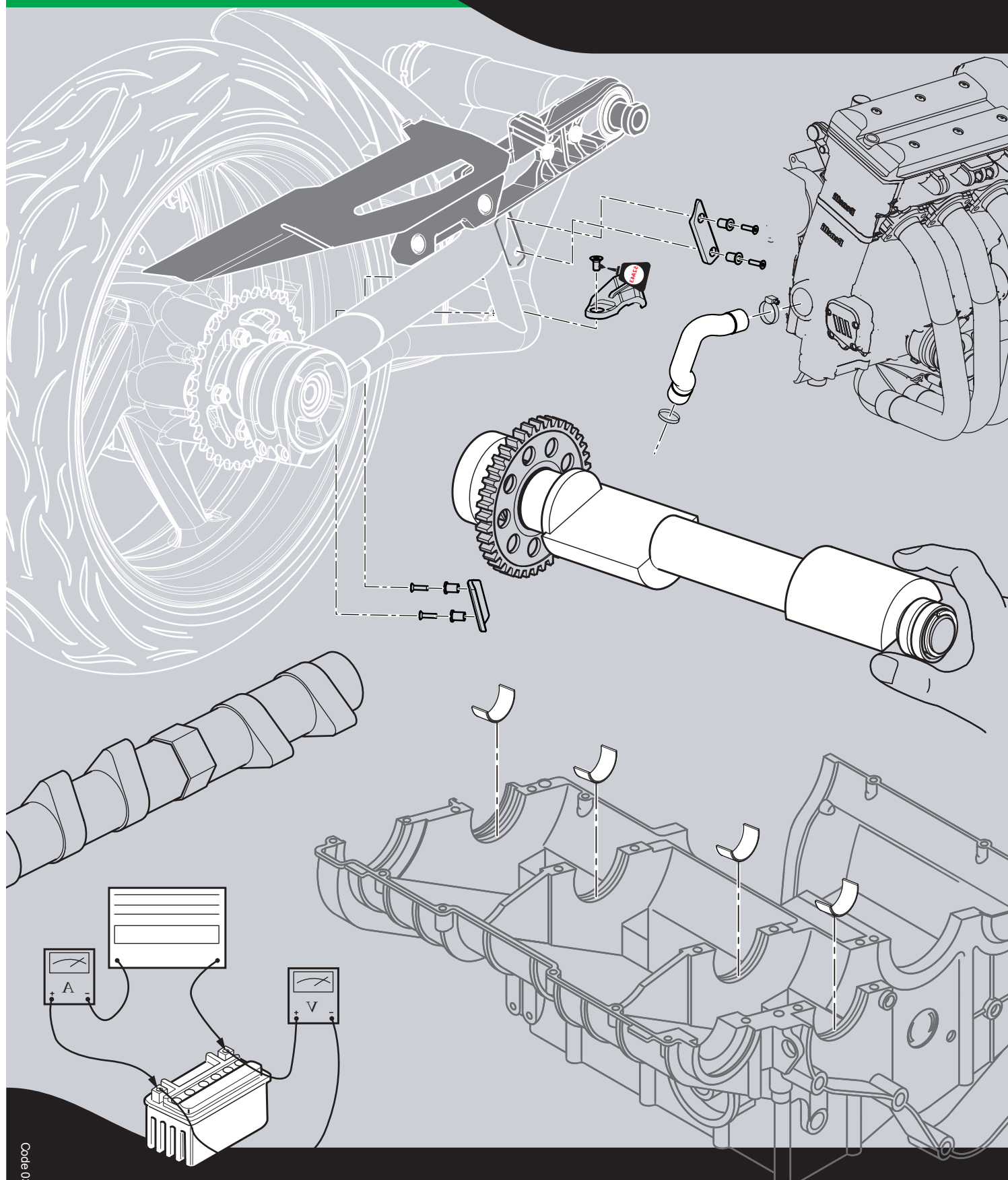




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TRK 1130
ver. 01 June 2009



MANUALE OFFICINA • WORKSHOP MANUAL • MANUEL D'ATELIER •
TECHNISCHES HANDBUCH • MANUAL THE TALLER



Workshop Manual

2009



**TRE 1130 K
WORKSHOP MANUAL
2009, Benelli Q.J. s.r.l.
First Edition, June 2009
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written authorisation of Benelli Q.J. s.r.l.
is forbidden.**

WARNING

This manual has been edited by Benelli Q.J. s.r.l. mainly for use by Benelli dealers and their qualified mechanics. It is not possible to supply a mechanic with all the necessary information in a single manual. It is therefore assumed that the persons using this manual for maintenance and repair of Benelli vehicles have a basic knowledge of the mechanical principles and of the procedures concerning the repairing technique of this type of vehicle. Without this knowledge, the repair or the maintenance of this type of vehicle can be dangerous and ineffective.

The Benelli Q.J. s.r.l. policy is to continuously improve all its models. The important amendments and changes in the technical data or in the procedures will be communicated to all authorised Benelli dealers and will be published in the future editions of this manual.

NOTE

The drawings and specifications are subject to amendment without prior notice.

PARTICULARLY IMPORTANT INFORMATION RELATING TO THE MANUAL

The text in this manual contains following important references.

WARNING

Failure to follow the instructions under this symbol may cause serious injury or even death of the driver, the person near-by, or the person who intends to inspect or repair the bike.

ATTENTION

Attention indicates the precautions that should be complied with to avoid damage to the bike.

NOTE

A note supplies key information to facilitate or clarify procedures.

HOW TO USE THIS MANUAL

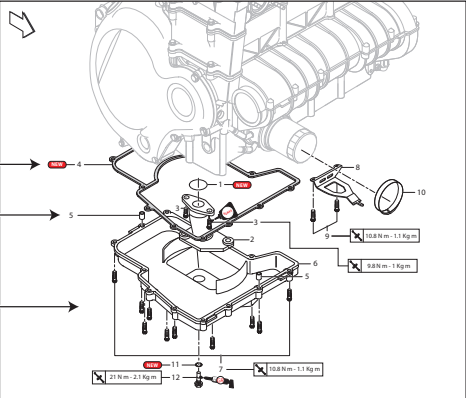
This manual is intended as a practical reference guide and easy to use for the mechanics. The explanations of all procedures of installation, removal, disassembly, assembly, repair and control are organized sequentially, taking one step at a time.

- ① Each chapter is divided into sections. At the top of each page shows the title of current section.
- ② To help identify parts and clarify the points of the various procedures, at the beginning of each section, exploded drawings are shown the removal and disassembly of the components.
- ③ The sequence of the operations is shown on the exploded drawing using progressive numbering. The number indicates the stage of dismantling.
- ④ The parts to be lubricated or replaced are marked by symbols. See the "SYMBOLS" paragraph.
- ⑤ The exploded drawing is accompanied by a table with the intervention instructions, indicating the order of the operations, the name of the pieces, the notes relating to the work, etc.
- ⑥ The interventions requiring additional information (for example, special tools and technical data), are described sequentially.

①

ENG  IMPIANTO DI LUBRIFICAZIONE

INSTALLAZIONE COPPA OLIO E FILTRO ASPIRAZIONE



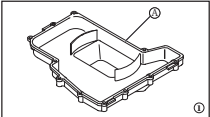
④ → 4
③ → 5
② → 5
⑤ → 5

SEQ.	SIMBOLI	INTERVENTO/DESCRIZIONE	Q.TA	OSSERVAZIONI
1		Installazione Filtro Aspirazione	1	Installare i pezzi nell'ordine indicato. NOTA: Rimettere l'olio motore una volta completate le operazioni.
2		Guarnizione O-Ring Filtro Aspirazione	1	
3		Vite	2	
4		Installazione Coppa Olio	1	
5		Guarnizione Coppa Olio	1	
6		Bussola	2	
7		Coppa Olio	1	
8		Vite	10	
9		Platto	2	
10		Vite	3	
11		Fascetta	1	
12		Rondella Tappo Magnetico	1	

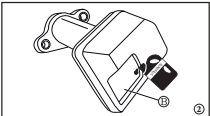
3 106

ENG  IMPIANTO DI LUBRIFICAZIONE

CONTROLLO COPPA OLIO E FILTRO ASPIRAZIONE

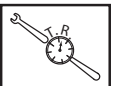
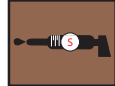


① Controllare:
• la coppa dell'olio ①
In presenza di lesioni/danni → Sostituire.



② Controllare:
• il filtro aspirazione ②
In presenza di lesioni/danni → Sostituire.
In presenza di sedimenti/residui → Pulire accuratamente la zona filtrante con solvente.

3 107

①	GEN INFO		SPEC		②
③	CHK ADJ		CHAS		④
⑤	ENG		COOL		⑥
⑦	ELEC				
⑧					⑨
⑩					⑪
⑫					⑬
⑭					⑮
⑯		⑰		⑱	
⑲		⑳		㉑	

SYMBOLS

These symbols do not refer to all vehicles:
the symbols from ① to ⑦ indicate the subject of each chapter.

- ① General Information
- ② Specifications
- ③ Routine Inspections and Adjustments
- ④ Frame
- ⑤ Engine
- ⑥ Cooling system
- ⑦ Electric system

The symbols from ⑧ to ⑩ indicate the following:

- ⑧ Wear, Clearance Limit
- ⑨ Special Tool
- ⑩ Fastening Torque

The symbols from ⑪ to ㉑ in the exploded drawings indicate the type of lubricant and the point of lubrication:

- ⑪ Brakes Liquid TUTELA BRAKE FLUID TOP 4 - DOT 4
- ⑫ Engine Oil SELENIA MOTO RIDER PRO-ACTION 4T
- ⑬ Oil for Gears TUTELA MATRYX MOTO RIDER
- ⑭ Solvent For Fairing TUTELA THE SHAMPOO
- ⑮ Solvent For Engine TUTELA MOTOR CLEAN
- ⑯ Molybdenum Disulphide Grease SINTOFLON
- ⑰ Copper Grease MOLYKOTE HSC PLUS
- ⑱ Lithium Soap Based Grease TUTELA MR 2
- ⑲ Apply Some AREXONS SYSTEM Thread Brakes
- ㉑ Apply TUTELA PROFESSIONAL IVORY SIL AC

- Sealing Paste
- Replace The Part

AREXONS-SYSTEM VARIATIONS

The following table refers to the sealing paste.
The table shows the various specifications of AREXONS SYSTEM.
Benelli recommends always using AREXONS SYSTEM original products.

Arexons SYSTEM 52A70 STRONG THREAD BREAKS	
Arexons SYSTEM 52A90 PENETRATING	
Arexons SYSTEM 56A48 HIGH TEMPERATURE SEALER	
Arexons SYSTEM 52A43 MEDIUM THREAD BRAKES	
Arexons SYSTEM 56A01 HIGH RESISTANCE SEALER	

INDICE

GENERAL INFORMATION	1	 GEN INFO
SPECIFICATIONS	2	 SPEC
ROUTINE INSPECTIONS AND ADJUSTMENTS	3	 CHK ADJ
FRAME	4	 CHAS
ENGINE	5	 ENG
COOLING SYSTEM	6	 COOL
ELECTRIC SYSTEM	7	 ELEC

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GENO
INFO



CHAPTER 1

GENERAL INFORMATION

IDENTIFICATION OF MOTORCYCLE.....

1

MOTORCYCLE IDENTIFICATION.....

1

FEATURES

2

INSTRUMENTATION AND LIGHTS.....

2

MULTIFUNCTION DISPLAY

3

DISPLAY FUNCTIONS SELECTION

4

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SPECIAL TOOLS FOR FRAME.....

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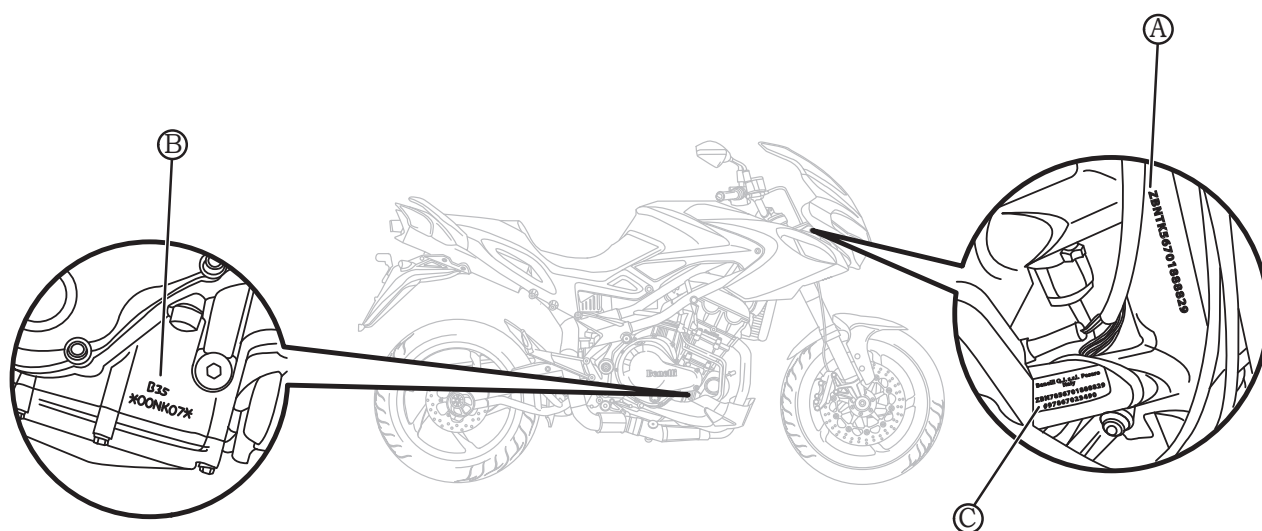
SPECIAL TOOLS FOR ENGINE

13

MOTORCYCLE IDENTIFICATION

The identification data is:

- Frame number (on steering tube) ①
- Engine number (on lower base) ②
- Homologation data (on frame) ③



INSTRUMENTATION AND LIGHTS

The instruments and warning lights are activated by turning the ignition key to "ON" position. After an initial check-up, the information corresponds to the general conditions of the motorcycle at the moment. The dashboard has following instruments:

① INDICATOR LIGHTS

- ① **High beam warning light (blue)**
It comes on when the upper beams are activated.
- ② **Turn direction warning light (green)**
It comes on when flip the switch of turn direction.
- ③ **Fuel reserve warning light (orange)**
It comes on when the fuel tank contains about 5 litres of fuel; in this case refuel as soon as possible.
- ④ **Neutral gear warning light (green)**
It comes on when the gear is in "Neutral" position.
- ⑤ **Injection malfunctioning warning light (orange)**
It remains on when a malfunctioning of the injection plant verifies; in this case, contact an authorised after-sales centre as soon as possible.

② COOLING LIQUID TEMPERATURE INDICATOR

It indicates the cooling liquid temperature in Celsius degrees (°C).

③ REVOLUTIONS COUNTER

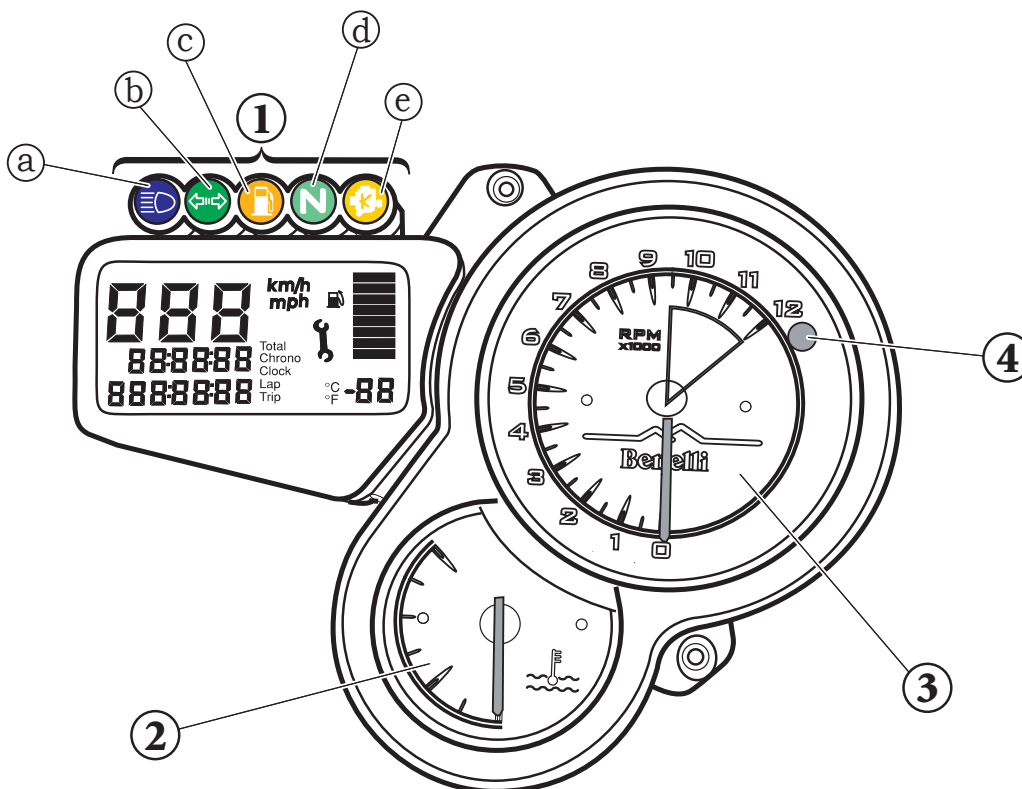
It indicates the number of engine revolutions per minute expressed in miles.

④ ALARM LED

It comes on when the oil pressure value, or that of the cooling temperature or of the battery voltage is incorrect (also possible is the verifying of more anomalies simultaneously) and it is accompanied by the flashing of the relative wording "OIL", "H O", "BAT" appearing on the speedometer instead of the speed value.

If it switches on, immediately stop, leave the vehicle to cool down for a few minutes and, if necessary, check the oil level and top-up.

If the problem persists, contact an authorised after-sales centre as soon as possible.



MULTIFUNCTION DISPLAY

① DISPLAY

It indicates the speed.

The value can appear in kilometres (Km/h) or in miles (mph). The value on the high full scale is of 320 Km/h (198.8 mph).

② TOTAL ODOMETER

"Total"

It indicates the total run from 0 to 999999 Km or Mi.

"Chrono" Chronometer

It indicates the run time expressed in minutes, seconds and hundredths.

"Clock"

It indicates the hour (0-12) and the minutes.

③ PARTIAL ODOMETER

"Trip"

It indicates the partial run from 0 to 999999 Km or Mi.

"Lap"

In "Chrono" mode, it indicates the average time and once the chronometer is stopped, it indicates the real time.

④ SERVICE WARNING LIGHT

It switches on for the first time after 1.000 Km (621 Mi) then every 10.000 Km (6.213 Mi).

Every time it switches on, contact an authorised after-sales centre as soon as possible and carefully follow the indications in the maintenance and control tables in this manual.

Together with the warning light the flashing wording "Service" is displayed instead of the partial odometer "Trip" for 10 seconds at every vehicle ignition.

⑤ THERMOMETER

It indicates the ambient temperature.

The value can appear in degrees Centigrade (°C) or in Fahrenheit (°F).

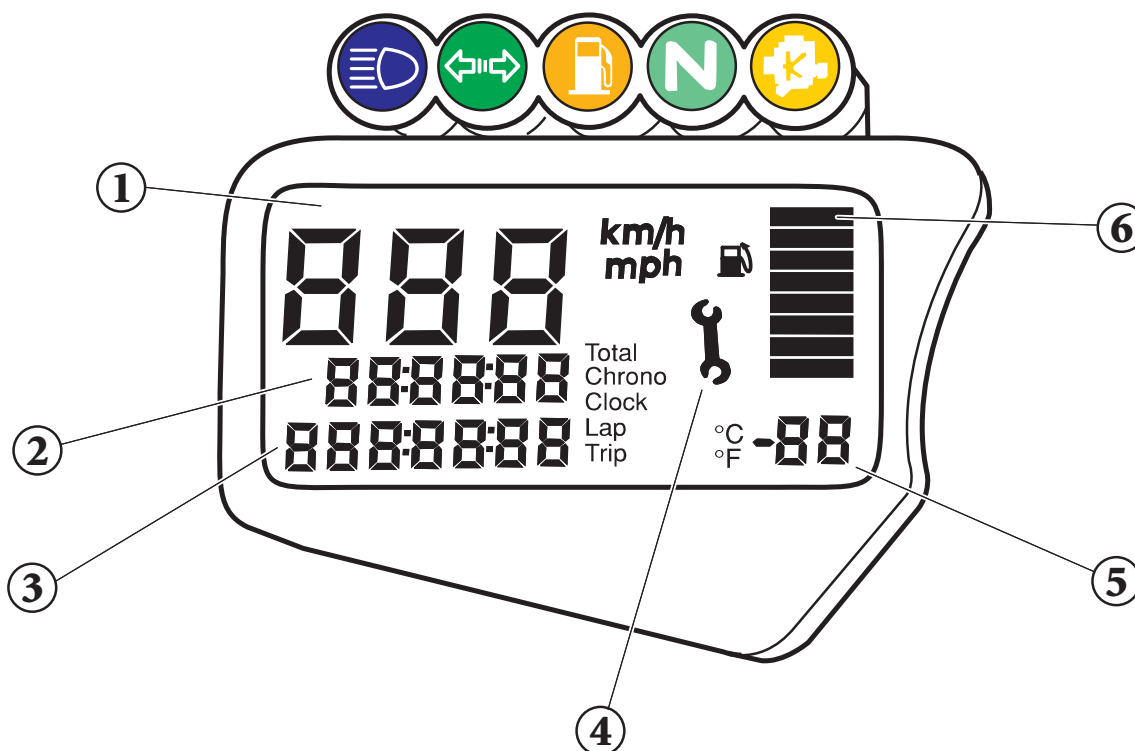
The indication field is between -30 and +50 °C or -22 and +122 °F.

NOTE:

During displaying of °F with values above 99°F, the value of the hundredths is not present, but it is, however, understood.

⑥ FUEL LEVEL

It indicates the amount of fuel inside the tank with an eight bar diagram.



DISPLAY FUNCTIONS SELECTION

NOTE:

The amendment or adjustment operations of the display functions must be carried out after three seconds from engine start-up, without subsequently activating the clutch lever

The display is provided with 3 primary functions:

Ⓐ "Total"/"Trip"

Ⓑ "Chrono"/"Lap"

Ⓒ "Clock"/"Trip"

To switch from Ⓐ "Total"/"Trip" to Ⓑ "Chrono"/"Lap", press the **START** button for more than two seconds.

To switch from Ⓑ "Chrono"/"Lap" to Ⓒ "Clock"/"Trip", press the **START** button for more than two seconds (with chronometer at a stand still).

To switch from Ⓒ "Clock"/"Trip" to Ⓐ "Total"/"Trip", press the **START** button for more than two seconds.

Partial odometer resetting

The value of the "Trip" function is reset by pressing the **START** key twice consecutively (with engine running and without pulling the clutch).

NOTE:

The equipment has an integral memory preserving all parameters even with the engine off. With the exception of the reset clock and of the "Trip" function, all other parameters remain in the memory even in case of disconnection from the battery.

Set "Chrono"/"Lap"

Switch to Ⓑ display.

To start the "Chrono" press the **START** button for less than one second.

To view "Lap" from the "Chrono" position, press the **START** button for less than one second.

Every time the **START** key is pressed for less than one second, the "Lap" function will display the time on the "Chrono" at that moment (lap time).

To stop the "Chrono" press the **START** button for less than one second.

To reset the "Chrono" press the **START** button for at least three seconds.

To exit from the "Chrono" position press the **START** button for at least two seconds moving to the Ⓒ "Clock"/"Trip" display.

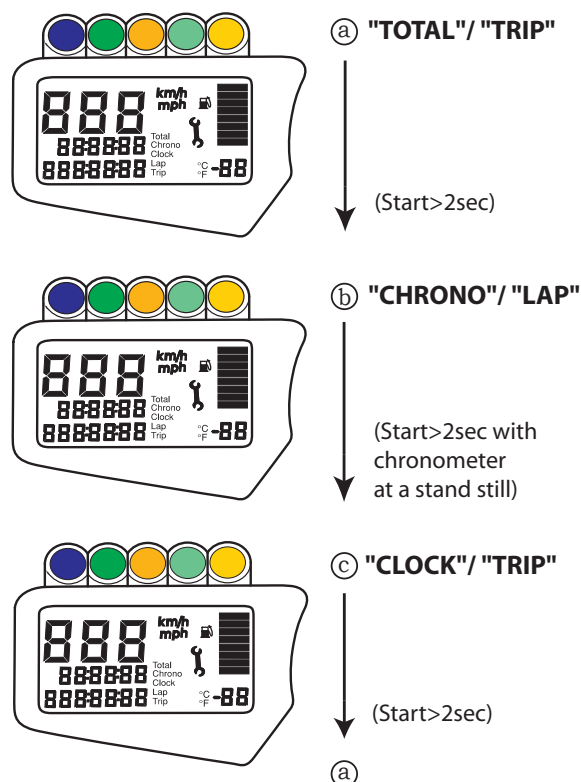
Set "Clock"/"Trip"

Switch to Ⓒ display.

To adjust the clock, press the **START** button for at least two seconds.

The first hour digit starts to flash.

Repeatedly press the **START** button to adjust the digit until the wanted digit is reached.



Press the **START** button for at least two seconds and adjust the next digit.

Repeat the procedure to adjust the second hour digit, the first and second minutes digit.

Press the **START** button for at least three seconds to interrupt the selection and the flashing.

To reset the "Trip" from the display Ⓒ press the **START** button twice consecutively.

Set "Km"/"Mi"

From the display Ⓐ "Total"/"Trip" with engine running, keep the **START** button pressed for at least ten seconds.

The "Km" or "Mi" symbol will start to flash, press the **START** button to switch to "Km" or "Mi".

Press the **START** button for at least two seconds to select the wanted unit of measure, automatically switching to the °C or °F selection.

Press the **START** button for less than one second to select the wanted unit of temperature.

Press the **START** button for at least three seconds to confirm and exit from the Set "Km"/"Mi" display.

Set "Service"

Upon reaching the first 1.000 Km (621 Mi) and every 10.000 Km (6.213 Mi), the flashing "Service" warning light will be displayed instead of the partial "Trip" for 10 seconds upon every vehicle ignition.

To reset the "Service" warning light, keep the **START** button pressed for at least ten seconds until the warning light switches off.

CLOCK ADJUSTMENT

To switch from  display.

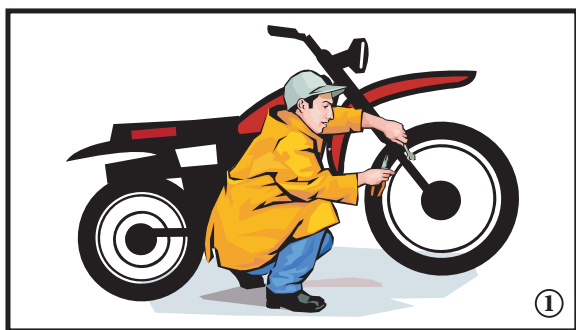
Press the **START** button (> 2 sec.); the first hour digit starts to flash.

Repeatedly press the **START** button to adjust the digit until the wanted digit is reached.

Press the **START** button (> 2 sec.) to adjust the next digit.

Repeat the procedure to adjust the second hour digit, the first and second minutes digit.

Press the **START** button (> 2 sec.) to confirm the hour adjustment and to interrupt the selection (the flashing).

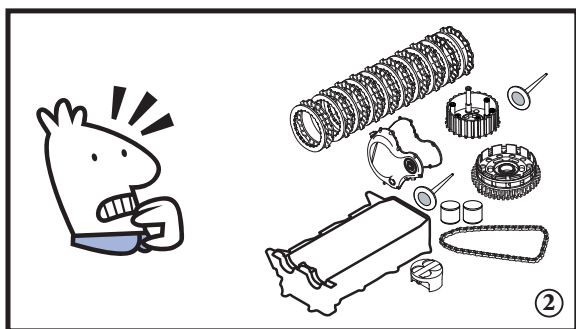


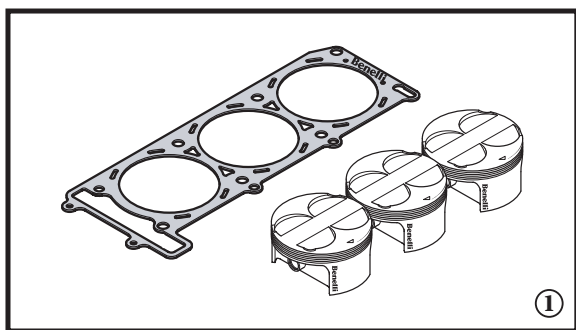
PREPARATION FOR REMOVAL AND DISMANTLING OPERATIONS

- ① Before carrying out the dismantling operations, remove any dirt, mud, dust and foreign bodies. Only use appropriate cleaning tools and products. See the "SPECIAL TOOLS" paragraph.

- ② During dismantling of the vehicle, we recommend always keeping the coupled parts together. Amongst these there are gears, cylinders, pistons and other parts, which surfaces, through the normal work wear, will have "coupled". The coupled pieces must always be reused or replaced together. During dismantling operations, clean all components and position them in a basin following the dismantling order. This will facilitate the assembly operations and allow correct installation of all components.

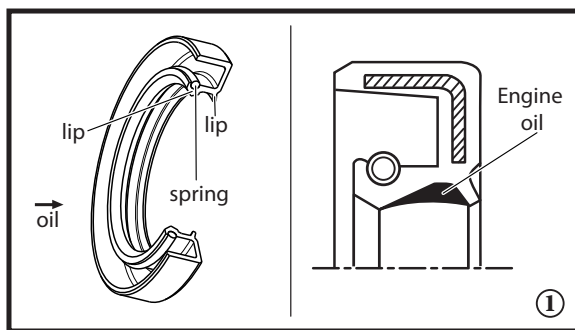
- ③ Keep all components away from any source of heat.





SPARE PARTS

- ① Only use original Benelli spare parts. To lubricate the components, use oils and greases recommended by Benelli. Other brands may be similar in aspect and function, but of lower quality.

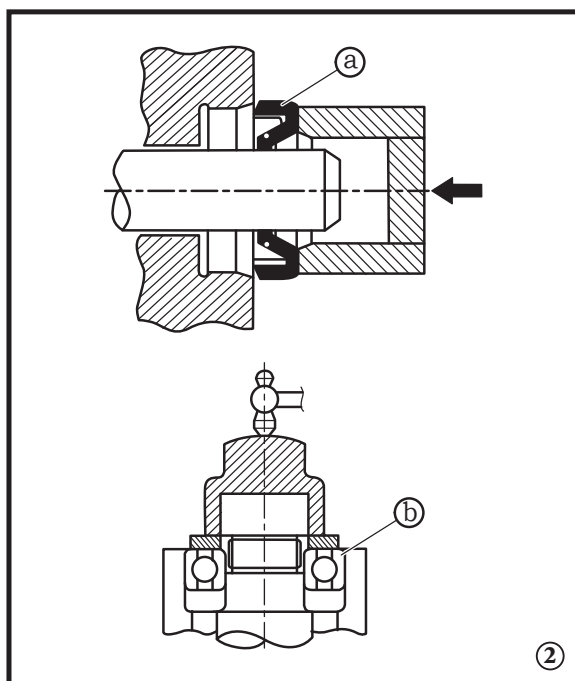


GASKETS, O-RINGS, OIL RETAINER AND BEARINGS

- ① Always replace all gaskets, oil retainers and the O-Rings during the engine repair interventions. The surfaces of the gaskets, the oil retainers lips and the O-Rings must always be kept clean. During installation, suitably oil all parts subject to coupling and the bearings, and lubricate the oil retainers lips with engine oil.



**Recommended lubricant
ENGINE OIL**



- ② Install the bearings and the oil retainers so that the brand or manufacturer number facing the outside are visible. To install the oil retainer, lubricate the lips with a layer of engine oil. When installing the bearings, abundantly oil them.

(a) Oil retainer

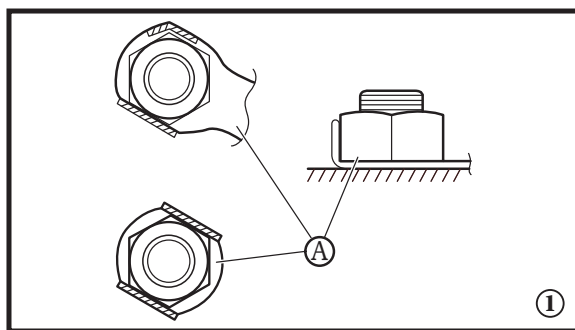
ATTENTION

Do not use compressed air to dry the bearings making them rotate, as this would damage their surface.

(b) Bearing

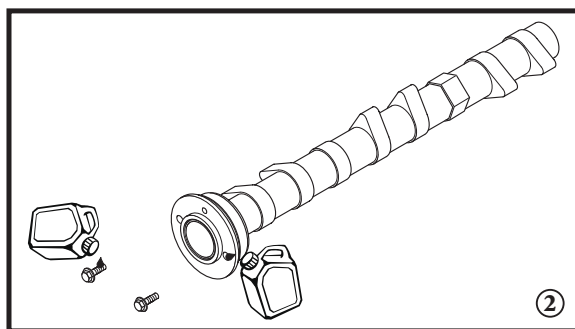


**Recommended lubricant
ENGINE OIL**



SAFETY WASHERS/SAFETY PLATES, PINS AND THREAD BRAKES

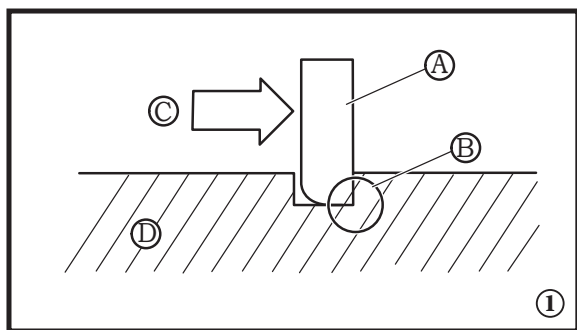
- ① After the removal, replace all safety washers/safety plates **A** and the pins.
After having fastened the bolt or the nut, according to specifications, fold the locking flaps and the ends of the split pin against the bolt or nut surfaces.



- ② Whenever applying thread brakes, previously remove grease from both sides using solvent.



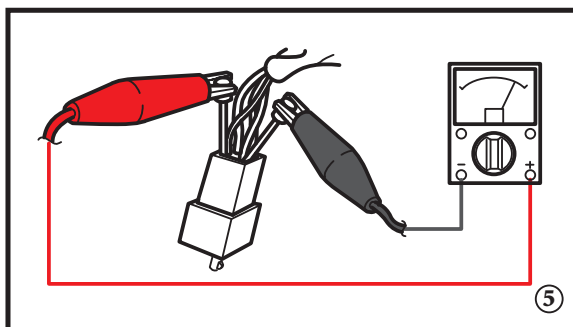
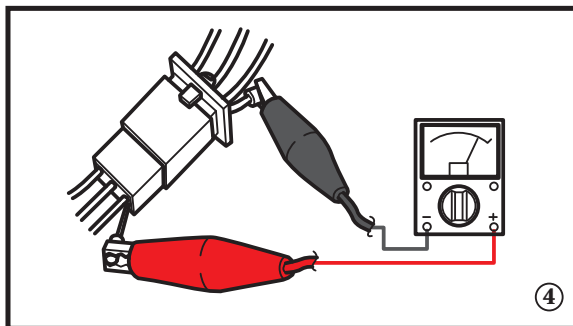
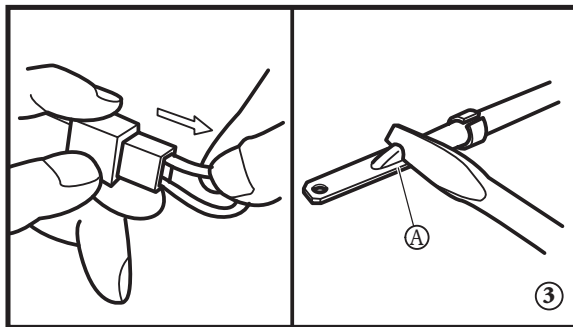
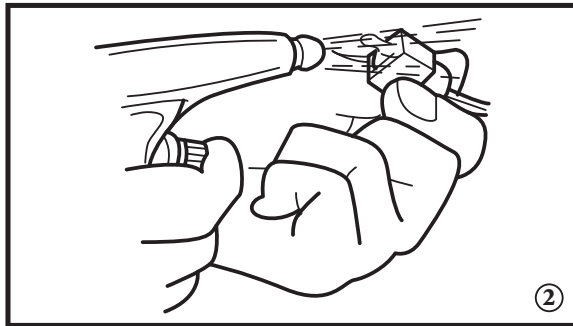
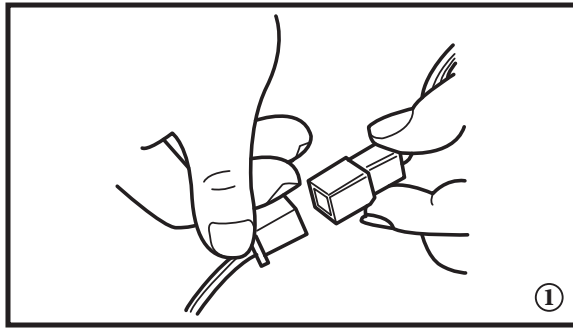
Recommended solvent
TUTELA MOTOR CLEAN



SAFETY ELASTIC RINGS

- ① Before assembling them, accurately check all elastic rings and replace the damaged or deformed ones. Always replace the elastic rings of the piston pin after having used them once. If installing an elastic ring ①, ensure that the pointed angle ② is positioned on the other side compared to the push ③ it receives.

④ Shaft



CONNECTIONS CONTROL

Check there are no stains, rust, humidity, etc. on the cables, the couplers and the connectors.

- ① Disconnect:
- the wire
 - the coupler
 - the connector

- ② Check:
- the wire
 - the coupler
 - the connector
- If there are traces of humidity → Dry using a fan.
In the presence of rust/stains → Connect and disconnect the parts various times.

- ③ Check:
- all connections
- If there are loose connections → Connect them correctly.

NOTE: _____
If the foot **A** of the terminal box is bent, straighten it. _____

- ④ Connect:
- the wire
 - the coupler
 - the connector

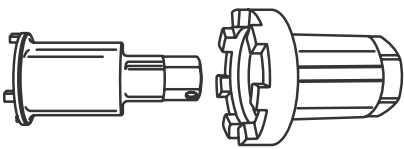
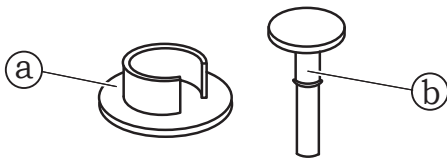
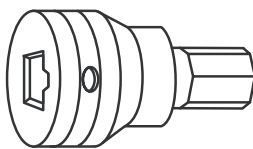
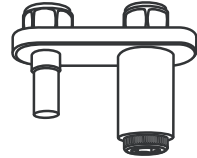
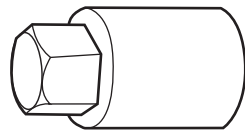
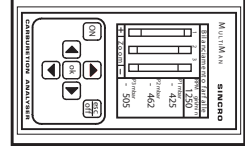
NOTE: _____
Check that all connections are securely installed. _____

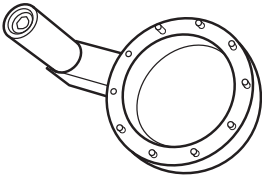
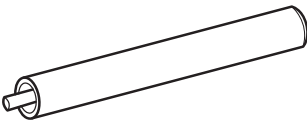
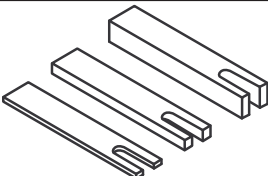
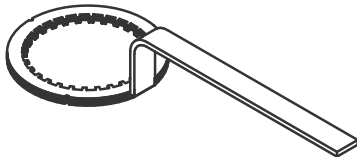
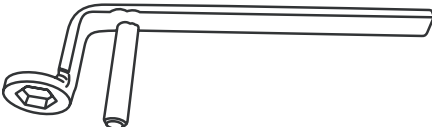
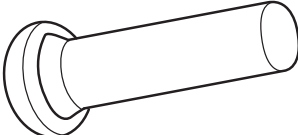
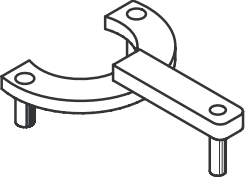
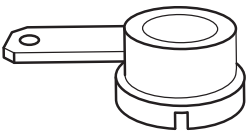
- ⑤ Check:
- continuity (with a pocket tester)

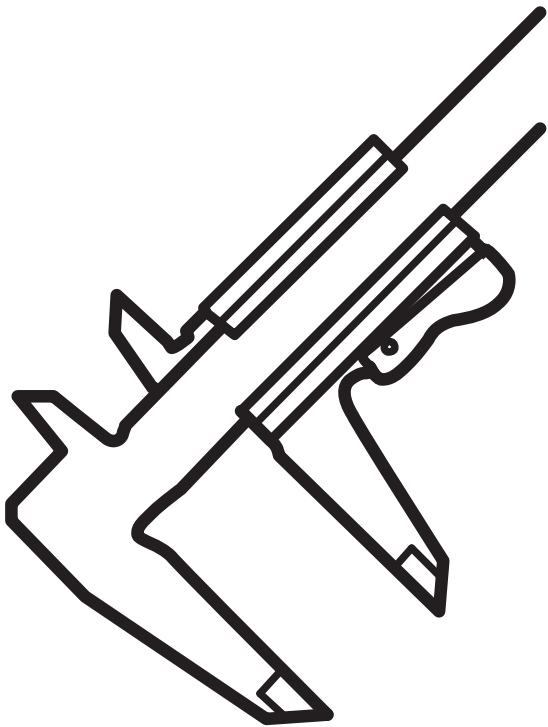
NOTE: _____
• If there is no continuity, clean the terminals.
• To check the wiring, follow the procedure from point ① to ③.
• As quick remedy, we recommend using a specific product for the contacts, found in spare parts shops. _____

SPECIAL TOOLS

The special tools shown here are used for the full and accurate execution of the set-up and assembly operations. Their use will help prevent damages caused by the use of unsuitable tools or improvised techniques. When filling in an order, consult the list below to avoid errors.

FRAME SPECIAL TOOLS		
Tool Code	Name - Tool Function	Illustration
R180297129000	Steering Return Ring Spanner This tool is used to remove and install the ring nut from the steering wheel	
R180100143000	Quick Release Kit This kit is divided into two tools. Tool A is used to remove the petrol tube, tool B works as cap to avoid petrol leaks.	
R300097146000	Steering Head Spanner This tool is used for the assembly and removal of the steering head cap.	
R300097147000	Transmission Chain Regulator Spanner This tool is used to regulate the tensioning of the chain.	
R180197033000	20 Allen Spanner This tool is used to remove and install the swing arm pin	
R180197036000	Diagnosis Instrument This instrument is used as control, check, setting and managing parameters in the injection plant	
R300082003000	Diagnosis Instrument This instrument is used as control, check, setting and managing parameters in the injection plant	
R300097170000	Vacuum meter This instrument is used to synchronise the carburettors or the throttless bodies as control instrument	

ENGINE SPECIAL TOOLS		
Tool Code	Name - Tool Function	Illustration
R300097083000	Phonic Wheel Removal This tool is used to block the phonic wheel, both during removal and during installation	
R180197025000	Buffer For Valves Oil Retainer This tool is used to install the valve oil retainer in the seat	
R180197018000	Cylinder Assembly Thicknesses These thicknesses are used to facilitate the correct insertion of the cylinder	
R180297047000	Clutch Dismantling Spanner This tool is used to block the clutch drum and loosen the nut	
R180297130000	Clutch Pressure Plate Adjustment Spanner This tool is used to regulate the clutch clearance	
R180197023000	Buffer For Dry Clutch Oil Retainer This tool is used to install the seal level	
R300197151000	Centring Ring This tool is used to install the dry clutch carter	
R180297048000	Pinion Dismantling Tool This tool is used to block the pinion and remove the nut	
R300097161000	Alternator Spanner This tool is used to remove and install the female joint	



SPEC

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CHAPTER 2

TECHNICAL DATA

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LUBRICATION POINTS AND TYPES OF ENGINE LUBRICANT

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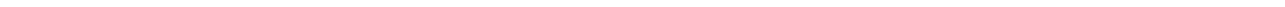
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COOLING SYSTEM LAYOUTS

COOLING SYSTEM LAYOUTS

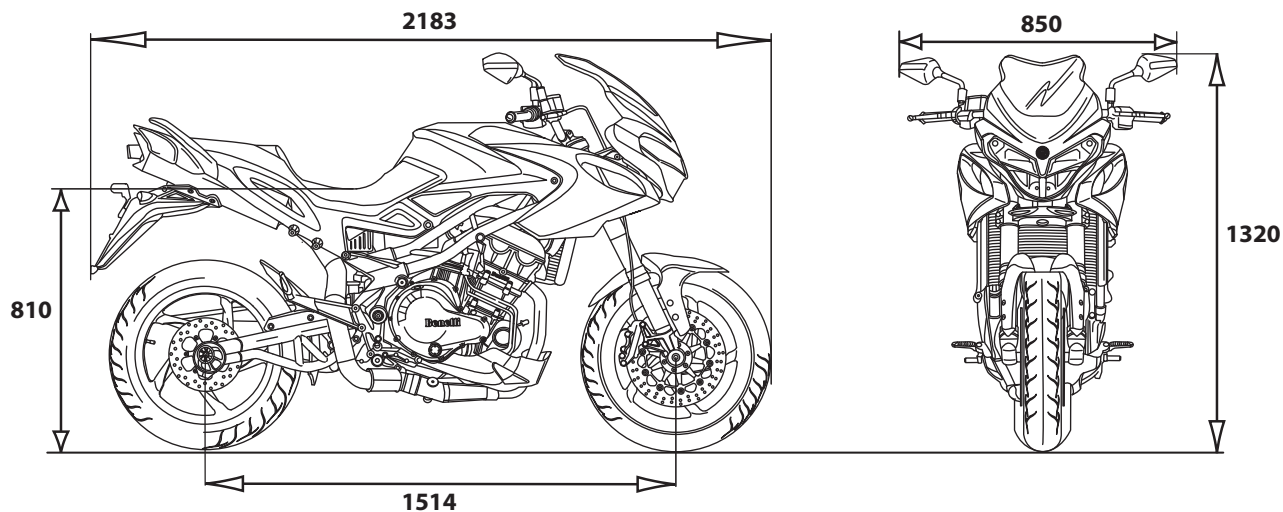
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GENERAL SPECIFICATIONS

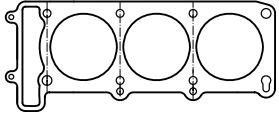
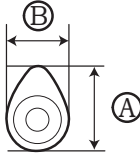
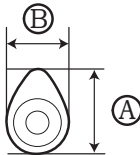
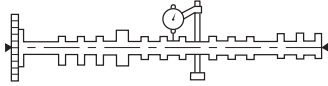
SIZES	STANDARD
Total length	2183 mm (85.9 in)
Total width	850 mm (33.4 in)
Total height	1320 mm (51.9 in)
Seat height	810 mm (31.8 in)
Interaxis	1514 mm (59.6 in)
WEIGHT	STANDARD
In start order (with full oil and fuel tank)	240 Kg (529 lb)
Empty (with empty oil and fuel tank)	215 Kg (473 lb)
Maximum technically admitted (with driver and load)	440 Kg (970 lb)



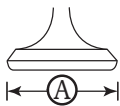
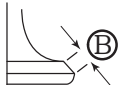
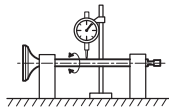
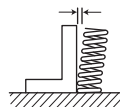


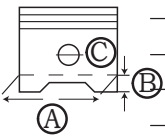
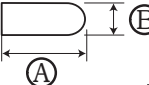
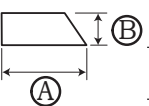
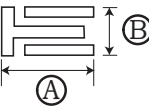
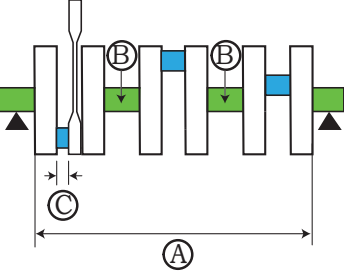
ENGINE SPECIFICATIONS

ENGINE	STANDARD
Type of engine	3 cylinders in line, 4 stroke, liquid cooling, 4 valves per cylinder, double cam axis on head with balancing counter shaft
Engine displacement	1131 cc
Number of cylinders	3
Cylinders arrangement	in line, tilted forward by 15° with anti-vibrations countershaft
Bore x stroke	88 x 62 mm (3.4 x 2.4 in)
Compression ratio	11.6 : 1
Minimum power	1250 rpm
Maximum power	9500 rpm
Distribution	chain driven double head cam shaft, with 4 valves per cylinder
Maximum net power	92 kW (123 cv) at 9000 rpm
Maximum net torque	112 N m (11.4 kgf·m) at 5000 rpm
STANDARD FUEL	STANDARD
Recommended fuel	super unleaded petrol RON 95 min
ENGINE OIL	STANDARD
Lubrication system	forced, with humid carter
Total quantity	3.5 lt
Amount without oil filter cartridge replacement	3.3 lt
Amount with oil filter cartridge replacement	4.0 lt
Recommended oil	SAE 10W-50 API SJ - JASO MA
OIL FILTER	STANDARD
Type of oil filter	with paper
By-pass valve opening pressure	1.6 bar
STANDARD OIL PUMP	STANDARD
Type of oil pump	with lobes
Clearance between the internal rotor point 0.25 mm (0.0098 in) max and the rotor point	0.25 mm (0.0098 in) max
Clearance between the external rotor and the oil pump slot	0.2 mm (0.0078 in) max
STANDARD START-UP	STANDARD
Type of start-up system	electric start-up

SPARK PLUGS	STANDARD
Model (manufacturer) x quantity	CHAMPION RG4HC\NGK CR9EK
Distance between the electrodes	0.7 ÷ 0.8 mm
CYLINDERS HEAD	STANDARD
Maximum twist	0.1 mm
	
CAM SHAFTS	STANDARD
Command system	chain transmission
Cam shafts supports diameter	22.459 ~ 22.472 mm (0.8842 ~ 0.8847 in)
Clearance between support and cam shaft cap	0.1 mm (0.0039 in) max
Inlet side cam shaft lobes sizes	
 Measurement A Measurement B	35.3 mm (1.38 in) 27.85 mm (1.096 in)
Drain side cam shaft lobes sizes	
 Measurement A Measurement B	35.3 mm (1.38 in) 27.85 mm (1.096 in)
Maximum cam shaft eccentricity	0.04 mm (0.0015 in)
	
DISTRIBUTION CHAIN	STANDARD
Model/number of links	BF49C/118
Tensioning system	automatic



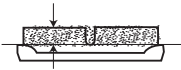
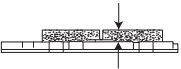
VALVES, VALVE CONE, VALVE GUIDES		STANDARD
Inlet valves clearance (when cold)		0.25 ~ 0.30 mm (0.009 ~ 0.011 in)
Drain valves clearance (when cold)		0.30 ~ 0.35 mm (0.011 ~ 0.013 in)
Valves sizes		
 Head diameter	Inlet Ⓐ	Ø 33 mm (1.29 in)
	Drain Ⓐ	Ø 29 mm (1.14 in)
 Contact surface width	Inlet Ⓑ	1 ~ 1.3 mm (0.039 ~ 0.051 in)
	Drain Ⓑ	1 ~ 1.3 mm (0.039 ~ 0.051 in)
 Seat width	Inlet Ⓒ	0.9 ~ 1.1 mm (0.035 ~ 0.043 in)
	Drain Ⓒ	0.9 ~ 1.1 mm (0.035 ~ 0.043 in)
Valve stem diameter	Inlet	4.965 ~ 5.05 mm (0.195 ~ 0.198 in)
	Drain	4.955 ~ 5.05 mm (0.195 ~ 0.198 in)
Clearance between valve stem and valve guide	Inlet	0.0010 ~ 0.0037 mm (0.000039 ~ 0.00014 in)
	Drain	0.025 ~ 0.052 mm (0.0010 ~ 0.0020 in)
 Valve stem eccentricity		0.015 mm (0.0005 in)
VALVE SPRINGS		STANDARD
Inlet/drain free length	External	37.0 mm (1.45 in)
	Internal	34.0 mm (1.33 in)
Inlet/drain (closed valve) installed length	External	186 Nm 18.96 Kgf·m
	Internal	92.5 Nm 9.43 Kgf·m
Spring inclination		
	Inlet	1.7 mm (0.066 in)
	Drain	1.7 mm (0.066 in)
CYLINDERS		STANDARD
Cylinders arrangement		in line tilted forward 15°
Bore x stroke		88 x 62
Compression ratio		11.6 ± 0.5 : 1
Bore		88 mm (3.46 in)
Maximum ovalisation		0.005 mm (0.00019 in)

PISTON	STANDARD
Clearance between piston and cylinder	0.05 ~ 0.07 mm (0.0019 ~ 0.0027 in)
 Piston diameter A Piston height B Pin seat diameter C	88 mm (3.46 in) 10.5 mm (0.41 in) 19.01 mm (0.748 in)
Piston pin external diameter	18.96 mm (0.746 in)
Upper band	
 Type of band Sizes (A)x(B)	elastic 3.15 x 0.96 mm (0.124 x 0.037 in)
2nd band	
 Type of band Sizes (A)x(B)	elastic 3.72 x 0.97 mm (0.146 x 0.038 in)
Oil scraper ring	
 Sizes (A)x(B)	2.26 x 1.93 mm (0.088 x 0.075 in)
CONNECTING RODS	STANDARD
Bearing colour code	A = Red B = Blu C = Yellow
Connecting rod weight code	K1 = Black K2 = Green K3 = White K4 = Brown K5 = Orange
ENGINE SHAFT	STANDARD
	
Width A	254 mm (10 in)
Maximum eccentricity B	0.050 mm (0.001 in)
Connecting rod head side clearance C	0.15 mm (0.0059 in)
Bench bearing colour code	A = Red B = blue C = yellow

CLUTCH	STANDARD
Type of clutch	oil bath clutch, multiple disks
Clutch release method	cable with springs
Activation for clutch release	activation with cable
Activation	with left handle bar lever
Clutch cable clearance (near clutch lever end)	3 ~ 5 mm (0.11 ~ 0.19 in)
Friction disks thickness	3 mm (0.11 in)
Friction disks quantity	11
Steel disks thickness	2 mm (0.078 in)
Steel disks quantity	5
Steel disks thickness	1.5 mm (0.059 in)
Steel disks quantity	5
Disks pack thickness	50.25 mm (1.97 in)
Maximum twist	0.05 (0.0019 in)
Clutch springs free length	34.3 mm (1.35 in)
Springs quantity	6
TRANSMISSION	STANDARD
Type of transmission	straight teeth gears
Primary reduction ratio	44/79
Secondary reduction system	chain/gears
Secondary reduction ratio	16/34
Transmission ratio	
1 ^a	14/39
2 ^a	18/35
3 ^a	21/32
4 ^a	23/30
5 ^a	24/28
6 ^a	25/27
GEARS COMMAND MECHANISM	STANDARD
Type of gears command mechanism	sequential with desmodromic and preselector
Gears command fork guide bar maximum deformation	0.05 mm (0.0019 in)
STANDARD AIR FILTER	STANDARD
Type of air filter	with sponge
FUEL PUMP	STANDARD
Type of pump	electric pump
Model (manufacturer)	BITRON
Output pressure	3.5 bar
THROTTLE BODIES	STANDARD
Diameter	53 mm (2.08 in)
Accelerator cable clearance (at accelerator knob flange)	1 mm (0.039 in)

FRAME SPECIFICATIONS

FRAME		STANDARD
Type of frame		with steel-aluminium mixed structure trellis
Steering tube inclination		25°
Forward run		103.5 mm (4.07 in)
FRONT WHEEL		STANDARD
Type of wheel		with 5 wires
Rim	Measurement	17 M/C x MT3.5
	Material	aluminium
Wheel run		150 mm (5.9 in)
REAR WHEEL		STANDARD
Type of wheel		with 5 wires
Rim	Measurement	17 M/C x MT6.00
	Material	aluminium
Wheel run		144 mm (5.66 in)
FRONT TYRE		STANDARD
Type of tyre		tubeless
Measurement		120/70 ZR17 M/C (58W)
Model (manufacturer)		roadsmart (DUNLOP)
Tyre pressure (when cold)		222 kPa (2.22 bar)
REAR TYRE		STANDARD
Type of tyre		tubeless
Measurement		180/55 ZR17 M/C (73W)
Model (manufacturer)		roadsmart (DUNLOP)
Tyre pressure (when cold)		242 kPa (2.42 bar)

FRONT BRAKE		STANDARD	LIMIT
Type of brake		double disk brake	
Activation		with right hand	
Recommended liquid		DOT 4	
Brake disks			
	Diameter x Thickness	320 x 4 mm (12.5 x 0.15 in)	
	Minimum thickness		4.0 mm (0.15 in)
	Maximum deformation		0.1 mm (0.004 in)
	Worn brake pads thickness	4 mm (0.15 in)	
Pump cylinder internal diameter		16 mm (0.62 in)	
Calliper cylinder internal diameter		34 e 30 mm (1.33 e 1.18 in)	
REAR BRAKE		STANDARD	LIMIT
Type of brake		Single disk brake	
Activation		with right foot	
Recommended liquid		DOT 4	
Brake disks			
	Diameter x Thickness	240 x 5 mm (9.44 x 0.19 in)	
	Minimum thickness		4.5 mm (0.17 in)
	Maximum deformation		0.15 mm (0.006 in)
	Worn brake pads thickness	3.5 mm (0.13 in)	
Pump cylinder internal diameter		12 mm (0.47 in)	
Calliper cylinder internal diameter		32 mm (1.25 in)	
FRONT SUSPENSION		STANDARD	
Type of suspension		with tilted stems telescopic fork with spiral spring/hydraulic shock absorber	
Fork excursion		150 mm (5.9 in)	
Spring			
Free length		262 mm (10.31 in)	
Spacer length		175 mm (6.88 in)	
Flexibility (K1)		9.5 Nm (0.96 Kg $\cdot$ m)	
Spring run (K1)		0 ~ 120 mm (0 ~ 4.72 in)	
Oil for fork			
Recommended oil		SAE 7.5 Marzocchi 19	
Quantity for stem		710 cc.	
Level (from end of external tube, with external tube fully compressed, and without fork spring)		130 mm (0 ~ 5.11 in)	
STEERING WHEEL		STANDARD	
Type of bearings for steering wheel		ball bearing	
Angle from end run to end run (left)		30°	
Angle from end run to end run (right)		30°	

REAR SUSPENSION		STANDARD
Type of suspension		oscillating swing arm with spiral spring/gas shock absorber
Fork excursion		145 mm (5.7 in)
Spring		
	Free length	160 mm (6.29 in)
	Installed length	137 mm (5.39 in)
	Flexibility (K1)	9.5 Nm (0.96 Kg·m)
	Spring run (K1)	61 mm (2.4 in)
Spring pre-load gas/air standard pressure		1200 kPa (12 bar)
Spring pre-load adjustment positions	Minimum	0
	Standard	0
	Maximum	10 mm (0.39 in)
Bounce damping adjustment positions	Minimum*	0
	Standard*	-17
	Maximum *	- 30
* from fully backward position		
TRANSMISSION CHAIN		STANDARD
Model (manufacturer)		REGINA 137-ORPB
Number of links		108
Loosening of transmission chain		15 mm (0.59 in) from slide

ELECTRIC SPECIFICATIONS

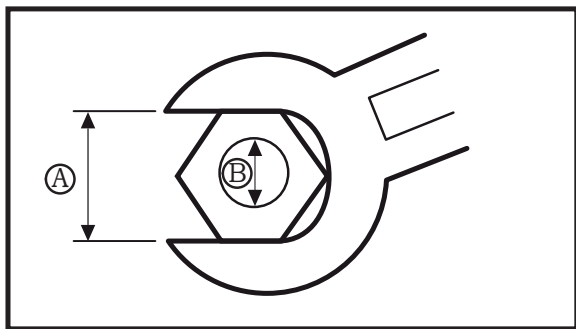
PLANT VOLTAGE	STANDARD
PLANT VOLTAGE	12 V
IGNITION REELS	STANDARD
Model (manufacturer)	02IG001 (JCI)
Primary real resistance	0.6 Ω
Secondary reel resistance	10 k Ω
Primary reel inductance	2.5 mH (1 kHz 0.3V)
Secondary reel inductance	23.5 mH (1kHz)
Max. admitted current value	7.6 A
RECHARGE SYSTEM	STANDARD
Type of system	AC Magnetic
Model (manufacturer)	5-101211-502-1 (DENSO)
Nominal output	13.5 V 48 A a 5000 rpm
Voltage regulator (inside alternator)	semi-conductor, FieldControl
Voltage adjustment	14.5 + 0.3 V (5000 rpm 10 A 25 C°)
START-UP RELAY	STANDARD
Model (manufacturer)	MS5F-421 (JIDECO)
Amperage	100 A
Reel resistance	4.4 Ω a 20 C°
BATTERY	STANDARD
Model (manufacturer)	CTZ 14S -BS (UNIBAT)
Battery capacity voltage	12 V / 14 A
Relative density	1.310
PROJECTOR	STANDARD
Type of projector	with halogen bulb
BULBS (VOLTAGE WATT x Q.TY)	STANDARD
Projectors	12 V 55 W x 4
Front position light	12 V 5 W x 2
Rear position light/brake light	LED x 1
Direction indicators	12 V 21 W x 2 + 12 V 6 W x 2
Number plate light	12 V 5 W x 1
Instruments control board light	LED x 1
WARNING LIGHTS (VOLTAGE WATT x Q.TY)	STANDARD
Neutral warning light	LED x 1
High-beam warning light	LED x 1
Oil level alarm warning light	LED x 1
Direction indicators warning light	LED x 1
Fuel level alarm warning light	LED x 1
Cooling temperature warning light	LED x 1
Faulty engine signal warning light	LED x 1
Gears change warning light	LED x 1

ELECTRIC START-UP SYSTEM	STANDARD
Model (manufacturer)	5-128-330 (DENSO)
Supplied power	0.7 kw
ACOUSTIC WARNING DEVICE	STANDARD
Type of acoustic warning device	flat
Model (manufacturer)	DL 123 (LI XIANG CHINA)
Maximum amperage	3 A
Performances	105 ~ 118 db (A)
FLASHING LIGHTS RELAY	STANDARD
Type of relay	electric lasher
Model (manufacturer)	355 E10 (LEONELLI)
Direction indicators flashing frequency	80 ~160 cycles/min
Watt	10 W x4
OIL PRESSURE SENSOR	STANDARD
Model (manufacturer)	11717.61 (F.M.D.I.)
FUSES (AMPERAGE x Q.TY)	STANDARD
Main fuse	30 A x 1
Fuel injection system fuse	15A x 1
Projector fuse	20 A x 1
Services fuse	15 A x 1
Radiator fan motor fuse	15 A x 1
Back-up fuse (odometer and clock)	5 A x 1
Reserve fuse	20A x 1 15A x 1 5A x 1
Petrol pump fuse	10 A x 1
THROTTLE VALVE SENSOR	STANDARD
Model (manufacturer)	6PX 008476-11 (Hella)
Resistance	4.0 K Ω $\pm$ 20%
FUEL PUMP	STANDARD
Model	BITRON
Max. amperage	5 A a 13.5 V
Level sensor	internal
Min. Max. resistance	285 Ω (empty) - 12 Ω (full)
SAFETY SWITCHES	STANDARD
Trestle switch	CE75A (ASAHI DENSO)
Neutral switch	20.00.057 (MONT.EL)
Tilt	YE69A (DENSO)
INLET STANDARD AIR TEMPERATURE SENSOR	STANDARD
Model (manufacturer)	15TT001 (JCI)
Resistance	23.75 Ω 20 C°, 16.7 Ω 30 C°
ENVIRONMENTAL AIR TEMPERATURE SENSOR	STANDARD
Model (manufacturer)	FACOMSA 2211-1002

LIQUID TEMPERATURE SENSOR	STANDARD
Model (manufacturer)	16TT001 (JCI)
Resistance	2500 Ω 20 C°, 322.5 Ω 80 C°
SPEED SENSOR	STANDARD
Model (manufacturer)	SNVO21F0001/0 (EUROSWITCH)
LAMBDA	STANDARD
Model (manufacturer)	OPS + 25324175 (DELPHI)
INJECTOR	STANDARD
Model (manufacturer)	U9122-357 (JCI)
RELAY UNIT	STANDARD
Model (manufacturer)	CM1 NAIS
IGNITION SYSTEM	STANDARD
Type of ignition system	WALBRO
Ignition setting	5° before PMS from 900 to 1800 r/min
Phonic wheel sensor (Pick-Up)	O1VR002 (JCI)
Model (manufacturer)	ECU - 1
STEPPER	STANDARD
Model (manufacturer)	02SM001 (JCI)
Type of stepper	two-phase
RADIATOR VENT	STANDARD
Model (manufacturer)	VA31-A101-46A (SPAL)

GENERAL FASTENING SPECIFICATIONS

The fastening torques of the components or of the special sets are shown in each chapter of this manual. With regard to the sets with multiple fixing elements, in order to avoid the risk of twisting, carry out fastening in a crossed manner, in successive steps, until the prescribed torque is reached. Save different indication, the fastening torques refer to the component with clean and dry threading. The components must be at ambient temperature.



- Ⓐ Key opening
- Ⓑ Threading external diameter

Ⓑ bolt	FASTENING TORQUES IN GENERAL	
	Nm	kgf•m
4 mm	2.3	0.23
5 mm	4.5	0.45
6 mm	10	1.01
8 mm	25	2.54
10 mm	45	4.58
12 mm	80	8.15
14 mm	130	13.25
16 mm	200	20.39
18 mm	240	24.47

FASTENING TORQUES AND RELATIVE PRE-LOADS FOR STANDARD CONNECTIONS

The values shown in the following table refer to standard fastenings, meaning regarding the coupled metric screws with relative nut or with metal female screw.

Furthermore, the bodies to be fastened must be made of metal or sufficiently stiff not to require bushes interpositions or spacers.

The coupling is always with lightly oiled or greased thread; alternatively, the type of requested thread brakes paste must be shown.

The axial pre-loads, correlated to the fastening torque, are increased by 10% compared to the calculated value, to take into account of the tolerance on the nominal moment of the torque and of the variation that the friction coefficient can suffer from, from fastening to fastening.

SCREWS	CLASS 8.8		CLASS 10.9		CLASS 12.9	
	FASTENING TORQUE [Nm]	AXIAL PRE-LOAD [N]	FASTENING TORQUE [Nm]	AXIAL PRE-LOAD [N]	FASTENING TORQUE [Nm]	AXIAL PRE-LOAD [N]
M4 X 0.7	3	3.870	4.2	5.420	5.2	6.710
M5 X 0.8	6	6.350	7.5	7.930	9	9.520
M6 X 1	10	8.860	13	11.520	16	14.180
M8 X 1.25	22	14.900	30	20.330	40	27.100
M8 X 1 (*)	25	17.280	36	24.890	45	31.110
M10 X 1.5	45	24.680	65	35.640	80	43.870
M10 X 1.25 (*)	50	27.870	70	39.013	85	47.380
M12 X 1.75	80	37.640	110	51.750	135	63.510
M12 X 1.5 (*)	85	40.547	120	57.250	145	69.170
M12 X 1.25 (*)	90	43.550	130	62.900	150	72.580
M14 X 2	130	52.670	185	74.800	220	88.950
M14 X 1.5 (*)	150	62.900	205	85.960	245	102.780
M16 X 2	200	74.070	280	103.690	335	124.060
M16 X 1.5 (*)	225	86.140	310	118.680	360	137.820
M18 X 2.5	265	83.650	370	116.790	450	142.040
M18 X 1.5 (*)	320	104.900	450	147.520	550	180.300
M20 X 2.5	390	111.870	550	257.770	650	186.450
M20 X 1.5 (*)	440	130.620	630	187.020	750	222.650
M22 X 2.5	540	141.950	750	197.150	900	236.580
M22 X 1.5 (*)	600	162.750	850	230.560	1.000	271.240
M24 X 3	670	160.238	950	227.203	1.130	270.252
M24 X 2 (*)	750	184.566	1.050	258.392	1.250	307.610

(*) The shown metric screw is fine step.

ENGINE FASTENING TORQUES

BASE	THREAD	FASTENING TORQUES	
		Nm	Kgf•m
Base Fixing TEF Screw	M6	10	1.01
Base Fixing Screw	M8	25	2.54
Base Benches Fixing TCEI Screw	M10	45	4.58
Oil Conducts Closing Conical Grain	M6	10	1.01
Bearings And Pin Fixing Screw	M6	10	1.01
Plates And Tube Fixing Screw	M6	10	1.01
Cylindrical Cap	M16	25	2.54
Conical Cap	M10	10	1.01
Oil Diaphragm	M8	25	2.54
Neutral Position Sensor	M8	10	1.01
Oil Pressure Minimum Sensor	M10	25	2.54
Clutch Lid Oil Load Cap	M24	By hand	~
Clutch Lid Phase Cap	M40	By stroke	~
Clutch Lid Screws	M6	10	1.01
Blow-By Lid Screws	M6	10	1.01
Counter-shaft Lid Screw	M6	10	1.01
Tank Oil Drain Cap	M14	22	2.24
Tank Filter Fixing Screw	M6	10	1.01
Tank Fixing Screw	M6	10	1.01
Head Prisoner	M10	By stroke	~
Head Vent Fitting	M18	15	1.52
Grain	M8	25	2.54
LUBRICATION	THREAD	FASTENING TORQUES	
		Nm	Kgf•m
Oil Pump Fixing Screw	M6	8.3	0.84
Over Pressure Valve	M12	25	2.54
Exchanger Fixing Large Screw	M20	60	6.11
Head Oil Tube Hole Screw	M10	16	1.63
Head Oil Tube Nipple	M10	20	2.03
Oil Filter	M20	18	1.83
HANDLING	THREAD	FASTENING TORQUES	
		Nm	Kgf•m
Phonic Wheel Fixing Nut	M8	25	2.54
Connecting Rod Screw	M9	25 + 50°	2.54 + 5.09
PISTON CYLINDER HEAD	THREAD	FASTENING TORQUES	
		Nm	Kgf•m
Prisoner	M8	12	1.22
Conical Grain	M6	10	1.01
Conical Cap	M14	30	3.05
Lids Fixing Screw	M6	13	1.32
Head Fixing Nut	M10	45 + 100°	4.58 + 10.19
Tensioner Fixing Screw	M6	10	1.01
Cylinder Cap Screw	M6	10	1.01
Cylinder Fixing Screw	M6	10	1.01



DISTRIBUTION	THREAD	FASTENING TORQUES	
		Nm	Kgf•m
Distribution Gear Fixing Screw	M6	15	1.52
Upper Slide Support Fixing Screw	M6	15	1.52
Reel Fixing Distribution Lid Screw	M6	10	1.01
Distribution Lid Screw	M6	10	1.01
Mobile Slide Pin	~	13	1.32
CLUTCH	THREAD	FASTENING TORQUES	
		Nm	Kgf•m
Clutch Rod Adjustment Low Hexagonal Nut	M8	16	1.63
Clutch Springs Fixing Screw	M6	10	1.01
Clutch Fixing Hexagonal Nut	M20	100	10.19
Clutch Command Fixing Screw	M6	10	1.01
GEAR CHANGE	THREAD	FASTENING TORQUES	
		Nm	Kgf•m
Engine Pinion Fixing Nut	M24	140	14.27
GEAR CHANGE COMMAND	THREAD	FASTENING TORQUES	
		Nm	Kgf•m
Plate Fixing Screw	M6	10	1.01
Forks Pins Fixing Screw	M6	10	1.01
Forks Pins Fixing Screws	M6	10	1.01
Gear Change Command Lid Fixing Screws	M6	10	1.01
Chain Cover Lid Fixing Screw	M6	10	1.01
Gear Change Flange Fixing Screw	M8	20	2.03
COOLING	THREAD	FASTENING TORQUES	
		Nm	Kgf•m
Pump Impeller Fixing Cap Nut	M6	8.03	0.81
Pump Lids Fixing Screw	M6	10	1.01
Bleeding Screw	M6	10	1.01
Elbow Fixing Screw	M6	10	1.01
Pump Body Fixing Screw	M6	10	1.01
Collector Fixing Screw	M6	10	1.01
Thermostat Disk Fixing Screw	M6	10	1.01
Small Lid Fixing Screw	M6	10	1.01
IGNITION	THREAD	FASTENING TORQUES	
		Nm	Kgf•m
Spark Plug	M10	12	1.22
Reel Bracket Fixing Nut	M6	8	0.81
ELECTRIC PLANT	THREAD	FASTENING TORQUES	
		Nm	Kgf•m
Start-up Motor Fixing Screw	M6	10	1.01
Alternator Fixing Screw	M8	25	2.54
Phonic Wheel Sensor Screw	M6	8.3	0.84
Water Temperature Sensor	/	20	2.03

POWER SUPPLY	THREAD	FASTENING TORQUES	
		Nm	Kgf•m
Throttled Body Fixing Screw	M6	10	1.01
Petrol Flute Fixing Screw	M6	10	1.01
Pull Power Limit Device Plate Fix Screw	/	/	/
Petrol Tube Fitting	/	20	2.03
Stepper Seat Fixing Screw	M5	By hand	1.01
Gas Cables Plate Fixing Screw	M6	10	1.01
Minimum Adjustment Cable	/	/	/
START-UP	THREAD	FASTENING TORQUES	
		Nm	Kgf•m
Free Wheel Ring Fixing Screw	M6	17	1.73
Engine Collar Hexagonal Screw	M10	50	5.09
Engine Collar Hexagonal Nut	M10	15	1.52
Satellite Gear Screw	M6	10	1.01

FRAME FASTENING TORQUES

BODY WORK	THREAD	FASTENING TORQUES	
		Nm	Kgf•m
Engine Protection Fixing Screw	M6	8/10	0.81/1.01
Pinion Carter Upper Fixing Screw	M6	10	1.01
Pinion Carter Lower Fixing Screw	M8	22	2.24
Tank Lid Front Fixing Screw	M6	8/10	0.81/1.01
Tank Lid Rear Fixing Screw	M6	8/10	0.81/1.01
Fairing Support Bracket Fixing Screw	M6	10	1.01
Steering Lock Lid Fixing Screw	M6	8/10	0.81/1.01
Right/Left Bearing Frames Fixing Screw	/	A mano	~
Cap Fixing Screw	M6	8/10	0.81/1.01
Small Glass Support Small Frame Fixing Screw	M5	6	0.61
Small Glass Adjustment Fixing Knob	/	A mano	~
Front Mudguard Fixing	M6	8/10	0.81/1.01
Rear Mudguard Fixing	M6	8/10	0.81/1.01
Tube Stop Eye Fixing Screw	M5	6	0.61
Front Mudguard Small Brackets Fixing Screw	M5	6	0.61
Number Plate Support Closing Screw	M6	10	1.01
Number Plate Support Fixing Screw On Drain	M6	10	1.01
Number Plate Light Fixing Screw	M5	By hand	~
Arrow Fixing Nut	M6	By hand	~
Petrol Cap Fixing Screw On Tank	M5	6	0.61
Petrol Cap Fixing False Screw	M5	By hand	~
Fairing Fixing Small Heads	M6	By hand	~
Tank Fixing Bracket Screw	M6	By hand	~
Seat Stop Flap Fixing Screw	M6	By hand	~
Tank Fixing Screw On Seat Holder Small Frame	/	By hand	~
Petrol Pump Set Fixing Screw	M5	3	0.30
Vent Fitting	/	By hand	~
REAR WHEEL	THREAD	FASTENING TORQUES	
		Nm	Kgf•m
Rear Wheel Pin	/	100	10.19
Brake Disks Screw On Wheel	M6	10	1.01
Crown Wheel Holder Flange Screw	M10X1.25	45	4.58
FRONT WHEEL	THREAD	FASTENING TORQUES	
		Nm	Kgf•m
Front Wheel Pin	/	50	5.09
Brake Disks Screw On Wheel	M8	22	2.24
REAR BRAKING PLANT	THREAD	FASTENING TORQUES	
		Nm	Kgf•m
Fitting Screw	M10X1	15	1.52
Calliper Fixing Screw	M8	22	2.24
Bleeding Screw	/	By hand	~
Rear Pin Pump Fixing Screw	M6	10	1.01
Spherical Joint Fixing Screw	M6	10	1.01
Brake Liquid Small Tank Fixing Screw	M5	By hand	~
Hydrostop Screw	M10X1	15	1.52

FRONT BRAKING PLANT	THREAD	FASTENING TORQUES	
		Nm	Kgf•m
Fitting Screw	M10X1	15	1.52
Callipers Fixing Screw	M10X1.25	40	4.07
Bleeding Screw	/	By hand	~
Pump Strap Fixing Screw	M6	8	0.81
REAR SUSPENSION	THREAD	FASTENING TORQUES	
		Nm	Kgf•m
Articulated Connecting Rods Fixing Screw	M10X1.25	40	4.07
Balancing Device Fixing Special Screw On Frame	/	60	6.11
Shock Absorber Upper Fixing Screw	M10	By hand	~
Shock Absorber Lower Fixing Screw	M10	40	4.07
FRONT SUSPENSION	THREAD	FASTENING TORQUES	
		Nm	Kgf•m
Lower Plate Clamp Closing Screw	M6	8	0.81
Upper Plate Clamp Closing Screw	M8	15/18	1.52/1.83
Handle Bar Clamp Closing Screw	M8	18	1.83
Steering Wheel Upper Plate Fixing Central Screw	/	60	6.11
Steering Wheel Bearing Fastening Ring Nut	/	15	1.52
Steering Column Return Ring	/	60	6.11
Steering Wheel Strokes Screw	M6	10	1.01
Front Wheel Pin Clamp Closing Screw	M6	8	0.81
Handle Bar Clamp Fulcrum Stop Grain	M3	By hand	~
Clutch Lever Clamp Fixing Screw	M6	8	0.81
Handle Bar Counter Weight	/	15	1.52
Gas Command Fixing Screw	M5	By hand	~
GPS Support Screw	M6	8	0.81
TRESTLE	THREAD	FASTENING TORQUES	
		Nm	Kgf•m
Trestle Plate Fixing Screw	M10	35	3.56
Hanger Sensor Screw	M5	6	0.61
Hanger Fixing Special Screw On Plate	/	By stroke	~
Special Screw Lock Nut	M10X1.25	40	4.07
SWING ARM	THREAD	FASTENING TORQUES	
		Nm	Kgf•m
Swing Arm Pin Screw	/	60	6.11
Lower Chain Slide Fixing TSPEI Screw	M6	8/10	0.81/1.01
External Upper Chain Slide Fixing Screw	M5	By hand	~
Internal Upper Chain Slide Fixing Screw	M5	By hand	~
Central Chain Slide Fixing Screw	M6	8/10	0.81/1.01
Chain Carter Fixing Screw	M6	8/10	0.81/1.01
Eccentric Clamp Closing Screw	M8	22	2.24
Rear Calliper Support Contrasting Pin	/	22	~
Swing Arm Regulator	/	By stroke	~
Regulator Ring Nut	/	By stroke	~
Speed Sensor Small Plate Screw	M3	By hand	~

FRAME	THREAD	FASTENING TORQUES	
		Nm	Kgf•m
Plates Closing Lower Pin On Engine	M10X1.25	40	4.07
Plates Closing Upper Pin On Engine	M10X1.25	40	4.07
Left Fixing Screw On Head	M12X1.25	40	4.07
Right Register Screw On Head	M12x1.25	40	4.07
Large Handle Fixing Screw	M6	By hand	~
Small Frame Rear Fixing Screw	M8	25	2.54
Seat Holder Small Frame Front Fixing Screw	M8	25	2.54
Seat Holder Central Triangle Fixing Screw	M6	10	1.01
Lock Fixing Screw	M6	10	1.01
Seat Holder Central Tie Rod	M6	By hand	~
Regulator Screw	/	8/10	0.81/1.01
Headlights Support Fixing Screw	M5	By hand	~
Seat Release Fixing Screw	M6	8/10	0.81/1.01
Battery Box Rear Fixing Screw	M6	8	0.81
Battery Box Front Fixing Screw	M6	8	0.81
Battery Box Support Small Plates Fixing Screw	M8	22	2.24
Rear Insulating Bulkhead Hooking Small Heads	M6	10	1.01
Rear Headlights Fixing Nut	M6	By hand	~
Pull Key Switch Fixing Screws	M6	With pull	~
FOOTPEGS	THREAD	FASTENING TORQUES	
		Nm	Kgf•m
Rear Footpeg Rubber Pad Fixing Screw	M4	By hand	~
Passenger Footpeg Support Fixing Screw	M8	25	2.54
Front Footpeg Rubber Pad Fixing Screw	M4	By hand	~
Left Footpeg Support Fixing Screw	M8	25	2.54
Right Footpeg Support Fixing Screw	M10	30	3.05
Pump Pointer Fixing Screw	M6	10	1.01
Gear Change Rod Fixing Screw On Gear Change Command	M5	6	0.61
Eccentric Fixing Screw	M6	10	1.01
Gear Change Rod Fixing Screw On Gear Change Lever	M6	10	1.01
Footpeg Fixing Screw On Footpeg Support	M10	40	4.07
FRONT HEADLIGHT	THREAD	FASTENING TORQUES	
		Nm	Kgf•m
Equipment Small Frame Support Screw	M6	By hand	~
Selfbraking Dashboard Lid Fixing Screw	/	By hand	~
Instrument Support Fixing Screw On Frame	M8	22	2.24
Closing Screw On Instrument Support	M6	10	1.01
Front Headlight Fixing Lower Screw	M6	By hand	~
Headlight Support Fixing Special Screw	/	By hand	~
COOLING PLANT	THREAD	FASTENING TORQUES	
		Nm	Kgf•m
Radiator Upper Fixing Screw	M6	10	1.01
Radiator Lower Connection Small Plates Fixing Screw	M6	10	1.01
Vent Fixing Selfbraking Screw	/	By hand	~

ELECTRIC PLANT	THREAD	FASTENING TORQUES	
		Nm	Kgf•m
Control Unit Fixing Screw	M4	By hand	~
Front Pins Small Plate Fixing Nut	M6	8	0.81
Remote Control Switch Small Plate Fixing Nut	M6	10	1.01
Acoustic Warning Device Fixing Screw	M6	8/10	0.81/1.01
Inertial Switch Small Plate Fixing Screw	M6	8/10	0.81/1.01
Clutch Sensor	/	By hand	~
Air Temperature Sensor	M10	10	1.01
Solenoid Fixing Screw	M6	10	1.01
DRAIN PLANT	THREAD	FASTENING TORQUES	
		Nm	Kgf•m
Primary Tubes Fixing Nut On Head	M8	15	1.52
Silencing Device Articulated Connecting Rods Fixing Screw	M8	By stroke	~
Valve Fixing Screw On Small Shaft	M8	10	1.01
Thermal Bulkheads Fixing Screw	M6	8/10	0.81/1.01
Drain Valve Small Shaft Fixing Nut	M6	10	1.01
INLET	THREAD	FASTENING TORQUES	
		Nm	Kgf•m
Filter Box Lid Closing Screw	M5	By hand	~
Air Box Fixing Screw On Frame	M6	8	0.81
Inlet Flap Fixing Screw	Special M6	By hand	~

LUBRICATION POINTS AND TYPES OF ENGINE LUBRICANT

LUBRICATION POINT	LUBRICANT
Oil Retainers Lips	
O-Ring	
Bearings	
Connecting Rod Supports	
Pistons Surfaces	
Pistons Pins	
Cylinder Wall	
Bench Supports	
Cam Shafts Lobes	
Cam Shafts Supports	
Valve Stems (Inlet And Drain)	
Valve Stems Ends (Inlet And Drain)	
Oil Pump Rotors (Internal And External)	
Oil Pump Slot	
Oil Filtering Element	
Clutch (Traction Rod)	
Oil Pump/Water And Washer Conductor Gear	
Clutch (Push Plate)	
Start-Up Clutch Return Gear Internal Surface	
Start-Up Clutch Set	
Primary Conduct Gear	
Final Transmission (Chain, Crown Wheel, Pinion)	
Primary And Secondary Shafts	
Gear Change Drum	
Gears Command Forks And Guide Bars	
Gear Change Shaft	
Selector	
Base Coupling Surface	



ENGINE OIL



LITHIUM SOAP
BASED GREASE



SEALING PASTE



LUBRICATION POINTS AND TYPES
OF FRAME LUBRICANT

LUBRICATION POINT	LUBRICANT
Steering Bearings And Bearings Tracks (Upper And Lower)	
Brake Lever Pivoting Point And Metal Parts Subject To Contact In Motion	
Clutch Lever Pivoting Point And Metal Parts Subject To Contact In Motion	
Engine Support Bolts (Upper Rear And Lower Rear)	
Shock Absorber Fixing Screws	
Bearing And Swing Arm Oil Retainer	
Bearings And Shock Absorbers Link Oil Retainers	
Side Trestle Rotation Point And Metal Parts Subject To Contact In Motion	
Gears Command Shaft Joint	
Front Axis	



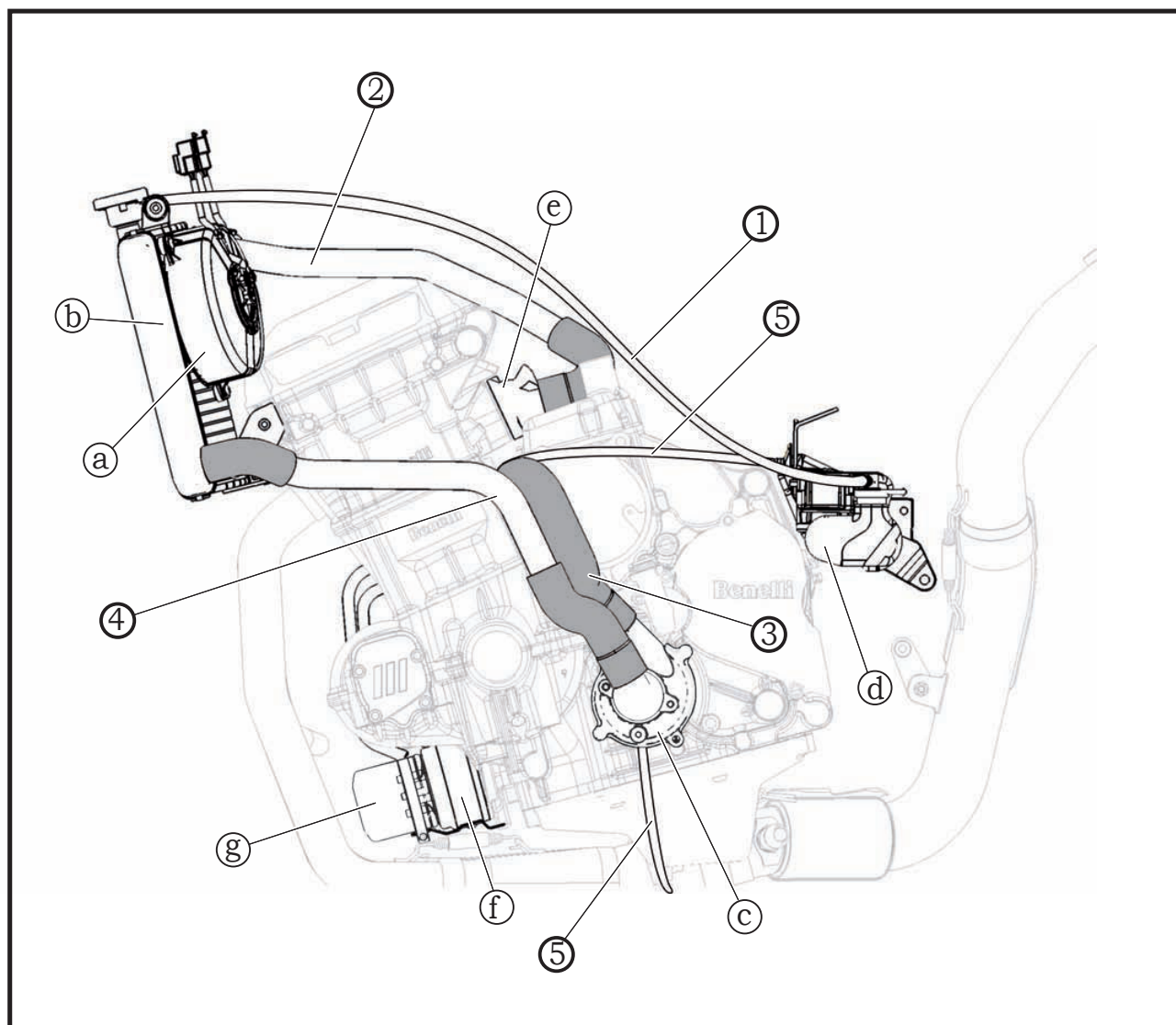
LITHIUM SOAP
BASED GREASE



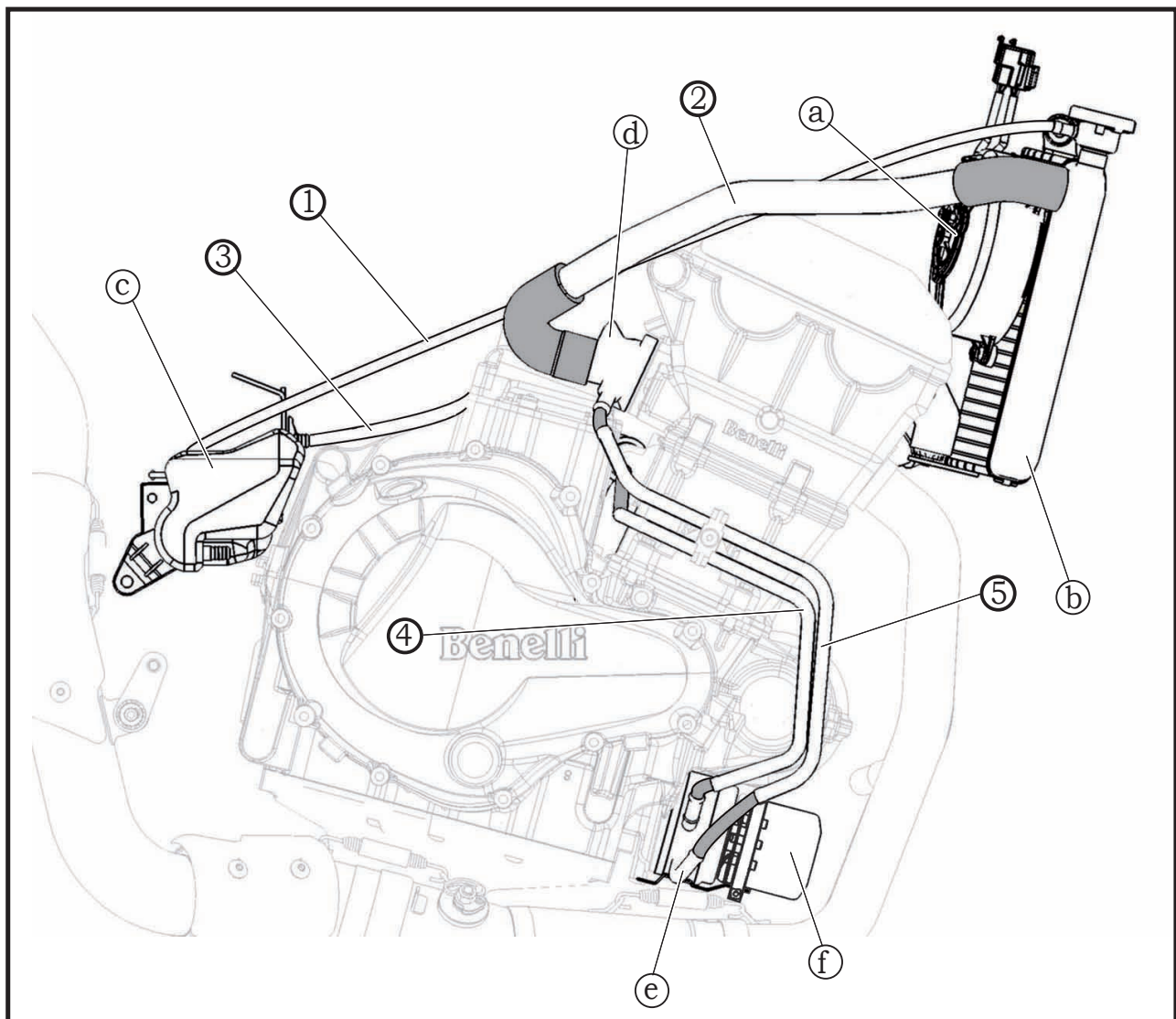
COOLING SYSTEM LAYOUTS

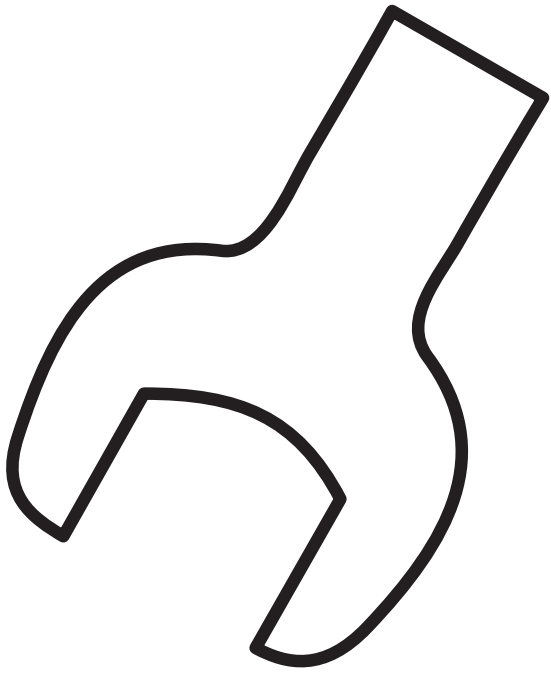
- Ⓐ Radiator Fan
- Ⓑ Radiator
- Ⓒ Water Pump
- Ⓓ Expansion Vessel
- Ⓔ Thermostat disk
- Ⓕ Water/Oil Exchanger
- Ⓖ Oil Filter

- ① Radiator Connection - Expansion Vessel
- ② Hot Water Outlet Tube
- ③ Pump Flow Tube
- ④ Pump Supply Tube
- ⑤ Recovery Tub Vent



- | | |
|--|--|
| <ul style="list-style-type: none"> Ⓐ Radiator Fan Ⓑ Radiator Ⓒ Expansion Vessel Ⓓ Thermostat disk Ⓔ Water/Oil Exchanger Ⓕ Oil Filter | <ul style="list-style-type: none"> ① Radiator Connection - Expansion Vessel ② Hot Water Outlet Tube ③ Recovery Tub Vent ④ Cold Water Inlet Tube On Exchanger ⑤ Hot Water Outlet Tube From Exchanger |
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CHAPTER 3

ROUTINE INSPECTIONS AND ADJUSTMENTS

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INTRODUCTION

This chapter includes all information necessary to carry out recommended inspections and adjustments. These preventive maintenance procedures, if complied with, guarantee a more reliable functioning, longer lasting of the vehicle and will limit the need for expensive revision operations.

This information is valid for both the already working vehicles, and for the under construction vehicles for sale.

All persons in charge of maintenance must know all instructions contained in this chapter well.

ROUTINE MAINTENANCE AND LUBRICATION INTERVALS

NOTE

In general, the maintenance operations must be carried out with the motorbike positioned on rear trestle, with engine off and switch in "OFF" position.

Whereas, during the liquid level control, we recommend placing the bike in vertical position, without using the rear trestle.

The annual controls must be carried out every year, except for when a service control based on a voucher system connected to the kilometres covered is already carried out.

Reached 40.000 Km (24.854 mi), repeat the service voucher system starting from that of 10.000 Km (6.213 mi). For interventions relating to the marked items, we recommend contacting a Benelli dealer, given that it is necessary to use special tools, particular information and specific technical abilities.

The following tables show all maintenance operations.

i	Inspection and adjustment, cleaning, lubrication or replacement depending on requirements
R	Replacement
T	Tighten
	Dealer

NO.	COMPONENT	MAINTENANCE CONTROLS OR INTERVENTIONS	0 Km (0 mi) PRE-DELIVERY	1000 Km (621 mi) 1st VOUCHER	10000 Km (6213 mi) 2nd VOUCHER	20000 Km (12427 mi) 3rd VOUCHER	30000 Km (18641 mi) 4th VOUCHER	40000 Km (24854 mi) 5th VOUCHER	ANNUAL CONTROL
1	Engine Oil	Control/Replacement	i	R	R	R	R	R	R
			Before every vehicle use						
2	Oil Filter	Control/Replacement		R	R	R	R	R	
			However, at every engine oil change						
3	Petrol Filter	Control/Replacement		R	R	R	R	R	
4	Air Filter	Control/Replacement			i	R	i	R	
			Before every vehicle use						
5	Cooling Liquid	Level restore control	i	i	i	i	i	i	i
			Every 2 years or 20.000 Km						
6	Cooling Plant	Check the cooling liquid level and that there are no leaks from the vehicle.	i	i	i	i	i	i	i
7	Spark Plugs	Control/Replacement			i	R	i	R	
			Check the condition, clean and restore the distance between the electrodes						
8	Transmission Chain	Check the tensioning of the chain and that the rear wheel is correctly aligned. Clean and lubricate	i	i	i	i	i	i	i
			Every 500 km and after every bike washing, or if the bike has worn under the rain						
9	Crown Wheel	Control/Lubrication	i	i	i	i	i	i	i
			However, replace at every chain replacement						
10	Stop Pinion /Washer	Control	i	i	i	i	i	i	i
			However, replace at every chain replacement						
11	Fuel Circuit Tubes	Faults and leaks control			i	R	i	R	i
			Replace every 20.000 Km and, however, every 3 years						
12	Brakes Liquid	Control/Replacement	i	i	i	i	i	i	i
			Replace every 20.000 Km and, however, every 2 years						
13	Front Brake/ Rear Brake	Check the functioning, the liquid level and that there are no liquid leaks from the vehicle.	i	i	i	i	i	i	i
14	Brake Pads	Control/Replacement		i	i	i	i	i	i
			Replace if worn to the limit						

NO.	COMPONENT	MAINTENANCE CONTROLS OR INTERVENTIONS	0 Km (0 mi) PRE-DELIVERY	1000 Km (621 mi) 1st VOUCHER	10000 Km (6213 mi) 2nd VOUCHER	20000 Km (12427 mi) 3rd VOUCHER	30000 Km (18641 mi) 4th VOUCHER	40000 Km (24854 mi) 5th VOUCHER	ANNUAL CONTROL
15	Swing Arm Chain Flow Slide	Control/Replacement		i	i	i	i	i	i
			Replace if worn to the limit						
16	Swing Arm Chain Guide Slide	Control/Replacement		i	i	i	i	i	i
			Replace if worn to the limit						
17	Lower Frame Chain Slide	Control/Replacement		i	i	i	i	i	i
			Replace if worn to the limit						
18	Accelerator Command	Check functioning and if necessary, adjust the clearance of the accelerator cable. Lubricate the slot of the accelerator knob and of the cable	i	i	i	i	i	i	i
19	Clutch	Clearance check/adjustment		i	i	i	i	i	
20	Clutch Command	Control/Adjustment	i	i	i	i	i	i	i
21	Throttled Body	Control/Adjustment		i	i	i	i	i	
22	Valves	Control/Adjustment			i	i	i	i	
23	Distribution Chain	Control/Replacement			i	i	i	R	
			Every 40.000 Km						
24	Distribution Mobile Slide	Control/Replacement			i	i	i	R	
			At every distribution chain replacement						
25	Distribution Chain Tensioner	Control/Replacement			i	i	i	R	
			At every distribution chain replacement						
26	Steering Tube And Ring Nut	Control/Adjustment	T	T	T	T	T	T	T
			Before every vehicle use						
27	Steering Tube And Bearings	Control/Adjustment	T	T	T	T	T	T	T
			Every 20.000 Km lubricate with lithium soap based grease						
28	Front/Rear Wheel Bearings	Control/Replacement		i	i	i	i	R	
			Every 40.000 Km						
29	Swing Arm Bearings	Control/Replacement		i	i	i	i	R	
			Every 40.000 Km						
30	Oscillating Swing Arm	Check the functioning and that it does not have an excessive clearance			i	i	i	i	
31	Fork	Check the functioning and that there are no leaks			i	i	i	i	
32	Fork Oil	Replacement							
			Every 20.000 Km						
33	Rear Shock Absorber	Control/Adjustment Check there are no leaks			i	i	i	i	
34	Wheels	Check they are aligned or not damaged			i	i	i	i	
35	Tyres	Check the depth of the tread and that there are no damages. Replace if necessary. Check the blowing pressure. Correct if necessary	T	i	i	i	i	i	i
			Replace if worn to the limit						
36	Side Trestle	Control/Functioning	i	i	i	i	i	i	i
37	Side Trestle Switch	Control/Functioning	i	i	i	i	i	i	i

NO.	COMPONENT	MAINTENANCE CONTROLS OR INTERVENTIONS	0 Km (0 mi) PRE-DELIVERY	1000 Km (621 mi) 1st VOUCHER	10000 Km (6213 mi) 2nd VOUCHER	20000 Km (12427 mi) 3rd VOUCHER	30000 Km (18641 mi) 4th VOUCHER	40000 Km (24854 mi) 5th VOUCHER	ANNUAL CONTROL
38	☒ Lights/Visual Signs	Control/Functioning	i	i	i	i	i	i	i
39	☒ Front Light	Control/Functioning	i	i	i	i	i	i	i
		Adjustment	At every vehicle asset variation						
40	☒ Acoustic Warning Device	Control/Functioning	i	i	i	i	i	i	i
41	☒ Equipment	Control/Functioning	i	i	i	i	i	i	i
42	☒ Battery Connections	Control/Functioning	i	i	i	i	i	i	i
43	☒ Electric Plant	Control/Adjustment	i	i	i	i	i	i	i
44	☒ Ignition Switch	Control/Functioning	i	i	i	i	i	i	i
45	☒ Electric fans	Control/Functioning	i	i	i	i	i	i	i
46	☒ Fuel Electronic Injection	Adjust the minimum power of the engine and the synchronisation		i	i	i	i	i	
47	☒ Fuelling/CO°	Control/Adjustment		i	i	i	i	i	i
			However, every 10.000 Km						
48	☒ Frame Fixing Elements	Check all nuts, bolts and screws are adequately fastened	T	T	T	T	T	T	T
			At every distribution chain replacement						
49	☒ Air Box Valve	Control/Replacement		i	i	i	i	i	
			Check the correct functioning, replace if necessary						
50	☒ Drain Plant Valve	Control/Replacement		i	i	i	i	i	
			Check functioning, clearance of the cable and the position of the pulley, replace if necessary						
51	☒ Inlet Drain Valve Actuator	Control/Replacement		i	i	i	i	i	
			Check functioning, clearance of the cable and the position of the pulley, replace if necessary						
52	☒ Valves Actuator Cables	Control/Replacement		i	i	i	i	i	
			Check the correct sliding of the cables, replace if damaged						
53	☒ Oil Tank Screws	Control	T	T	T	T	T	T	
54	☒ Clutch Lid Screws	Control	T	T	T	T	T	T	
55	☒ Alternator Collar Rubber	Replacement			R	R	R	R	
56	☒ Catalyst	Faults and leaks control		i	i	i	i	R	
			Maintenance not envisioned, replace if malfunctioning						
57	☒ USA Cannister Version	Faults and leaks control		i	i	R	i	R	
58	☒ Brake Flexible Tubes	Control/Replacement	i	i	i	i	i	i	i
			Every 4 years						
59	☒ Parts And Cables Subject To Movement	Control/Replacement	i	i	i	i	i	i	i
			Before every vehicle use						



NOTE:

• **AIR FILTER**

- The air filter must be replaced more often when the vehicle is used in particularly dusty and humid areas.

• **HYDRAULIC BRAKE MAINTENANCE**

- Regularly check the brakes liquid level and, if necessary, top-up.
- Replace the internal components of the brakes and callipers main cylinder, and change the brakes liquid every two years.
- Replace the brakes flexible tubes every 4 years, or before if cracked or damaged.

IGNITION SPARK PLUGS REMOVAL

The following procedure is applied to all ignition spark plugs.

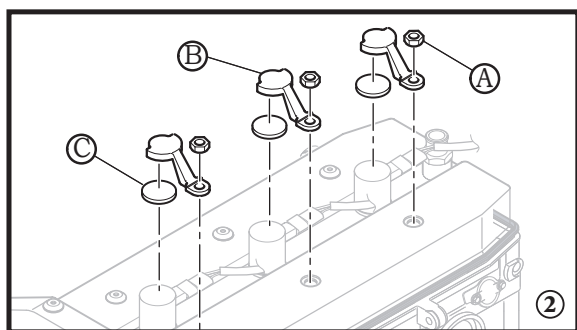
WARNING

The replacement and check of the spark plugs must be carried out with the engine cold.

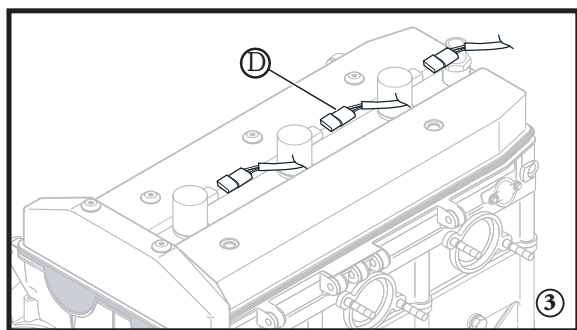
- ① Remove:
 - **the right and left tank lids**
See "FRAME 4.112" paragraph.
 - **the tank**
See "FRAME 4.118" paragraph.
 - **the air box**
See paragraph "3.10".
 - **the conveyor**
See paragraph "3.10".

ATTENTION

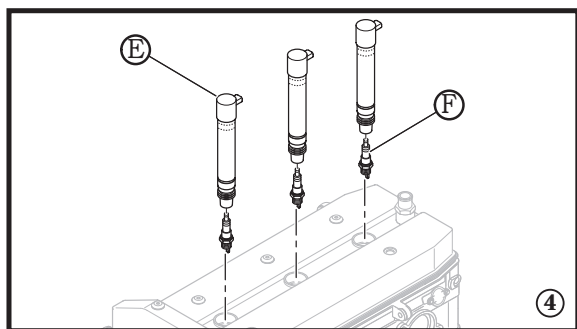
Before disconnecting the spark plugs, remove the dirt eventually accumulated inside the seats using a jet of compressed air, to avoid it falling inside the cylinders.



- ② Remove:
 - **the nut** (A)
 - **the bracket** (B)
 - **the rubber pad** (C)



- ③ Disconnect:
 - **the reel connector** (D)



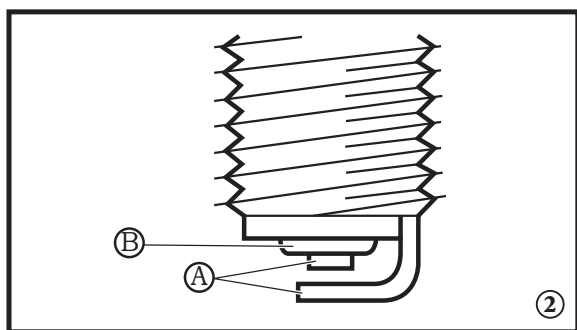
- ④ Remove:
 - **the reel** (E)
 - **the spark plug underneath** (F)

IGNITION SPARK PLUGS CONTROL

The following procedure is applied to all ignition spark plugs.

- ① Check:
- **the type of ignition spark plug**
Incorrect → Change

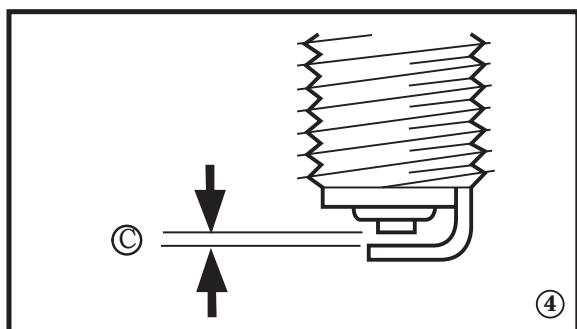
	Type of ignition spark plug (manufacturer) RG4HC (CHAMPION) or CR9EK (NGK)
---	---



- ② Check:
- **the electrodes A**
In the presence of damages/wear/rounding → Replace the ignition spark plug.
 - **the insulating part B**
Anomalous colour → Replace the ignition spark plug.
The colour is usually light brown.

 DIRTY SPARK PLUG		 OVERHEATED SPARK PLUG	
Causes	Remedies	Causes	Remedies
• Mix air/petrol too rich -Incorrect carburettor calibration • Inefficiency of electric plant -Incorrect connection of reels • Particular driving conditions -Extended periods "at minimum" -Long distance travelled at low speed • Spark plug too cold	Carry out the setting up of the supply /fuelling system Check the connections of the reels and relative impedance Every now and again, it is necessary to reach a speed of approx. 80 Km/h Use a warmer spark plug as in the specification	• Ignition too advanced • Air/petrol mix too poor • Insufficient cooling and/or lubricant liquid • Fastening torque of the spark plugs too low • Use of a spark plug too hot	Adjust the ignition advance Adjust the air/petrol ratio Add cooling and/or lubricating liquid Tighten up to correct torque Use a colder spark plug as in the specification

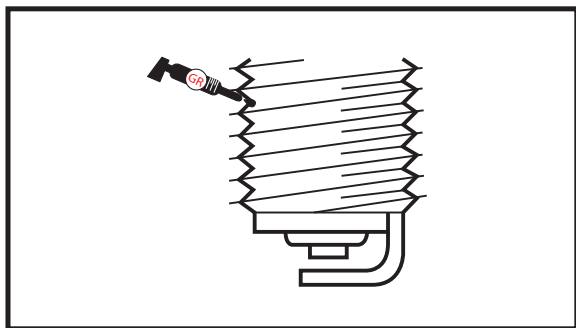
- ③ Clean:
- **the ignition spark plug**
(using a detergent for spark plugs or a metal brush)



- ④ Measure:
- **the distance between the electrodes ④**
(using a feeler)
If out of specification → Restore the correct distance



Distance between the electrodes
0.7 ~ 0.8 mm (0.02 ~ 0.03 in)



IGNITION SPARK PLUGS INSTALLATION

The following procedure is applied to all ignition spark plugs.

WARNING

Lubricate the spark plug threading.



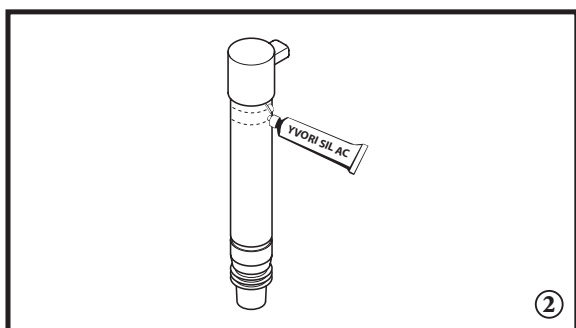
Recommended lubricant
GRASSO AL RAME

NOTE:

Before installing the spark plug, clean it and the surface in contact with the gasket.

- ① Install:
 - **the ignition spark plug**
 on the head manually tightening it until a contact on the base of the head is heard, therefore, torque fasten.

 12 N m - 1.22 Kg·m



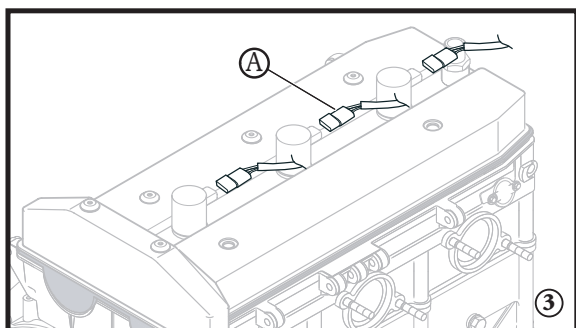
- ② Install:
 - **the reel**

NOTE:

Before installing it, apply sealing paste on the reel.



Recommended paste
**TUTELA PROFESSIONAL
IVORY SIL AC**



- ③ Connect:
 - **the reel connector** ①

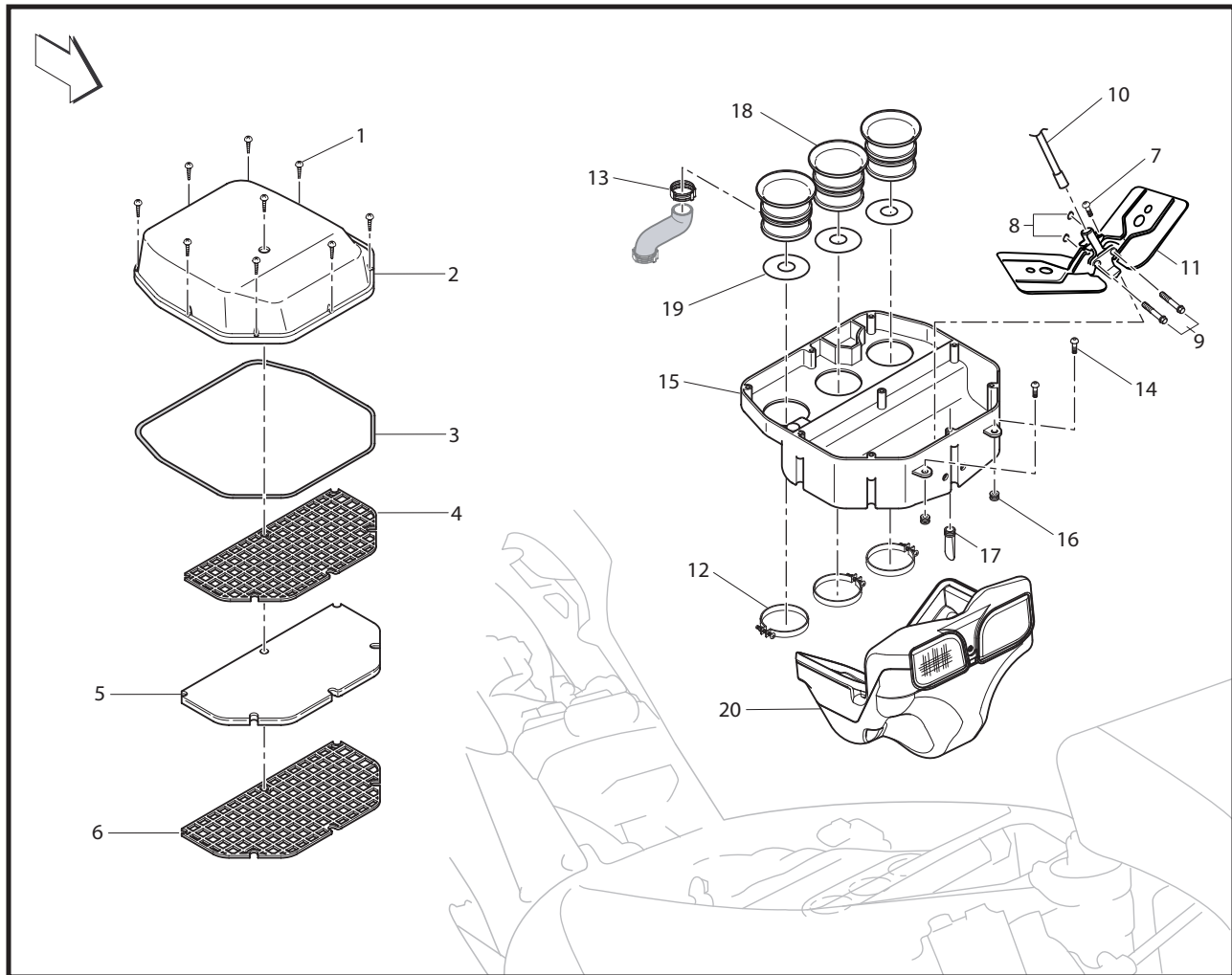
- ④ Install:
 - **the rubber pad**
 - **the bracket**
 - **the nut**

Torque fasten:

 8 N m - 0.81 Kg·m



AIR BOX REMOVAL



SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1		Seat Removal	9	Remove the pieces in the given order. See "FRAME 4.130" paragraph. See "FRAME 4.118" paragraph. Disconnect. Loosen. Loosen. ATTENTION: _____ Pay particular attention not to let foreign bodies fall inside the throttled bodies. _____
2		Tank Removal	1	
3		Air Box Removal	1	
4		Screw	1	
5		Filter Box Lid	1	
6		Gasket	1	
7		Check Net	1	
8		Filtering Element	1	
9		Check Net	1	
10		Screw	1	
11		Seeger	2	
12		Pin	2	
13		Throttle Cable	1	
14		Inlet Valve	1	
15		Throttled Bodies Strip	3	
16		Blow By Tube Strip	1	
17		Screw	2	
18		Air Filter Box	1	
19		Cable Gland	2	
20		Rubber Pad	1	
		Inlet Conduct	3	
		Washer	3	
		Conveyor	1	

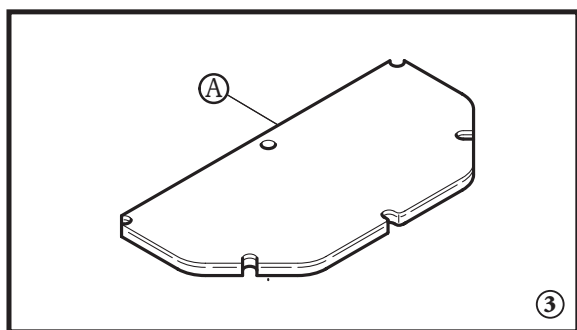
AIR FILTERING ELEMENT REPLACEMENT

- ① Remove:
 - **the seat**
See "FRAME 4.130" paragraph.
 - **the tank**
See "FRAME 4.118" paragraph.

- ② Remove:
 - **the 9 screws**
 - **the filter box lid**
 - **the filtering element**
See paragraph "3.10".

ATTENTION

Replace the air filter element every 20.000 Km (12.427 mi). If the vehicle is used during particularly humid climates or in very dusty areas, it will be necessary to intervene on the air filter at shorter intervals.



- ③ Check:
 - **the air filter element A**
In the presence of damages → Replace.
- ④ Install:
 - **the filtering element**
See paragraph "3.13".

ATTENTION

Before installing the filtering element inside the air box, eliminate the excess oil checking it no longer drips.

- ⑤ Install:
- **the filter box lid**
 - **the 9 screws**
- See paragraph "3.13"

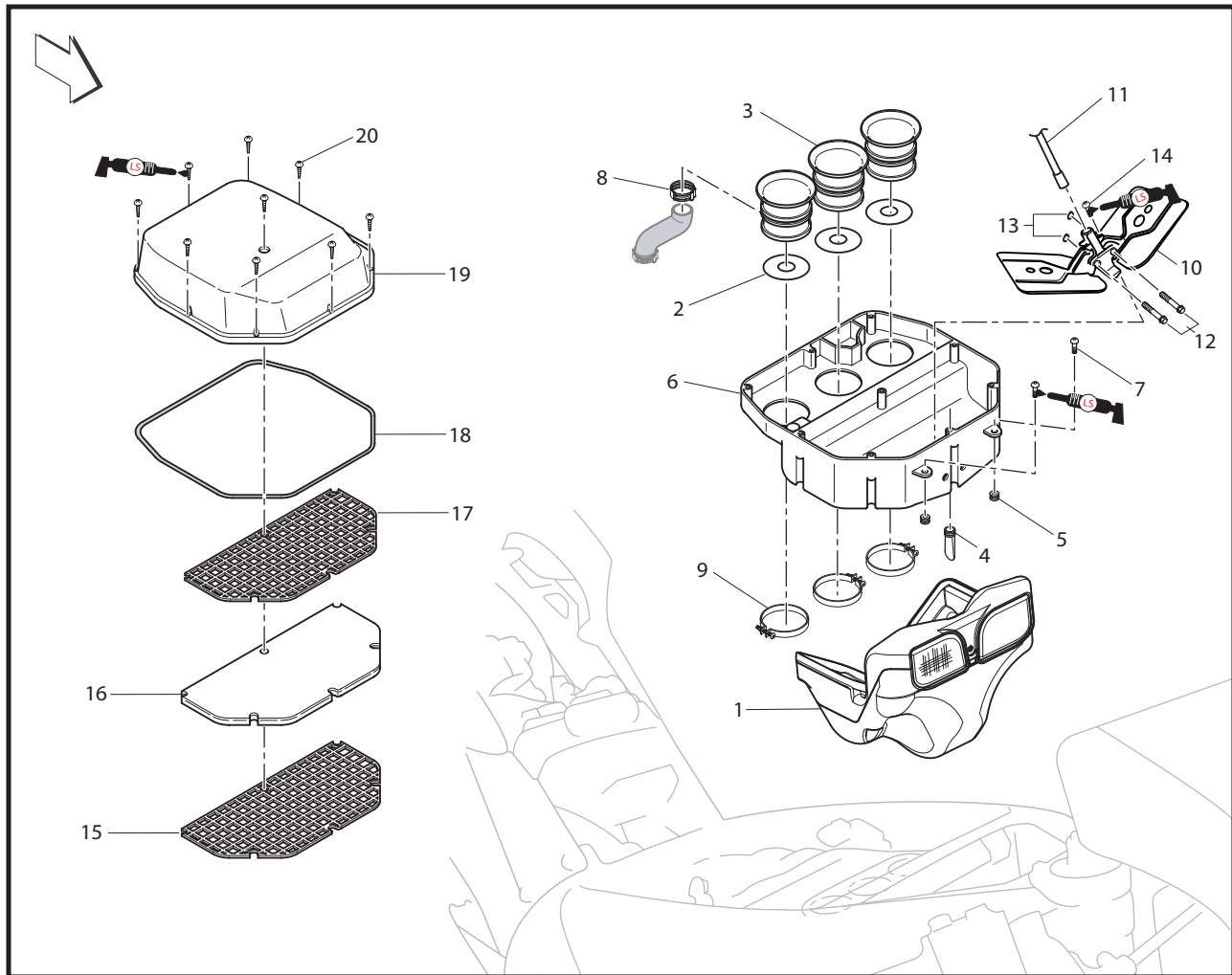
WARNING

Never start the engine if the air filter is not installed. The unfiltered air causes rapid wearing of the engine parts and it may damage the engine. Furthermore, by running the engine without the air filter influences negatively on the setting up of the throttle bodies, and this entails a deterioration of the engine performances, and eventually its overheating. Therefore, ensure that the air filter is always in good conditions. The duration of the engine mainly depends from this component.

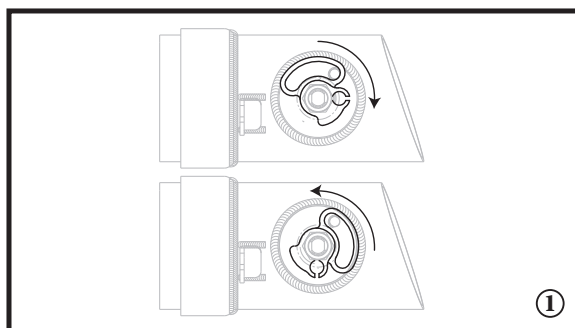
- ⑥ Install:
- **the tank**
- See "FRAME 4.119" paragraph.
- **the seat**
- See "FRAME 4.131" paragraph.



AIR BOX INSTALLATION



SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1		Air Box Installation	1	Install the pieces in the given order.
2		Conveyor	3	
3		Washer	3	
4		Inlet Conduct	1	
5		Rubber Pad	2	
6		Cable Gland	1	
7		Air Filter Box	2	Manually fasten.
8		Screw	1	Tighten.
9		Blow By Tube Strip	1	Tighten.
10		Throttled Bodies Strip	3	ATTENTION: Pay particular attention to the phasing of the inlet valve flaps checking that, with the valve completely open, the resting oblique surfaces on support are identical.
		Inlet Valve	1	
11		Throttle Cable	1	Connect.
12		Pin	2	
13		Seeger	2	
14		Screw	1	Manually fasten
15		Check Net	1	
16		Filtering Element	1	
17		Check Net	1	
18		Gasket	1	
19		Filter Box Lid	1	
20		Filter Box Lid Screw	9	Manually fasten



WIRED ACTUATOR CONTROL

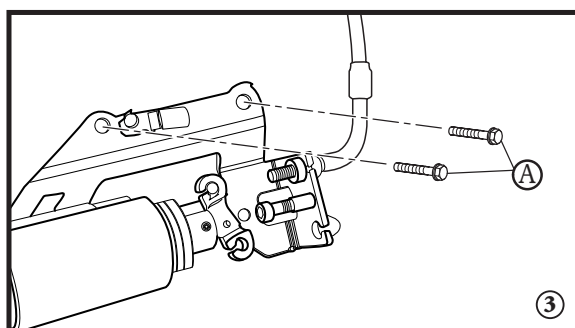
- ① Start:
 - **the bike**
 and check with a few gas revolutions that the drain throttle works as shown in the illustration.

If the inlet and drain throttles do not perform the correct closing cycle, it is necessary to remove the wired actuator.

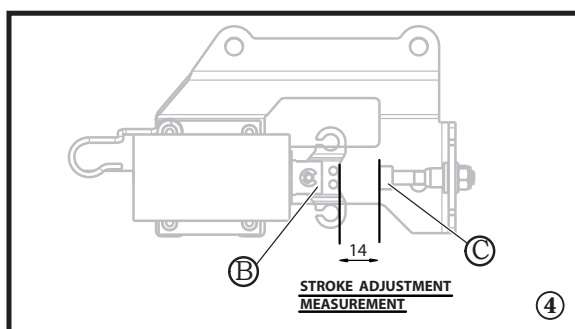
There are 2 types of controls to carry out.

CONTROL 1

- ② Remove:
 - **the seat**
See "FRAME 4.130" paragraph.
 - **the tank**
See "FRAME 4.118" paragraph.
 - **the filter box lid**
See paragraph "3.10".



- ③ Remove:
 - **the 2 screws** ①



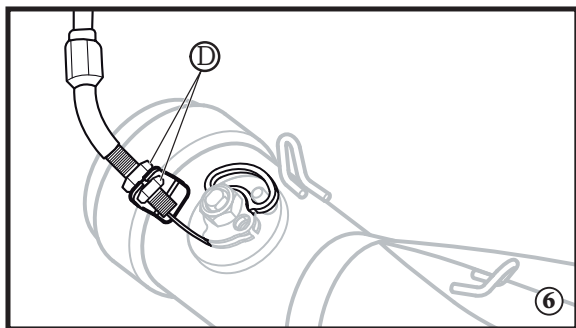
- ④ Measure:
 - **the distance**
between the balancing device ②, in orthogonal position compared to the piston axis, and the screw head ③



Distance between balancing device and screw head
14 mm (0.55 in)

On the contrary, regulate the screw ③

- ⑤ Should this not be sufficient for the correct closing cycle of the throttles, check the drain valves.

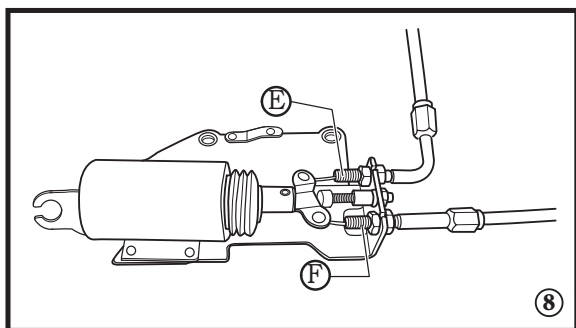


CONTROL 2

If the control of the wired actuator is not sufficient for the correct throttle closing cycle, check the cables clearance adjustment.

- ⑥ Loosen:
- **the nuts of the drain valve regulator ①**
(on 3 in 1 exhaust pipe)

- ⑦ Adjust:
- **the tensioning of the cable**
ensuring it is always tensioned but keeping the stand-by position of the drain valve.

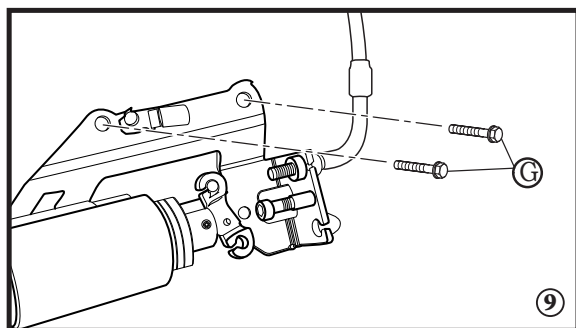


- ⑧ Adjust:
- **the thread of regulator ⑤ and of regulator ⑥**
up to the specified measurement.



Measurements of the regulator threads

- ⑤ 9.8 mm (0.38 in)
- ⑥ 9.4 mm (0.37 in)



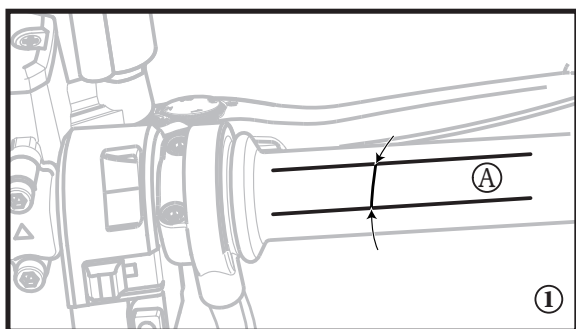
- ⑨ Install:
- **the 2 screws ⑦**

- ⑩ Install:
- **the filter box lid**
See paragraph "3.13".
 - **the tank**
See "FRAME 4.119" paragraph.
 - **the seat**
See "FRAME 4.131" paragraph.

ACCELERATOR CABLE CLEARANCE ADJUSTMENT

NOTE:

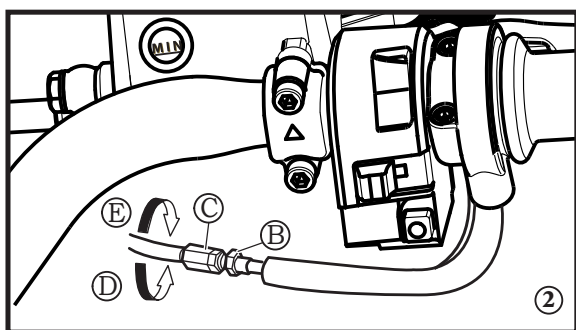
Before adjusting the accelerator cable clearance, adequately adjust the minimum power of the engine.
Initially check at 1000 Km (621 mi) and subsequently every 10.000 Km (6.213 mi).



- ① Check:
- the accelerator cable clearance **(A)**
Check that the accelerator command grip works regularly and that it is possible to reach the maximum opening and automatic closing positions from all steering positions.
If out of specification → Adjust.



**Accelerator cable clearance
(at accelerator knob flange)**
3 ~ 5 mm (0.11 ~ 0.19 in)



- ② Adjust:
- the accelerator cable clearance

Handle bar side

- a) Loosen lock nut **(B)**
- b) Rotate the adjusting nut **(C)** in **(D)** or **(E)** direction, until clearance of the specified accelerator cable is obtained.

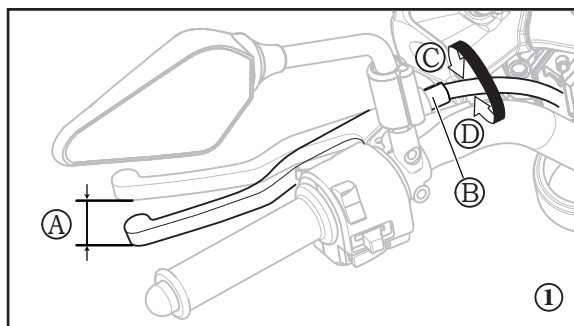
DIRECTION (D)	The clearance increases
DIRECTION (E)	The clearance decreases

- c) Fasten the lock nut.

WARNING

After adjustment of the accelerator cable clearance, start the engine and turn the handle bar to the right and to the left, ensuring that the minimum engine power does not change.

- ③ Check:
- the cables
If damaged, worn, or tangled → Replace.



CLUTCH CABLE CLEARANCE ADJUSTMENT

- ① Check:
- the clutch cable clearance (A)
- If out of specification → Adjust.



Clutch cable clearance
(at the end of the clutch lever)
3 ~ 5 mm (0.11 ~ 0.19 in)

- ② Adjust:
- the clutch cable clearance

Handle bar side

- Ⓐ Rotate the adjusting disk (B) in (C) or (D) direction, until clearance of the specified clutch cable is obtained.

DIRECTION (C)	The clutch cable clearance increases
DIRECTION (D)	The clutch cable clearance decreases

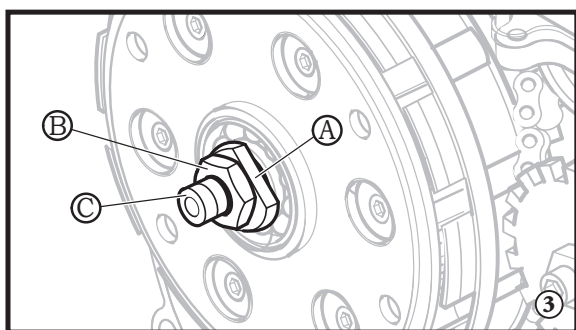
NOTE: _____
If the specified clearance of the clutch cable on handle bar side is not obtained, act on the engine side adjusting nut. _____

CLUTCH DISKS ADJUSTMENT

- ① Position:
 - **the bike**
on side trestle to avoid oil leaking.

- ② Remove:
 - **the clutch lid**
See "ENGINE 5.69" paragraph.

NOTE: Before adjusting the clutch disks, free the lower clutch command of the clutch cable. Check every 10000 Km.

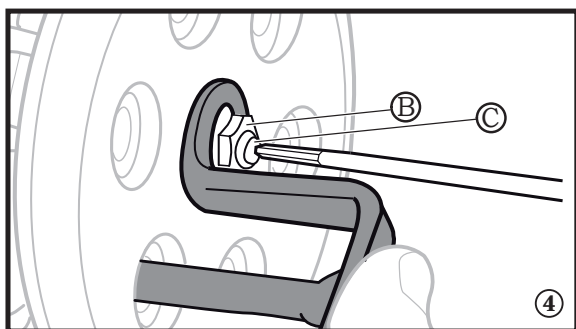


- ③ Lock:
 - **the flange** A
Loosen:
 - **the lock nut** B
Tighten:
 - **the regulator** C
until contact with the internal reaction rod is heard and loosen it by ¼ of a turn.

Check the clearance on the clutch command positioned on the opposite side of the engine.



Clutch lever clearance: 3 ~ 5 mm (0.11 ~ 0.19 in)
Clutch disengagement screw: ¼ of a turn outwards



- ④ Fasten:
 - **the lock nut** B
using special tool keeping the regulator still C.



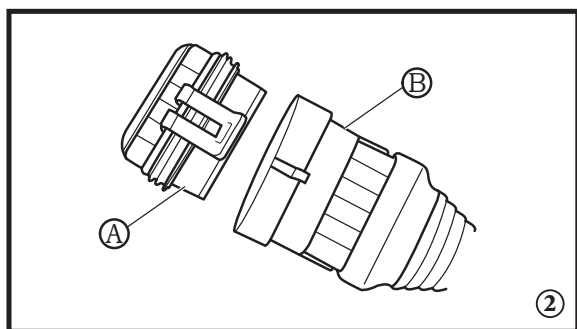
Special Tools: CLUTCH PRESSURE PLATE ADJUSTMENT SPANNER
Code : R180297130000

NOTE: To use the special tool, remove one screw with relative cup and spring.

- ⑤ Install:
 - **the clutch lid**
See "ENGINE 5.70" paragraph.

EXHAUST GAS ADJUSTMENT

- ① Remove:
- **the seat**
- See "FRAME 4.130" paragraph.



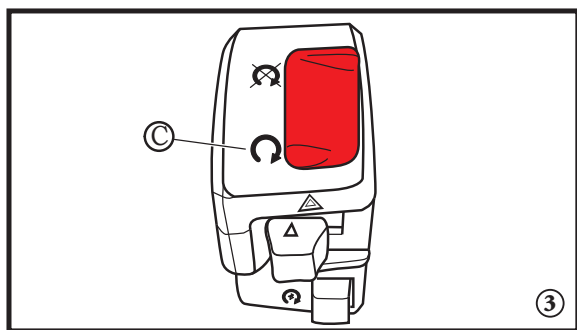
- ② Remove:
- **the cap of the diagnostics socket** ①
- Connect:
- **the diagnostics instrument**
- to the socket positioned underneath the seat ②.



**Special Tools: ENGINE INJECTION HANDLING
DIAGNOSTICS INSTRUMENT - AXONE 2000**
Code: R180197036000



**Special Tools: ENGINE INJECTION HANDLING
DIAGNOSTICS INSTRUMENT - BENDIA SCANTOOL**
Code: R300082003000



- ③ Check:
- **the bike stop switch on right command**
- the switch must be on "RUN" (switched on). ③
- **the vehicle**
- no gear must be engaged.

- ④ Select:
- **the options**
- choosing the wanted menu, following the instructions regarding the diagnostics instrument.

- ⑤ Start:
- **the engine**
taking it to approx. 95°C.

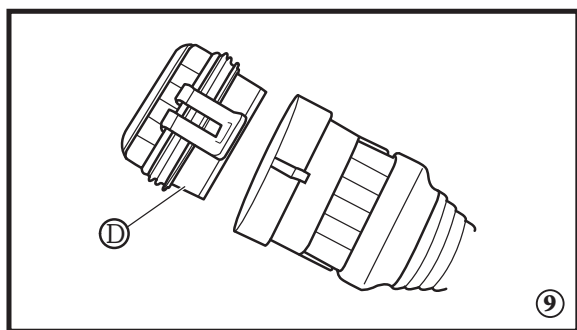
- ⑥ Check:
- **the lambda probe value**

	Lambda Probe Value "1.00"
---	-------------------------------------

VALUE GREATER THAN "1.00"	VALUE LOWER THAN "1.00"
If the lambda probe value shown on the display is greater than "1.00", increase the "CO%" value to minimum map 1 or 2 (referred to used map lock) so that the correction and relative lambda parameter work as close to "1.00" as possible.	If the lambda probe value shown on the display is lower than "1.00", decrease the "CO%" value to minimum map 1 or 2 (referred to used map lock) so that the correction and relative lambda parameter work as close to "1.00" as possible.

- ⑦ Turn-off:
- **the diagnostics instrument**
following the instructions relating to the bike.

- ⑧ Disconnect:
- **the diagnostics connector**
from the socket.



- ⑨ Install:
- **the diagnostics socket cap ①**

- ⑩ Install:
- **the seat**
- See "FRAME 4.131" paragraph.

THROTTLED BODY ADJUSTMENT

NOTE: Before synchronising the throttle bodies, suitably regulate the valves clearance and the engine minimum power.



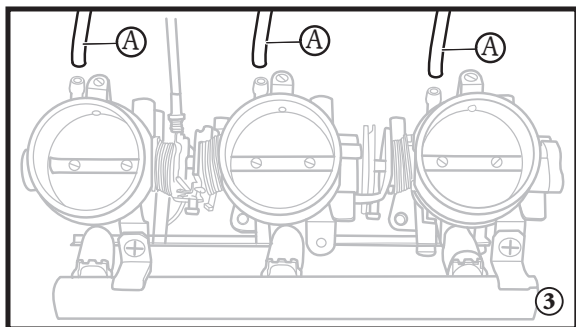
Engine Minimum Power
1250 ~ 1350 r/min.

NOTE: Check and execute the alignment of the throttled body with engine temperature at approx. 90/95°C.

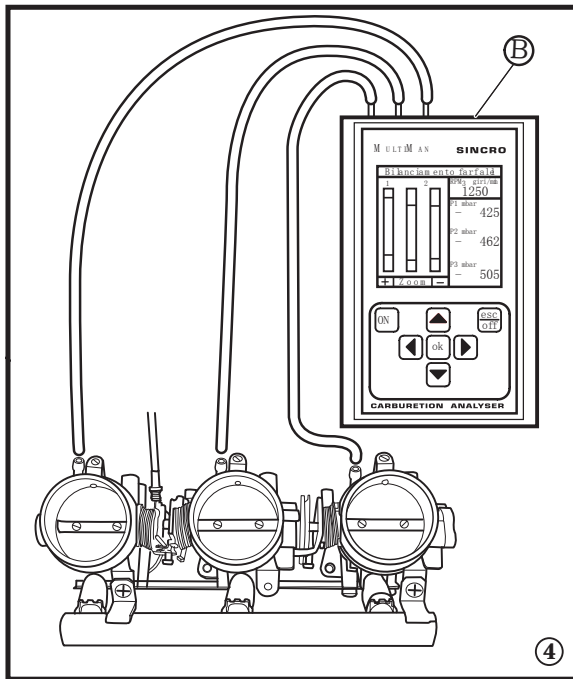
- ① Park:
- the bike levelled.

NOTE: Place the bike on a suitable trestle.

- ② Remove:
- the seat
See "FRAME 130" paragraph.
 - the tank
See "FRAME 4.118" paragraph.
 - the air filter box
See paragraph "3.10"



- ③ Disconnect:
- the flexible tubes of the stepper air passages A



(B)

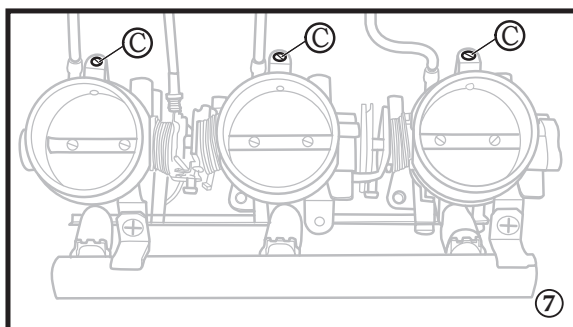
- ④ Install:
- **the vacuum meter**
directly on to the fittings of the throttled body of the previously disconnected stepper air passages tubes.



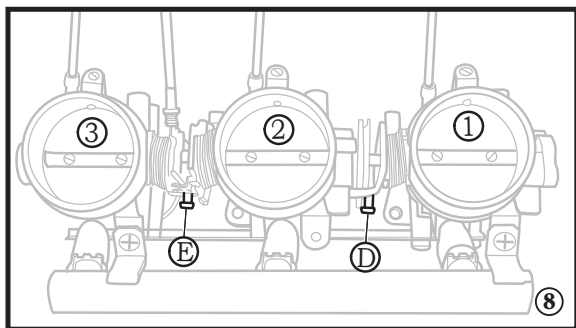
Special Tools: VACUUM METER
Code: R300097170000

- ⑤ Install:
- **the tank**
directing it towards the rear part of the vehicle (secure the tank with belt).

- ⑥ Start:
- **the engine**
and leave it to warm up for a few minutes until the temperature reaches 95°C.



- ⑦ Fasten:
- **the by-pass screws** ©
Tighten them completely.



- ⑧ Correct:
- **the alignment values**
using a screwdriver on the pair screws ④ and ⑤ .
Align body 1 with body 2 by acting on the pair screw ④ .
Align body 2 with body 3 by acting on the pair screw ⑤ .

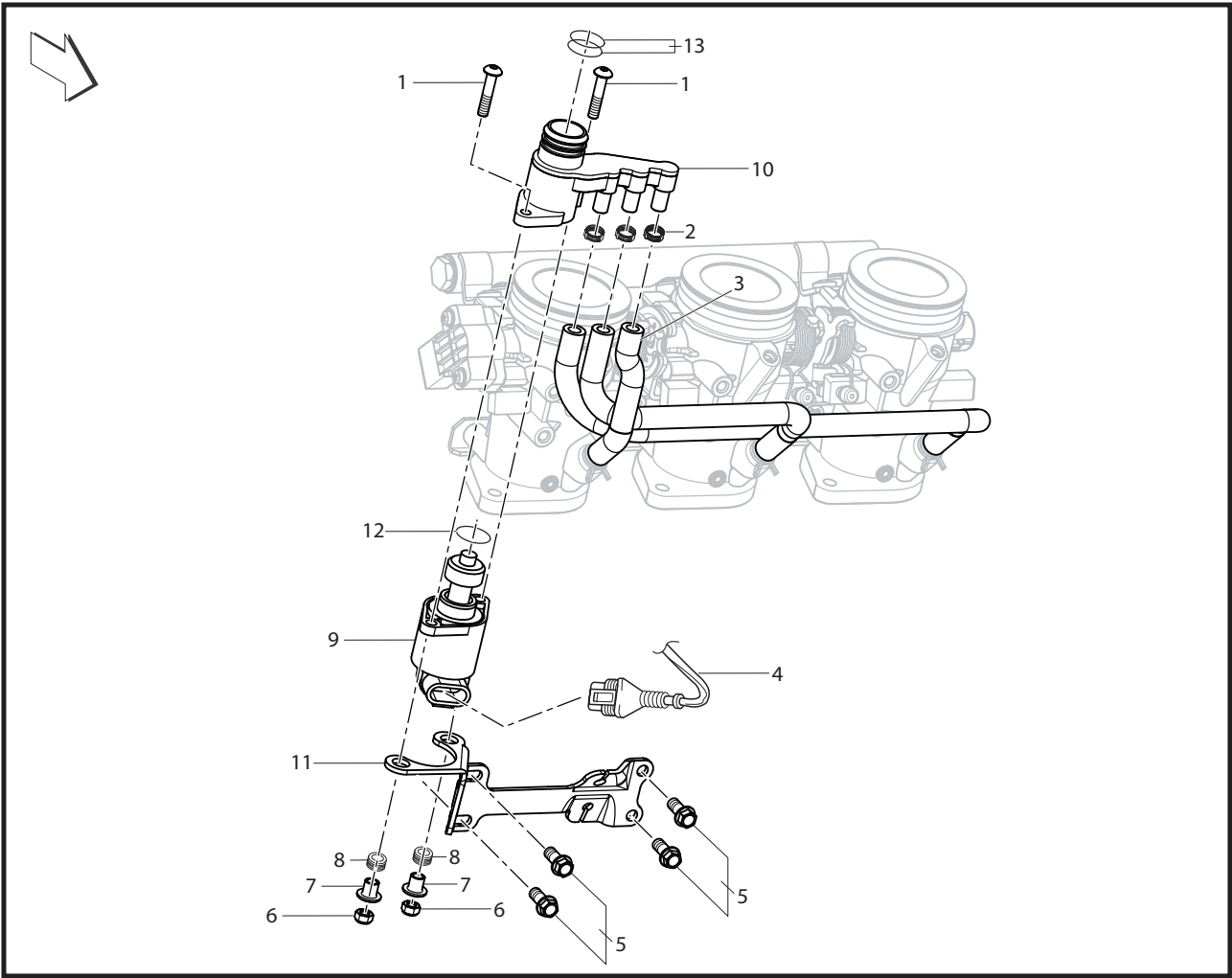
NOTE: Having reached an optimal alignment on the 3 bodies, it is possible to perfect the correction by individually acting on the previously closed by-pass screws ③ .

- ⑨ Turn-off:
- **the engine**
- Remove:
- **the measuring instrument**
- Re-connect:
- **the flexible tubes of the previously disconnected stepper air passages.**

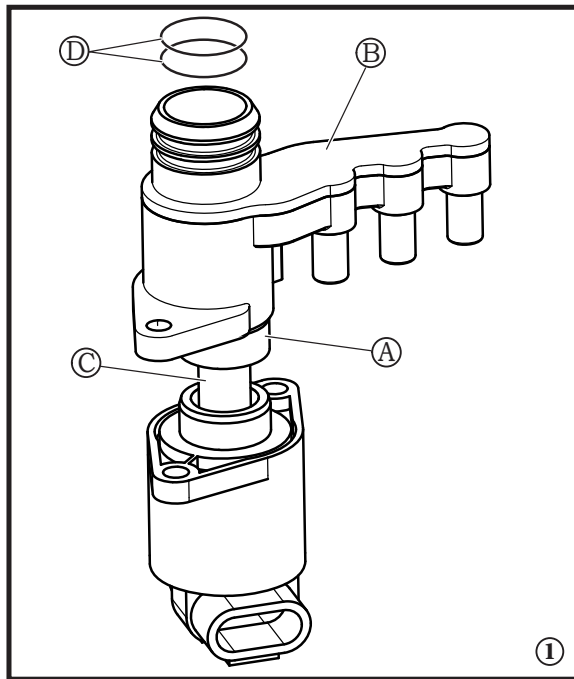
- ⑩ Carry out:
- **resetting of the throttle sensor**
using the diagnosis system:
- Adjust the engine minimum power
See paragraph "3.34".
 - Adjust the exhaust gas emissions
See paragraph "3.19"

- ⑪ Install:
- **the air filter box**
See paragraph "3.13".
 - **the tank**
See "FRAME 4.119" paragraph.
 - **the seat**
See "FRAME 4.131" paragraph.

STEPPER REMOVAL



SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
		Seat Removal Tank Removal Air Box Removal Stepper Removal		Remove the pieces in the given order. See "FRAME 4.130" paragraph. See "FRAME 4.118" paragraph. See paragraph "3.10".
1		Screw	2	
2		Click Strip	3	
3		Minimum Air Tube	3	Loosen.
4		Connector	1	Disconnect.
5		Screw	4	Disconnect.
6		Nut	2	
7		Bush	2	
8		Anti-vibration Rubber Pad	2	
9		Step-by-Step Motor	1	
10		Distributor	1	
11		Special Plate	1	
12		O-Ring Gasket	1	
13		O-Ring Gasket	2	



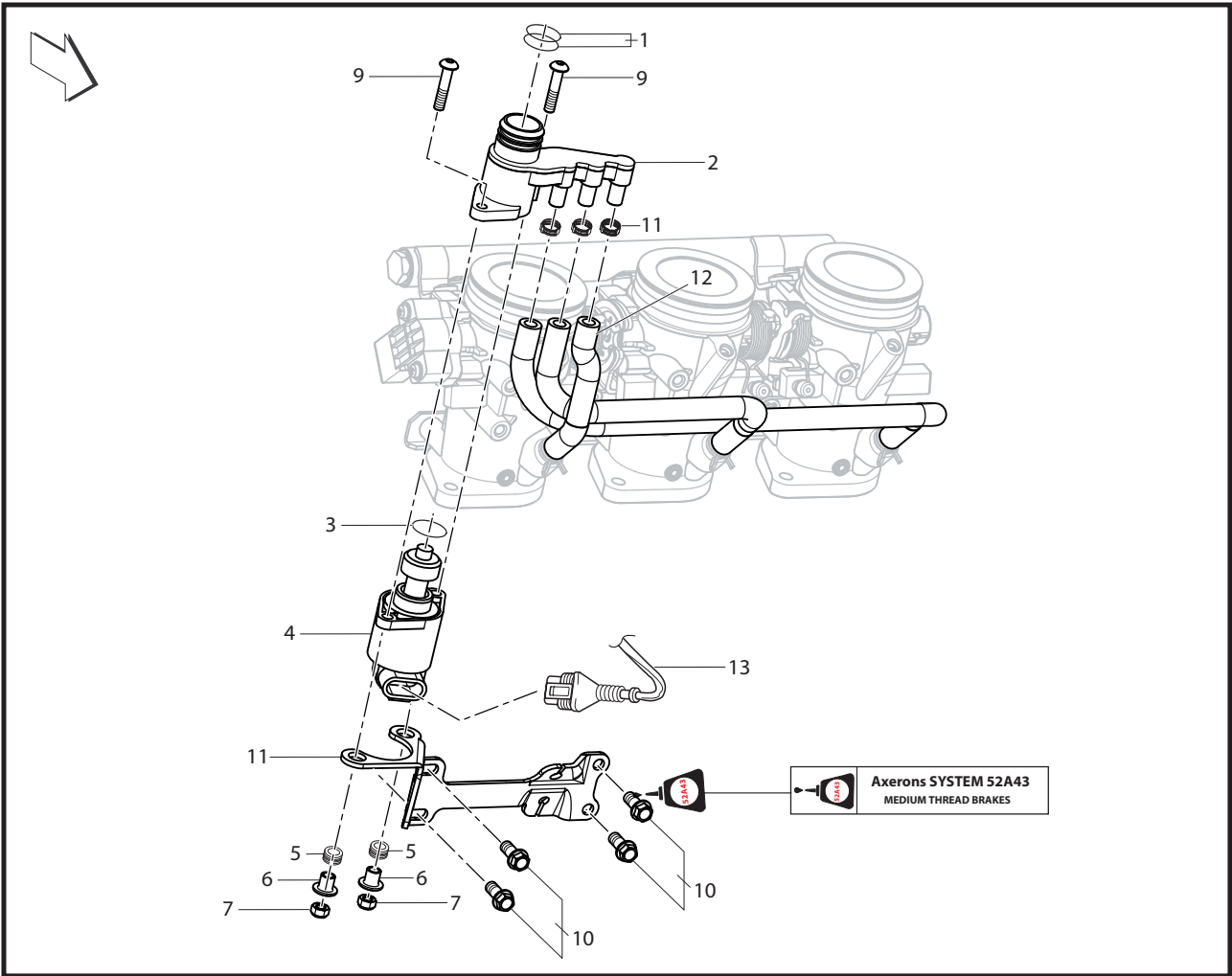
STEPPER CONTROL

- ① Check:
- **the stepper** ①
In the presence of breaks and/or deformations → Replace.
 - **the distributor** ②
In the presence of obstructions → Replace.
 - **the free sliding between the piston ③ and the distributor** ④
In case of forced sliding → Replace the distributor.
 - **the 2 O-Ring gaskets** ⑤
In the presence of deformations → Replace in pair.

NOTE: _____
Clean the distributor and the stepper before installation. _____

NOTE: _____
In case of replacing the stepper, check the adjustment of the diagnostics instrument, reset the throttles. _____

STEPPER INSTALLATION



SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1		Stepper Installation	2	Install the pieces in the given order.
2		O-Ring Gasket	1	
3		Distributor	1	
4		O-Ring Gasket	1	
5		Step-by-Step Motor	1	
6		Anti-vibration Rubber Pad	2	
7		Bush	2	
8		Nut	2	
9		Special Plate	1	
10		Screw	2	
11		Click Strip	4	Manually fasten.
12		Minimum Air Tube	3	Manually fasten.
13		Connector	3	Tighten.
			1	Connect.

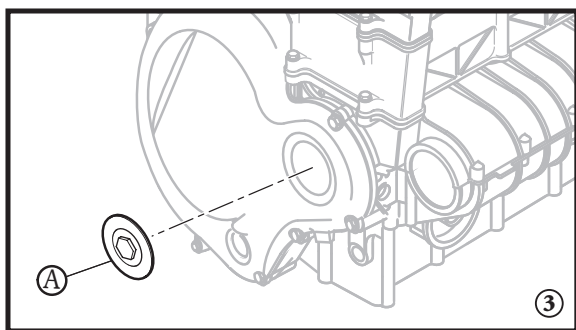
VALVES CLEARANCE ADJUSTMENT AND CALIBRATED PADS REPLACEMENT

The following procedure is applied to all valves.

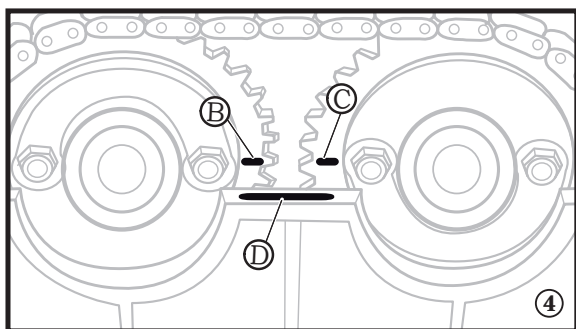
NOTE: The adjusting of the valves clearance must be carried out with the engine cold, at ambient temperature and with the engine in PMS.

- ① Remove:
 - **the seat**
See "FRAME 4.130" paragraph.
 - **the tank**
See "FRAME 4.118" paragraph.
 - **the air filter box**
See paragraph "3.10".
 - **the radiator**
See "COOLING PLANT 6.1" paragraph.
 - **the stepper connector**
See paragraph "3.25".

- ② Remove:
 - **the ignition reels**
 - **the ignition spark plugs**
 - **the distribution lid**
 - **the gasket of the distribution lid**
See "ENGINE 5.1" paragraph.

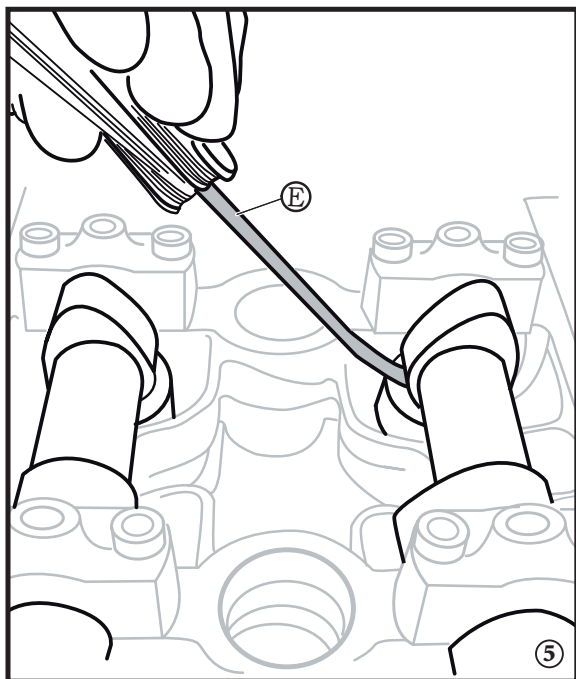


- ③ Remove:
 - **the phonic wheel cap** ①



- ④ Align:
 - **the gear notches** ② and ③

Check that the notches are also aligned with the head plane ④ .



- ⑤ Measure:
- **the valves clearance**
using a feeler (E) positioning the cam as shown in the illustration.
If out of specification → Adjust.



Valves Clearance

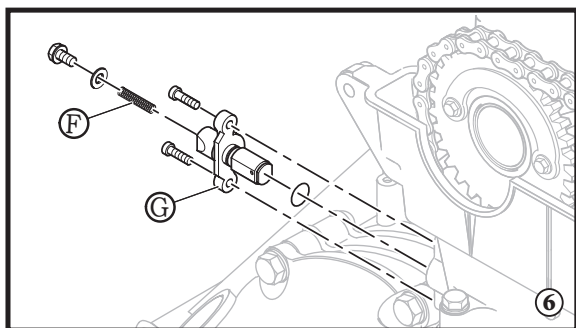
Inlet Valve

0.25 ~ 0.30 mm (0.009 ~ 0.011 in)

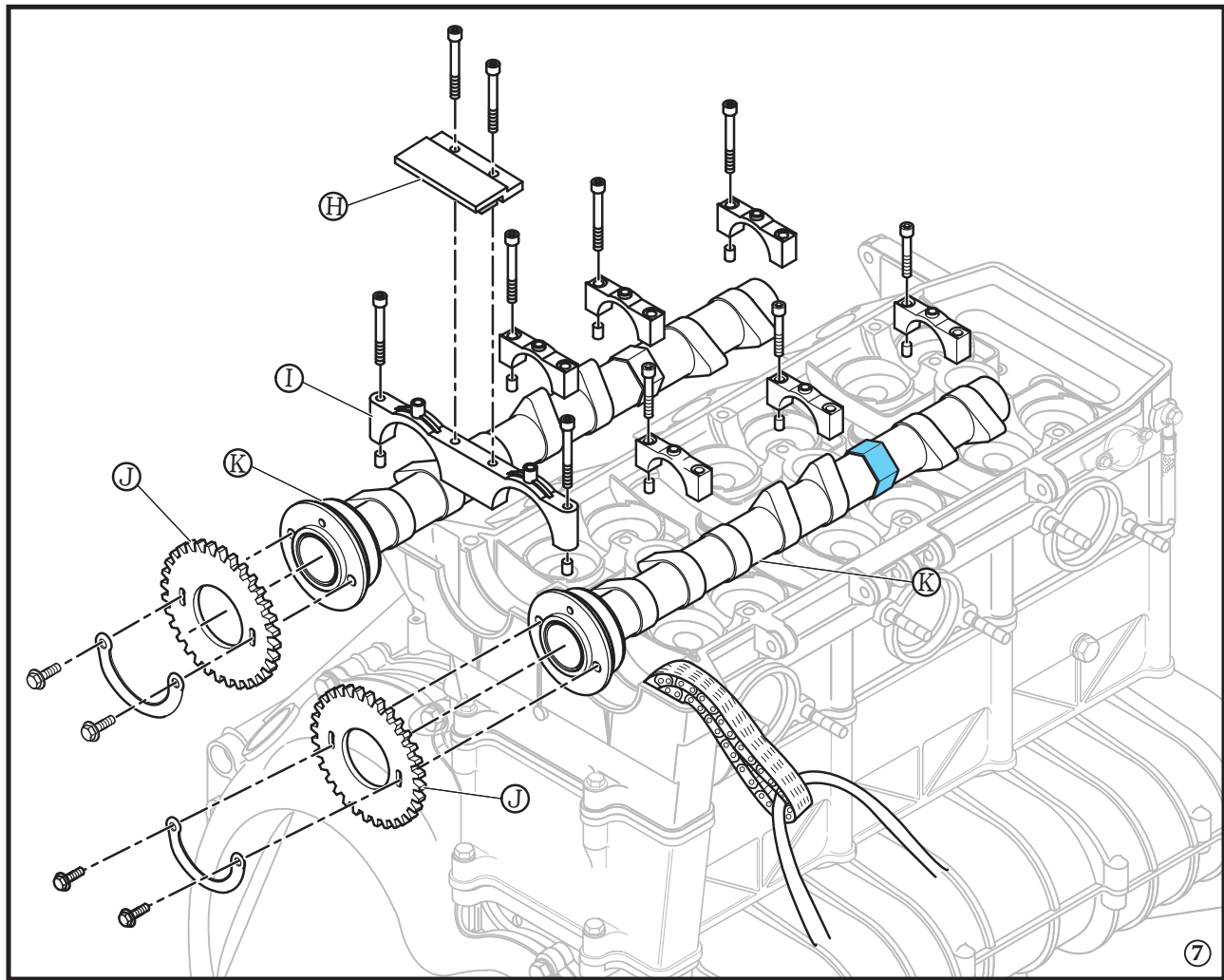
Drain Valve

0.30 ~ 0.35 mm (0.011 ~ 0.013 in)

NOTE:
If the valves clearance is incorrect, take note of the effectively detected value.



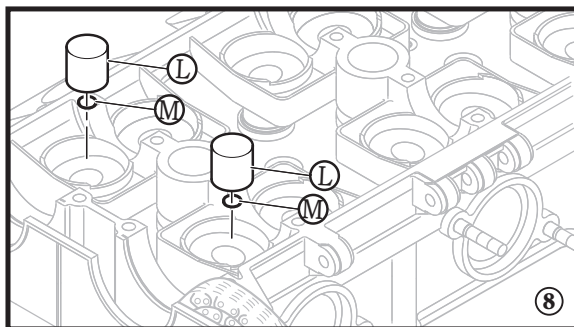
- ⑥ Remove:
- **the spring of the chain tensioner (F)**
 - **the chain tensioner (G)**
See "ENGINE 5.5" paragraph.



- ⑦ Remove:
- the upper chain slide (H)
 - the drain/inlet/central headgears (I)
 - the drain/inlet Z34 gears (J)
 - the drain/inlet cam shafts (K)
- See "ENGINE 5.8" paragraph.

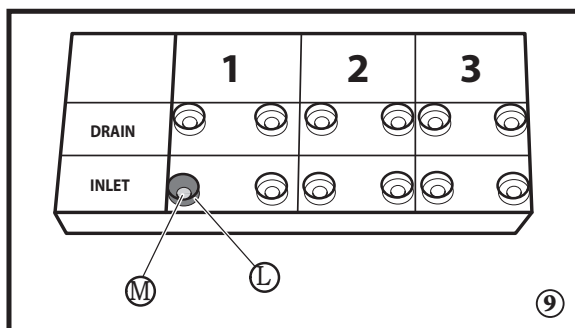
NOTE:
Take note of the position of each headgear in order to be able to re-assemble them in the correct position.

NOTE:
During removal of the cam shafts, tighten a metal wire to the distribution chain to be able to recover it in case it should fall in the base.

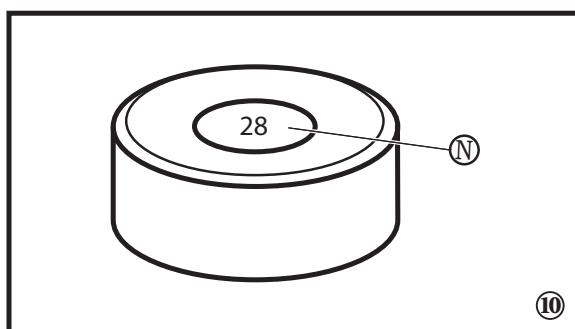


- ⑧ Remove:
- the drain/inlet valves lifters (L)
 - the drain/inlet calibrated pads (M)
- See "ENGINE 5.30" paragraph.

NOTE:
Cover the opening of the distribution chain using a cloth to avoid the calibrated pad from falling in the base.



NOTE:
Take note of the position of each valve lifter (L) and of each calibrated pad (M) to be able to re-assemble them correctly.



- ⑩ Measure:
• **the calibrated pad**
If out of specification → Replace it until the correct clearance is reached.
The thickness (N) of every calibrated pad is shown in hundredths of millimetre.



Valves Clearance

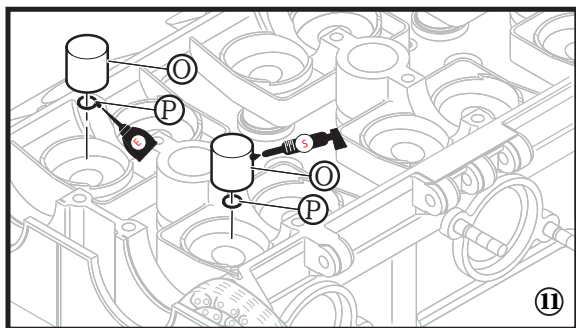
Inlet Valve

0.25 ~ 0.30 mm (0.009 ~ 0.011 in)

Drain Valve

0.30 ~ 0.35 mm (0.011 ~ 0.013 in)

HOW TO FIND THE VALUE OF THE NEW PAD	INLET	DRAIN
rule	example	example
1) Measure the thickness of the pad	0.35	0.37
2) Measure the valve clearance	0.22	0.31
3) Sum the thickness of the pad with the measured valve clearance	$0.35 + 0.22 = 0.57$	$0.37 + 0.31 = 0.68$
4) Subtract from the obtained sum (pad + clearance) the value of 0.30 mm (for inlet) the value of 0.35 mm (for drain)	$0.57 - 0.30$	$0.68 - 0.35$
5) The obtained value will be the measurement of the new pad	0.27	0.33



- ⑪ Install:
- the new drain/inlet calibrated pads ①
 - the new drain/inlet valves lifters ②
- See "ENGINE 5.33" paragraph.
- Check:
- the valves clearances
- If out of specification → Repeat the operations in the table.

NOTE:

- Lubricate the calibrated pad using engine oil.
- Lubricate the valve lifter using molybdenum disulphide grease.
- By manually rotating the valve lifter, it must turn smoothly.



NOTE:

Before installing, ensure that the engine shaft is in PMS of cylinder 1.

- ⑫ Install:
- the drain/inlet cam shafts
 - the drain/inlet Z34 gears
 - the distribution chain
 - the drain/inlet/central headgears
 - the upper chain slide
- See "ENGINE 5.13" paragraph.

Torque fasten the screws of the small plates on the drain/inlet Z34 gears

 15 N m - 1.52 Kgf•m

Torque fasten the screws of the drain/inlet/central headgears

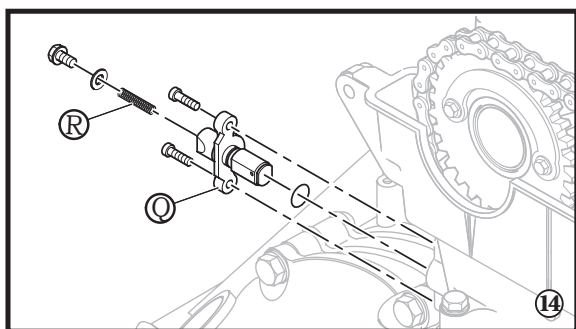
 6 + 13 N m - 0.61 + 1.32 Kgf•m

NOTE:

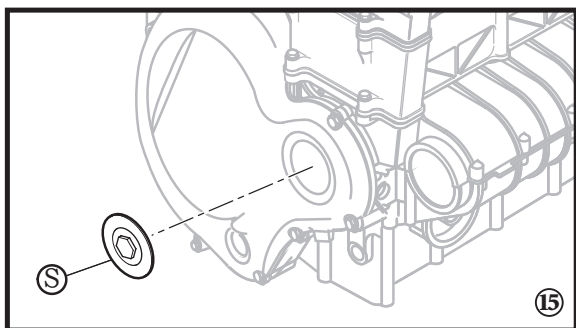
- Lubricate the bearings of the cam shafts, the lobes and the supports of the cam shafts.
- Firstly install the drain shaft.
- Align the marks on the cam shafts with the marks on the relative headgears.
- Have the engine shaft turn clockwise a few times to adjust the parts in the relative seats.



- ⑬ Measure:
- **the valves clearance again**
If still out of specification → Repeat the entire adjustment procedure until clearance is obtained.



- ⑭ Install:
- **the chain tensioner** ①
 - **the spring of the chain tensioner** ②
- See "ENGINE 5.7" paragraph.



- ⑮ Install:
- **the phonic wheel cap** ③

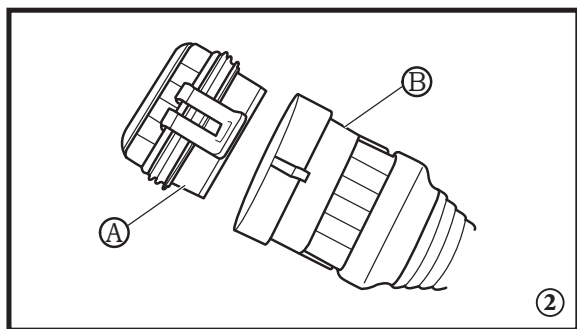
- ⑯ Install:
- **the gasket of the distribution lid**
 - **the distribution lid**
 - **the ignition spark plugs**
 - **the ignition reels**
- See "ENGINE 5.3" paragraph.

- ⑰ Install:
- **the stepper connector**
See paragraph "3.27".
 - **the radiator**
See "COOLING PLANT 6.4" paragraph.
 - **the air filter box**
See paragraph "3.13".
 - **the tank**
See "FRAME 4.119" paragraph.
 - **the seat**
See "FRAME 4.131" paragraph.

ENGINE MINIMUM POWER ADJUSTMENT

NOTE: Before adjusting the engine minimum power, adjust the throttled bodies and check that the engine has a suitable compression.

- ① Remove:
- **the seat**
- See "FRAME 4.130" paragraph.



- ② Remove:
- **the cap of the diagnostics socket (A)**
- Connect:
- **the diagnostics instrument**
- to the socket positioned underneath the seat (B)



Special Tools: DIAGNOSTICS INSTRUMENT
ENGINE INJECTION HANDLING - AXONE 2000
Code: R180197036000



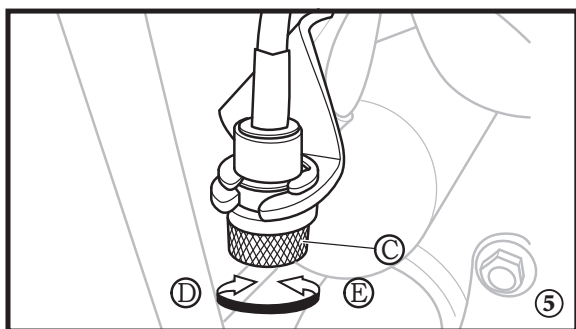
Special Tools: DIAGNOSTICS INSTRUMENT
ENGINE INJECTION HANDLING - BENDIA SCANTOOL
Code: R300082003000

- ③ Start:
- **the engine**
- and leave it to warm up for a few minutes.

- ④ Check:
- **the engine minimum power**
- If out of specification → Adjust.



Engine Minimum Power
1250 ~ 1350 r/min.



- ⑤ Adjust:
- **the engine minimum power**
- (a) Rotate the minimum adjusting screw (C) in (D) or (E) direction, until specified engine minimum power is obtained.

DIRECTION (D)	The engine minimum power decreases
DIRECTION (E)	The engine minimum power increases

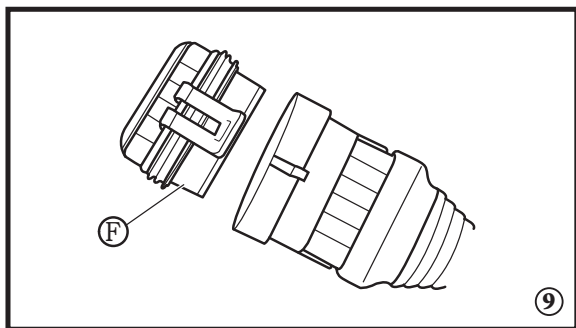
- ⑥ Adjust:
- **the accelerator cable clearance**
- See paragraph "3.16".



Accelerator cable clearance
(near the flange of the accelerator knob)
3 ~ 5 mm (0.11 ~ 0.19 in)

- ⑦ Turn-off:
- **the diagnosis instrument**
- following the instructions relating to the bike.

- ⑧ Disconnect:
- **the diagnostics connector**
- from the socket.



- ⑨ Install:
- the diagnostics socket cap ①

- ⑩ Install:
- the seat
- See "FRAME 4.131" paragraph.

ENGINE OIL LEVEL CONTROL

- ① Park:
- **the bike** levelled.

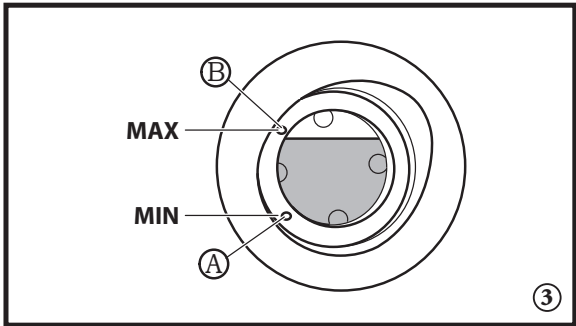
NOTE:

- **Place the bike on a suitable trestle.**
- **Ensure that the bike is in straight position.**

- ② Start:
- **the engine**
leave it to warm up for a few minutes, then turn it off.

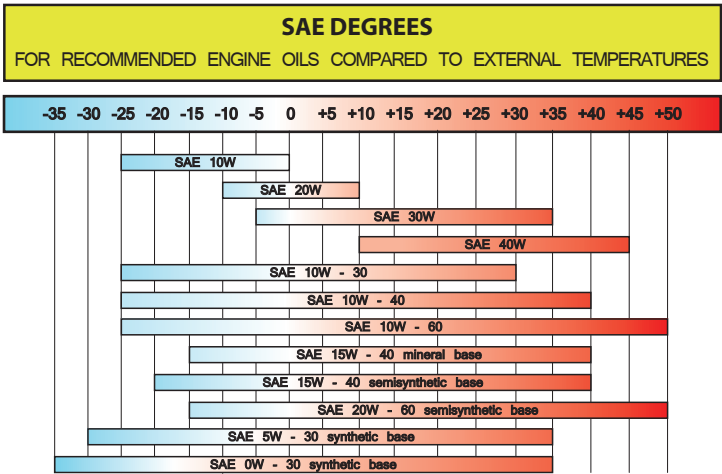
ATTENTION

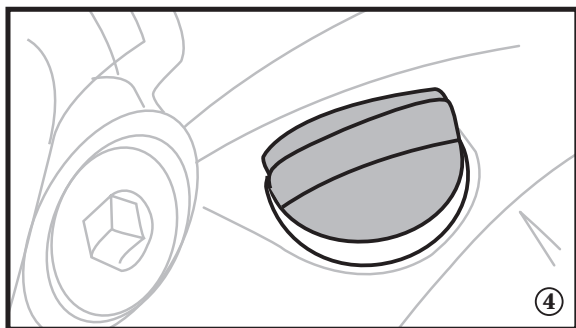
Do not start the engine if the oil is underneath MIN reference.



- ③ Check:
- **the engine oil level**
the engine oil level must be between the minimum level reference (MIN) ① and that of the maximum level (MAX) ② .
If below the minimum level notch → Top-up to the correct level using recommended engine oil.

	Recommended Oil SAE 10 W-50 API SJ - JASO MA
---	--





- ④ To top-up with engine oil loosen:
- **the oil cap** with the engine off
- Pour an amount of recommended oil until half the inspection hole between the MAX and MIN reference is reached.

ATTENTION

- Given that the engine oil also lubricates the clutch, if of unsuitable type or if containing additives, it may cause the sliding of the clutch. Therefore, we recommend not adding chemical additives and not using oil different to that shown in the technical specifications table of the engine. See "ROUTINE INSPECTIONS AND ADJUSTMENTS 2.2" paragraph.
- Avoid the entering of foreign bodies inside the base.
- The new or exhaust engine oil can be dangerous. In fact, swallowing it can be toxic for persons and domestic animals. In case of swallowing, immediately call the doctor and do not force vomiting in order to avoid inhaling the product in the lungs. Brief contact with the engine oil can irritate the skin.
- Keep the engine oil away from the reach of children and domestic animals.
- Wear clothing with long sleeves and waterproof gloves every time engine oil top-up is carried out.
- If the engine oil comes into contact with the skin wash with soap and water.
- Recycle or dispose of the exhaust engine oil correctly.

NOTE:

The engine contains approx. 3.5 litres of oil.
Use oil with API-SJ classification and SAE 10W/50 viscosity.

- ⑤ Tighten:
- **the oil cap**

NOTE:

To check the engine oil level again, start the engine, leave it to warm up for a few minutes then turn it off.
Wait a few minutes for the oil to flow downwards.

ENGINE OIL CHANGE AND FILTER REPLACEMENT

- ① Start:
- **the engine**
leave it to warm up for a few minutes, then turn it off.

- ② Remove:
- **the engine protection**
See "FRAME 4.120" paragraph.

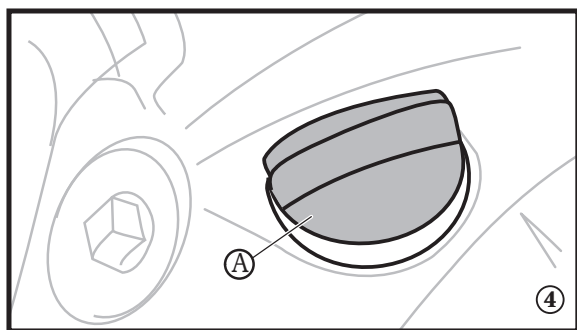
- ③ Position:
- **a suitable container**
underneath the magnetic cap for the recovery of the engine oil.

NOTE: _____
Initially replace the engine oil at 1000 Km (621 mi) and then every 10000 Km (6213 mi). _____

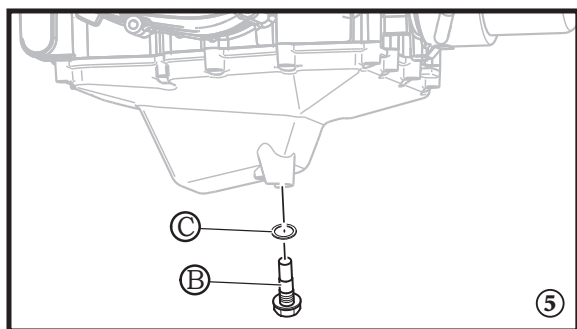
ATTENTION

The used oils are damaging for the environment. Dispose of the used oils according to the Standards in force. _____

- ④ Remove:
- **the oil cap** ①



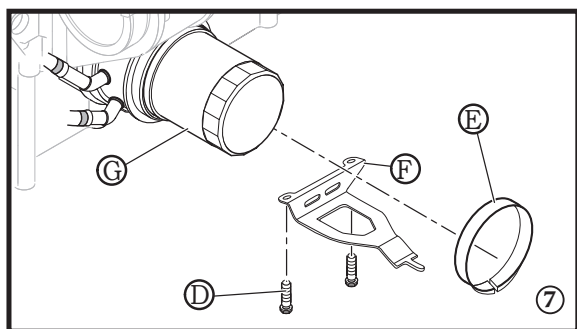
- ⑤ Remove:
- the magnetic cap ②
(together with the gasket ③)



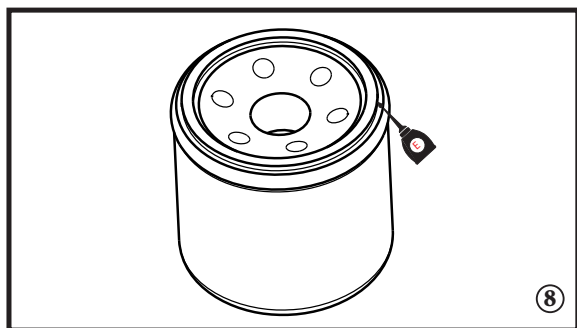
- ⑥ Drain:
- **the engine oil**
making it all flow from the base.

In case of having to also replace the cartridge of the oil filter, proceed as follows.

NOTE: Initially replace the oil filter at 1000 Km (621 mi) and then every 10000 Km (6213 mi) and, however, at every engine oil change.



- ⑦ Loosen:
- **the 2 screws** ①
- Remove:
- **the strip** ②
 - **the plate** ③
- See "COOLING PLANT 6.9" paragraph.
- Remove:
- **the oil filter** ④
using tool for oil filter removal.



- ⑧ **NOTE:** Before installing the new oil filter, apply a thin layer of engine oil on the contact surfaces of the same to lubricate it.

ATTENTION Only use the Benelli original oil filter (code R180107114000). Other brands of oil filters may differ with regard to the threading (diameter and step). The filtering performances and duration with consequent possible damages to the engine or oil leaks.

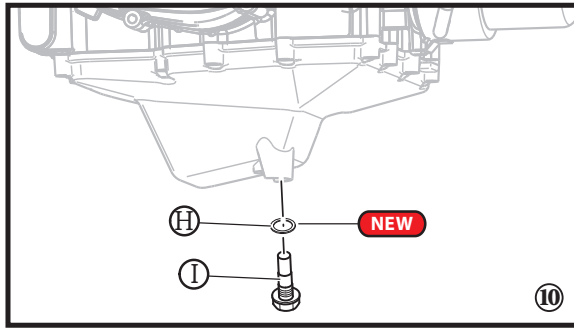


**Recommended lubricant
ENGINE OIL**

- ⑨ Fasten:
- **the oil filter**
using a suitable spanner.

Torque fasten:

 18 + 20 N m - 1.83 + 2.03 Kgfm



- ⑩ Replace:
- the gasket of the magnetic cap
- Install:
- the new gasket ⑨
 - the magnetic cap ①

Torque fasten:

22 N m - 2.24 Kgf·m

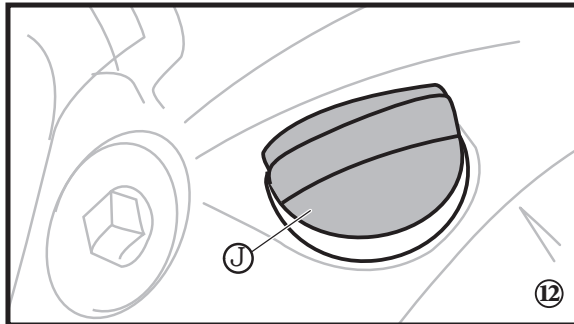
- ⑪ Fill:
- the base
- with recommended and specified amount of engine oil.



Total quantity
approx. 3.5 l

Amount without oil filter change
approx. 3.3 l

Amount with oil filter change
approx. 4.0 l



- ⑫ Install:
- the oil cap ①

- ⑬ Install:
- the engine protection
- See "FRAME 4.121" paragraph.

- ⑭ Start:
- the engine
- leave it to warm up for a few minutes, then turn it off.

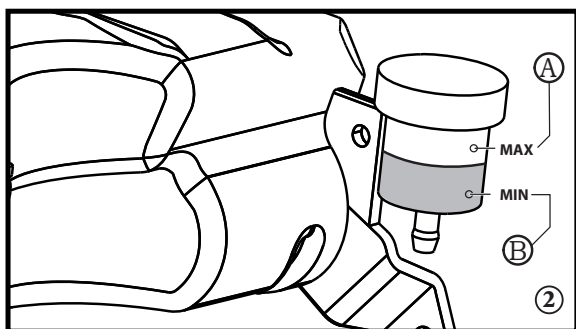
NOTE: _____
Always check that the level on the inspection hole
is halfway between MIN and MAX.
If required, restore the engine oil level. _____

COOLING LIQUID CONTROL

- ① Park:
 - **the bike** levelled.

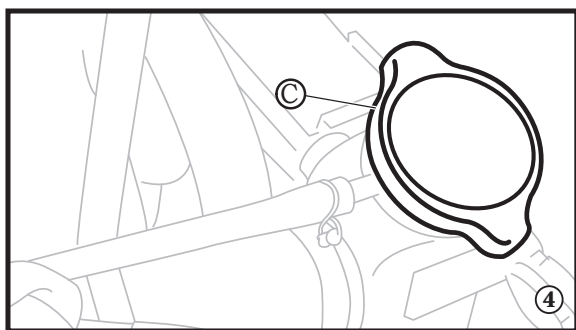
NOTE:

- **Place the bike on a suitable trestle.**
- **Ensure that the bike is in straight position.**



- ② Check:
 - **the cooling liquid level**
the cooling liquid level must be between the maximum level reference (MAX) (A) and that of the minimum level (MIN) (B).
If below the minimum level notch → top-up to the correct level using recommended cooling liquid.

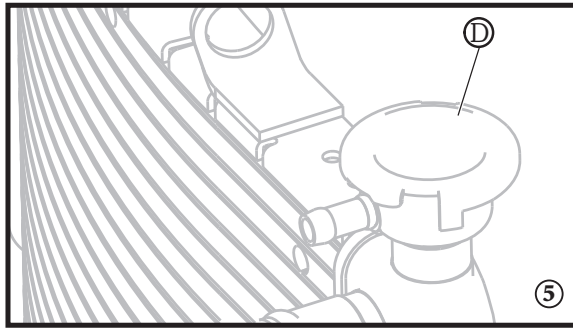
- ③ Remove:
 - **the right tank lid**
See "FRAME 4.112" paragraph.
 - **the engine protection**
See "FRAME 4.120" paragraph.



- ④ Remove:
 - **the radiator cap** (C)

WARNING

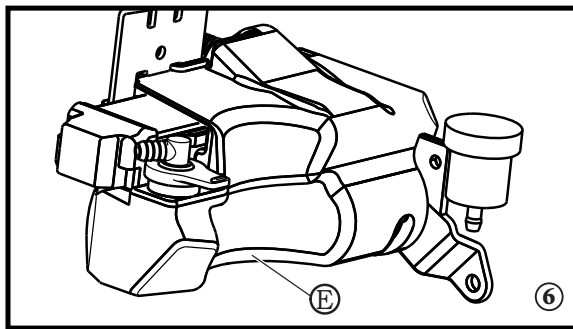
If the radiator is very hot, the liquid inside will be pressurised. Do not remove the radiator cap with the engine hot. Boiling hot liquid may leak, causing serious injuries. When the engine has cooled down, open the radiator cap as follows:
Position a towel on the radiator cap and slowly loosen the cap anti-clockwise to drain any residue pressure.
When the usual hiss is no longer heard, press on the radiator cap and loosen it anti-clockwise to remove it.



- ⑤ Fill:
- the cooling system (using the top-up nozzle ① up to the end of the same)

ATTENTION

- By adding water instead of cooling liquid, the percentage of anti-freeze contained in the cooling liquid decreases.
If water is used instead of cooling liquid check, and eventually correct, the concentration of anti-freeze in the liquid.
- Add only distilled water. However, soft water can be used if distilled water is not available.
- If the cooling liquid comes into contact with a painted surface, immediately wash it using water.



- ⑥ Check:
- **the cooling liquid level** using the expansion vessel ② .
Bring the reference level between MIN and MAX.

- ⑦ Install:
- **the radiator cap**

- ⑧ Start:
- **the engine**
leave it to warm up for a few minutes, then turn it off.
- Check:
- **the cooling liquid level**

NOTE:

Before checking the cooling liquid level, wait a few minutes for it to gather inside the expansion vessel.

- ⑨ Install:
- **the engine protection**
See "FRAME 4.121" paragraph.
 - **the right tank lid**
See "FRAME 4.113" paragraph.

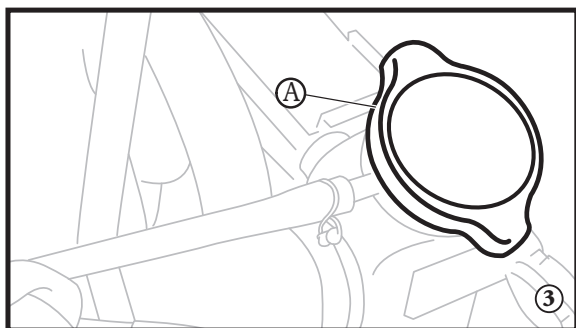
COOLING LIQUID CHANGE

- ① Park:
- **the bike** levelled.

NOTE:

- Place the bike on a suitable trestle.
- Ensure that the bike is in straight position.
- Carry out the following operations with the engine cold.

- ② Remove:
- **the right tank lid**
See "FRAME 4.112" paragraph.
 - **the engine protection**
See "FRAME 4.120" paragraph.

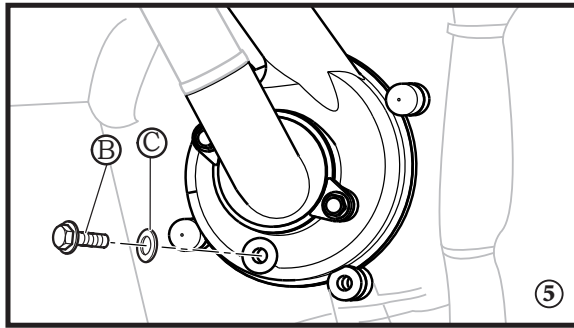


- ③ Remove:
- **the radiator cap** ①

WARNING

If the radiator is very hot, the liquid inside will be pressurised. Do not remove the radiator cap with the engine hot. Boiling hot liquid may leak, causing serious injuries. When the engine has cooled down, open the radiator cap as follows:
Position a towel on the radiator cap and slowly loosen the cap anti-clockwise to drain any residue pressure.
When the usual hiss is no longer heard, press on the radiator cap and loosen it anti-clockwise to remove it.

- ④ Arrange besides the bike:
- **a container**
with capacity above 4 l for the recovery of the exhausted liquid.



- ⑤ Remove:
- the liquid drain screw on the pump ⑤
 - the copper washer ⑥

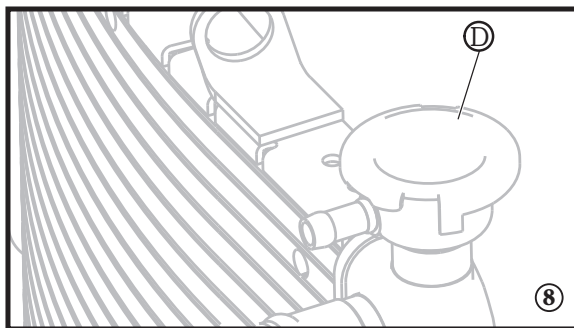
- ⑥ Drain:
- the cooling liquid
- leave the liquid to flow completely

- ⑦ Install:
- the copper washer
 - the liquid drain screw on the pump

NOTE: Always replace the copper washer with a new one.

Torque fasten:

10 N m - 1.01 Kg·m



- ⑧ Fill:
- the cooling system
- (using the top-up nozzle ⑧ up to the end of the same)

NOTE: Eventually press on the rubber tubes of the radiator or tilt the bike to both sides to eliminate air bubbles.



Recommended Anti-freeze

High quality, ethylene glycol based anti-freeze liquid with organic inhibition. In case of top-up with inorganic inhibition products, the benefits and features of the liquid decrease.

Mixing ratio

1:1 (anti-freeze: water)

Total quantity

2.50 l

Cooling liquid tub capacity

120 cc

Cooling liquid treatment

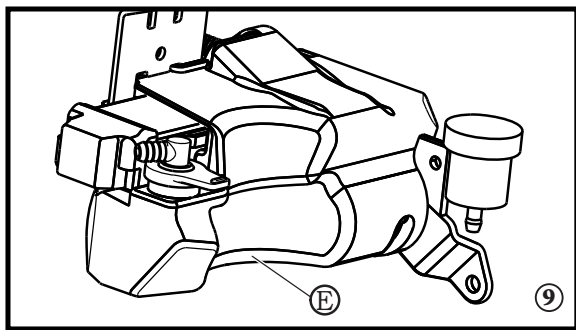
The cooling liquid is potentially toxic and must be handled with particular attention.

WARNING

- The cooling liquid top-up must always be carried out with a cold engine. Never attempt to remove the radiator cap when the engine is hot to avoid the risk of burns.
The circuit is pressurised.
 - If the cooling liquid should come into contact with the eyes, accurately rinse them with water and contact a doctor.
 - If the cooling liquid comes into contact with clothing, immediately remove the liquid using water and soap.
 - In case of swallowing the cooling liquid, force vomiting and immediately contact a doctor.
 - In certain conditions, the ethylene glycol contained in the cooling liquid is flammable and its flame is invisible.
- Avoid the cooling liquid coming into contact with hot parts, in that the consequent fuelling of the ethylene glycol might expose the operator to risks of burns.

ATTENTION

- By adding water instead of cooling liquid, the percentage of anti-freeze contained in the cooling liquid decreases.
If water is used instead of cooling liquid check, and eventually correct, the concentration of anti-freeze in the liquid.
- Add only distilled water. However, soft water can be used if distilled water is not available.
- If the cooling liquid comes into contact with a painted surface, immediately wash it using water.
- Never mix different types of anti-freeze.



- ⑨ Check:
- **the cooling liquid level**
using the expansion vessel (E).
Bring the reference level between MIN and MAX.

- ⑩ Install:
- **the radiator cap**

- ⑪ Start:
- **the engine**
- leave it to warm up for a few minutes, then turn it off.

- ⑫ Check:
- **the cooling liquid level**
- See paragraph "3.42".

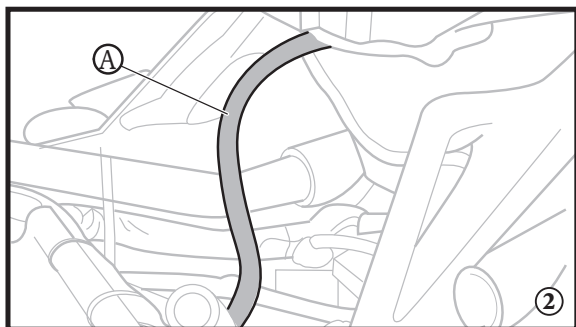
NOTE:

Before checking the cooling liquid level, wait a few minutes for it to gather inside the expansion vessel.

- ⑬ Install:
- **the engine protection**
See "FRAME 4.121" paragraph.
 - **the right tank lid**
See "FRAME 4.113" paragraph.

FUEL TUBE CONTROL AND REPLACEMENT

- Remove:
 - **the seat**
See "FRAME 4.130" paragraph.
 - **the tank**
See "FRAME 4.118" paragraph.
 - **the air box**
See paragraph "3.10".



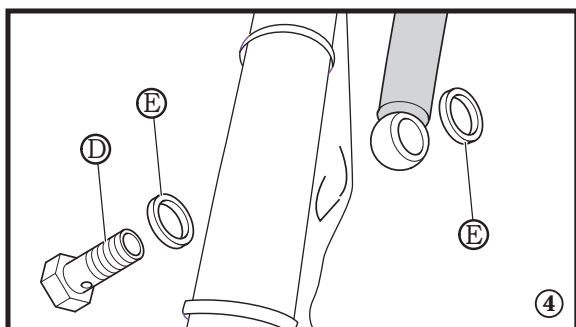
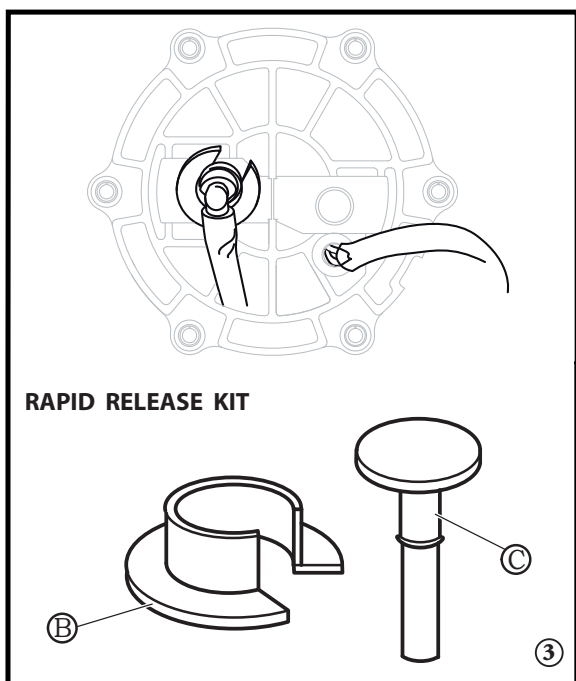
- Check:
 - **the fuel tube (A)**
In the presence of cracks/damages → Replace.
If there are loose connections → Connect them correctly.

TO REPLACE THE FUEL TUBE

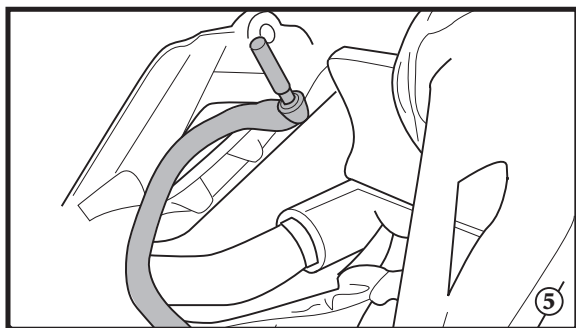
- Release:
 - **the fuel tube**
using the specific tool (B) and (C) .



NOTE:
 When using the special tool, the two flaps of the petrol pump must be pressed. Once the fuel tube is removed, insert the special tool (C) to avoid petrol leaking.
 However, place cloths underneath the disconnecting point.



- Remove:
 - **the screw (D)**
 - **the 2 washers (E)**
from the injectors flute.
 - **the fuel tube**



- ⑤ Replace:
- **the fuel tube**
- Install:
- **the 2 washers**
 - **the screw**

- ⑥ Release:
- **the special tool**
- Hook:
- **the new fuel tube**

- ⑦ Install:
- **the air box**
See paragraph "3.13".
 - **the tank**
See "FRAME 4.119" paragraph.

NOTE:

To install the tank, check that the fuel tube is not bent or crushed by the same tank.

- **the seat**
See "FRAME 4.131" paragraph.

NOTE:

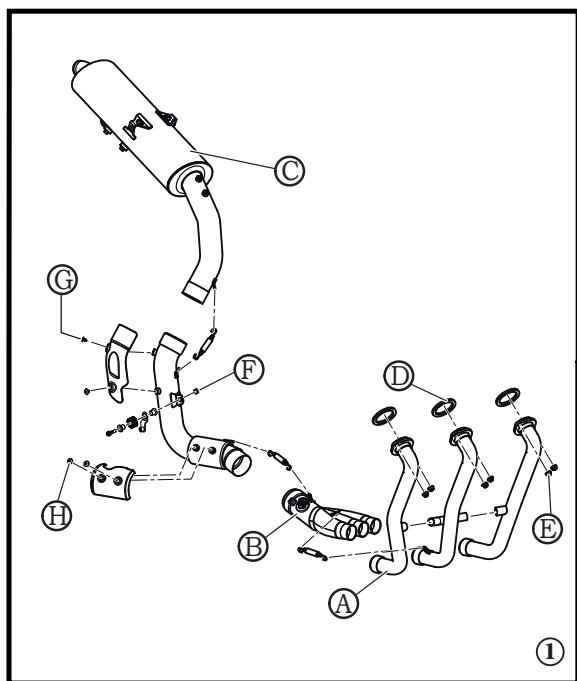
The fuel tube must be replaced every 20.000 Km or (12.427 mi).

DRAIN PLANT CONTROL AND REPLACEMENT

The following procedure is applied to all drain tubes and gaskets.

WARNING

Do not touch the silencing device bracket until the drain plant has cooled down.



- ① Check:
- the exhaust pipes (A)
 - the drain valve tube (B)
 - the silencing device (C)
In the presence of cracks/damages → Replace.
 - the gaskets (D)
In the presence of gas leaks → Replace.

Check:

- the fastening torques

	Nuts of the exhaust pipe (E) 15 N m - 1.52 Kgf·m Drain collector nut (F) 10 N m - 1.01 Kgf·m Drain collector thermal protection screws (G) 8 N m - 0.81 Kgf·m Drain collector nuts (H) 10 N m - 1.01 Kgf·m
---	--

TO REPLACE THE DRAIN PLANT

- ② Remove:
- the number plate bracket
See "FRAME 4.128" paragraph.
 - the seat
See "FRAME 4.130" paragraph.
 - the heat shield lid
See "FRAME 4.132" paragraph.
 - the right and left tank lids
See "FRAME 4.112" paragraph.
 - the tank
See "FRAME 4.118" paragraph.

- ③ Disconnect:
- **the lambda probe connector**
See "ELECTRIC PLANT 7.13" paragraph.
 - **the drain valve cable**
See "FRAME 4.157" paragraph.

- ④ Remove:
- **the entire drain unit**
See "FRAME 4.155" paragraph.

- ⑤ Replace:
- **the interested component**
with a new one.

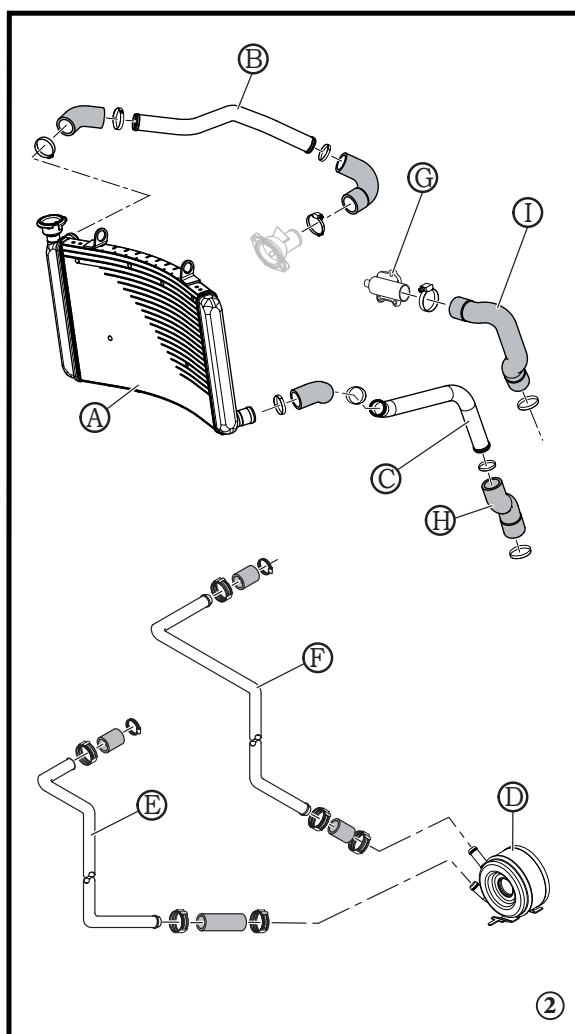
- ⑥ Install:
- **the entire drain unit**
See "FRAME 4.158" paragraph.

- ⑦ Connect:
- **the drain valve cable**
See "FRAME 4.157" paragraph.
 - **the lambda probe connector**
See "ELECTRIC PLANT 7.13" paragraph.

- ⑧ Install:
- **the tank**
See "FRAME 4.119" paragraph.
 - **the right and left tank lids**
See "FRAME 4.113" paragraph.
 - **the heat shield lid**
See "FRAME 4.133" paragraph.
 - **the seat**
See "FRAME 4.131" paragraph.
 - **the number plate bracket**
See "FRAME 4.129" paragraph.

COOLING SYSTEM CONTROL AND REPLACEMENT

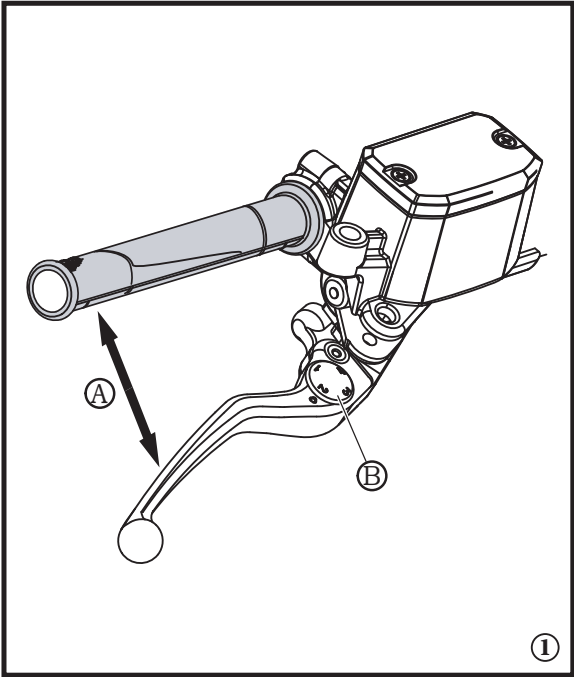
- ① Remove:
- **the alternator lid**
See "FRAME 4.120" paragraph.
 - **the right and left tank lids**
See "FRAME 4.112" paragraph.
 - **the tank**
See "FRAME 4.118" paragraph.



- ② Check:
- **the radiator** ①
 - **the radiator inlet tube** ②
 - **the radiator outlet tube** ③
 - **the water/oil exchanger** ④
 - **the oil exchanger inlet tube** ⑤
 - **the oil exchanger outlet tube** ⑥
 - **the cylinder inflow fitting** ⑦
 - **the water pump inlet sleeve** ⑧
 - **the water pump outlet sleeve** ⑨
- In the presence of cracks/damages → Replace.

TO REPLACE THE COOLING SYSTEM

- ③ Remove:
- **the cooling circuit**
See "COOLING PLANT 6.6" paragraph.
- ④ Replace:
- **the interested component**
with a new one.
- ⑤ Install:
- **the cooling circuit**
See "COOLING PLANT 6.7" paragraph.
- ⑥ Install:
- **the tank**
See "FRAME 4.119" paragraph.
 - **the right and left tank lids**
See "FRAME 4.113" paragraph.
 - **the alternator lid**
See "FRAME 4.121" paragraph.



FRONT BRAKE ADJUSTMENT

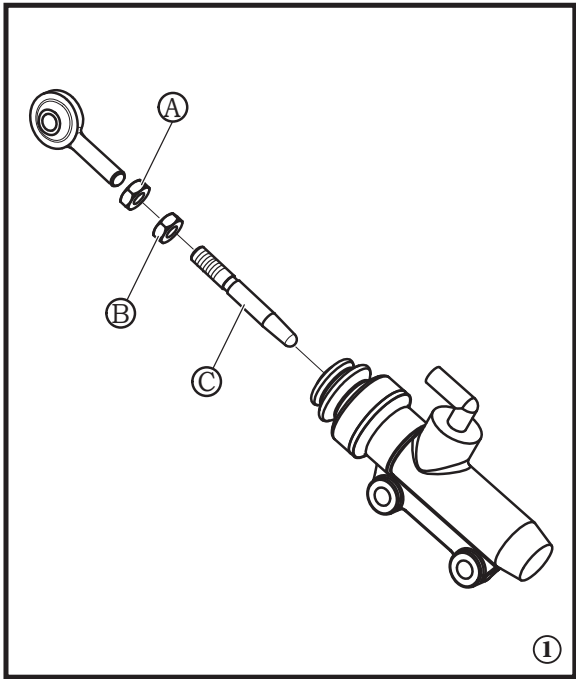
- ① Adjust:
- **the position of the brake lever**
(distance ① between the accelerator knob and the brake lever).

NOTE:
Push the brake lever forward to neutralise the push of the spring and simultaneously adjust the position by turning the ring nut ② clockwise or anti-clockwise, until the brake lever is in the wanted position.

POSITION	①	the distance is further away from the handle bar
POSITION	④	the distance is closer to the handle bar

WARNING
If the brake lever is soft or spongy to the touch, this may mean that there is air inside the braking system. Before using the vehicle, remove the air by bleeding the braking system. The presence of air inside the braking system significantly reduces the system performances and may cause loss of control of the vehicle and possible accidents. Therefore, check and, if required, bleed the braking system.

ATTENTION
After having adjusted the brake lever position, check there is no dragging of the brake.



REAR BRAKE ADJUSTMENT

- ① Adjust:
- the position of the brake pedal
- (a) Loosen the nut (A) and lock nut (B) .
- (b) Tighten or loosen the threaded pin (C) to increase or decrease the rear brake command clearance.

TIGHTENING	the clearance increases
LOOSENING	the clearance decreases

- (c) Tighten the nut (A)
- (d) Fasten the lock nut (B) to the specified value.

 16 N m - 1.63 Kgfm

WARNING

If the brake pedal is soft or spongy to the touch, this may mean that there is air inside the braking system. Before using the vehicle, remove the air by bleeding the braking system. The presence of air inside the braking system significantly reduces the system performances and may cause loss of control of the vehicle and possible accidents. Therefore, check and, if required, bleed the braking system.

ATTENTION

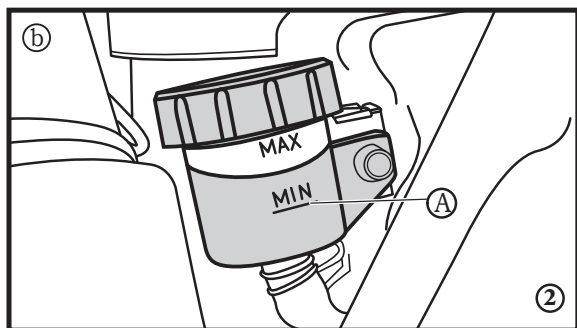
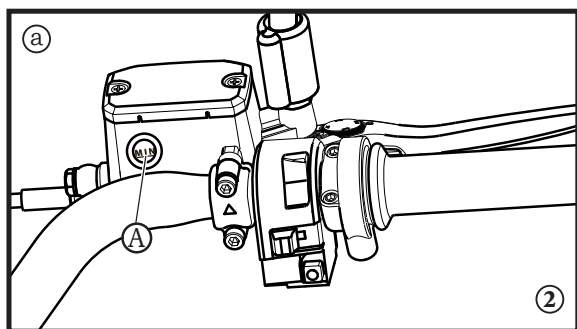
After having adjusted the brake pedal position, ensure there is no sticking of the brakes.

BRAKES LIQUID LEVEL CONTROL

- ① Park:
- the bike levelled

NOTE:

- Place the bike on a suitable trestle.
- Ensure that the bike is in straight position.



- ② Check:
- the brakes liquid level
- If below the minimum level notch (A) → Top-up to the correct level using the recommended brakes liquid.



- (a) Front brake
(b) Rear brake

WARNING

- Use only the prescribed brakes liquid. Other brakes liquids may be cause of deterioration of the rubber gaskets, causing leaks and unsuitable functioning of the braking system.
- Top-up using the same type of brakes liquid already present inside the plant. The mixing of different brakes liquids can cause a dangerous chemical reaction, able to determine a bad functioning of the braking system.
- During top-up, be careful not to let water flow inside the tub. Water would significantly lower the boiling point of the brakes liquid and may cause vapour bubbles.

ATTENTION

The brakes liquid can damage the painted surfaces and the plastic parts. Therefore, always immediately clean all brakes liquid spills.

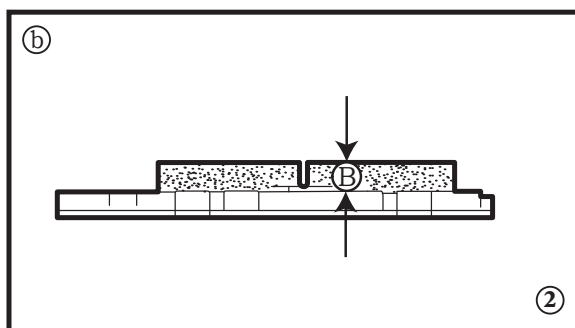
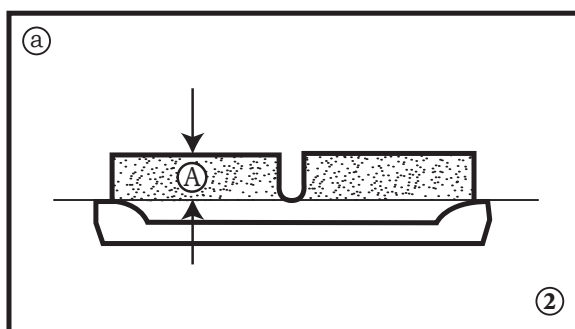
NOTE:

To assure the correct reading of the brakes liquid level, the end of the tub must be horizontal.

FRONT AND REAR BRAKE PADS CONTROL

The following procedure is applied to all brakes pads.

- ① Activate:
 - the brake



- ② Check:
 - the front brake pad
 - the rear brake pad
 - the wear limit of the front brake pads ① and rear ②

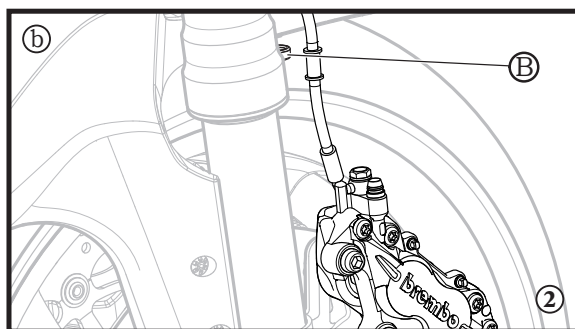
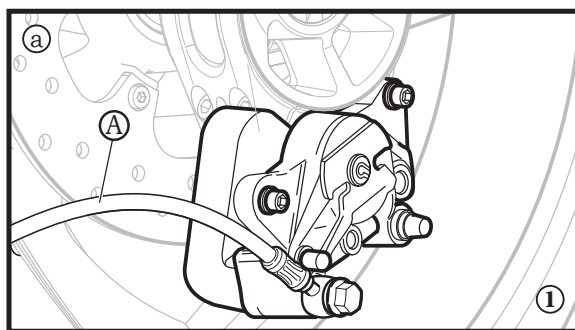
Wear limit reached → Replace all brake pads.
To replace the front brake pads see "FRAME 4.32" paragraph and installation "FRAME 4.36"; for the rear brake pads see "FRAME 4.34" paragraph and installation "FRAME 4.38".



Wear limit of the brake pads

Front	0.5 mm (0.01 in)
Rear	1.0 mm (0.03 in)

- ① Front brake
- ② Rear brake



BRAKING PLANT FLEXIBLE TUBES CONTROL

The following procedure is applied to all brakes flexible tubes and to the brakes tubes clamps.

- ① Check:
 - **the brake flexible tube** ①
 In the presence of cracks/damages/wear lines → Replace.
- ② Check:
 - **the clamp of the brake flexible tube** ②
 If loose → Fasten the clamp bolt.
- ③ Keep:
 - **the bike in straight position**
 Activate:
 - **the brake repeatedly**
- ④ Check:
 - **the brake flexible tube**
 In the presence of brakes liquid leaks → Replace the damaged flexible tube.

HYDRAULIC BRAKING SYSTEM BLEEDING

WARNING

Bleed the hydraulic braking system every time that:

- the system has been dismantled.
- a flexible tube of the brake is loosened, disconnected or replaced.
- the brakes liquid level is very low.
- the brake is faulty.

NOTE:

- Careful not to spill the brakes liquid or excessively fill the tub until it overflows.
- When bleeding the hydraulic braking system, check there is always a sufficient amount of liquid before engaging the brake. By ignoring this procedure, air may penetrate inside the braking plant, significantly extending the bleeding procedure.
- Should the bleeding operation be difficult, it may be necessary to let the brakes liquid rest for a few hours. Repeat the bleeding procedure when the bubbles inside the flexible have disappeared. —

① Bleed:

- the hydraulic braking system

- (a) Fill the brakes liquid tub to the correct level using the recommended brakes liquid.

WARNING

- Use only the prescribed brakes liquid. Other brakes liquids may be cause of deterioration of the rubber gaskets, causing leaks and unsuitable functioning of the braking system.
- Top-up using the same type of brakes liquid already present inside the plant. The mixing of different brakes liquids can cause a dangerous chemical reaction, able to determine a bad functioning of the braking system.



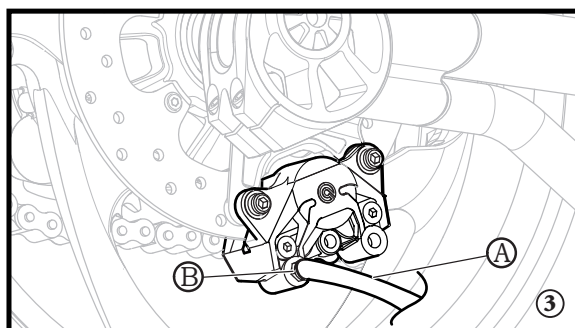
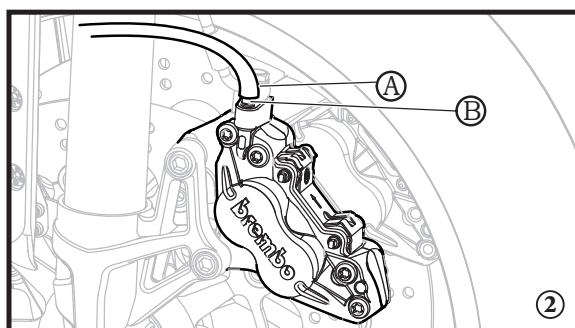
Recommended brakes liquid

TUTELA BRAKE FLUID

TOP 4 - DOT 4

ATTENTION

The brakes liquid may damage the painted surfaces and the plastic parts. Therefore, immediately clean all brakes liquid spills.



- (b) Install the brakes liquid tub diaphragm.
- (c) Connect a transparent plastic tube (A) by securely inserting it on the bleeding screw (B)
- ② Front brake calliper
③ Rear brake calliper
- (d) Insert the other end of the flexible tube inside a container.
- (e) Slowly activate the brake a few times.
- (f) Pull the brake lever completely, or press the brake pedal to the end, maintaining the reached position.
- (g) Loosen the bleeding screw.

NOTE:

By loosening the bleeding screw the pressure is released allowing the brake lever to reach the accelerator knob, or allowing the brake pedal to reach end run.

- (h) Fasten the bleeding screw and release the brake lever or pedal.
- (i) Repeat points (e) to (h) until the air bubbles have definitely disappeared from the brakes liquid visible in the plastic tube.
- (j) Fasten the bleeding screws to the specified value.

 10 N m - 1.01 Kg·m

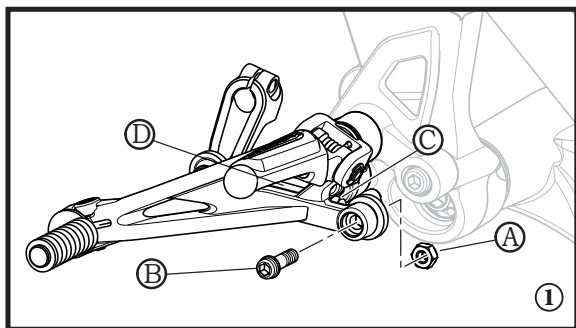
- Ⓚ Fill the brakes liquid tub to the correct level using the recommended brakes liquid.
See paragraph "3.55".

WARNING

After having bled the hydraulic braking plant, check the functioning of the brakes.

NOTE:

After having bled the air, brake liquid may drip on the threaded section of the bleeding screw. This does not indicate the presence of leaks but of brake liquid accumulated on the threading of the screw during air bleeding. Clean the interested parts.



ADJUSTMENT OF PEDAL OF THE GEAR CHANGE

- ① Adjust:
- the position of the gear change pedal
- Remove the nut ① and the screw ② .
 - Loosen the two nuts of the rod ③ .
 - Rotate the gears command rod ④ clockwise or anti-clockwise.

CLOCKWISE	the gear change pedal is lowered
ANTI-CLOCKWISE	the gear change pedal is lifted

- Once the gear change pedal adjustment is completed, fasten the rod nuts and fix the rod to the support using the previously removed screw and nut.

TRANSMISSION CHAIN LOOSENING ADJUSTMENT

NOTE:
Do not inspect or adjust the transmission chain with the engine running.

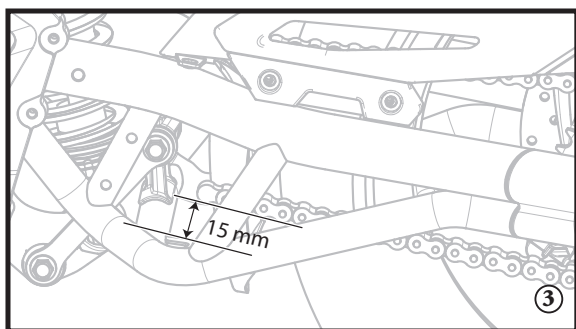
NOTE:
Check the loosening of the transmission chain where it seems more tensed.

WARNING
If the transmission chain is too tense, the engine and other vital parts will be overloaded, whereas if it is too loose, it can come away and damage the suspension arm or cause an accident. Therefore, we recommend maintaining the loosening of the chain within the specified limits.

- ① Park:
 - the bike levelled.

WARNING
Support the bike with adequate supports, so that it cannot fall and so that the rear wheel is lifted.

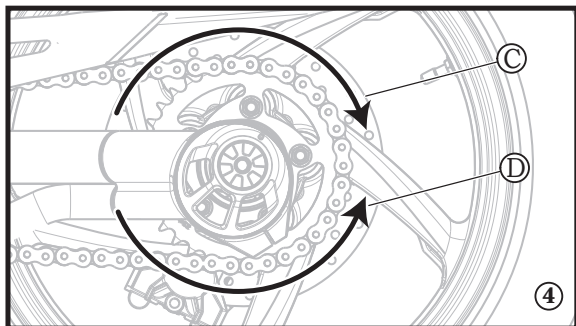
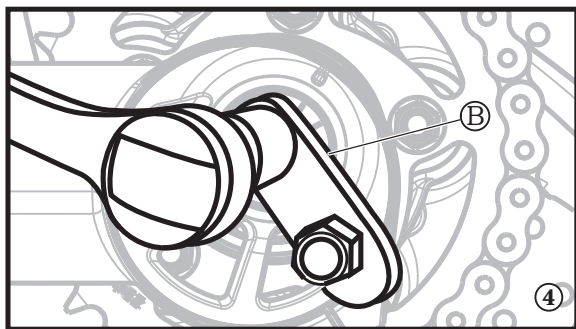
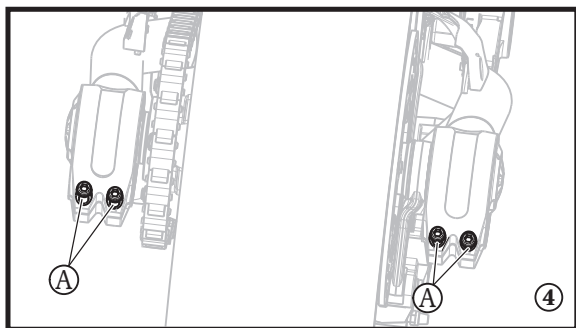
- ② Have the rear wheel turn repeatedly and identify the position in which the transmission chain is more tensioned.



- ③ Check:
 - the loosening of the transmission chain
 If out of specification → Adjust.



Loosening of transmission chain
15 mm (0.59 in)



- ④ Adjust:
• **the loosening of the transmission chain**

- a) Loosen the eccentric locking screws ① on both sides of the swing arm.
- b) Insert the specific tool ② inside the eccentric.



**Special Tools: TRANSMISSION CHAIN
REGULATOR SPANNER**
 Code: R300097147000

- c) Rotate the eccentrics in ③ or ④ direction until the specified loosening degree for the transmission chain is obtained.

DIRECTION ③	the transmission chain loosens
DIRECTION ④	the transmission chain tenses

NOTE: To maintain the correct alignment of the wheel, evenly adjust on both sides.

- d) Fasten both eccentric locking screws to the specified value.



Eccentric locking screws
 22 N m (2.24 Kg•m)

TRANSMISSION CHAIN LUBRICATION

The transmission chain is made of many parts interacting with each other.

The chain must be subject to correct maintenance otherwise it will rapidly wear out.

We therefore recommend subjecting the transmission chain to maintenance, in particular if using the bike in very dusty areas.

This bike is equipped with a transmission chain with small rubber O-Rings placed between one side plate and the other.

Do not use jets of vapour, high pressure water jets, aggressive solvents or brushes with very rough bristles, or these O-Rings will be damaged.

We therefore suggest cleaning the transmission chain with recommended products.

Dry the chain and accurately lubricate it using engine oil or specific lubricant for O-Ring chains.

Do not use other types of lubricants on the transmission chain, in that they might contain solvents that will damage the O-Rings.

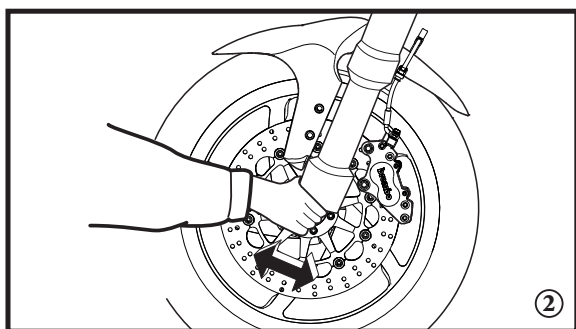
	Recommended lubricant SINTOFLO
---	---

- ① Apply:
- **a thin and even layer of lubricant** on the entire chain being careful not to reach the surrounding parts, in particular tyres.

STEERING TUBE CONTROL AND ADJUSTMENT

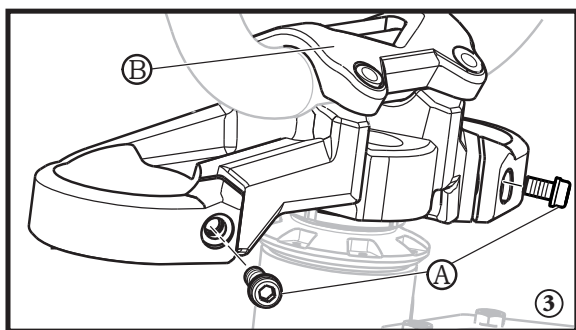
- ① Park:
- **the bike** levelled.

NOTE: _____
Place the bike on a trestle of adequate support so
that the front wheel is lifted. _____

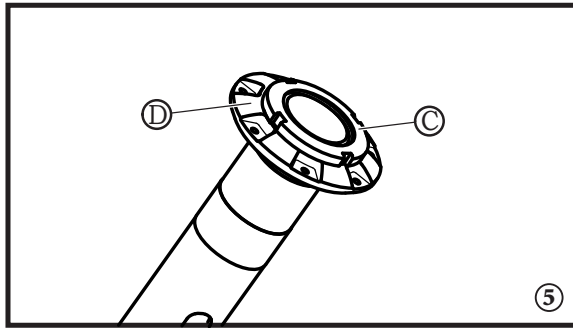


- ② Check:
- **the steering tube**
 Make the front fork oscillate delicately grabbing it by the tubes' ends.
 In the presence of jamming/loosening points →
 Adjust the steering tube.

- ③ Remove:
- **the handle bar**
 See "FRAME 4.77" paragraph.



- ④ Loosen:
- **the stop screws of the upper steering wheel plate** (A)
- Remove:
- **the upper steering wheel plate** (B)



⑤ Adjust:
• **the steering tube**

- a) Remove the kingpin ring nut ③.
- b) Loosen the steering ring nut ④, therefore fasten it to the specified value using the appropriate spanner



Special Tools: STEERING WHEEL RETURN RING SPANNER
Code: R180297129000

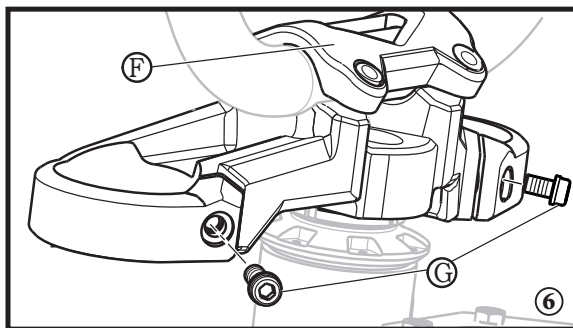


Fastening torque of steering ring nut
60 N m - 6.11 Kgf·m

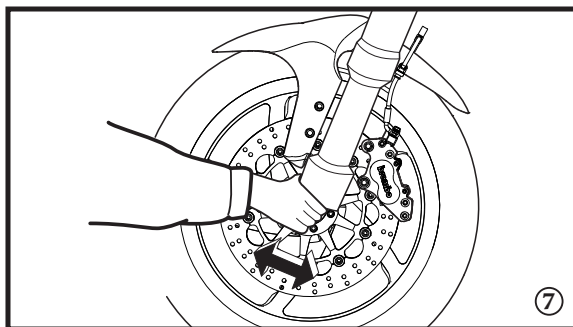
WARNING

Do not excessively fasten the steering ring nut._____

- c) Check that the steering tube is not loose and that it does not have jamming points, by turning the front fork to end run in both directions. If detecting jamming points, remove the lower steering wheel base and inspect the upper and lower bearings. See "FRAME 4.85" paragraph.



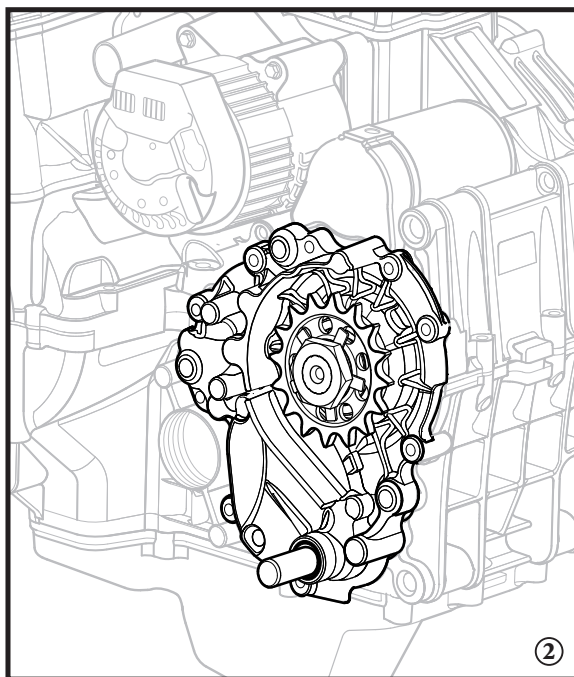
- ⑥ Install:
- **the upper steering wheel plate ⑥**
 - **the stop screws of the upper steering wheel plate ⑦**



- ⑦ Check:
- **the steering tube**
Make the front fork oscillate delicately grabbing it by the tubes' ends.
In the presence of jamming/loosening points → Repeat the operations to adjust the steering tube.

TRANSMISSION GEARS CONTROL AND REPLACEMENT

- ① Remove:
- **the clutch lid**
See "ENGINE 5.69" paragraph.
 - **the transmission chain**
See "FRAME 4.97" paragraph.



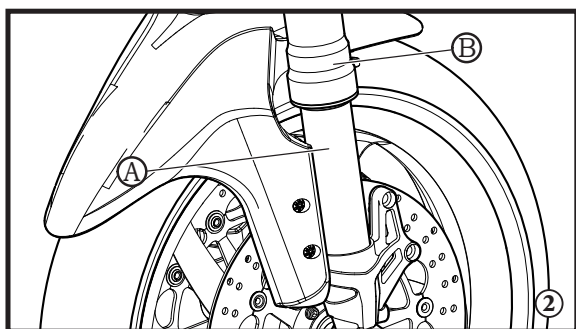
- ② Check:
- **the teeth of the conducting and conducted gears**
In the presence of damages or wear —→ Replace.

NOTE: In case of replacing the transmission chain, check that the conducting and conducted gears are in good state so as not to rapidly wear out the new chain.

FRONT FORK CONTROL

- ① Park:
- **the bike** levelled.

NOTE: Support the bike using suitable supports so that it cannot fall.



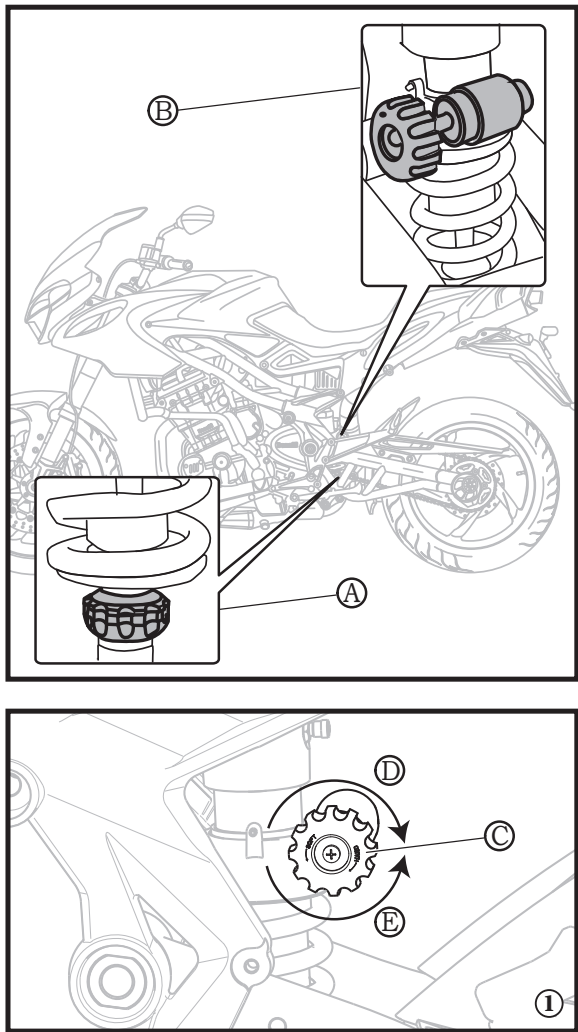
- ② Check:
- **the fork shank** ^A
 - **the fork sleeve** ^B
- In the presence of damages/scratches → Replace.
- **the oil retainer**
- In the presence of leaks → Replace.

- ③ Keep:
- **the bike** in straight position.
- Activate:
- **the front brake**

- ④ Check:
- **the functioning of the fork**
- Push a few times on the handle bar and check that the front fork smoothly returns backwards.
- If the movement is not smooth → Repair.
- See "FRAME 4.66" paragraph.

REAR SHOCK ABSORBER SET
ADJUSTMENT

NOTE: Support the bike using suitable supports so that it cannot fall.



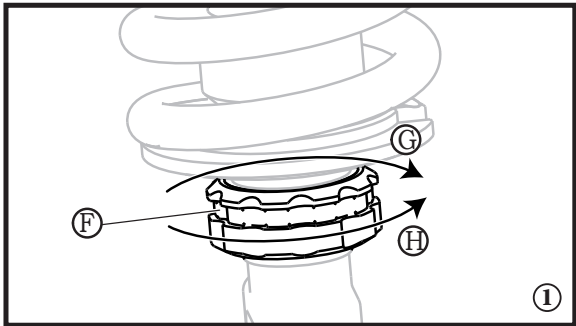
The rear shock absorber is equipped with external regulators to adjust the motorbike asset at the load conditions.
The regulator **A** , placed below, in correspondence of the lower fixing of the shock absorber to the swing arm, adjusts the hydraulic brake during the extending phase (return).
The regulator **B** adjusts the spring pre-load.

SPRING PRE-LOAD

- ① Adjust:
- the spring pre-load
- Ⓐ Rotate the adjusting screw **C** in **D** or **E** direction

DIRECTION D	the spring pre-load increases
DIRECTION E	the spring pre-load decreases

ADJUSTING POSITIONS
Minimum: 0
Standard: -17
Maximum: -30



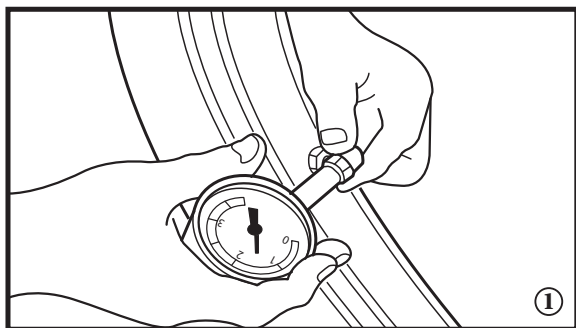
EXPANSION DAMPING

WARNING Never overstep the minimum or maximum adjusting positions.

- ① Adjust:
- the extension damping
- Ⓐ Rotate the adjusting screw ① in ② or ③ direction

DIRECTION ②	the extension damping increases (suspension is stiffer)
DIRECTION ③	the extension damping decreases (suspension is more springy)

ADJUSTING POSITIONS	
Minimum: 0	
Standard: 0	
Maximum: 10 mm	



TYRES CONTROL

The following procedure is applied to both tyres.

- ① Check:
- **the tyres pressure**
If out of specification → Adjust it.

WARNING

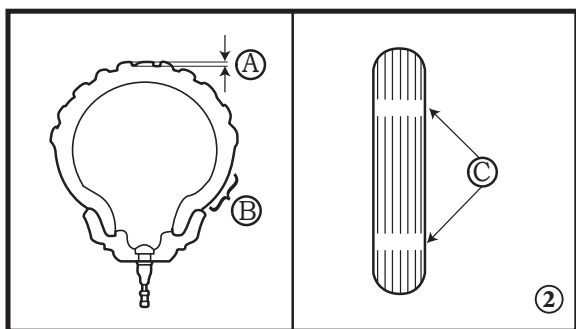
- **The tyres pressure must be checked and adjusted only when the temperature of the wheels is the same as the ambient temperature.**
 - **The tyres pressure and the suspension must be adjusted according to the total weight (including luggage, driver, passenger and accessories) and bearing in mind the envisioned gear speed.**
 - **The use of the overloaded bike may cause damages to the tyres, with the risk of an accident or injuries to persons.**
- NEVER OVERLOAD THE MOTORBIKE.**

Net Weight (with oil and fuel tank full)	240 Kg	
Maximum Load*	440 Kg	
TYRES PRESSURE WHEN COLD	FRONT	REAR
Up to 90 kg of load*	2.2 bar	2.4 bar
90 kg ~ maximum load*	2.3 bar	2.6 bar

* Including luggage, driver, passenger and accessories.

WARNING

It is dangerous to ride with the tread worn. If the tread reaches wear limit, immediately replace the tyre.



- ② Check:
- **the tyres surface**
In the presence of damages/wear → Replace the tyre.

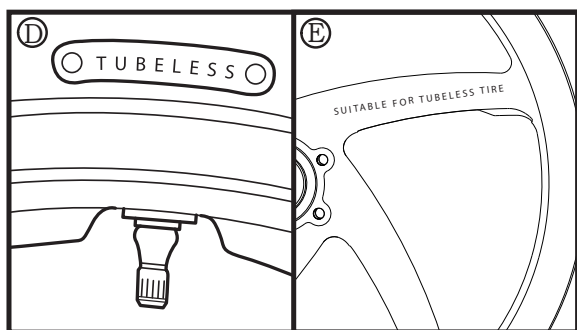


Minimum tread depth
45 N m - 4.58 Kgf•m

- Ⓐ Tread depth
- Ⓑ Side wall
- Ⓒ Wear signal device

WARNING

- Do not use "tubeless" type tyres on rims designed only for tyres with air chamber, so as to avoid the risk of tyre braking with consequent injuries to persons caused by the sudden deflating.
- If using tyres with air chamber, remember that the correct type of air chamber must be installed.
- Always replace both the tyre and the air chamber together.
- To avoid nipping the air chamber, ensure that the rim band and the air chamber are correctly centred on the wheel groove.
- We recommend patching the air chamber in case of perforation. Use maximum care and replace the air chamber as soon as possible using an excellent quality spare part.



- D Tyre
 E Wheel

Wheel with air chamber	Only tyre with air chamber
Wheel without air chamber	Tyre with or without air chamber

WARNING

After various tests, the tyres shown below have been approved by Benelli Q.J. s.r.l. for this model. The front and rear tyres must be of the same drawing and the same brand. No road behaviour guarantee can be given if a combination of tyres different to that approved by Benelli is used.

Front tyre

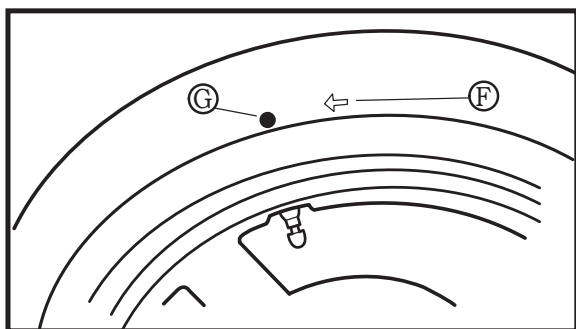
MANUFACTURER	MEASURE	MODEL
Dunlop	120/70 ZR17 58W	SPORT MAX ROADSMART

Rear tyre

MANUFACTURER	MEASURE	MODEL
Dunlop	180/55 ZR17 73W	SPORT MAX ROADSMART

WARNING

If the tyres are new, they will have a relatively modest grip on the road until they have worn slightly. Therefore, we recommend driving the first 100 km at normal speed, before increasing speed.



NOTE:

Tyres with indication of rotary direction **F** :

- Install the tyre with the mark facing the rotary direction of the wheel.
- Align the mark **G** with the installation point of the valve.

WHEELS CONTROL

The following procedure is applied to both wheels.

- ① Check:
 - **the wheel**
See "FRAME 4.5" paragraph for the front wheel; the
"FRAME 4.20" paragraph for the rear wheel.
In case of damage/ovalisation → Replace.

WARNING

Never attempt any kind of repairs on the wheel. —

NOTE:

If a tyre or a wheel has been replaced or removed and re-assembled, it is always necessary to carry out wheel balancing. —

CABLES CONTROL AND LUBRICATION

The following procedure is applied to all cables and relative sheaths.

WARNING

If an external cable is damaged, it may corrode and cause interferences in the movement. Replace any damaged cables and sheaths as soon as possible.

- ① Check:
 - **the external cable**
In the presence of damages → Replace.

- ② Check:
 - **the functioning of the cables**
If the movement is not smooth → Lubricate.

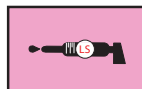


**Recommended lubricant
ENGINE OIL**

NOTE:
Keeping the end of the cable upwards, pour a few drops of lubricant inside the sheath or use an appropriate lubrication device.

LEVERS AND PEDALS LUBRICATION

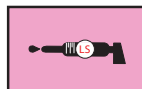
Lubricate the rotary points and the levers and pedals metal parts subject to contact during movement.



**Recommended lubricant
TUTELA MR2 GREASE**

SIDE TRESTLE LUBRICATION

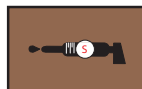
Lubricate the rotary points and the side trestle metal parts subject to contact during movement.



**Recommended lubricant
TUTELA MR2 GREASE**

LUBRICATION OF THE REAR SUSPENSION

Lubricate the rotary points and the rear suspension metal parts subject to contact during movement.



**Recommended grease
SINTOFLON**



BATTERY CHARGE AND CONTROL

WARNING

The batteries generate a nitrogen based explosive gas and contain electrolyte, which is made of sulphuric acid, a poisonous and highly caustic substance.

Therefore, the following precautions must always be complied with:

- Wear the protection glasses when handling the battery or working near it.
- Recharge the battery in an adequately aired area.
- Keep the batteries away from fire, sparks or naked flames (for example: welding tools, lit cigarettes).
- DO NOT SMOKE when recharging or handling a battery.
- KEEP THE BATTERIES AND THE ELECTROLYTE AWAY FROM CHILDRENS REACH.
- Avoid the electrolyte coming into contact with body parts, in that it may cause serious burns or permanent injuries to the eyes.

FIRST AID IN CASE OF PHYSICAL CONTACT:

EXTERNAL CONTACT

- Skin: wash with water.
- Eyes: Wash with running water for 15 minutes and immediately contact a doctor.

SWALLOWING

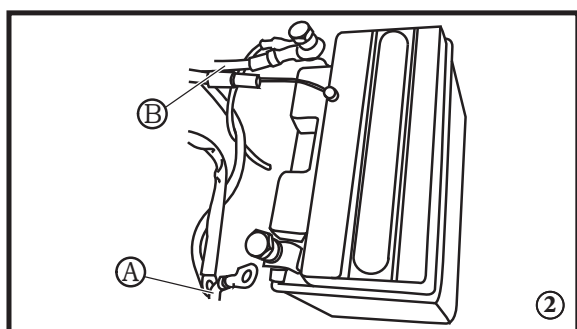
- Drink large amounts of water or milk, therefore magnesium milk, beaten eggs or vegetable oil. Immediately contact a doctor.

ATTENTION

- This battery is sealed. Do not remove the sealing caps, as the balance between the cells would not be maintained and the battery performances would suffer the consequences.
- The time, amperage and voltage for charging the above battery are different to those of conventional batteries. Charge the battery as shown in the explanatory illustrations. If the battery is overcharged, the level of the electrolyte decreases significantly. Therefore, pay maximum attention during battery charging.

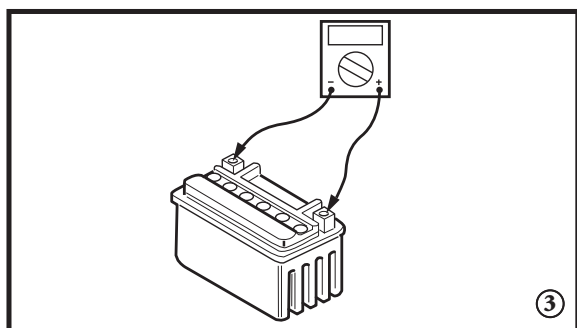
NOTE: _____
Given that the battery is sealed, it is not possible to check the charge state by measuring the density of the electrolyte.
Therefore, the battery charge must be controlled by measuring the voltage on the terminals of the same battery. _____

- ① Remove:
 - **the seat**See "FRAME 4.130" paragraph.



- ② Disconnect:
 - **the battery cables**from the terminals.

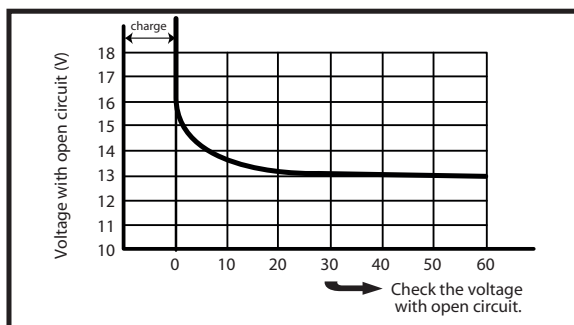
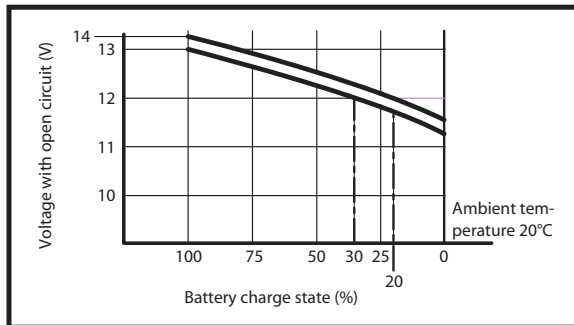
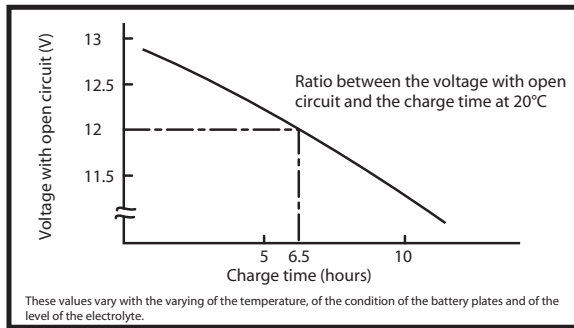
ATTENTION _____
Firstly disconnect the battery negative cable ① , therefore, the positive cable ② . _____



- ③ Disconnect:
 - **the battery**Check:
 - **the battery charge**

- a) Connect a pocket tester to the battery terminals.

Positive pointer of tester	→	Positive terminal of the battery
Negative pointer of tester	→	Negative terminal of the battery



- ⑥ Check the battery charge as shown in the tables of the following example.

NOTE:

- The charge state of a battery can be checked by measuring its voltage with open circuit (meaning the existing voltage when the positive terminal is disconnected).
- If the voltage with open circuit is the same or above 12.8 V, no charging is required.

Example

- ⑦ Voltage with open circuit = 12.0 V
- ⑧ Charge time = 6.5 hours
- ⑨ Battery charge = 20 ~ 30%
- ④ Charge:
- the battery (see the illustration with the appropriate charging method).

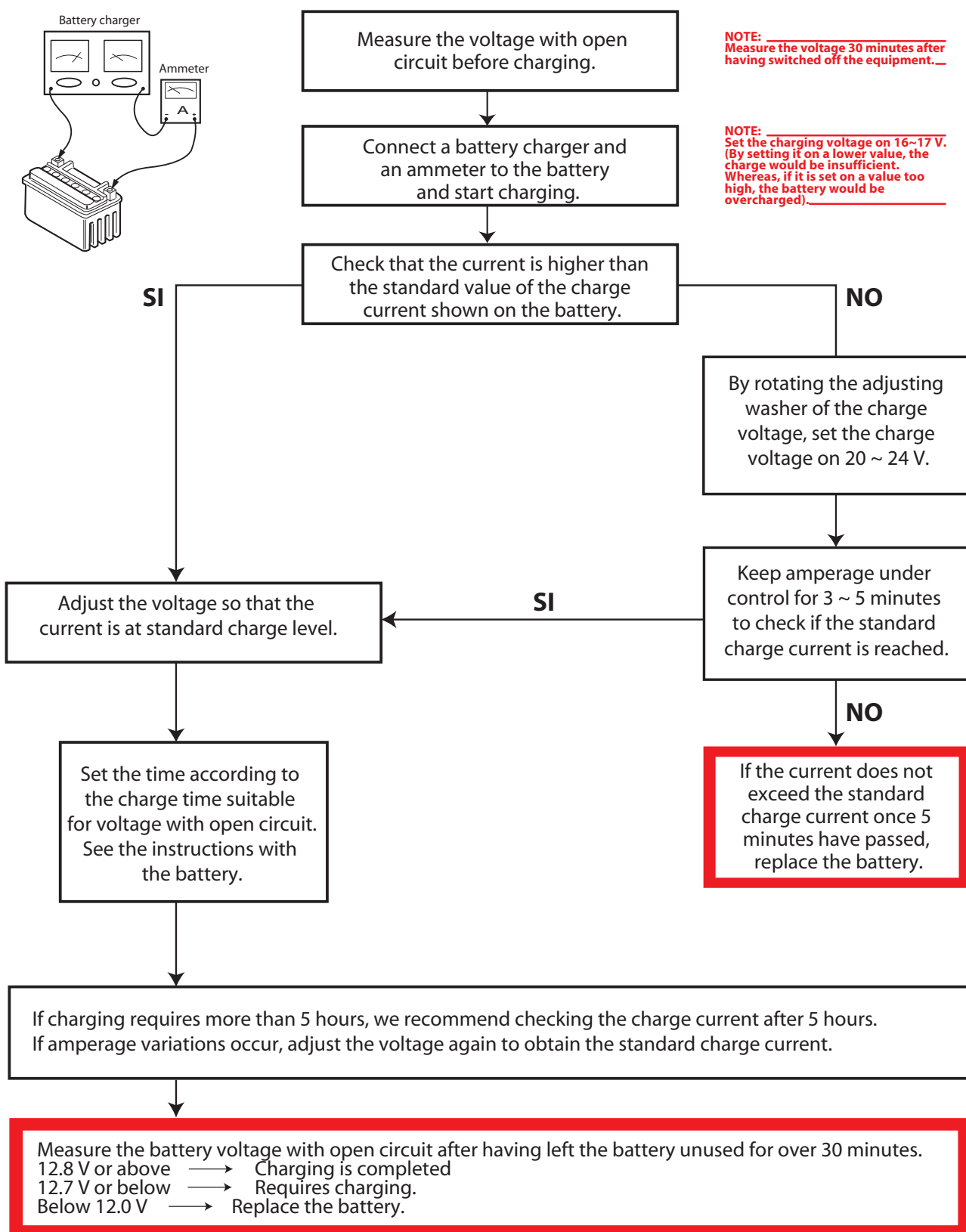
ATTENTION

Do not submit the battery to rapid charge.

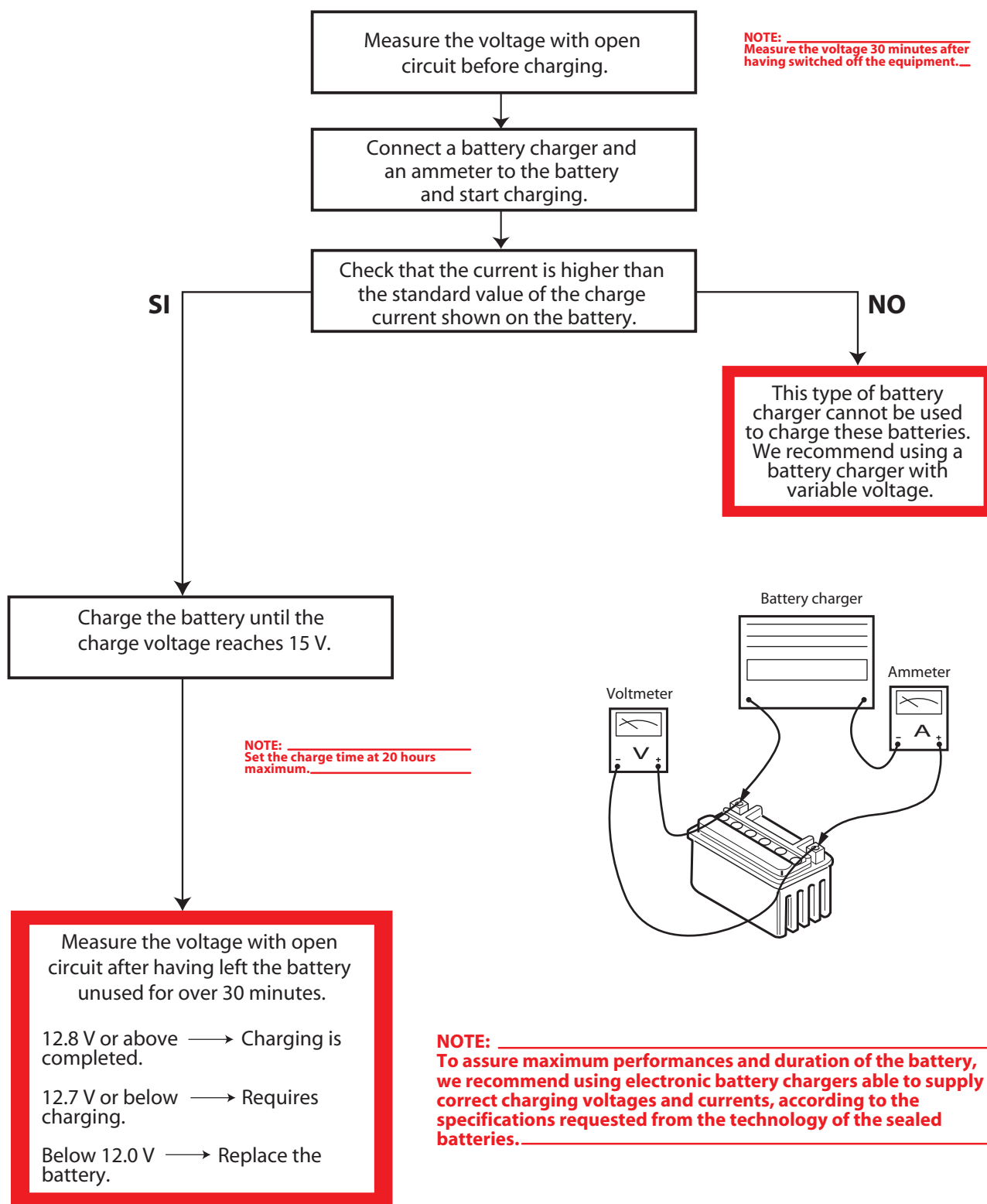
WARNING

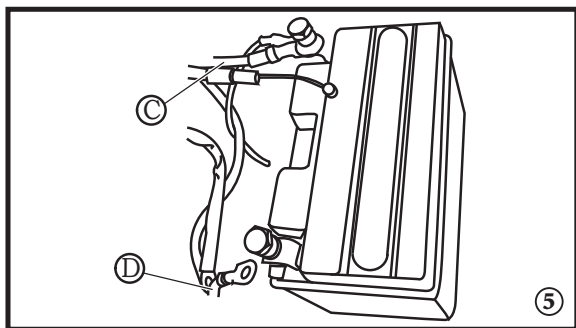
- Never remove the caps sealing the battery.
- Do not use rapid battery chargers as these insert the battery with high amperage current at high speed, therefore the battery may overheat and its elements be damaged.
- Should it be impossible to adjust the charge current of the battery charger, pay attention not to overcharge the battery.
- For charging, the battery must be disconnected from the bike. (Should it be necessary to charge the battery when connected to the bike, disconnect the negative cable from the battery terminal).
- To reduce the possibility of sparks being produced, connect the battery charger to the power supply network only after having connected the battery cables.
- Before disconnecting the cables clamps of the battery charger from the battery terminals, remember to switch off the battery charger.
- Ensure that the cables clamps of the battery charger are in full contact with the battery terminals and are not in short circuit. A corroded clamp can generate heat in the contact area and an inefficient clamp spring can cause sparks.
- If the battery heats up during the charging process, disconnect the battery charger and leave the battery to cool before continuing the operation. The batteries that heat up can explode!!
- As shown in the following illustrations, the voltage with open circuit of a battery stabilises approximately 30 minutes after charging has completed, before measuring the voltage with open circuit.

Charging method with a battery charger of variable current (voltage) type



Charging method with a battery charger of constant voltage type





- ⑤ Install:
- **the battery**
- Connect:
- **the battery cables**
(to the battery terminals)

ATTENTION

Firstly connect the battery positive cable ③ ,
therefore, the negative cable ④ .

- ⑥ Check:
- **the battery terminals**
- In the presence of dirt → Clean using a metal brush.
If there are loose connections → Connect them correctly.

- ⑦ Lubricate:
- **the battery terminals**



**Recommended grease
ENGINE OIL**

- ⑧ Install:
- **the seat**
- See "FRAME 4.131" paragraph.

FUSES CONTROL

The following procedure is applied to all fuses.

ATTENTION

If having to check or replace the fuses, to avoid a short circuit, always switch off the main switch by turning it to "OFF".

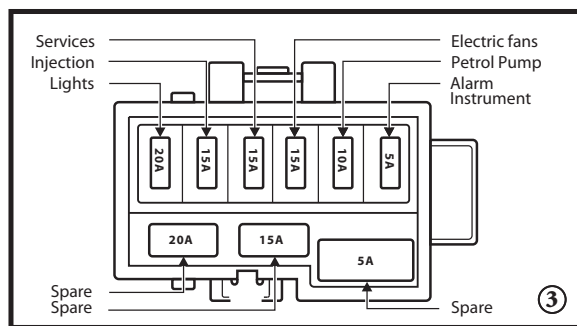
- ① Remove:
 - **the seat**
See "FRAME 4.130" paragraph.
 - **the object compartment**
See "FRAME 4.132" paragraph.

- ② Check:
 - **the fuse**
 - ⓐ Connect a pocket tester to the fuse to check its continuity.

NOTE:

Set the pocket tester selector on " $\Omega \times 1$ ".

- ⓑ If the pocket tester indicates " ∞ ", replace the fuse.
- ③ Replace:
 - **the burnt fuse**
 - ⓐ Turn the main switch to "OFF".
 - ⓑ Install a new fuse with correct amperage.
 - ⓒ Switch on the switches to check that the electric circuit works.
 - ⓓ If the fuse immediately burns, check the electric circuit.



Fuses	Amperage	Quantity
Alarm Instrument	5 A	1
Petrol Pump	10 A	1
Electric fan	15 A	1
Services	15 A	1
Injection	15 A	1
Lights	20 A	1
Spare	20 A	1
Spare	15 A	1
Spare	5 A	1

WARNING

Never use a fuse with amperage different to that specified. The use of improvised techniques or fuses with different amperage can cause irreversible damages to the electric plant, cause faults in the lights and ignition system functioning, and eventually cause a fire.

- ④

Install:

 - the object compartment
See "FRAME 4.134" paragraph.
 - the seat
See "FRAME 4.131" paragraph.

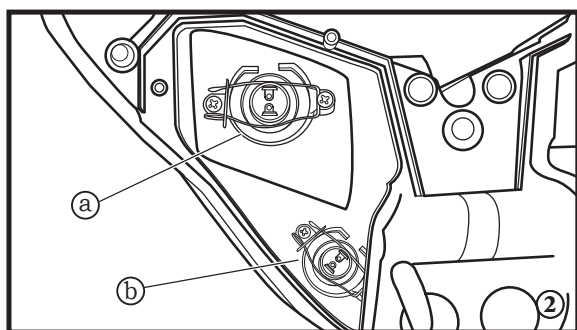
FRONT LIGHTS REPLACEMENT

The following procedure is applied to both the front lights.

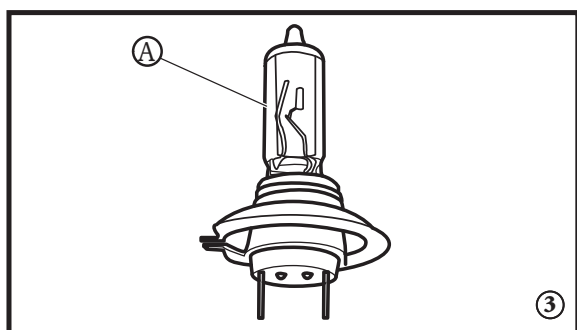
ATTENTION

Given that the projector bulb reaches very high temperatures, we recommend not touching it with the hands until it has cooled down.

- ① Remove:
 - the fixing screws
 - the right and left inspection lids



- ② Disconnect:
 - the connectors of the lamp to be replaced
 - a) High beam
 - b) Dipped beam



- ③ Release:
 - the fixing spring
 Extract:
 - the lamp A

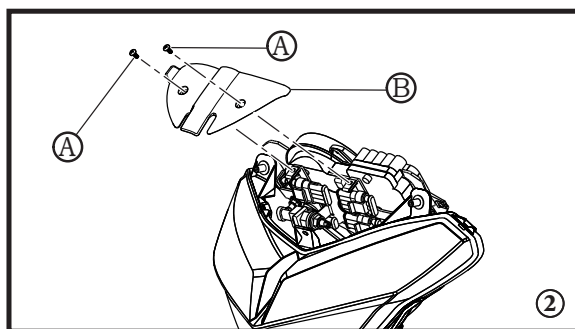
ATTENTION

Avoid touching the glass part of the projector lamp to keep it clean from any oil trace. On the contrary, the glass transparency, the duration of the bulb, the luminosity of the projected light beam may be affected. If the bulb becomes dirty, accurately clean it using a cloth wet with alcohol or thinner for enamel.

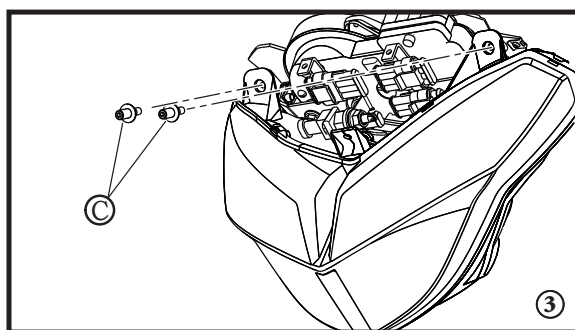
- ④ Install:
- **the new lamp**
- and fix it using the fixing spring.
- ⑤ Connect:
- **the connectors of the new lamp**
- ⑥ Connect:
- **the right and left inspection lid**
 - **the fixing screws**

FRONT HEADLIGHT REMOVAL

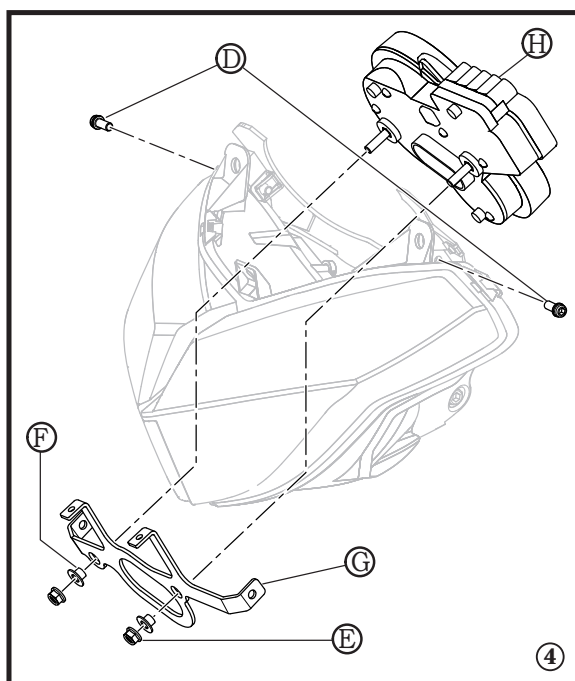
- ① Remove:
- the right and left tank lids
See "FRAME 4.112" paragraph.
 - the mobile and fixed cap
See "FRAME 4.110" paragraph.



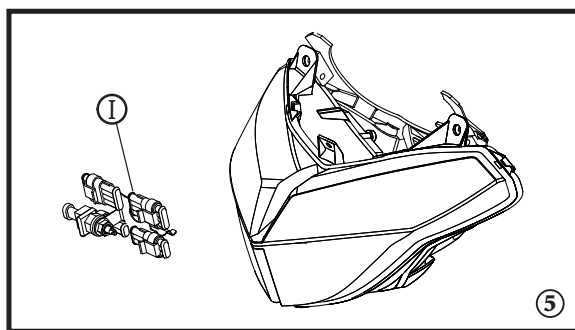
- ② Remove:
- the self-locking screws (A)
 - the equipment lid (B)



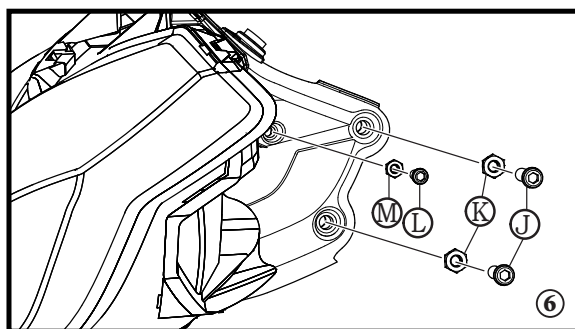
- ③ Remove:
- the lamp inspection lids
 - the headlight fixing pins (C)



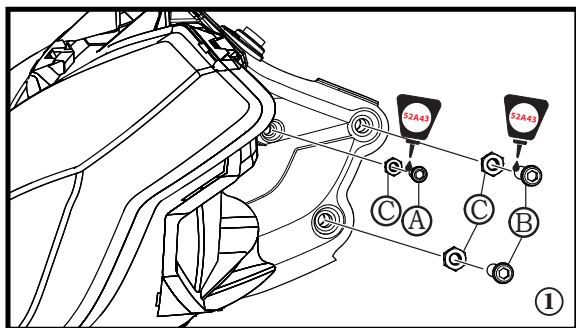
- ④ Remove:
- the side screws (D)
 - the nuts (E)
 - the bushes (F)
 - the equipment support (G)
 - the odometer instrument (H)



- ⑤ Release:
- the headlight connectors ①



- ⑥ Remove:
- the screws for headlight fixing on the frame ①
 - the nuts ②
 - the central screw ③
 - for closing right and left frame
 - the nut ④



FRONT HEADLIGHT INSTALLATION

- ① Install:
- the central screw ① for closing right and left frame
 - the screws ② for headlight fixing on the frame
 - the nuts ③

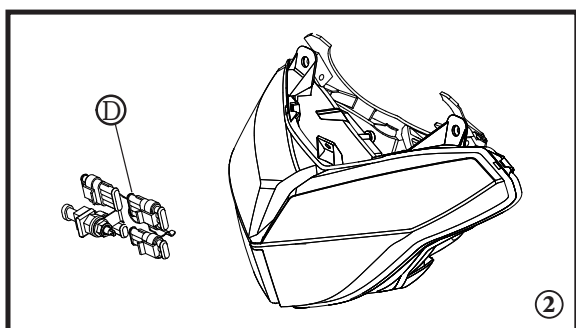
Recommended thread brakes:



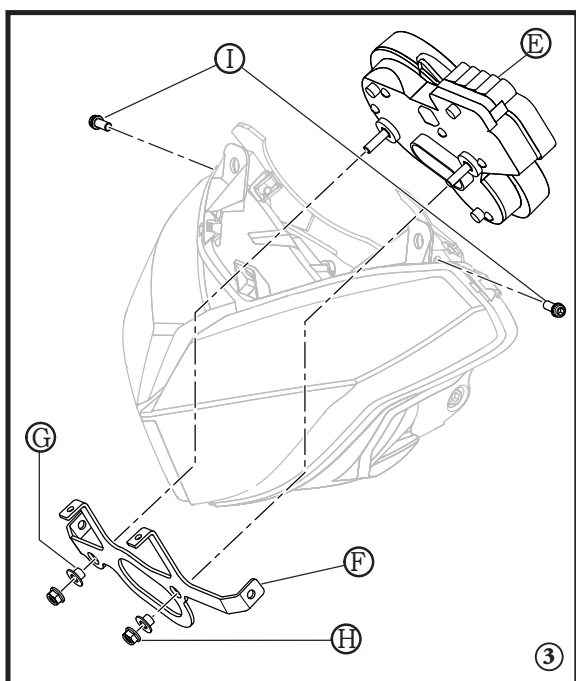
AREXONS SYSTEM 52A43
MEDIUM THREAD BRAKES

Torque fasten the screw ①  10 N m - 1.01 Kg·m

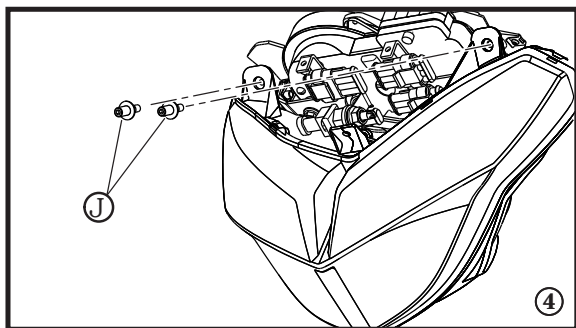
Torque fasten the screws ②  22 N m - 2.24 Kg·m



- ② Connect:
- the headlight connectors ①



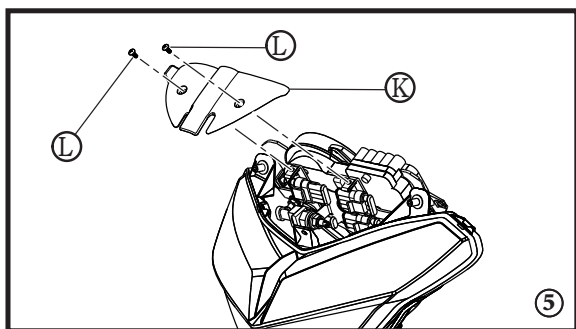
- ③ Install:
- the odometer instrument ①
 - the equipment support ②
 - the bushes ③
 - the nuts ④
 - the side screws ⑤



- ④ Install:
- the headlight fixing pins ①
 - the lamp inspection lids

Torque fasten the pins ①

 10 N m - 1.01 Kgf·m



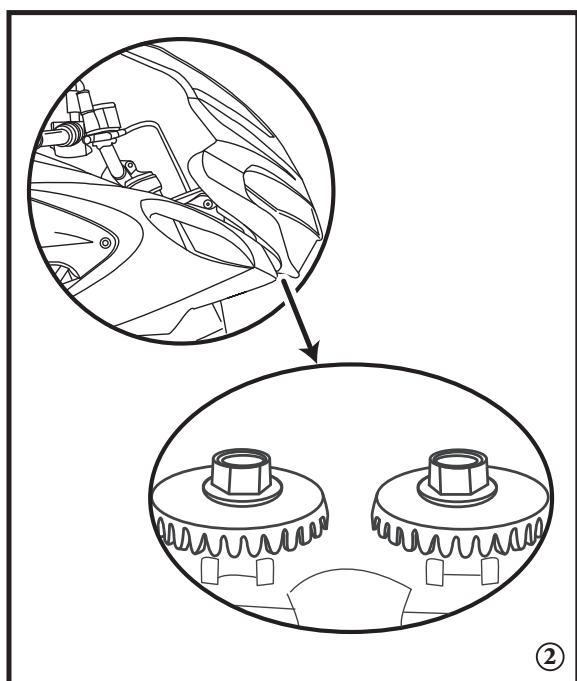
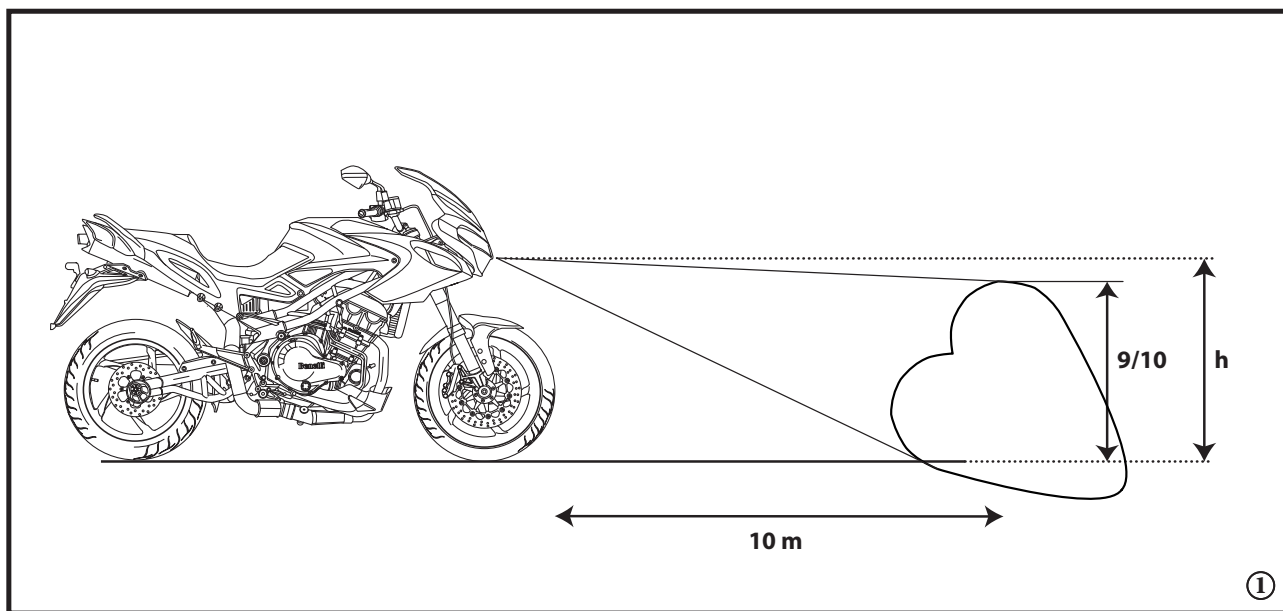
- ⑤ Install:
- the equipment lid ②
 - the self-locking screws ③

- ⑥ Install:
- the mobile and fixed cap
See "FRAME 4.111" paragraph.
 - the right and left tank lids
See "FRAME 4.113" paragraph.

FRONT HEADLIGHT ADJUSTMENT

- ① To correctly adjust the luminous beam projected from the front headlight:
 - position the vehicle at approximately 10 meters from a vertical wall on a perfectly levelled ground;
 - sit on the vehicle in driving position;
 - check that the upper limit of the luminous beam projected on the vertical wall is lower by approximately 1/10 compared to the horizontal axis of the headlights.

If the luminous beam is not compliant with this indication, adjust until the luminous beam is in the correct position.

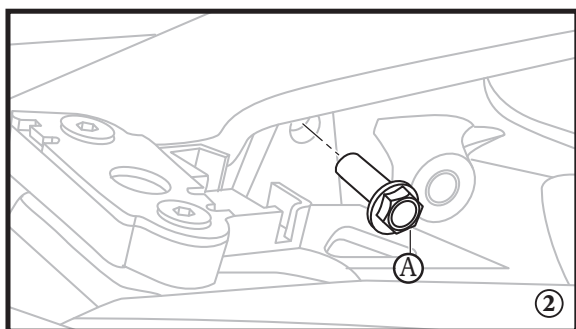


- ② Adjust:
 - **the projector light beam**
 - by acting on the two right and left dish regulator screws positioned underneath the headlight.

The headlight has the possibility of adjusting the right and left dishes separately; by loosening the luminous beam lifts, by tightening the luminous beam lowers.

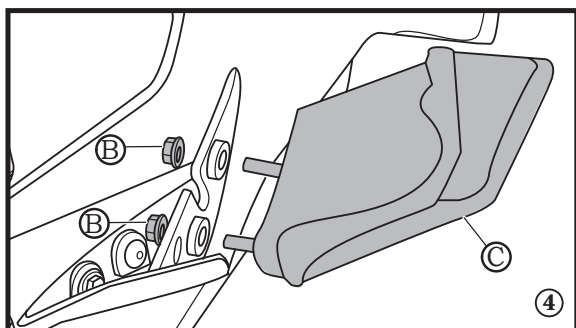
REAR HEADLIGHT REPLACEMENT

- ① Remove:
- **the seat**
See "FRAME 4.130" paragraph.
 - **the heat shield lid**
See "FRAME 4.132" paragraph.
 - **the number plate bracket**
See "FRAME 4.128" paragraph.
 - **the silencing device**
See "FRAME 4.155" paragraph.



- ② Loosen:
- **the silencing device screws (A)**
and lower it to enable the headlight to come out.

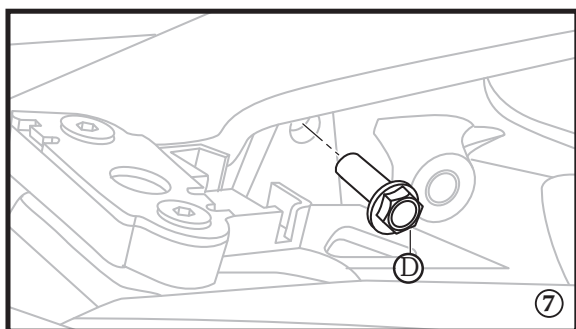
- ③ Cut:
- **the wiring locking strip**
- Release:
- **the headlight connector**



- ④ Remove:
- **the nuts (B)**
 - **the headlight (C)**

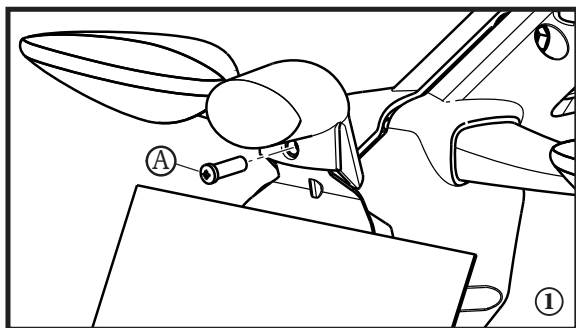
- ⑤ Install:
- **the new headlight**
 - **the nuts**

- ⑥ Hook:
- **the headlight connector**
- Install:
- **a new wiring locking strip**



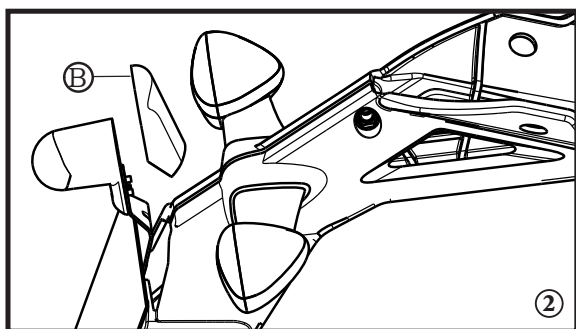
- ⑦ Install:
- **the silencing device screws ①**

- ⑧ Install:
- **the silencing device**
See "FRAME 4.158" paragraph.
 - **the number plate bracket**
See "FRAME 4.129" paragraph.
 - **the heat shield lid**
See "FRAME 4.135" paragraph.
 - **the seat**
See "FRAME 4.131" paragraph.



NUMBER PLATE BRACKET LIGHT REPLACEMENT

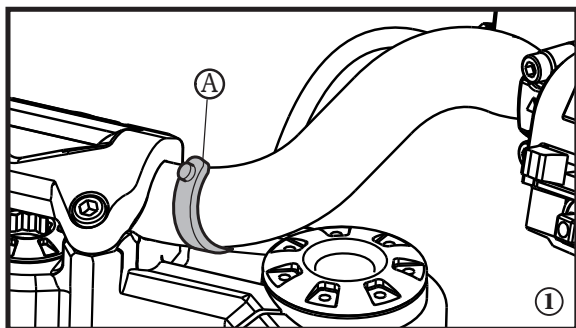
- ① Remove:
- the screw ①



- ② Remove:
- the rubber lamp holder ②

- ③ Replace:
- the position bulb

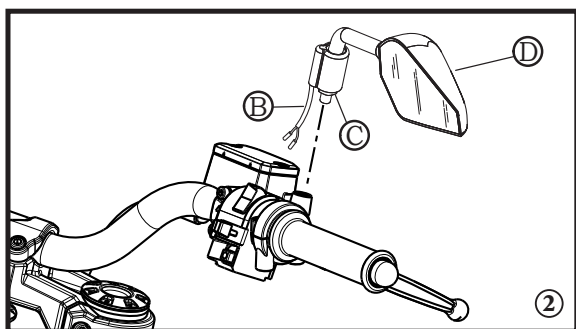
- ④ Install:
- the rubber lamp holder
 - the screw



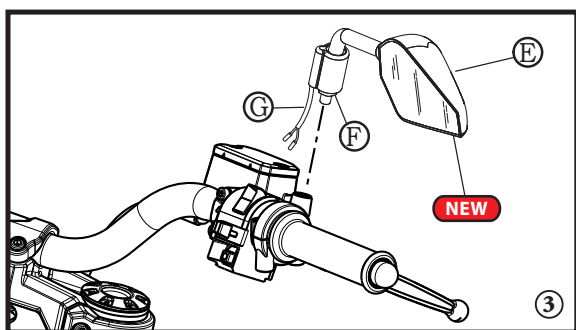
FRONT INDICATORS REPLACEMENT

The following procedure can be applied to both the front indicators.

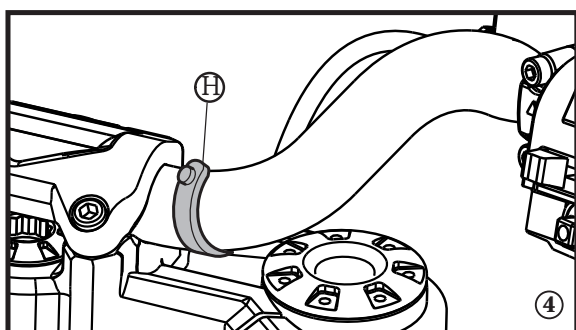
- ① Remove:
 - the handle bar cable gland (A)



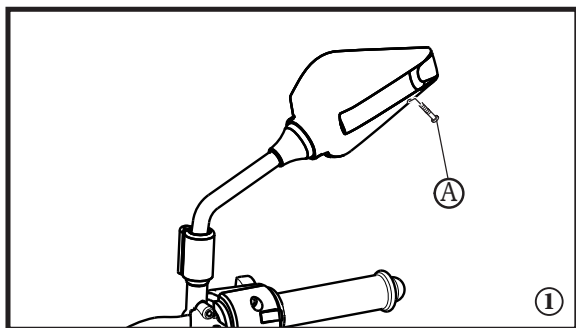
- ② Release:
 - the indicator connector (B)
 Loosen:
 - the lower nut (C)
 Remove:
 - the rear-view mirror (D)



- ③ Install:
 - the new rear-view mirror (E)
 Tighten:
 - the lower nut (F)
 Hook:
 - the indicator connector (G)



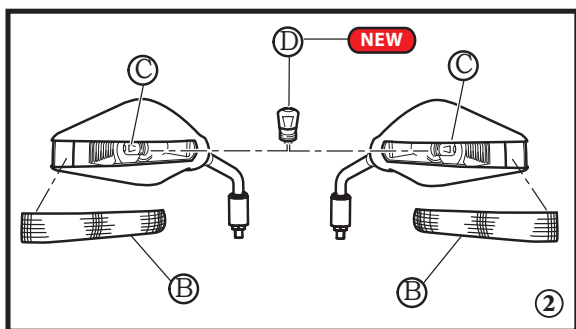
- ④ Install:
 - the handle bar cable gland (H)



INDICATORS LAMPS REPLACEMENT FRONT

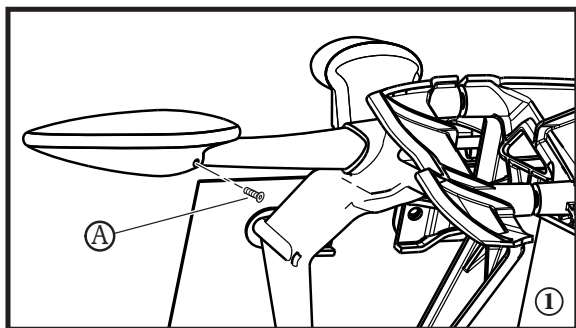
The following procedure is applied to both the front indicators lamps.

- ① Remove:
• the screw (A)



- ② Remove:
• the glass (B)
Remove:
• the bulb to be changed (C)
Install:
the new bulb (D)

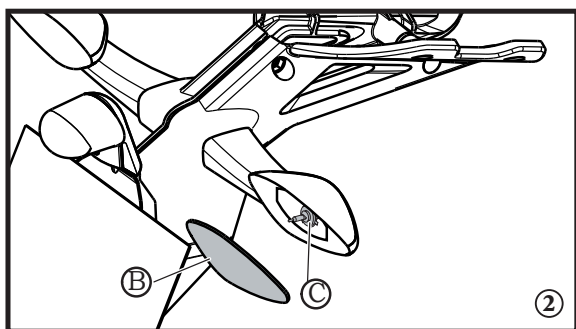
- ③ Install:
• the glass
• the screw



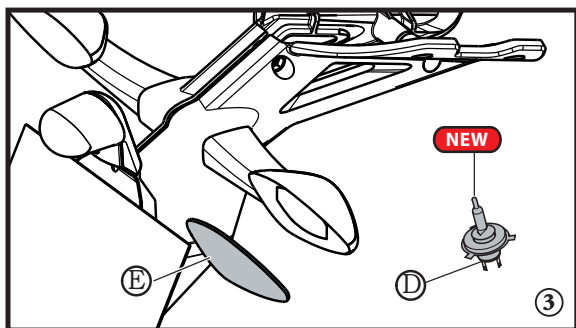
REAR INDICATORS LAMPS REPLACEMENT

The following procedure is applied to both the rear indicators lamps.

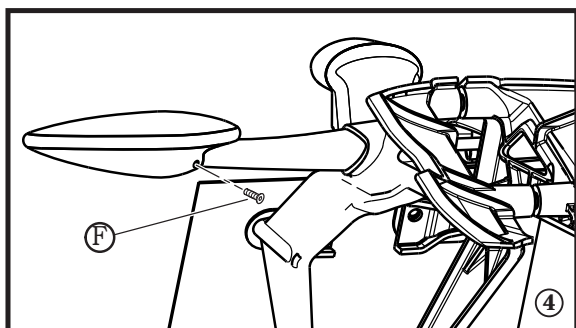
- ① Remove:
- the screw (A)



- ② Remove:
- the glass (B)
 - the bulb to be changed (C)



- ③ Install:
- the new bulb (D)
 - the glass (E)



- ④ Install:
- the screw (F)

NOTE: _____
Moderately fasten the screw. _____



CHAS



CHAPTER 4

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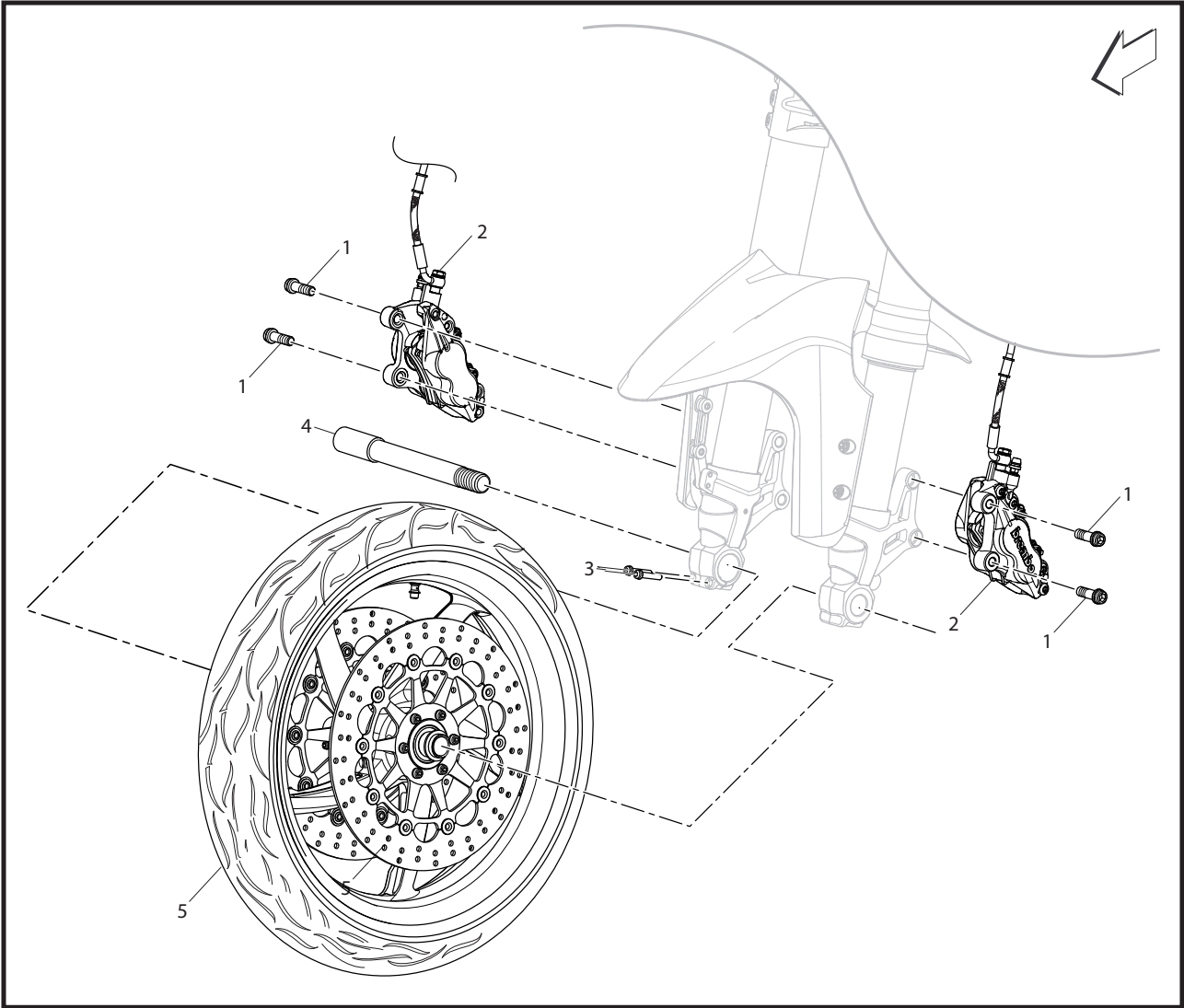
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FRONT WHEEL REMOVAL



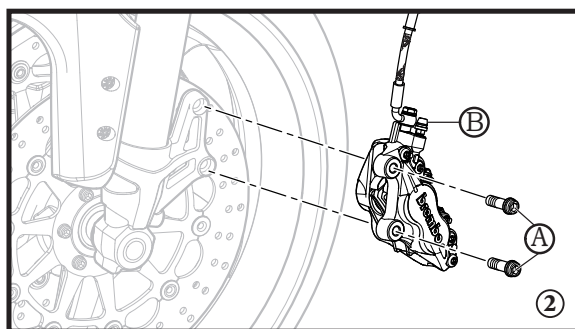
SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
		Front Wheel Removal		Remove the pieces in the given order.
1		Screw	4	NOTE: <u>Place the bike on a trestle of adequate support so that the front wheel is lifted.</u>
2		Front Brake Calliper (Right And Left)	2	
3		Stop Screw	2	
4		Front Wheel Pin	1	
5		Front Wheel	1	
				Loosen.



FRONT WHEEL REMOVAL

- ① Park the bike levelled.

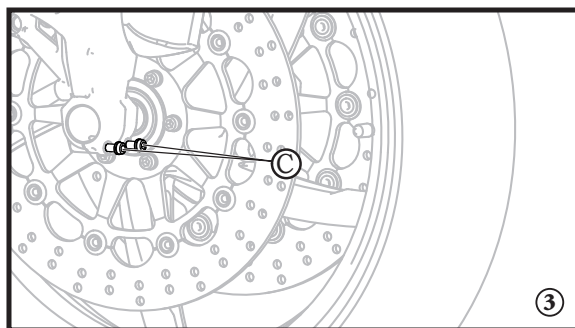
NOTE: _____
Place the bike on a trestle of adequate support so
that the front wheel is lifted. _____



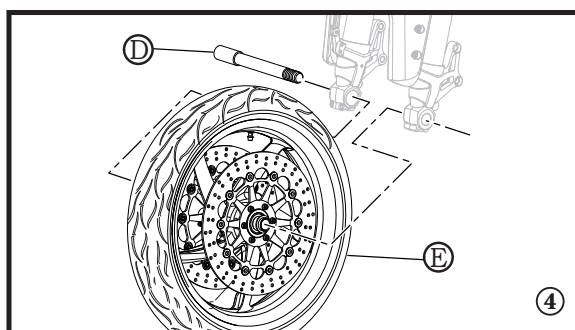
- ② Remove:
• the screws A
Disconnect:
• the left brake calliper B

NOTE: _____
Repeat the above procedure for the right brake
calliper. _____

NOTE: _____
Do not pull the front brake lever whilst
disconnecting the brake callipers. _____

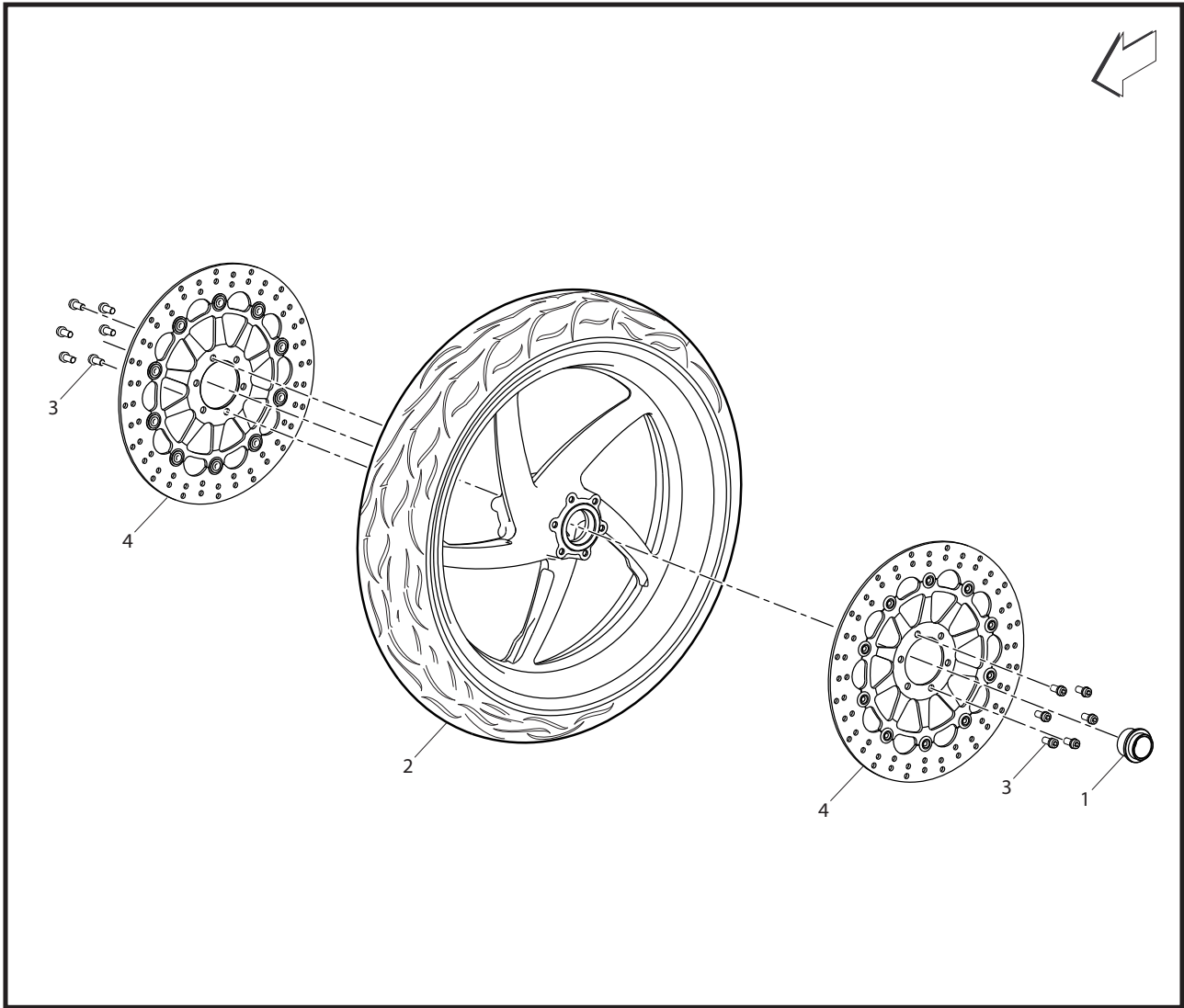


- ③ Loosen:
• the stop screws C



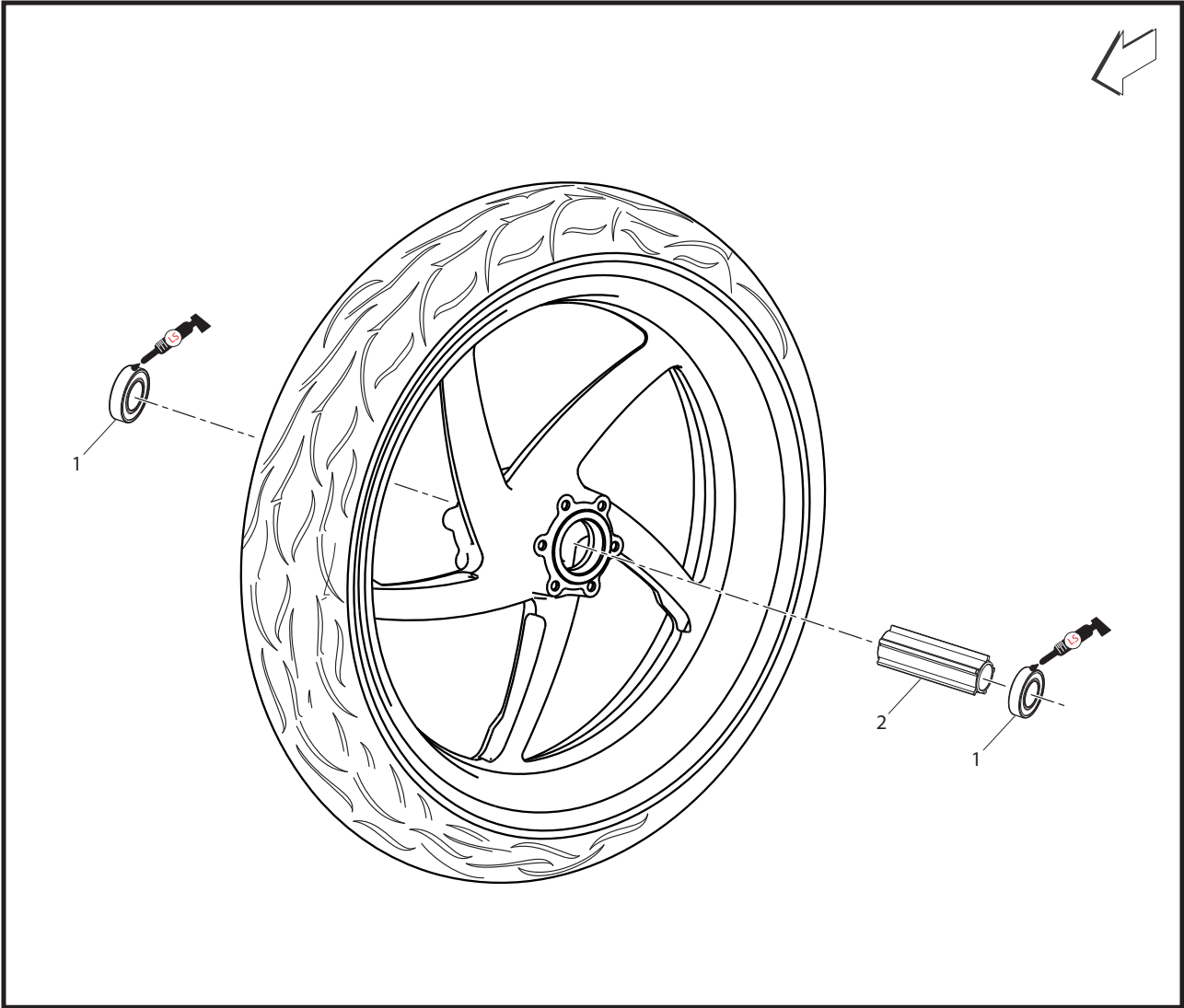
- ④ Remove:
• the front wheel pin D
• the front wheel E

FRONT BRAKE DISKS REMOVAL

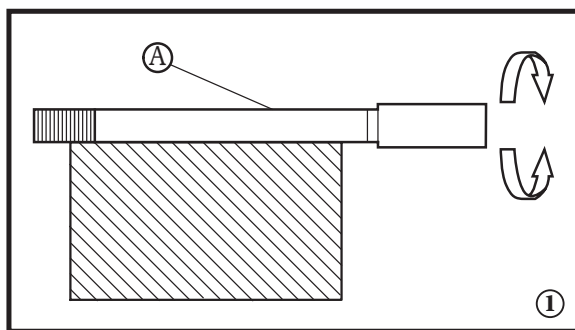


SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1 2 3 4		Front Wheel Removal Front Brake Disks Removal Left Spacer Front Wheel Screw Front Brake Disk (Ø320)	1 1 12 2	Remove the pieces in the given order. See paragraph "4.1".

FRONT WHEEL DECOMPOSITION



SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1 2		Front Wheel Decomposition Bearing Inside Spacer	2 1	Decompose the pieces in the given order. NOTE: <u>To install, invert the order of the removal operations.</u>



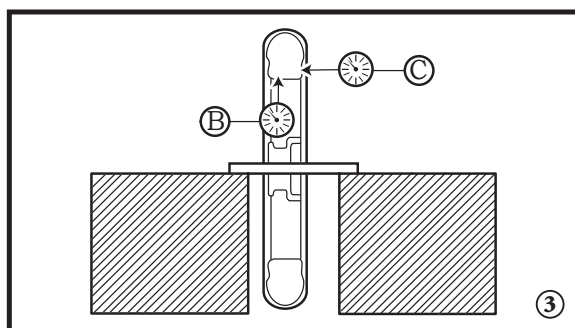
FRONT WHEEL CONTROL

- ① Check:
- **the wheel axis** ①
- Roll the axis of the wheel on a flat surface.
In the presence of deformations → Replace.

WARNING

Do not attempt to straighten the axis of the wheel if it is deformed.

- ② Check:
- **the tyre**
 - **the front wheel**
- In the presence of damages/wear → Replace.

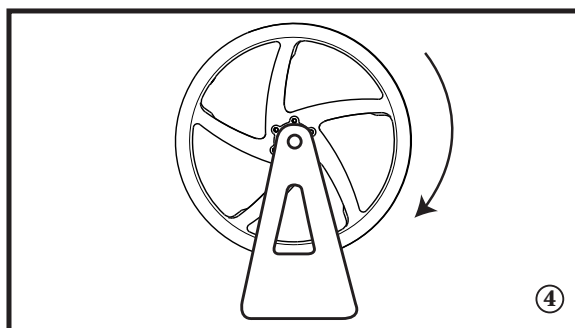


- ③ Measure:
- **the radial eccentricity of the wheel** ③
 - **the side eccentricity of the wheel** ③
- If the specified limit is exceeded → Replace.

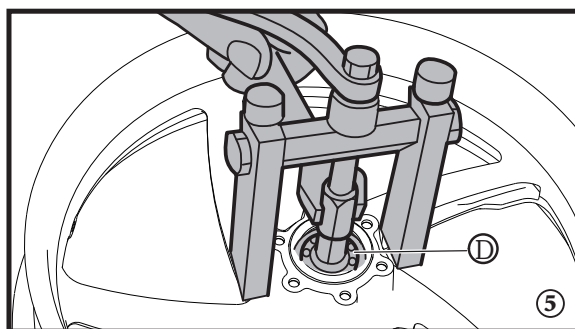


Radial eccentricity limit of the wheel
0.05 mm (0.0019 in)

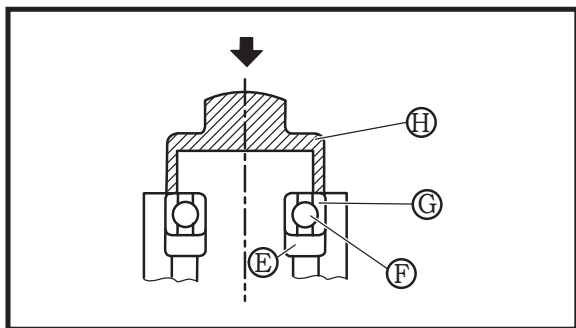
Side eccentricity limit of the wheel
0.05 mm (0.0019 in)



- ④ Check:
- **the wheel bearings**
- If the front wheel turns irregularly or is loose → Replace the wheel bearings.



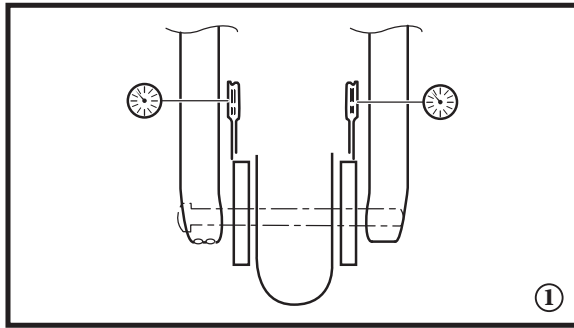
- ⑤ Replace:
- **the wheel bearings**
- (a) Remove the bearings from the wheel ⑤ using an extractor for bearings.
- (b) Install the new wheel bearings inverting the order of the removal operations.

**ATTENTION**

Do not touch the internal track (E) or the wheel bearings balls (F). Contact must only take place with the external track (G).

NOTE:

Use a spanner (H) that adapts to the diameter of the external track of the wheel bearing.



BRAKE DISKS CONTROL

The procedure below can be applied to all brake disks.

- ① Check:
 - **the brake disk**
 In the presence of damages/abrasions → Replace.

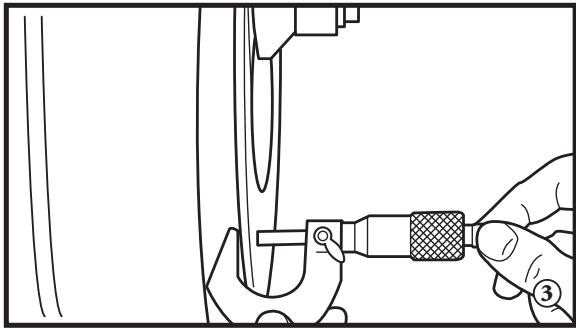
- ② Measure:
 - **the deformation of the brake disk**
 If out of specification → Correct the deformation or replace the brake disk.



Deformation limit of the brake disk (maximum)

Front: 0.1 mm (0.004 in)
Rear: 0.15 mm (0.006 in)

- Ⓐ Place the bike on a trestle of adequate support so that the wheel is lifted.
- Ⓑ Before measuring the front brake disk bending, turn the handle bar to the right or to the left, to ensure that the front wheel is still.
- Ⓒ Remove the brake calliper.
- Ⓓ Keep the comparator at a straight angle compared to the brake disk surface.
- Ⓔ Measure the bending of 1.5 mm (0.5 in) below the brake disk edge.

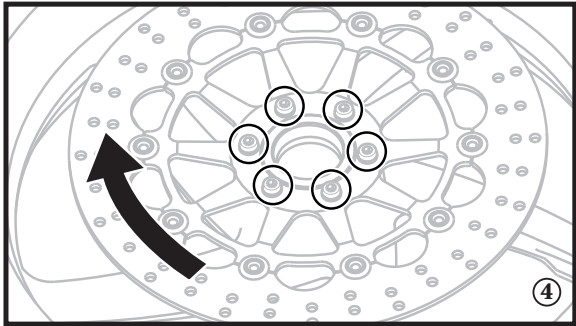


- ③ Measure:
- **the brake disk thickness**
- Measure the thickness of the brake disk in different points.
If out of specification → Replace.

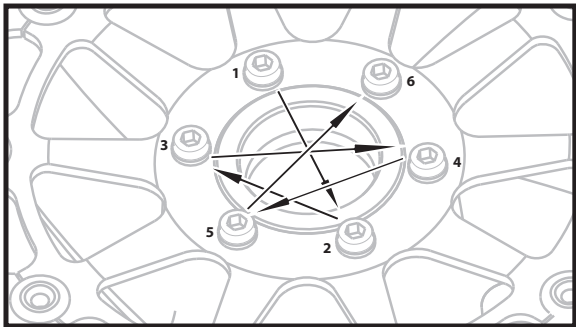


**Deformation limit of the brake disk
(maximum)**

Front:0.1 mm (0.004 in)
Rear:0.15 mm (0.006 in)



- ④ Adjust:
- **the deformation of the brake disk**
- (a) Remove the brake disk.
(b) Rotate the brake disk moving it one hole per bolt.
(c) Install the brake.



NOTE:
**Fasten the brake disk bolts in successive steps and
proceeding in a crossed manner.**

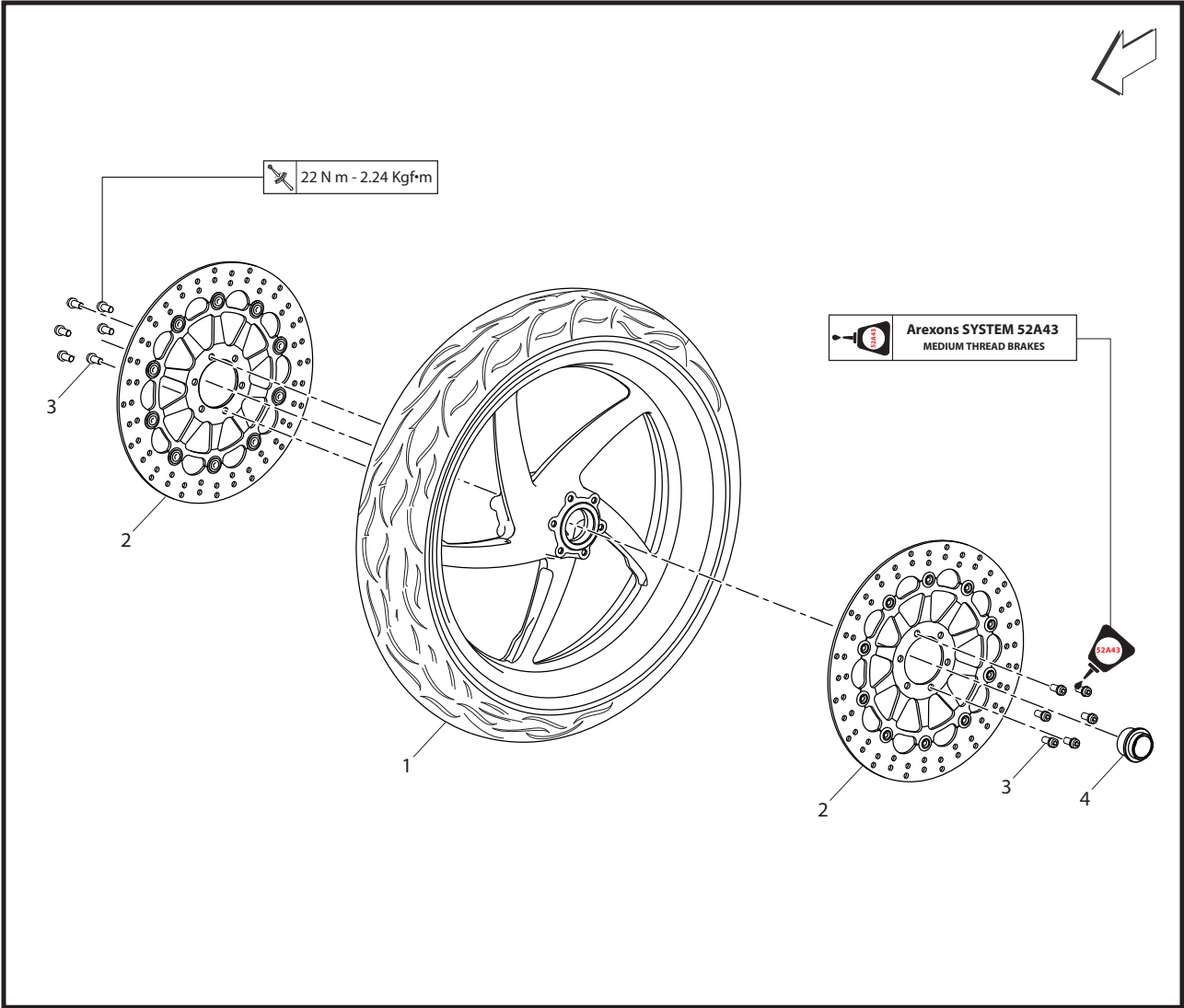


Brake disk bolt

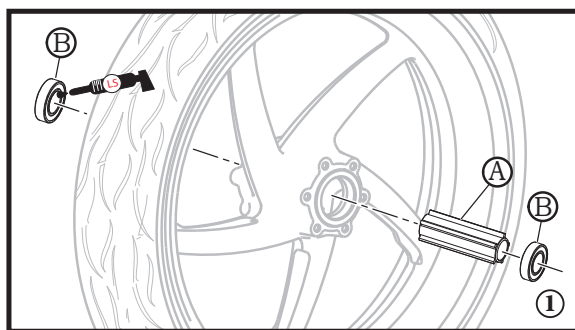
Front:22 Nm (2.24 Kgf•m)
Rear:10 Nm (1.01 Kgf•m)

- (d) Measure the deformation of the brake disk.
(e) If out of specification, repeat the adjusting
procedure until the deformation is within the
specified values.
(f) Should it not be possible to bring the bending of
the brake disk within the specified values, replace
it.

FRONT BRAKE DISKS ASSEMBLY

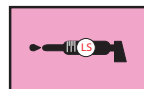


SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1 2 3 4		Front Brake Disks Assembly Front Wheel Front Brake Disk (Ø320) Screw Left Spacer	1 2 12 1	Install the pieces in the given order.

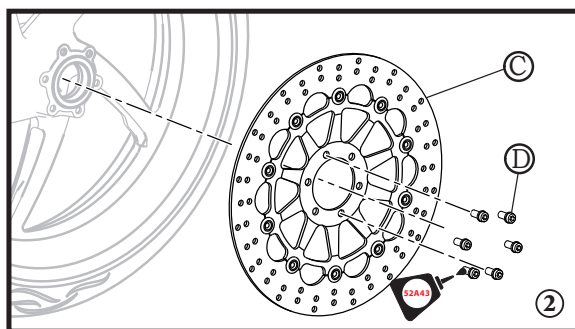


FRONT BRAKE DISKS ASSEMBLY

- ① Assemble:
- the inside spacer (A)
 - the bearings (B)



Recommended lubricant
TUTELA MR2 GREASE

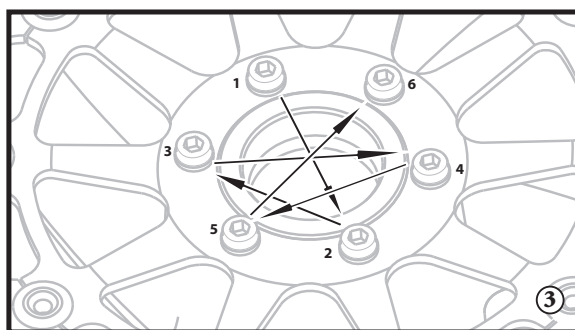


- ② Assemble:
- the left front brake disk (C)
 - the screws (D)

NOTE:
Repeat the above procedure for the right front brake disk.



AREXONS SYSTEM 52A43
MEDIUM THREAD BRAKES

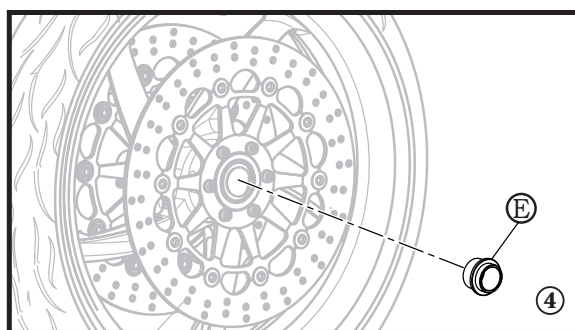


- ③ The procedure below can be applied to both brake disks.

NOTE:
Fasten the brake disk bolts in successive steps and proceeding in a crossed manner.

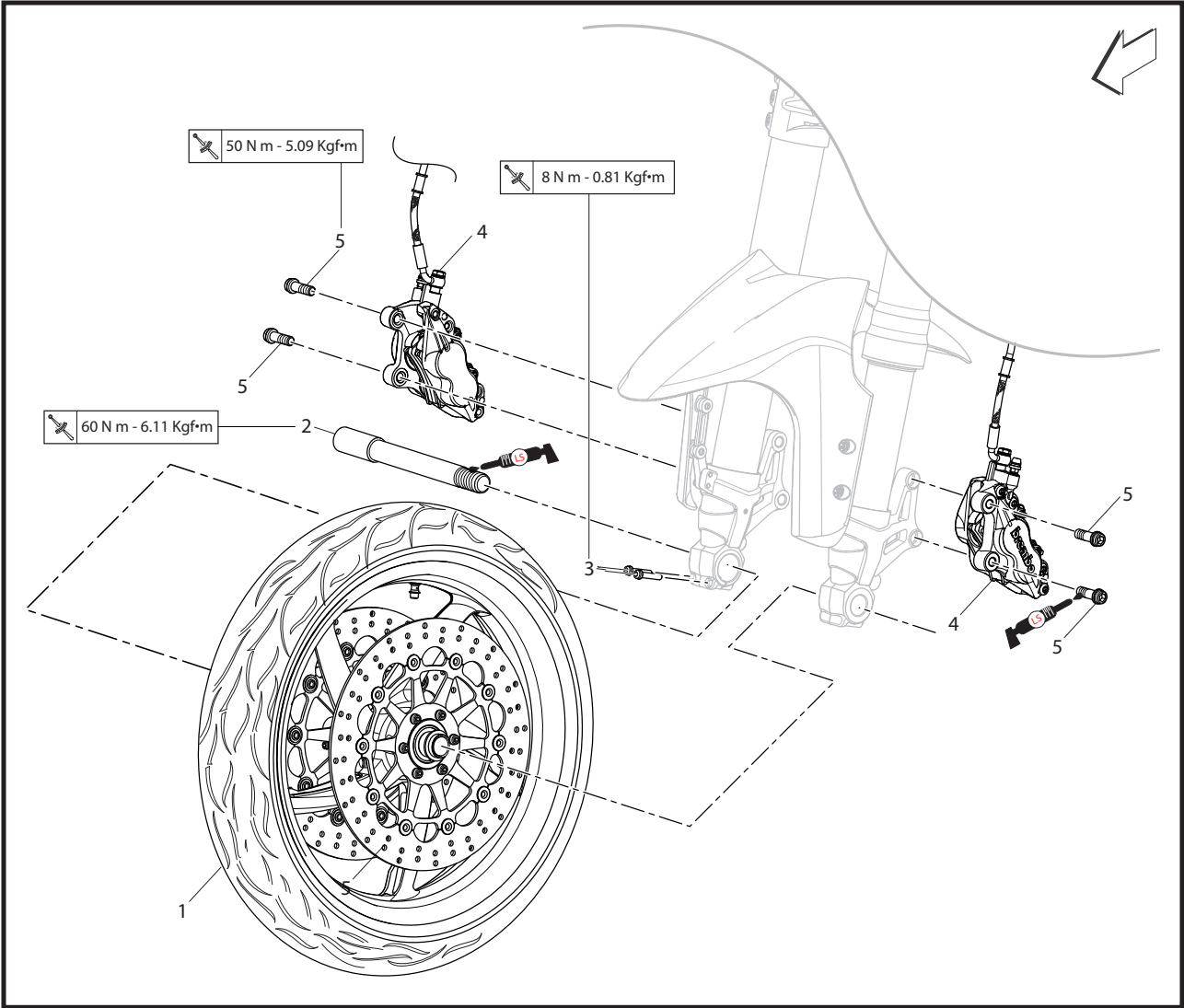
Torque fasten:

22 N m - 2.24 Kgf·m

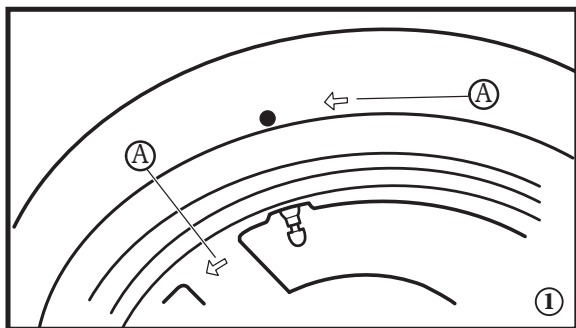


- ④ Assemble:
- the left spacer (E)

FRONT WHEEL INSTALLATION



SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1		Front Wheel Installation	1	Install the pieces in the given order.
2		Front Wheel	1	
3		Front Wheel Pin	2	
4		Stop Screw	2	
5		Front Brake Calliper (Right And Left)	4	



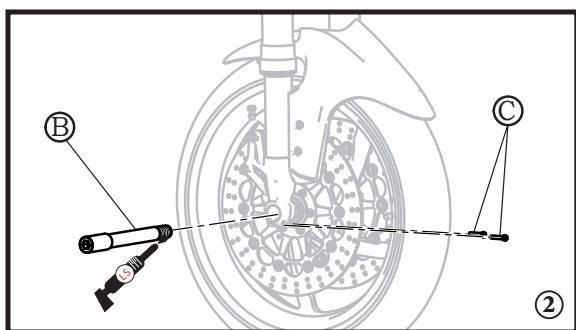
FRONT WHEEL INSTALLATION

- ① Lubricate:
• the wheel axis

- (a) Lift the wheel between the two shanks of the fork.
(b) Insert the axis of the wheel.

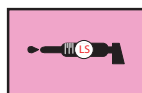
NOTE: Install the tyre and the wheel with the mark **A** in the rotary direction of the wheel.

- (c) Rest the front wheel on the ground.



- ② Fasten:
• the front wheel pin **B**

60 N m - 6.11 Kgf·m



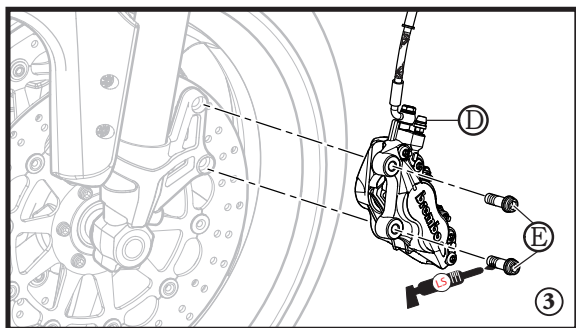
Recommended lubricant
TUTELA MR2 GREASE

- the stop screws **C**

8 N m - 0.81 Kgf·m

ATTENTION

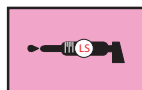
Before fastening the front wheel pin, push on the handle bar and check that the front fork smoothly moves backwards.



- ③ Install:
- the left brake calliper ①
 - the screws ②

Torque fasten with:

50 N m - 5.09 Kg·m



Recommended lubricant
TUTELA MR2 GREASE

NOTE: _____
Repeat the above procedure for the right brake calliper. _____

NOTE: _____
Ensure there is sufficient space between the brake pads before installing the callipers on the relative brake disks. _____

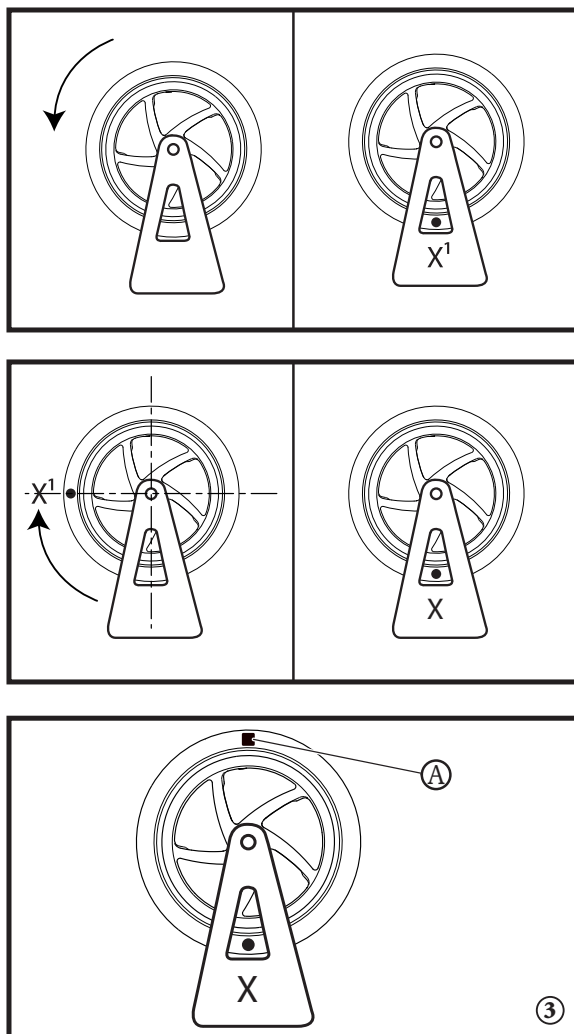
ATTENTION _____
Check that the path of the brake flexible tube is correct. _____

FRONT WHEEL BALANCING

NOTE: _____
After having replaced the tyre, the wheel, or both, the front wheel needs balancing again.
Adjust the balancing of the front wheel with the brake disk installed. _____

- ① Disconnect:
 - **the balancing weight(s)**
- ② Find:
 - **the unbalanced point (heavier)** of the front wheel.

NOTE: _____
Place the front wheel on a suitable balancing bench. _____

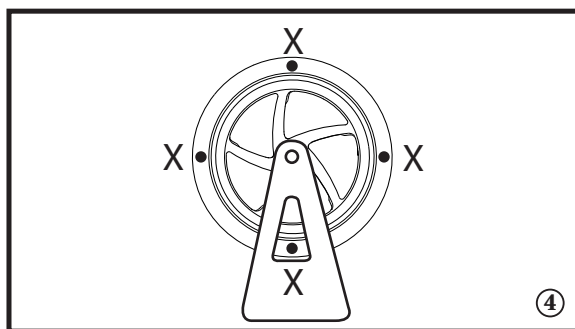
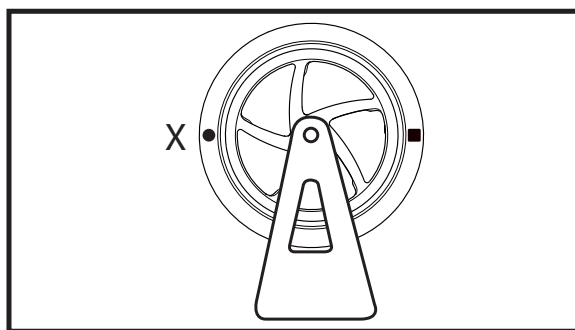


- ① Have the front wheel turn quickly.
- ② When the front wheel stops, place an "X" on the part of the wheel facing downwards.
- ③ Turn the front wheel by 90° so that the "X" is positioned as shown in the illustration.
- ④ Let the front wheel go.
- ⑤ When the front wheel stops, place an "X²" on the part of the wheel facing downwards.
- ⑥ Repeat points ① to ⑥ a few times, until the applied marks always stop in the same point.
- ⑦ The point where all marks applied stop represent the "X" unbalanced point (heavier) of the wheel.

- ③ Adjust:
 - **the balancing of the front wheel**

- ① Install a balancing weight **A** on the rim in the point diametrically opposed to the unbalanced point (heavier).

NOTE: _____
Start with the lightest weight. _____

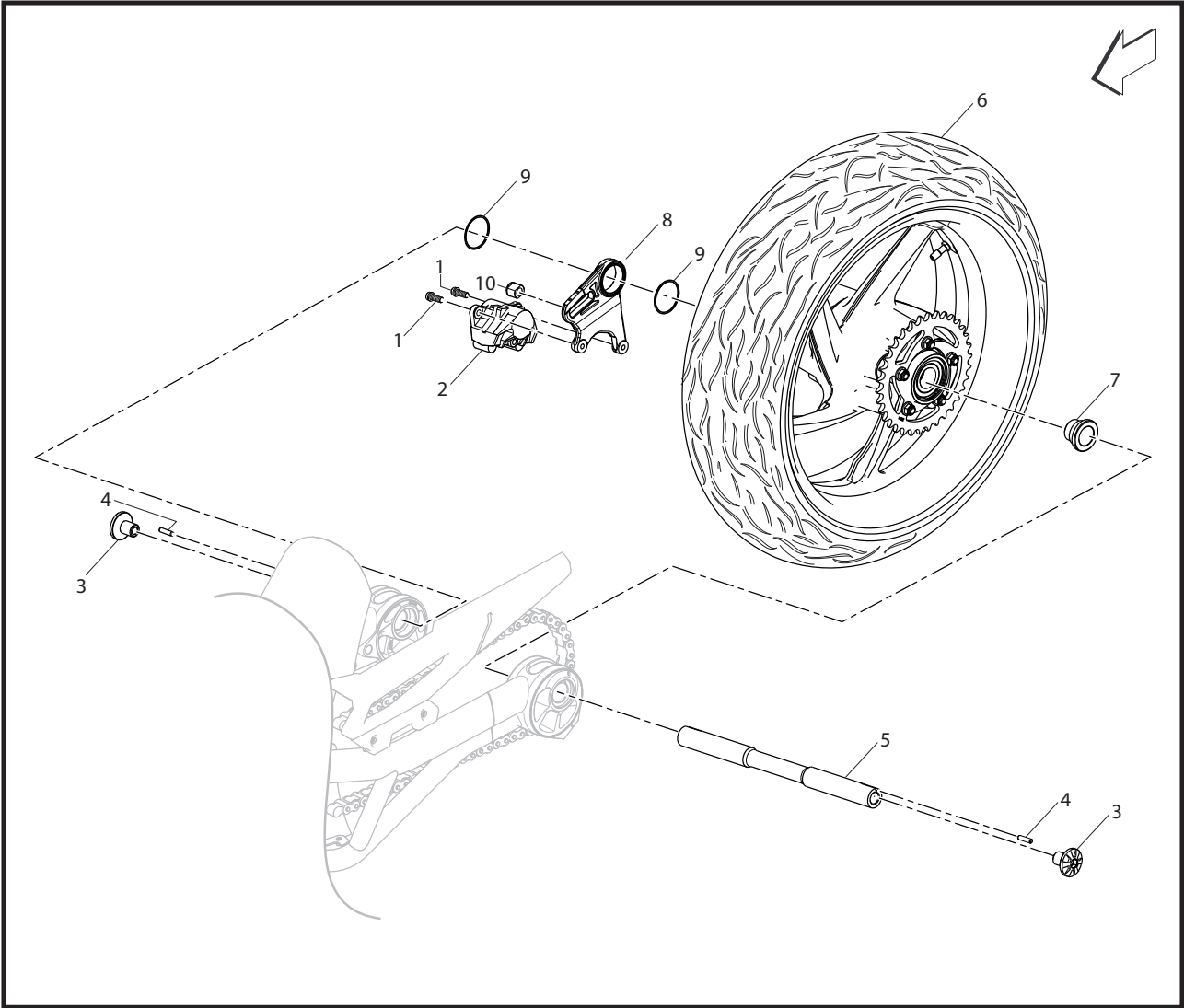


- ⓑ Turn the front wheel by 90° so that the unbalanced point (heavier) is positioned as shown in the illustration.
- ⓒ If the unbalanced point does not remain in the given position, install a heavier weight.
- ⓓ Repeat points ⓑ and ⓒ until balancing of the front wheel is obtained.

④ Check:
• **the balancing of the front wheel**

- ⓐ Have the front wheel turn and check that it remains still in each of the illustrated positions.
- ⓑ If it does not, repeat balancing.

REAR WHEEL REMOVAL



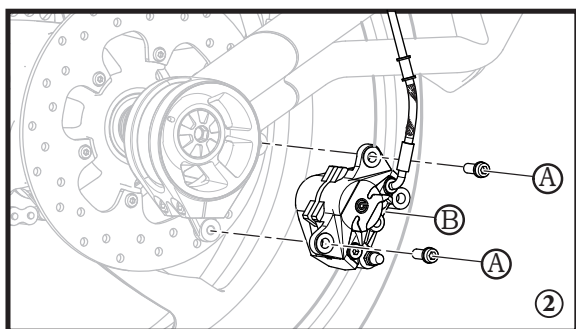
SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
		Rear Wheel Removal		Remove the pieces in the given order.
1		Screw	2	NOTE: _____ Place the bike on a trestle of adequate support so that the rear wheel is lifted. _____
2		Rear Brake Calliper	1	
3		Special Screw	2	
4		Plug	2	
5		Pin	1	
6		Rear Wheel	1	NOTE: _____ Loosen the regulator of the eccentrics. _____
7		Spacer	1	
8		Calliper Holder Plate	1	
9		O-Ring Gasket	2	
10		Bush	1	



REAR WHEEL REMOVAL

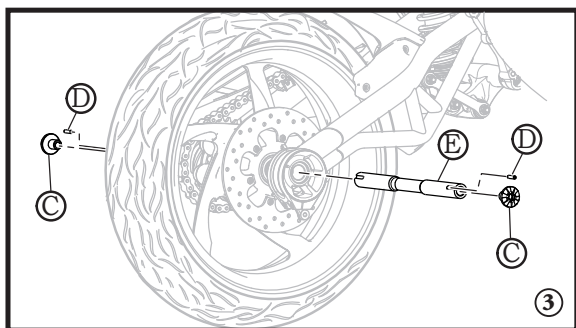
- ① Park the bike levelled.

NOTE: _____
Place the bike on a trestle of adequate support so that the rear wheel is lifted. _____

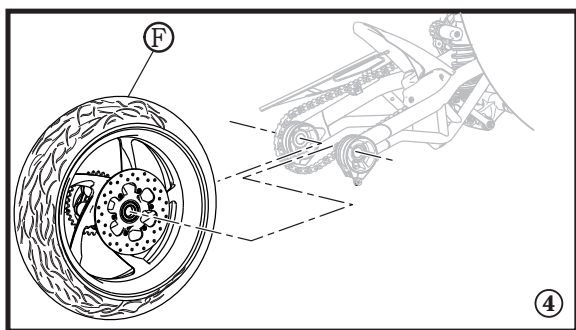


- ② Remove:
• the screws (A)
Disconnect:
• the brake calliper (B)

NOTE: _____
Do not press on the brake pedal whilst removing the brake calliper. _____

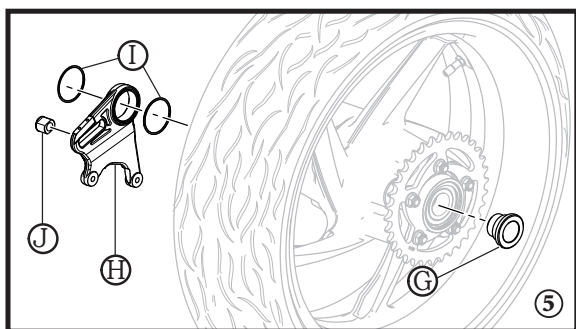


- ③ Remove:
• the special screws (C)
• the plugs (D)
• the pin (E)



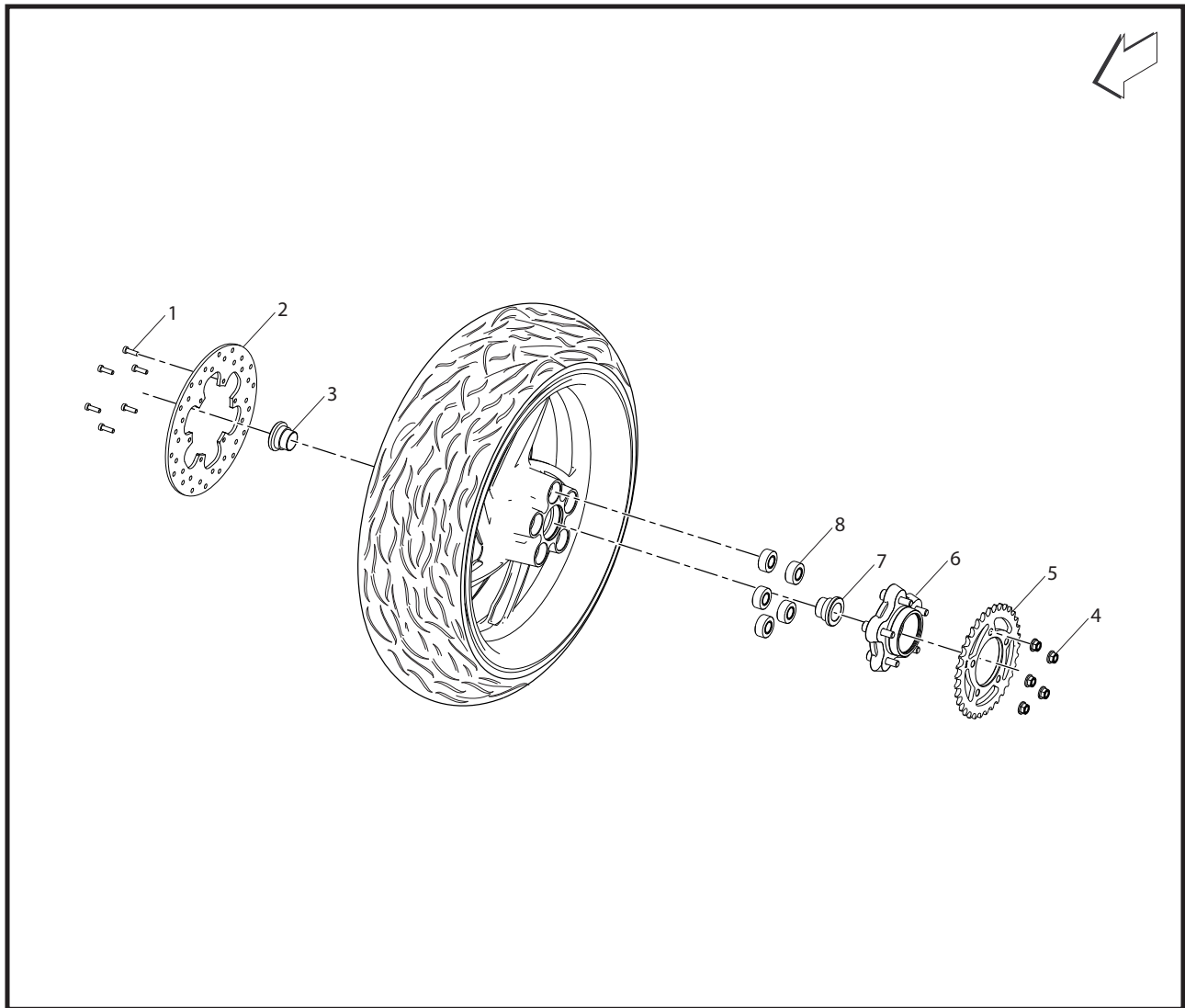
- ④ Remove:
• the rear wheel (F)

NOTE: _____
Push the rear wheel forward and remove the transmission chain from the rear cogwheel. _____



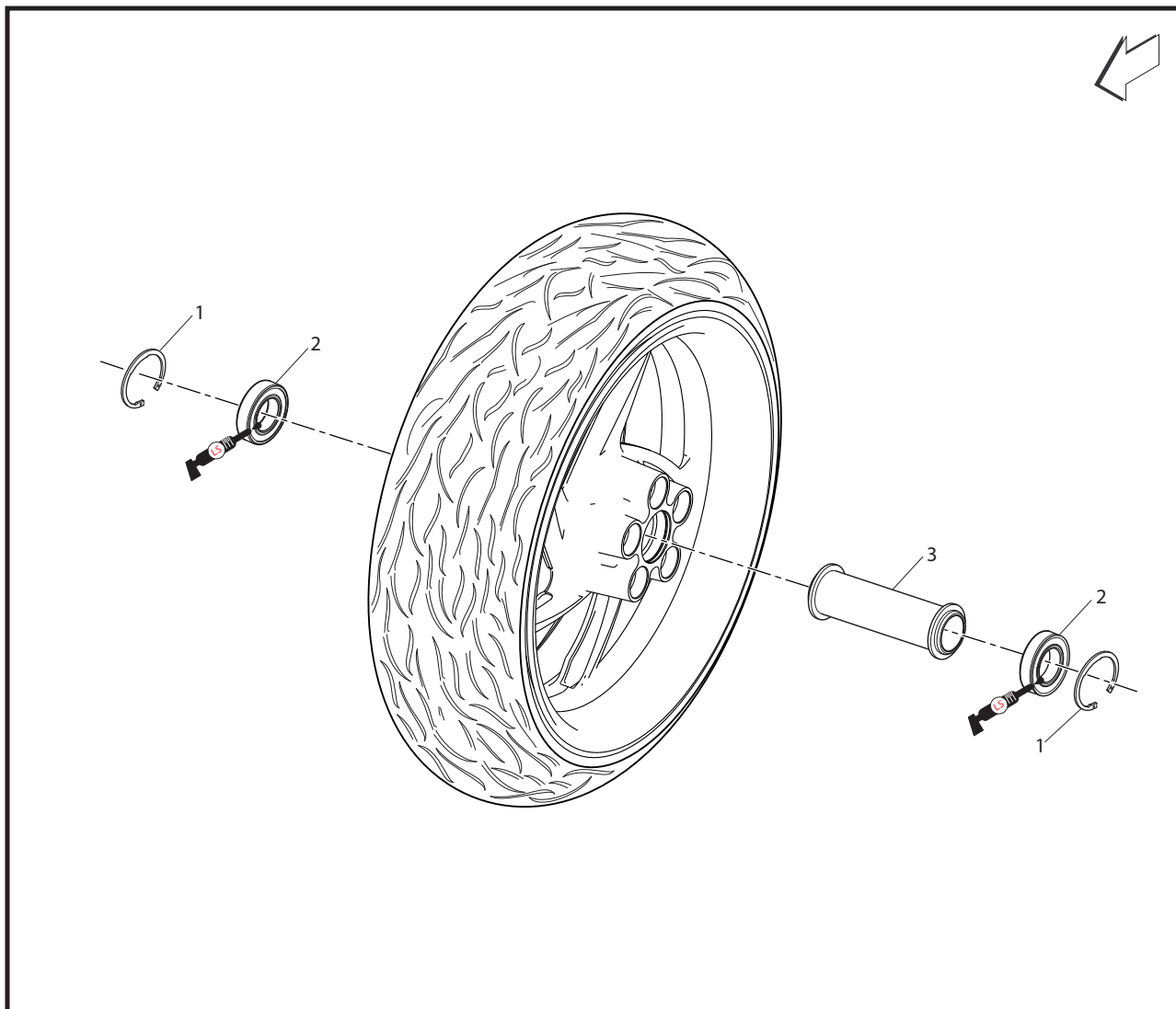
- ⑤ Remove:
• the spacer (G)
• the calliper holder plate (H)
• the O-Ring gaskets (I)
• the bush (J)

REAR BRAKE DISK AND CROWN WHEEL REMOVAL

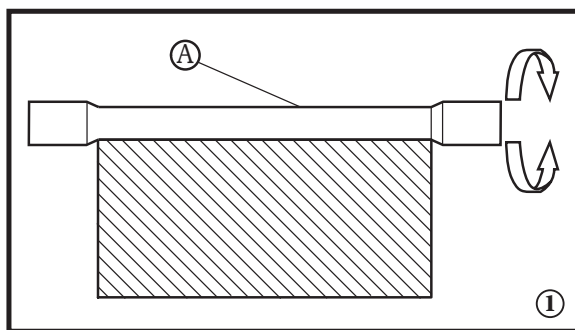


SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1		Rear Wheel Removal	6	Remove the pieces in the given order. See paragraph "4.16.
2		Rear Brake Disk And Crown Wheel Removal	1	
3		Screw	1	
4		Rear Brake Disk	1	
5		Spacer	5	
6		Self-locking Nut	1	
7		Crown Wheel	1	
8		Crown Wheel Holder Flange	1	
		Spacer	1	
		Collar Rubber	5	

REAR WHEEL DECOMPOSITION



SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1 2 3		Rear Wheel Decomposition Seeger Bearing Spacer	2 2 1	Decompose the pieces in the given order. NOTE: _____ To install, invert the order of the operations for removal. _____



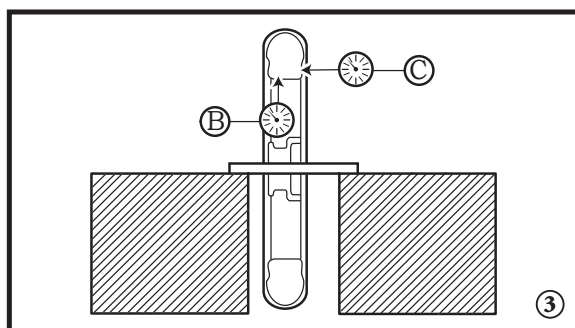
REAR WHEEL CONTROL

- ① Check:
- **the wheel axis** ①
- Roll the axis of the wheel on a flat surface.
In the presence of deformations → Replace.

WARNING

Do not attempt to straighten the axis of the wheel if it is deformed.

- ② Check:
- **the tyre**
 - **the rear wheel**
- In the presence of damages/wear → Replace.

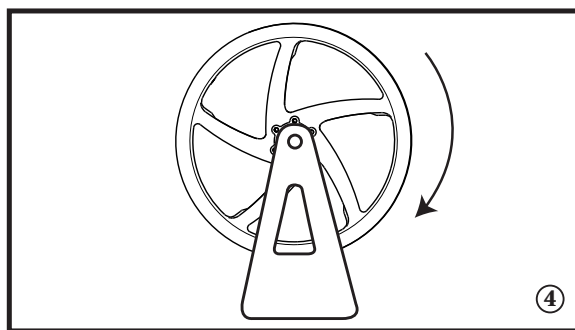


- ③ Measure:
- **the radial eccentricity of the wheel** ③
 - **the side eccentricity of the wheel** ③
- If the specified limit is exceeded → Replace.

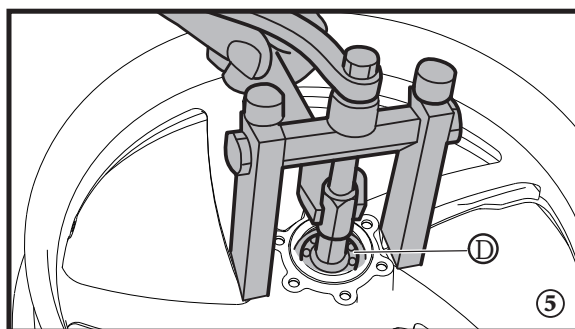


Radial eccentricity limit of the wheel
0.05 mm (0.0019 in)

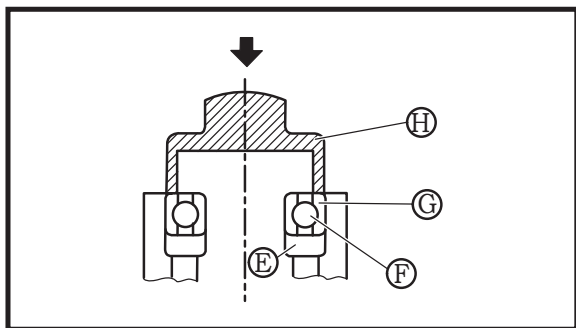
Side eccentricity limit of the wheel
0.05 mm (0.0019 in)



- ④ Check:
- **the wheel bearings**
- If the rear wheel turns irregularly or is loose → Replace the wheel bearings.



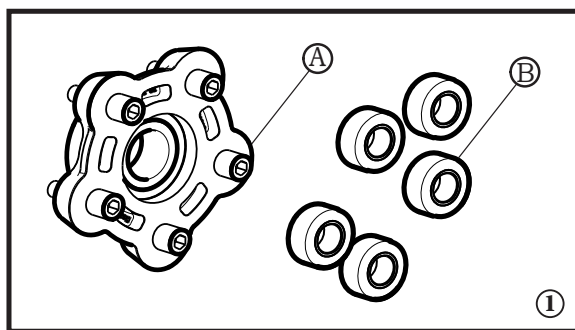
- ⑤ Replace:
- **the wheel bearings**
- (a) Remove the bearings from the wheel ⑤ using an extractor for bearings.
- (b) Install the new wheel bearings inverting the order of the removal operations.

**ATTENTION**

Do not touch the internal track **(E)** or the wheel bearings balls **(F)**. Contact must only take place with the external track **(G)**.

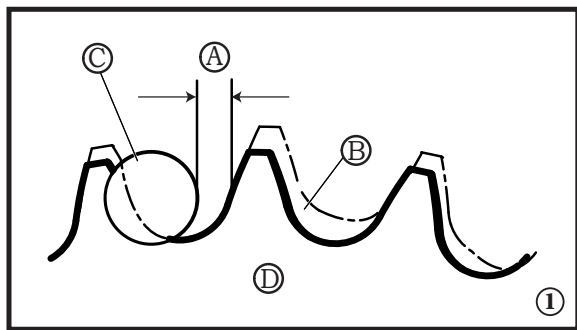
NOTE:

Use a spanner **(H)** that adapts to the diameter of the external track of the wheel bearing.



REAR WHEEL CROWN WHEEL HOLDER FLANGE INSPECTION

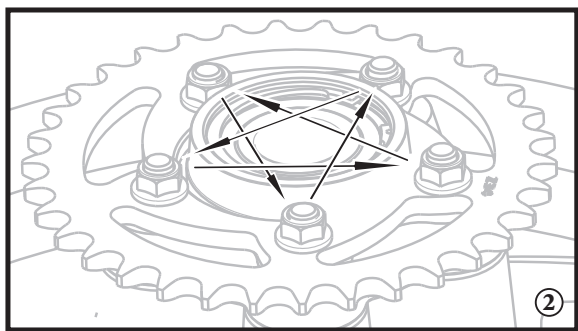
- ① Check:
- **the crown wheel holder flange** ①
In the presence of cracks/damages → Replace.
 - **the collar rubbers** ②
In the presence of damages/wear → Replace.



CROWN WHEEL CONTROL AND REPLACEMENT

- ① Check:
- **the crown wheel**
- If more of a $\frac{1}{4}$ of each tooth (A) is worn → Replace the crown wheel.
If the teeth are bent → Replace the crown wheel.

- (A) $\frac{1}{4}$ teeth
(B) Correct
(C) Distribution chain roller
(D) Crown Wheel



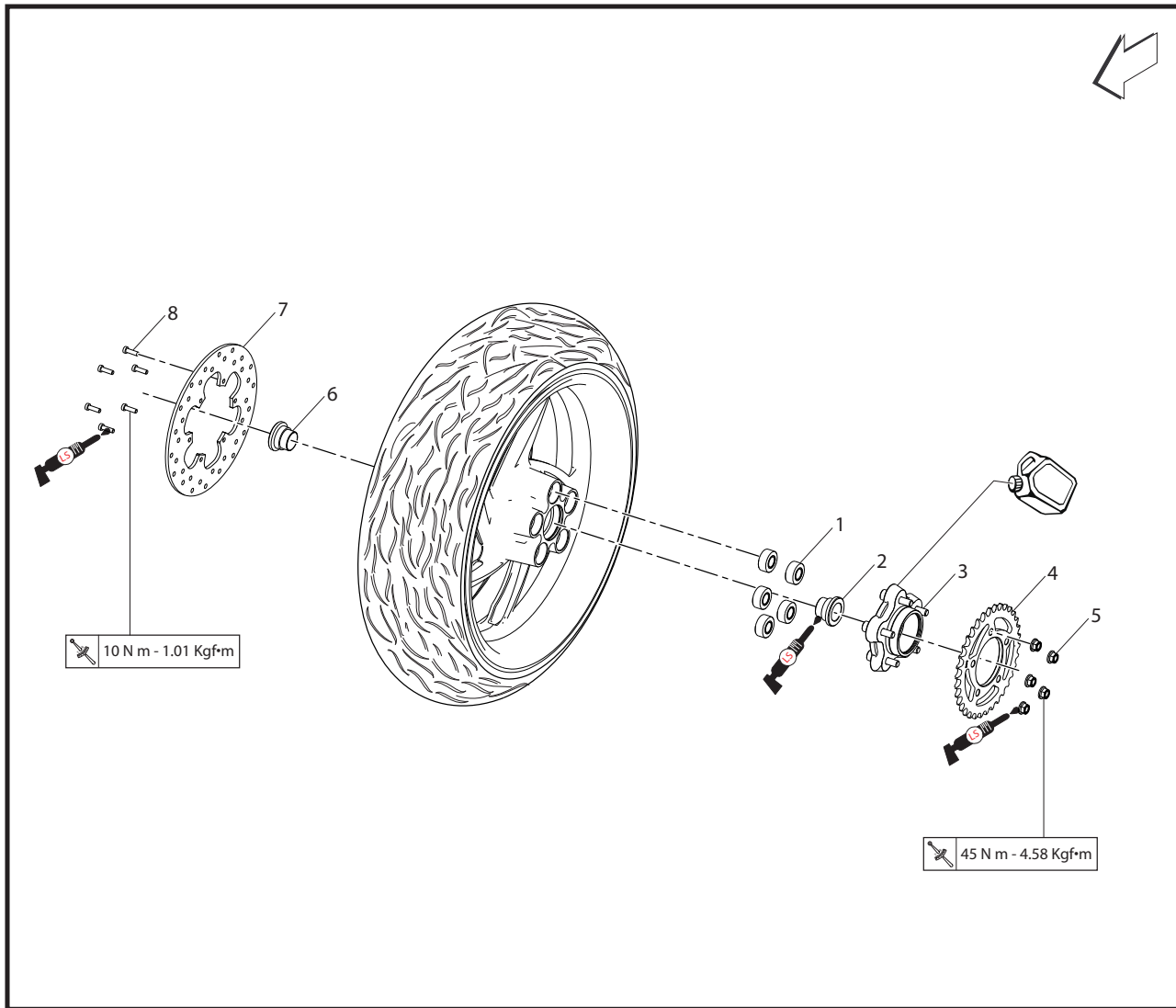
- ② Replace:
- **the crown wheel**
- (a) Remove the self-locking nuts and the crown wheel.
(b) Using a clean cloth clean the crown wheel holder flange, in particular the surfaces touching the crown wheel.
(c) Install the new crown wheel.



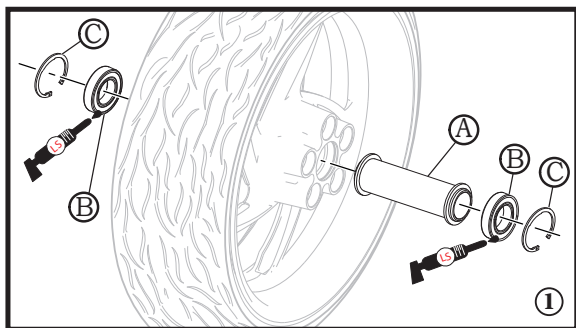
Crown wheel self-locking nut
45 N m - 4.58 Kgf·m

NOTE: Fasten the self-locking nuts in more steps and proceed in crossed sequence.

REAR BRAKE DISK AND CROWN WHEEL ASSEMBLY

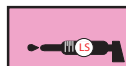


SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1		Rear Brake Disk And Crown Wheel Assembly	5	Install the pieces in the given order.
2		Collar Rubber	1	
3		Spacer	1	
4		Crown Wheel Holder Flange	1	
5		Crown Wheel	1	
6		Self-locking Nut	5	
7		Spacer	1	
8		Rear Brake Disk	1	
		Screw	6	



REAR BRAKE DISK AND CROWN WHEEL ASSEMBLY

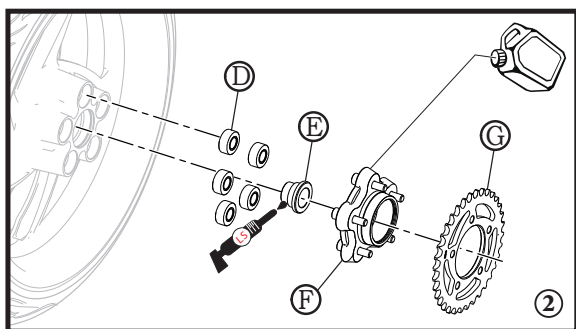
- ① Assemble:
- the spacer (A)
 - the bearings (B)



Recommended lubricant
TUTELA MR2 GREASE

- the seegers (C)

- ② Assemble:
- the collar rubbers (D)
 - the spacer (E)
 - the crown wheel holder flange (F)
 - the crown wheel (G)



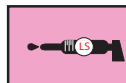
Recommended solvent
TUTELA MOTOR CLEAN



Recommended lubricant
TUTELA MR2 GREASE

- ③ Install:
- the self-locking nuts

NOTE:
Fasten the self-locking nuts in successive steps and proceed in a crossed manner.



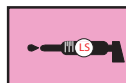
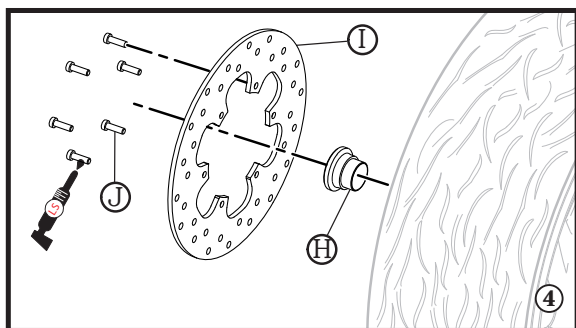
Recommended lubricant
TUTELA MR2 GREASE

Torque fasten:

 45 N m - 4.58 Kgf·m



- ④ Install:
- the spacer (H)
 - the rear brake disk (I)
 - the screws (J)

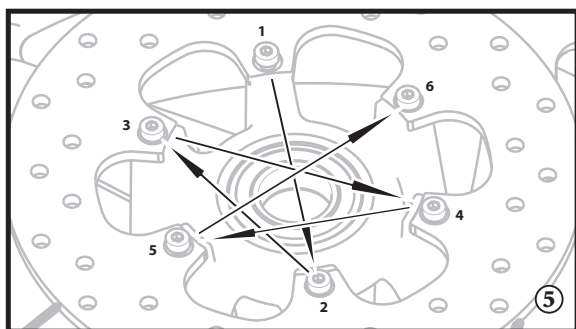


Recommended lubricant
TUTELA MR2 GREASE

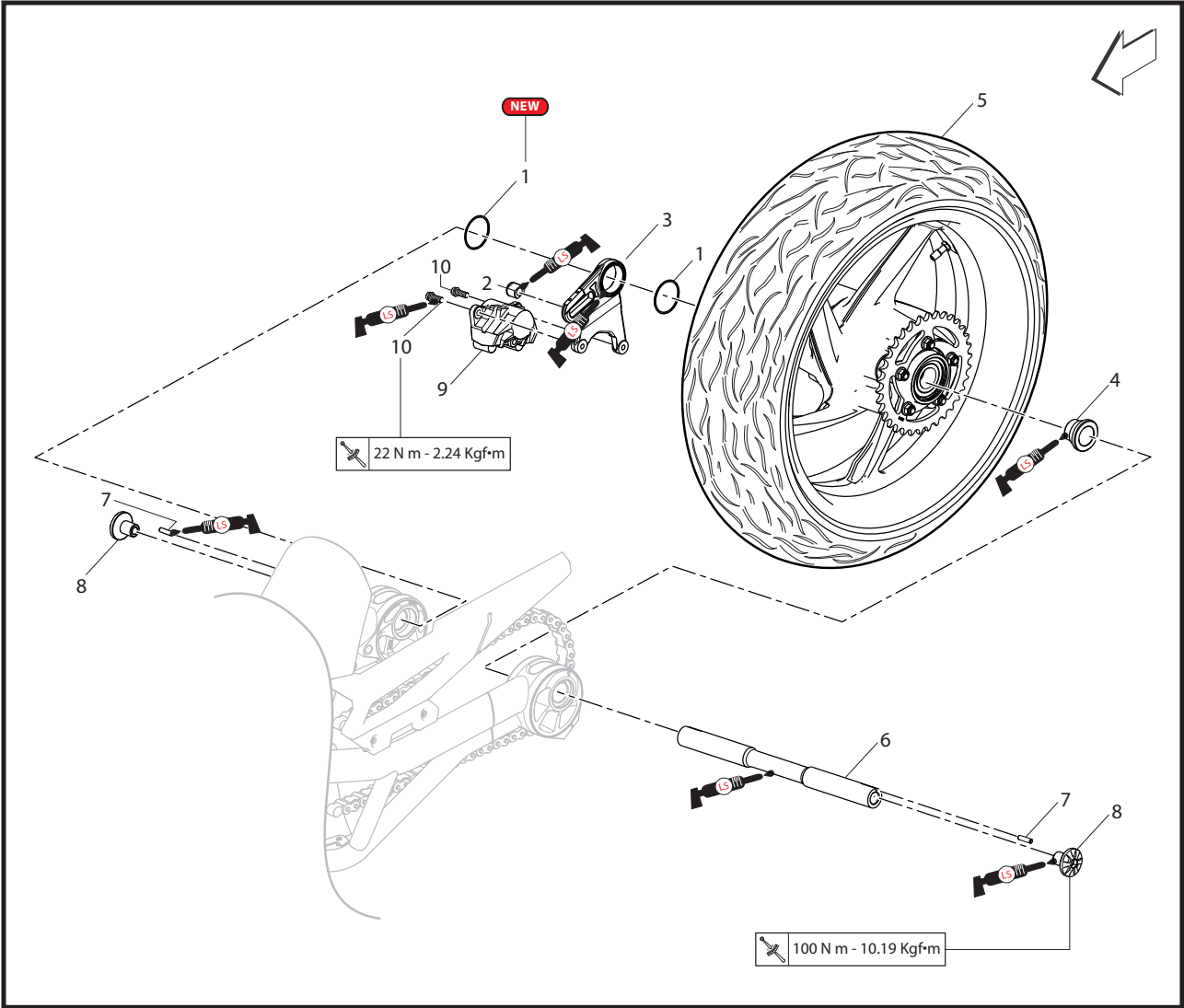
NOTE:
Fasten the brake disk bolts in successive steps and proceeding in a crossed manner.

Torque fasten:

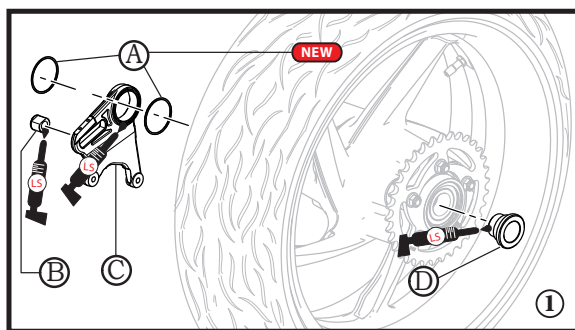
 10 N m - 1.01 Kgf·m



REAR WHEEL INSTALLATION



SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1		Rear Wheel Installation	2	Install the pieces in the given order.
2		O-Ring Gasket	1	
3		Bush	1	
4		Calliper Holder Plate	1	
5		Spacer	1	
6		Rear Wheel	1	
7		Pin	1	
8		Plug	2	
9		Special Screw	2	
10		Rear Brake Calliper	1	
		Screw	2	



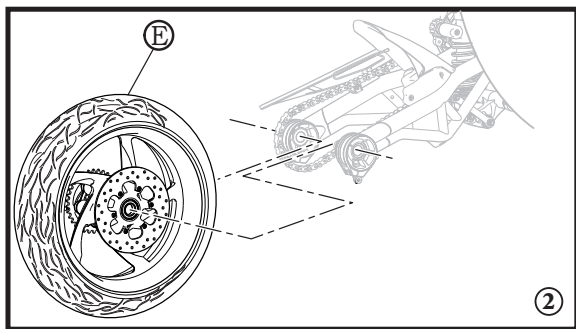
REAR WHEEL INSTALLATION

- ① Install:
- the O-Ring gaskets **A**
 - the bush **B**
 - the calliper holder plate **C**
 - the spacer **D**



Recommended lubricant
TUTELA MR2 GREASE

- ② Install
- the rear wheel **E**



- ③ Lubricate and install:
- the pin **F**
 - the plugs **G**
 - the special screws **H**



Recommended lubricant
TUTELA MR2 GREASE

Torque fasten:

100 N m - 10.19 Kgf·m

- ④ Install:
- the brake calliper **I**
 - the screws **J**

22 N m - 2.24 Kgf·m



Recommended lubricant
TUTELA MR2 GREASE

NOTE:

Ensure there is sufficient space between the brake pads before installing the calliper on the relative brake disk.

ATTENTION

Check that the path of the brake flexible tube is correct.

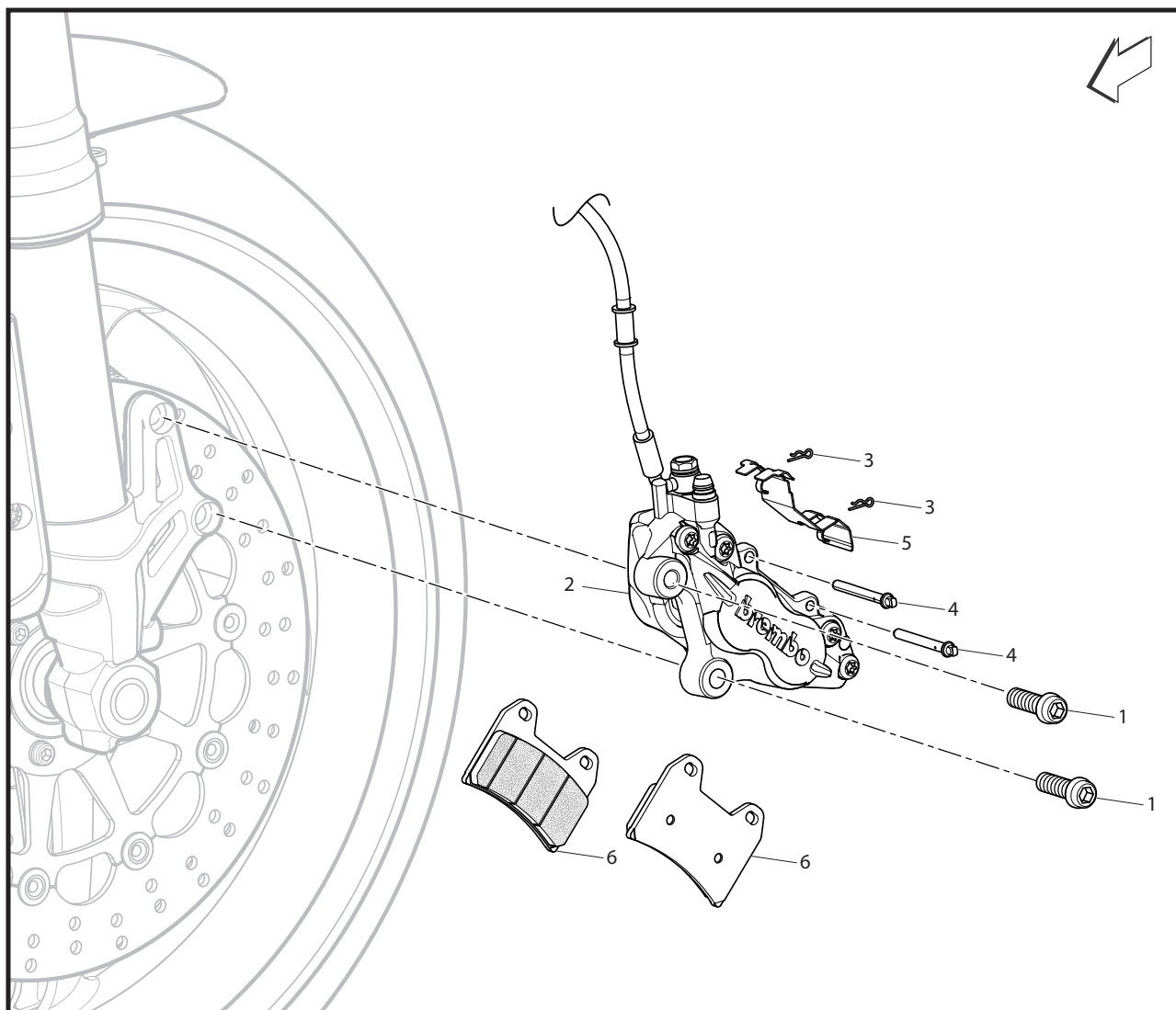
REAR WHEEL BALANCING

NOTE:

- After having replaced the tyre, the wheel or both, the rear wheel needs balancing again.
- Adjust the balancing of the rear wheel with the brake disk and the crown wheel holder flange.——

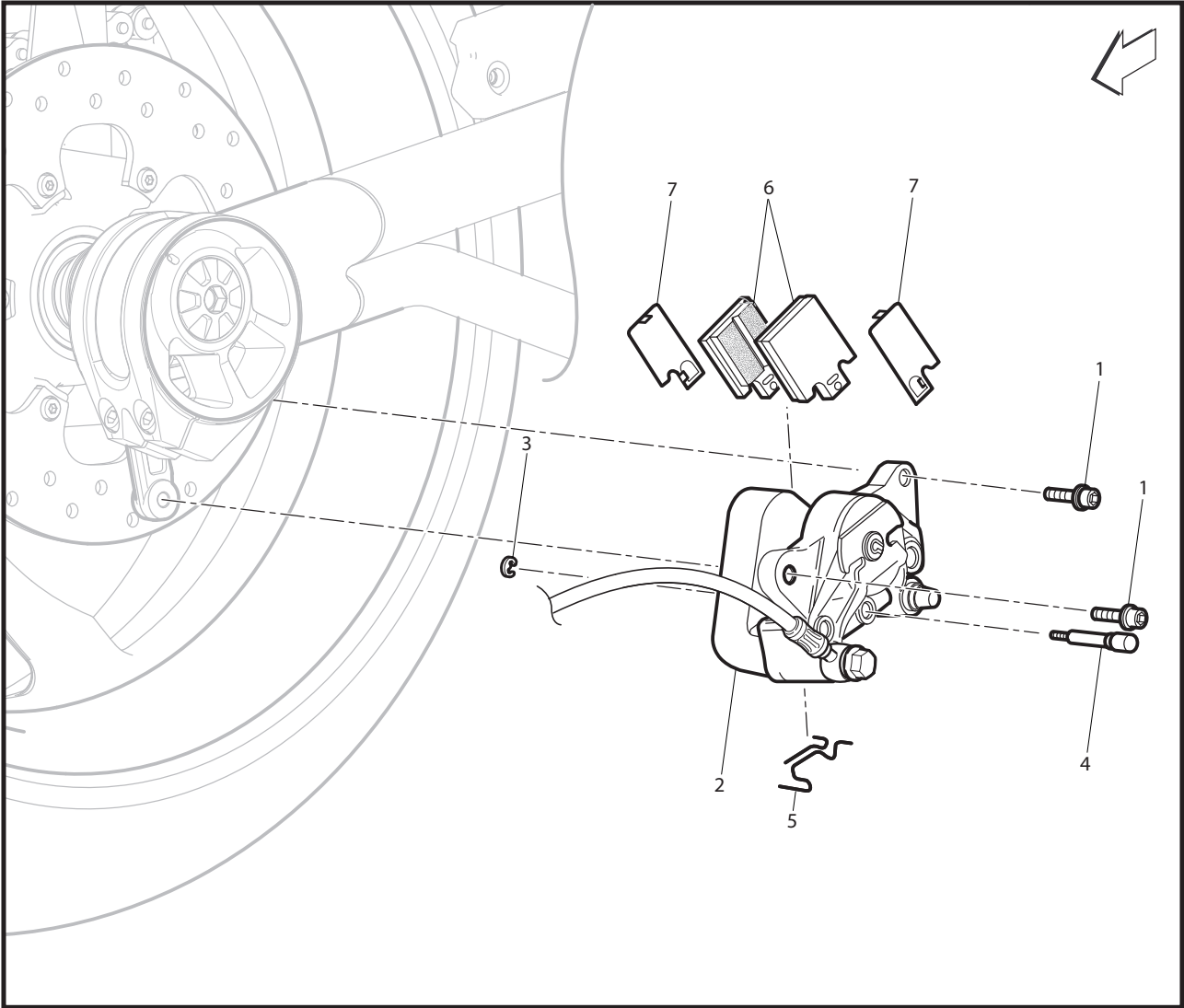
- ① Adjust:
- **the balancing of the rear wheel**
See paragraph "4.14".

FRONT BRAKE PADS REMOVAL



SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1		Screw	2	Remove the pieces in the given order. NOTE: _____ The procedure below can be applied to both front brake callipers. _____
2		Left Brake Calliper	1	
3		Clip	2	
4		Pin	2	
5		Safety Spring	1	
6		Pad	2	

REAR BRAKE PADS REMOVAL



SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1		Rear Brake Pads Removal	2	Remove the pieces in the given order.
2		Screw	1	
3		Rear Brake Calliper	1	
4		Seeager	1	
5		Pin	1	
6		Clip	2	
7		Pad	2	
		Thickness For Brake Pads		

WARNING

The need to dismantle the components of the brake disk is rare. Therefore, the following precautions must always be complied with:

- Never dismantle the brake components unless absolutely necessary.
- If one of the connections of the hydraulic braking plant disconnects, it is necessary to dismantle, empty, clean, adequately fill and bleed (after re-assembly) the entire braking system.
- Do not use solvents on the internal components of the brake.
- Only use clean or new brake liquid to clean the brake components.
- The brake liquid can damage the painted surfaces and the plastic parts. Therefore, always immediately clean all brakes liquid spills.
- Avoid bringing the brake liquid in contact with the eyes, as it can cause serious injuries.

FIRST AID IN CASE OF BRAKE LIQUID SPLASHING IN THE EYES:

- Wash with running water for 15 minutes and immediately contact a doctor.



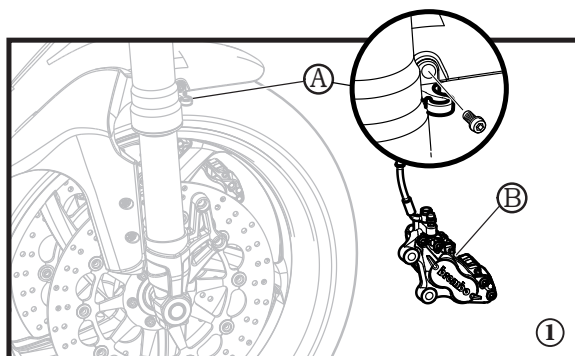
FRONT BRAKE PADS REPLACEMENT

The procedure below can be applied to both the brake callipers.

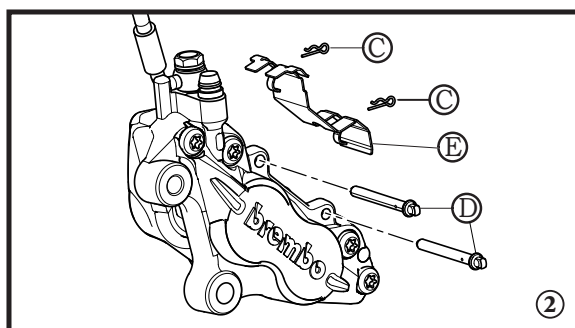
NOTE:

To replace the brake pads, always replace in pair to guarantee an even pressure.

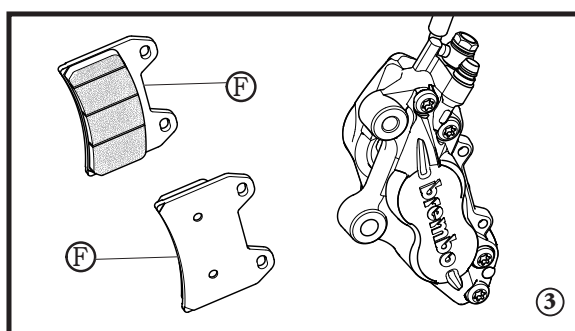
It is not necessary to disconnect the flexible tube.



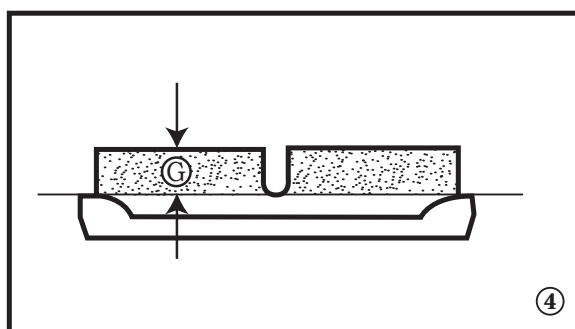
- ① Disconnect:
- the support of the brake flexible tube (A)
 - the brake calliper (B)



- ② Disconnect:
- the clips (C)
 - the pins (D)
 - the safety spring (E)



- ③ Disconnect:
- the brake pads (F)



- ④ Measure:
- the wear limit of the brake pads (G)
- If out of specification → Replace the brake pads together.



Wear limit of the brake pads
1 mm (0.04 in)

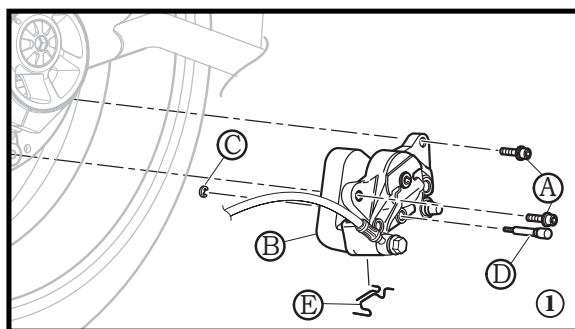
- ⑤ Clean:
- **the inside of the calliper**
 - **the pistons**
- then dry everything

- ⑥ Press:
- **the calliper pistons**
- inwards to enable installation of the new brake pads.

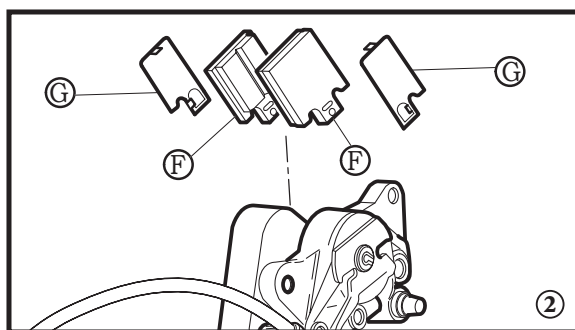
REAR BRAKE PADS REPLACEMENT

NOTE:

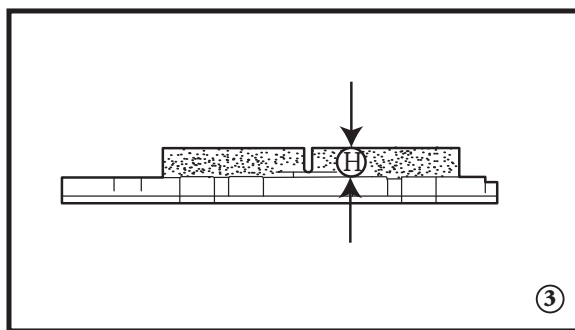
To replace the brake pads, always replace in pair to guarantee an even pressure.
It is not necessary to disconnect the flexible tube.



- ① Disconnect:
- the screws (A)
 - the brake calliper (B)
 - the seeger (C)
 - the pin (D)
 - the clip (E)



- ② Disconnect:
- the brake pads (F)
 - the brake pads thicknesses (G)



- ③ Measure:
- the wear limit of the brake pads (H)
- If out of specification → Replace all brake pads.



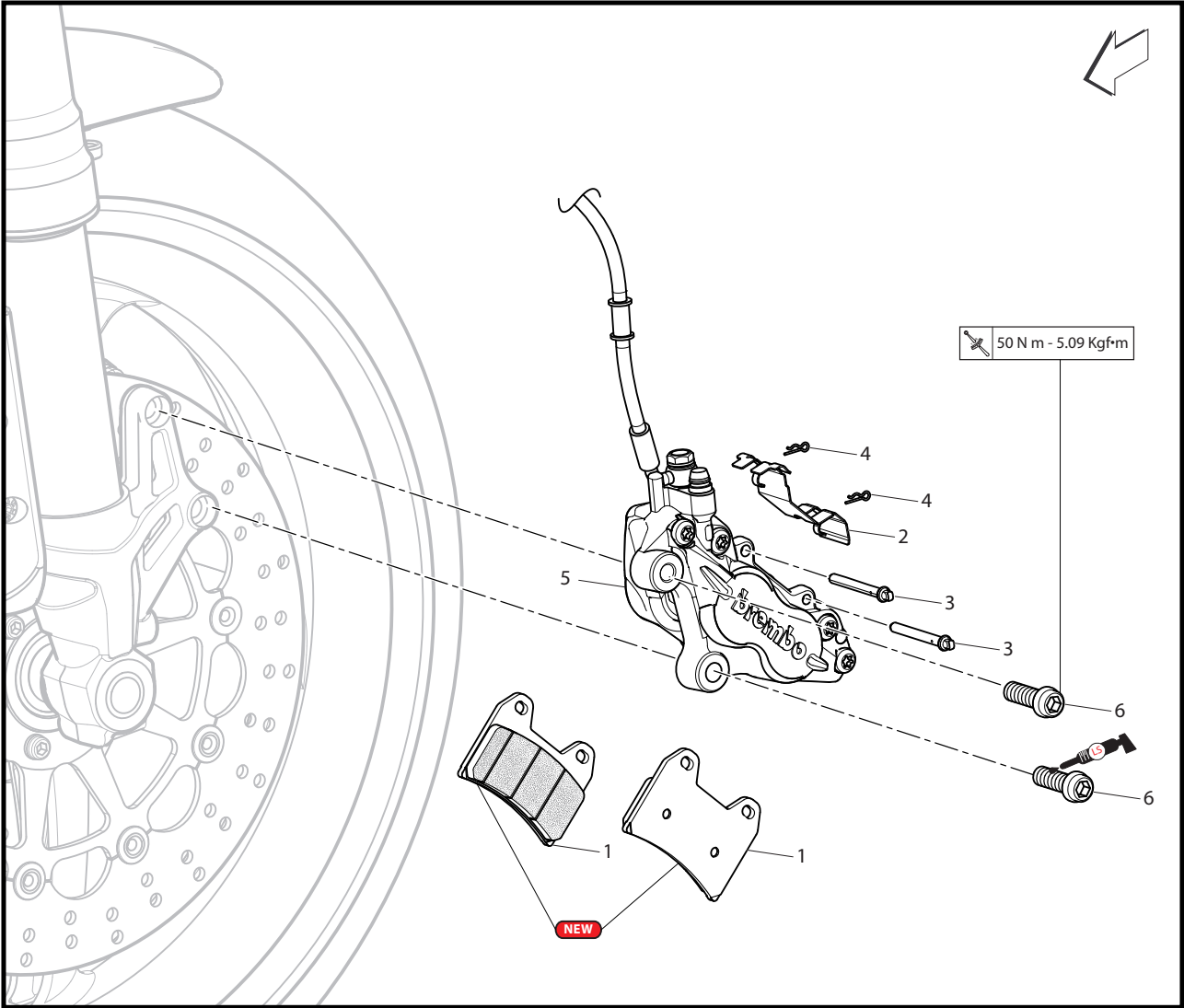
Wear limit of the brake pads
1.0 mm (0.04 in)

- ④ Clean:
- the inside of the calliper

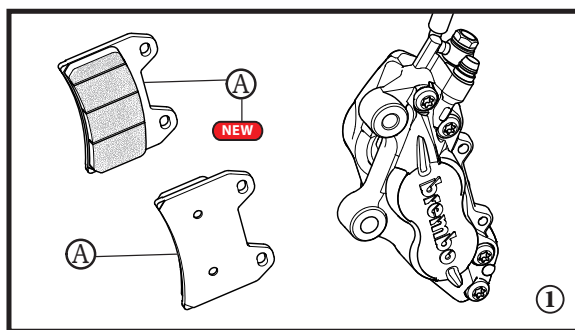
- ⑤ Press:
- **the calliper pistons**
inwards to enable installation of the new brake pads.

- ⑥ Act:
- **on the brake command**
with long brakes but not intense for approximately
one hundred kilometres.

FRONT BRAKE PADS INSTALLATION



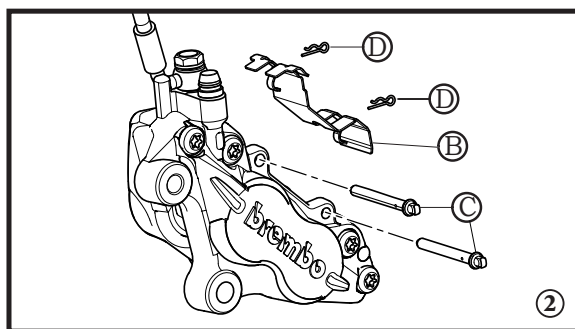
SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
		Front Brake Pads Installation		Install the pieces in the given order.
1		Pad	2	NOTE: _____ The procedure below can be applied to both front brake callipers. _____
2		Safety Spring	1	
3		Pin	2	
4		Clip	2	
5		Left Brake Calliper	1	
6		Screw	2	



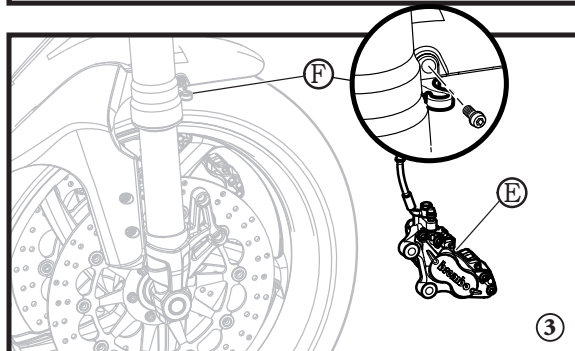
FRONT BRAKE PADS INSTALLATION

- ① Install:
- the brake pads (A)

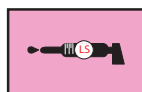
NOTE: Always install new brake pads.



- ② Install:
- the safety spring (B)
 - the pins (C)
 - the clips (D)



- ③ Install:
- the brake calliper (E)

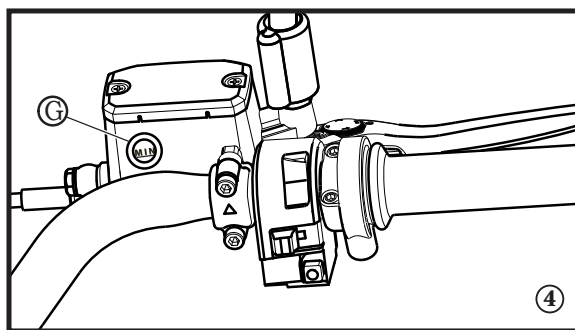


Recommended lubricant
TUTELA MR2 GREASE

Torque fasten:

50 N m - 5.09 Kgf·m

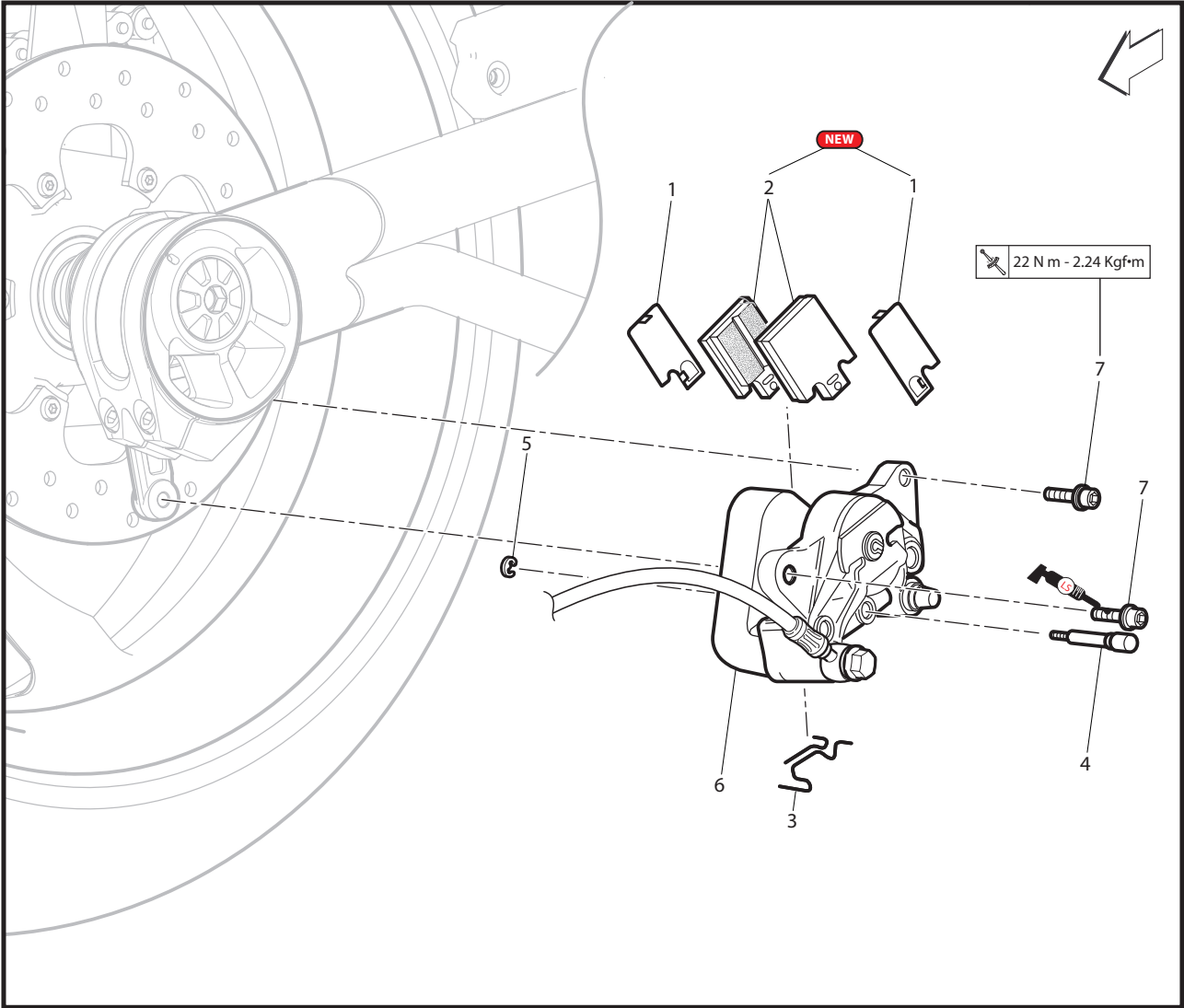
- the support of the flexible tube (F)



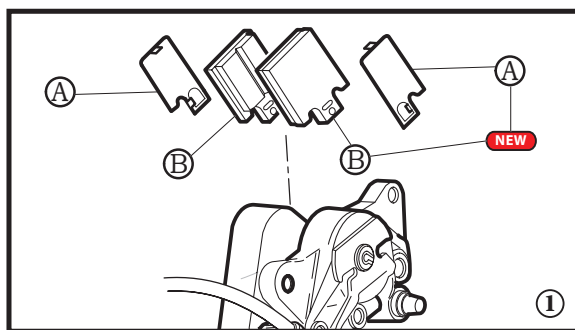
- ④ Check:
- the brakes liquid level
- If below the minimum level notch (G) → Top-up to the correct level using the recommended brake liquid.
See "ROUTINE INSPECTIONS AND ADJUSTMENTS 3.55" paragraph.

- ⑤ Check:
- the functioning of the brake lever
- If the brake lever is soft or spongy to touch → Bleed the braking plant.
See "ROUTINE INSPECTIONS AND ADJUSTMENTS 3.58" paragraph.

PADS INSTALLATION REAR BRAKE



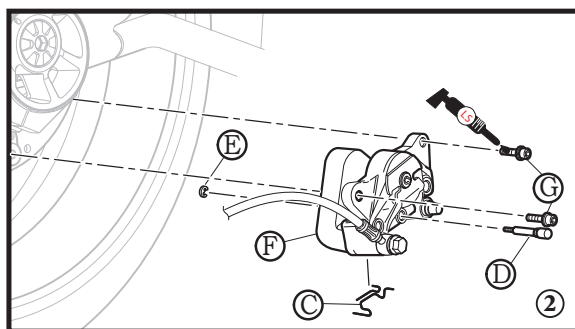
SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1		Rear Brake Pads Installation	2	Install the pieces in the given order.
2		Thickness For Brake Pads	2	
3		Pad	1	
4		Clip	1	
5		Pin	1	
6		Seeger	1	
7		Rear Brake Calliper	1	
		Screw	2	



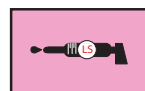
REAR BRAKE PADS INSTALLATION

- ① Install:
- the brake pads thicknesses ①
 - the brake pads ②

NOTE: Always install new brake pads and thicknesses.



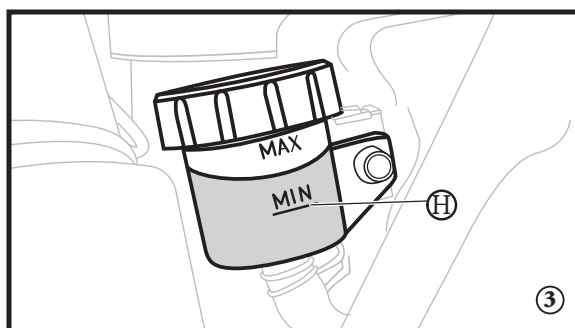
- ② Install:
- the clip ③
 - the pin ④
 - the seeger ⑤
 - the brake calliper ⑥
 - the screws ⑦



**Recommended lubricant
TUTELA MR2 GREASE**

Torque fasten:

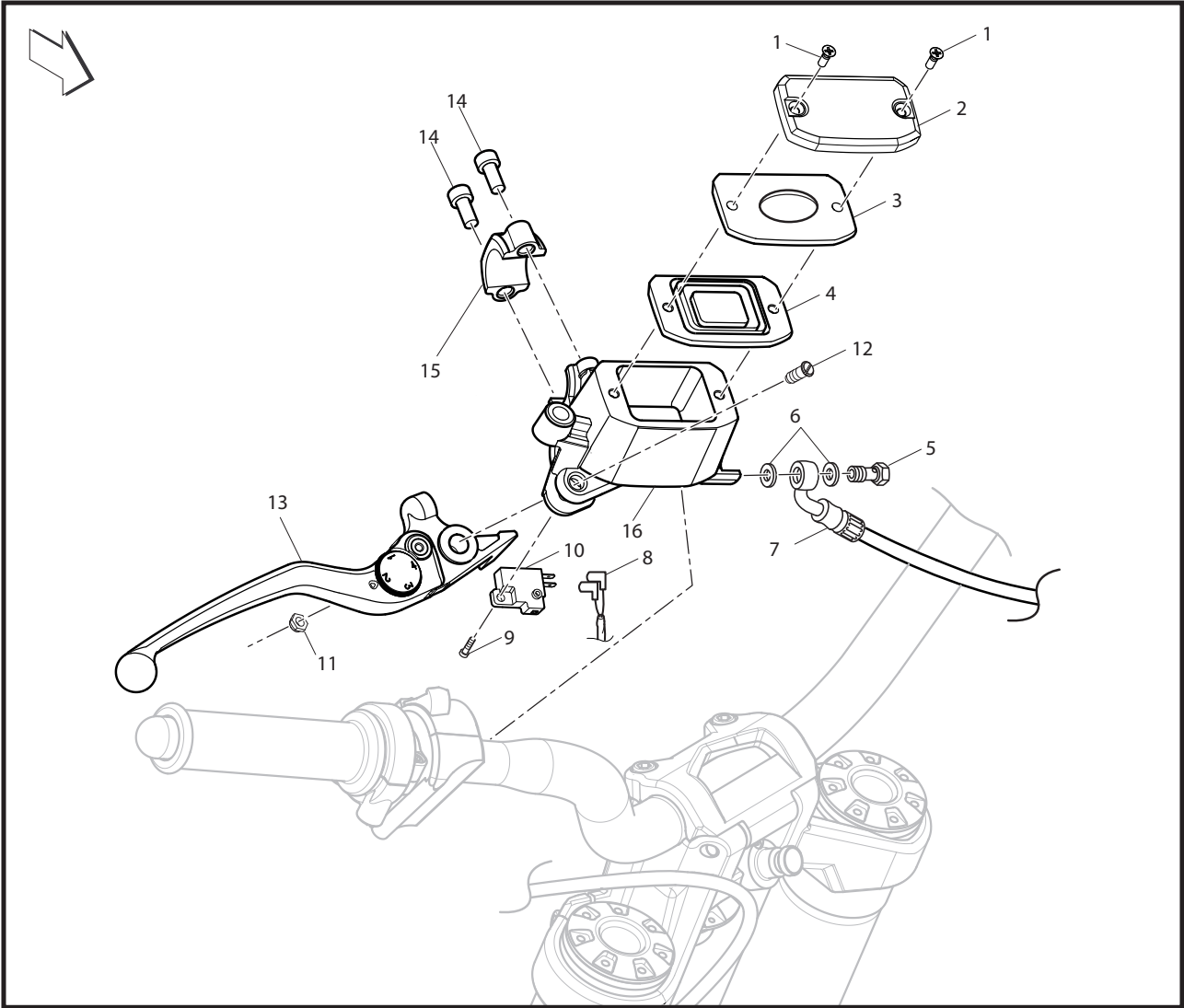
22 N m - 2.24 Kgf·m



- ③ Check:
- the brakes liquid level
- If below the minimum level notch ⑧ → Top-up to the correct level using the recommended brakes liquid.
See "ROUTINE INSPECTIONS AND ADJUSTMENTS 3.55" paragraph.

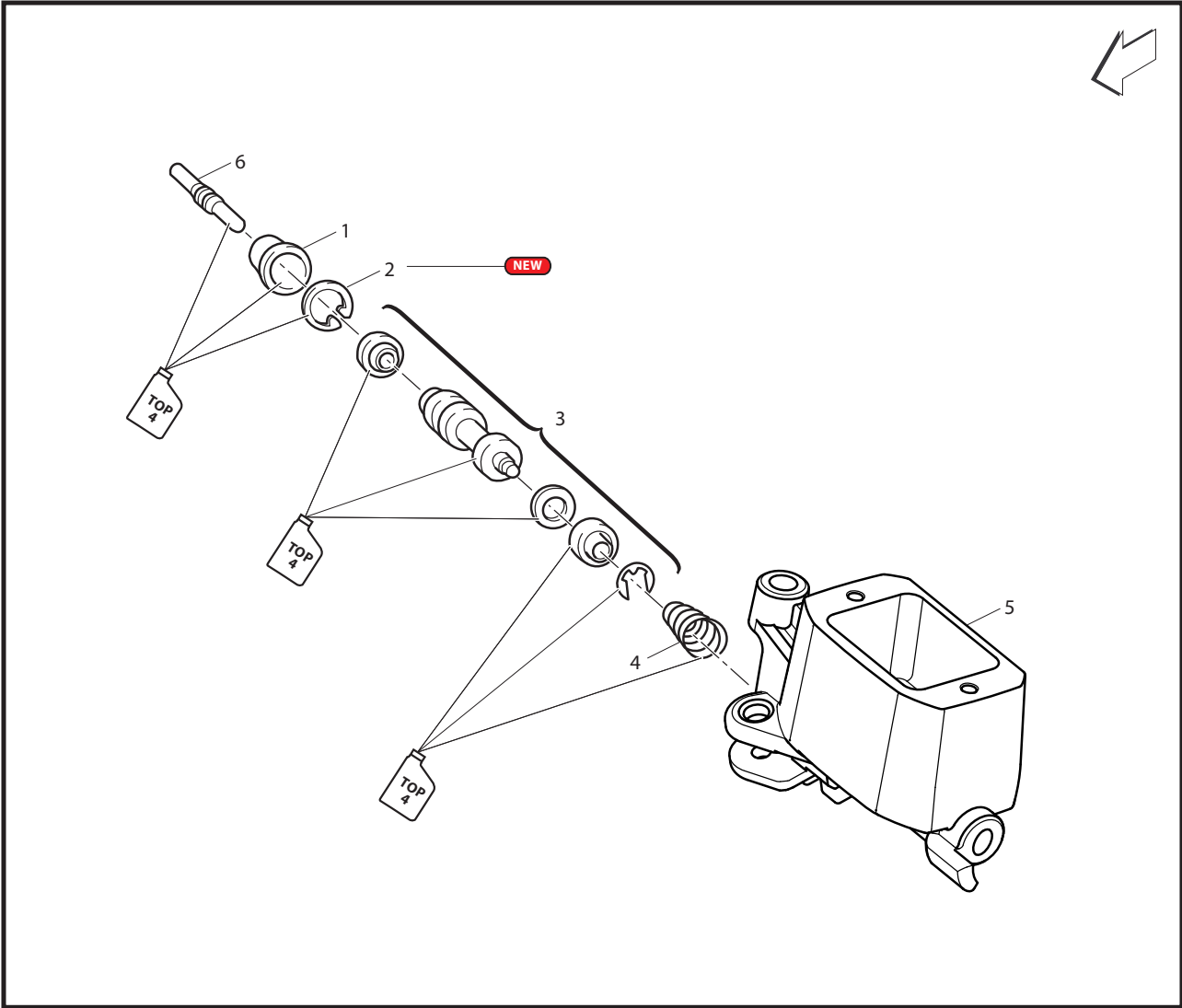
- ④ Check:
- the functioning of the brake pedal
- If the brake lever is soft or spongy to touch → Bleed the braking system.
See "ROUTINE INSPECTIONS AND ADJUSTMENTS 3.58" paragraph.

FRONT BRAKE PUMP REMOVAL



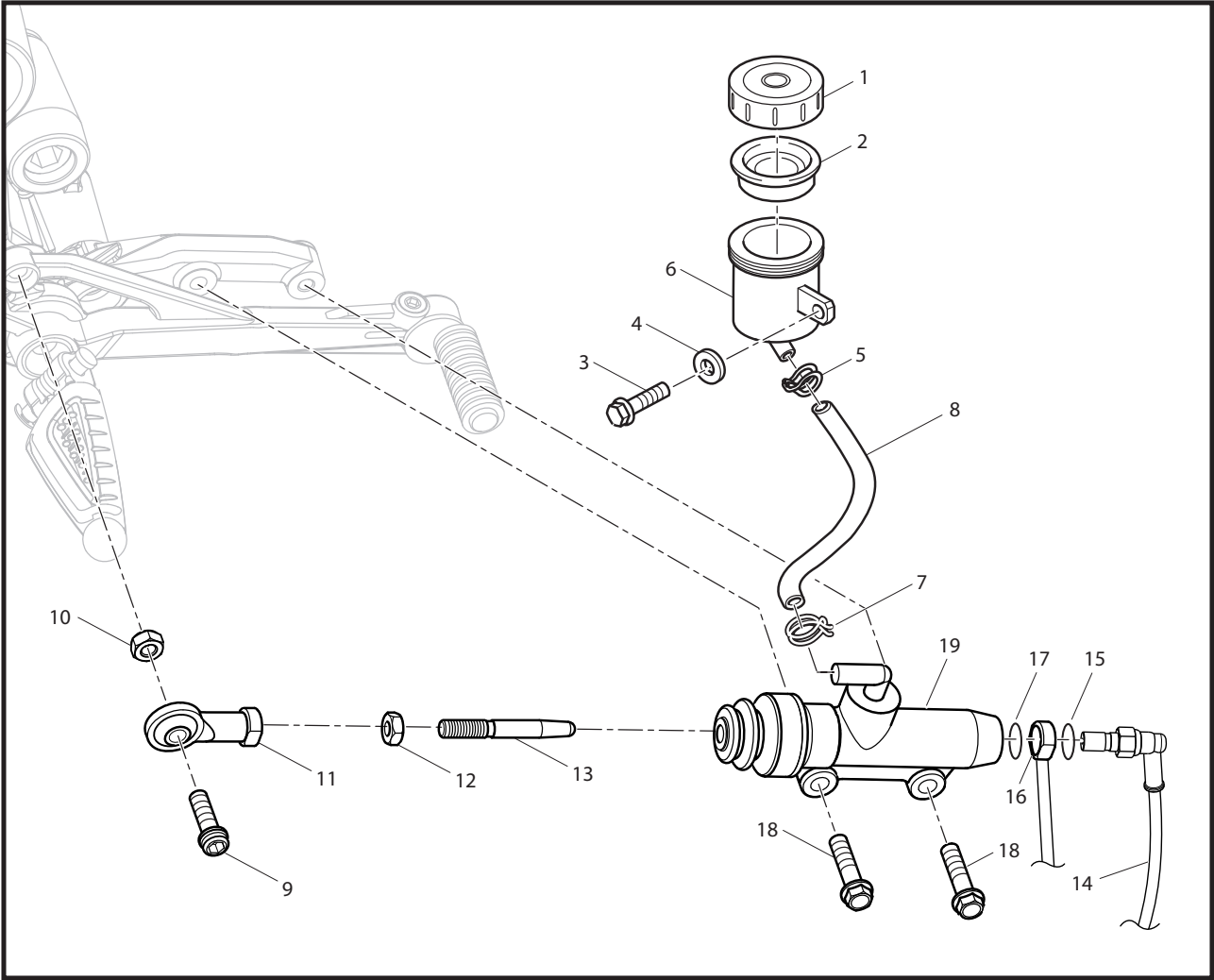
SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1		Front Brake Pump Removal	2	Remove the pieces in the given order. NOTE: <u>Drain the brakes liquid before carrying out the operations. See "ROUTINE INSPECTIONS AND ADJUSTMENTS 3.58" paragraph.</u> ATTENTION: <u>Avoid trickeling of brake fluid.</u>
2		Screw	1	
3		Trestle	1	
4		Brakes Pump Body	1	
		Screw	1	
5		Brakes Command Lever	1	
6		Nut	2	
7		Screw	1	
8		Lid	1	
9		Support For Brakes Liquid Tub Diaphragm	1	
10		Diaphragm of Brakes Liquid Tub	1	
11		Special Screw	1	
12		Washer	1	
13		Front Brake Tube	1	
14		Screw	2	
15		Front Brake Switch Connector	1	
16		Front Brake Light Switch	1	

FRONT BRAKE PUMP DECOMPOSITION

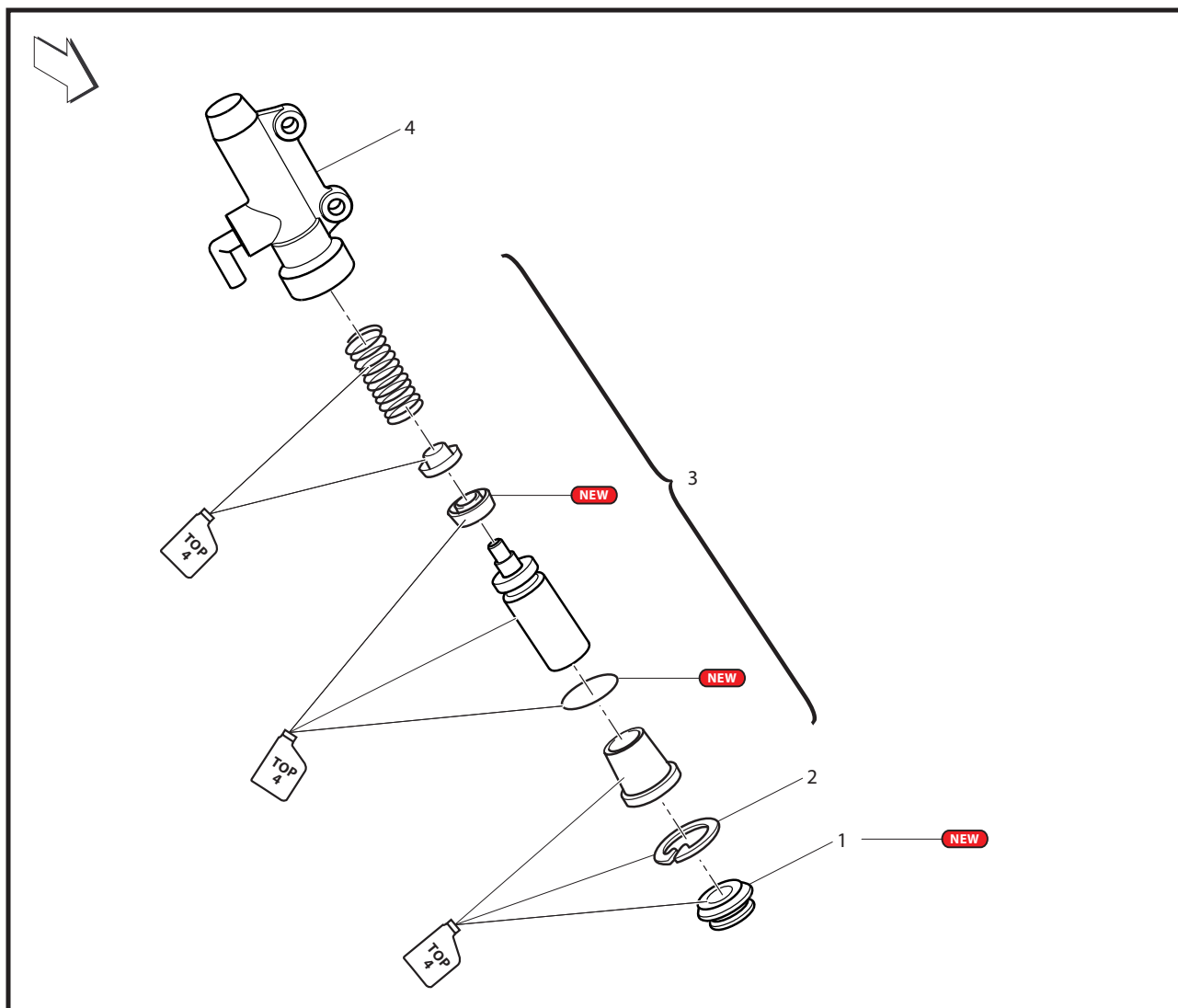


SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1		Front Brake Pump Decomposition	1	Decompose the pieces in the given order. NOTE: _____ To install, invert the order of the removal operations. _____
2		Dust seal	1	
3		Seeger	1	
4		Main Cylinder Kit	1	
5		Spring	1	
6		Body Main Cylinder	1	
		Pin	1	

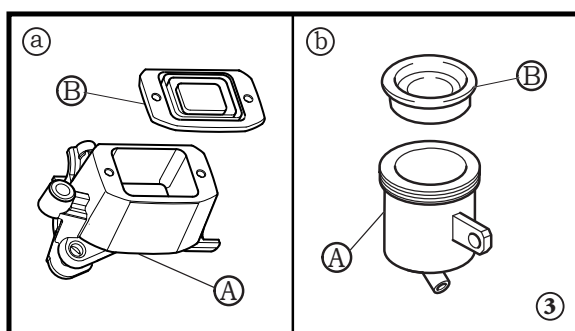
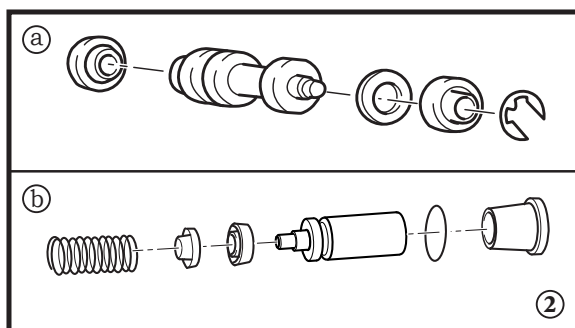
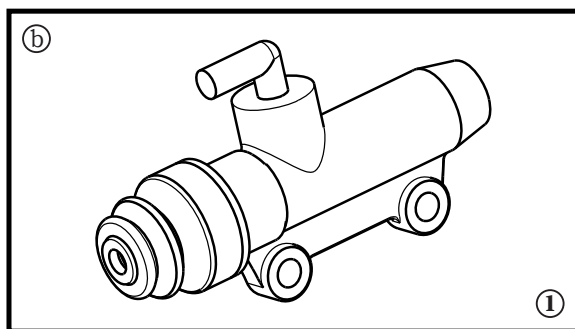
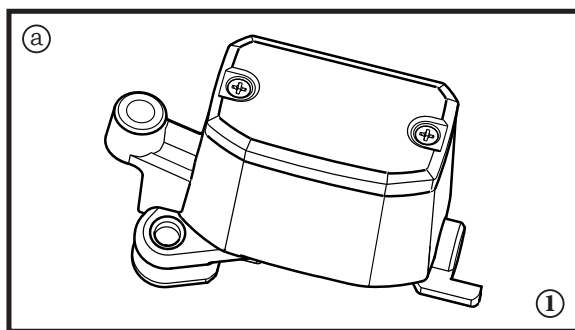
REAR BRAKE PUMP REMOVAL



SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
		Rear Brake Pump Removal Brakes Liquid		Remove the pieces in the given order. NOTE: Drain the brakes liquid before carrying out the operations. See "ROUTINE INSPECTIONS AND ADJUSTMENTS 3.58" paragraph.
1		Brakes Liquid Tub Cap	1	
2		Brakes Liquid Tub Diaphragm	1	
3		Screw	1	
4		Bush	1	
5		Spring Strip	1	
6		Brakes Liquid Tub	1	
7		Spring Strip	1	
8		Tub Tube	1	
9		Screw	1	
10		Nut	1	
11		Ball Joint	1	
12		Nut	1	
13		Regulator Rod	1	
14		Hydrostop	1	
15		Gasket	1	
16		Brake Tube	1	
17		Gasket	1	
18		Screw	2	
19		Rear Brake Pump	1	Disconnect the central wiring pin.



SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1 2 3 4	  	Rear Brake Pump Decomposition Dust Seal Rubber Seeger Main Cylinder Kit Rear Brake Pump	1 1 1 1	Decompose the pieces in the given order. NOTE: _____ To install, invert the order of the removal operations. _____



FRONT AND REAR BRAKE PUMP CONTROL

The following procedure is applied to both the brakes pumps.

- ① Check:
 - **the brake main cylinder**
In the presence of damages/scratches/wear lines → Replace.
 - **the brakes liquid flow passages**
(brake pump body)
In the presence of obstructions → Clean using a jet of compressed air.

(a) Front
(b) Rear

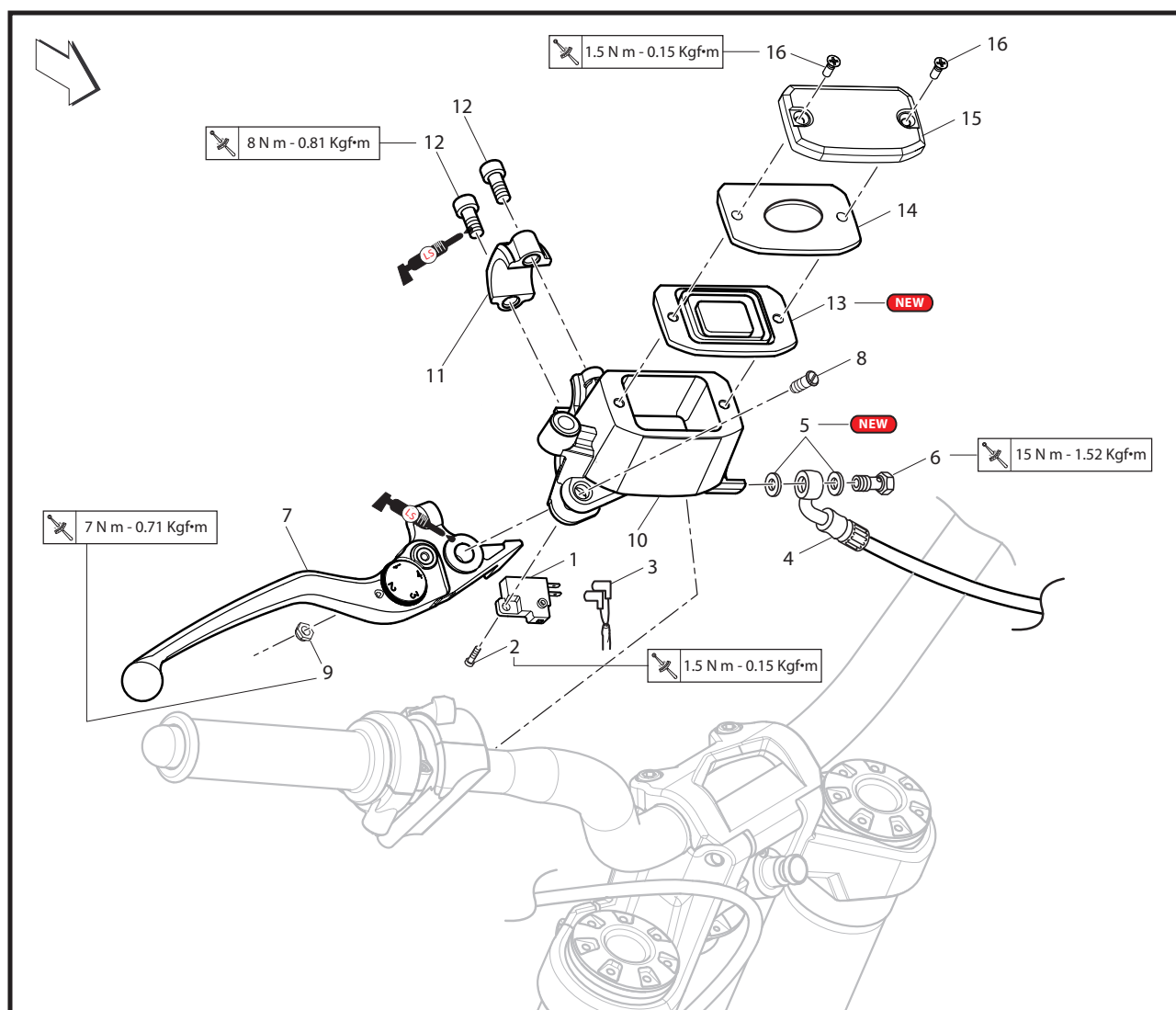
- ② Check:
 - **the brake pump kit**
In the presence of damages/scratches/wear lines → Replace.

(a) Front
(b) Rear

- ③ Check:
 - **the brakes liquid tub** (A)
In the presence of cracks/damages → Replace.
 - **diaphragm of the brakes liquid tub** (B)
In the presence of cracks/damages → Replace.

(a) Front
(b) Rear

- ④ Check:
 - **the brake flexible tubes**
In the presence of cracks/damages/wear lines → Replace.
 - **the hydrostop cables**
If disconnected → Connect them.



SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
		Front Brake Pump Installation		Install the pieces in the given order.
1		Front Brake Light Switch	1	
2		Screw	1	
3		Front Brake Switch Connector	1	
4		Front Brake Tube	1	
5		Washer	2	
6		Special Screw	1	
7		Brakes Command Lever	1	
8		Screw	1	
9		Nut	1	
10		Brakes Pump Body	1	
11		Trestle	1	
12		Screw	2	
13		Diaphragm of Brakes Liquid Tub	1	
14		Support For Brakes Liquid Tub Diaphragm	1	
15		Lid	1	
16		Screw	2	
				NOTE: _____ Once operations have been completed, top-up with brakes liquid. _____

FRONT BRAKE PUMP INSTALLATION

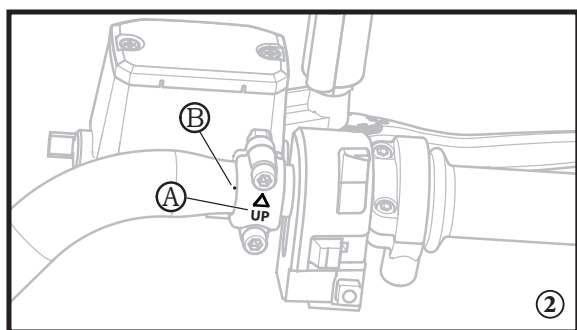
WARNING

- Before installation, clean all brake internal components, lubricating them using clean or new brakes liquid.
- Do not use solvents on the internal components of the brake.



Recommended brakes liquid
TUTELA BRAKE FLUID
TOP 4 - DOT 4

- ① Install:
- **the pin**
in the main cylinder body
 - **the spring**
 - **the main cylinder kit**
 - **the seeger**
 - **the dust seal**
See paragraph "4.41".



- ② Install:
- **the front brake pump**

Torque fasten:

 8 N m - 0.81 Kg•m



Recommended lubricant
TUTELA MR2 GREASE

NOTE:

- Install the main cylinder support of the brake with the "UP" mark (A) facing upwards.
- Align the end of the retainer element of the main cylinder of the brake with the punching (B) on the right knob of the handle bar.
- Firstly, fasten the upper bolt, then the lower bolt..

- ③ Install:
- **the copper washers**
 - **the front brake tube**
 - **the special screw**

Torque fasten:

 15 N m - 1.52 Kg•m

- **the connector of the front brake switch**

WARNING

To guarantee bike safety, it is essential that the path of the brake flexible tube is correct.

NOTE:

- Fasten the fitting bolt by keeping the brake flexible tube still.
- Turn the handle bar to the right and left to check that the brake flexible tube does not touch other parts (for example, the cables band, the metal cables, the electric wires). Correct if necessary.

- ④ Fill:
- **the brakes liquid tub**
(with the specified quality of recommended brakes liquid)



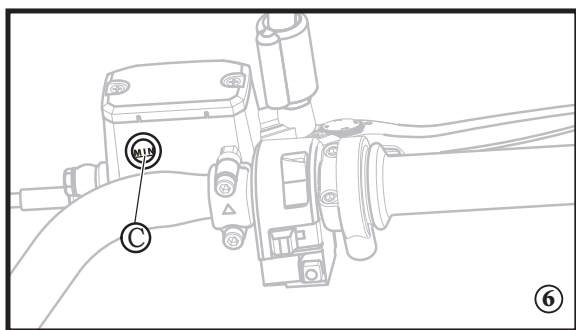
WARNING

- Use only the prescribed brakes liquid. The use of other types of brakes liquid may damage the rubber gaskets, causing leaks and deteriorating the performances of the brakes.
- Top-up using the same type of brakes liquid already present inside the system. The brakes liquid must never be mixed with liquids of other brands, in that it may cause a dangerous chemical reaction, with the consequent deterioration of the performances of the brakes.
- During top-up, be careful not to let water flow inside the tub. The presence of water will significantly reduce the boiling point of the brakes liquid and may cause vapour to form.

ATTENTION

- The brakes liquid can damage the painted surfaces and the plastic parts. Therefore, always immediately clean all brakes liquid spills.

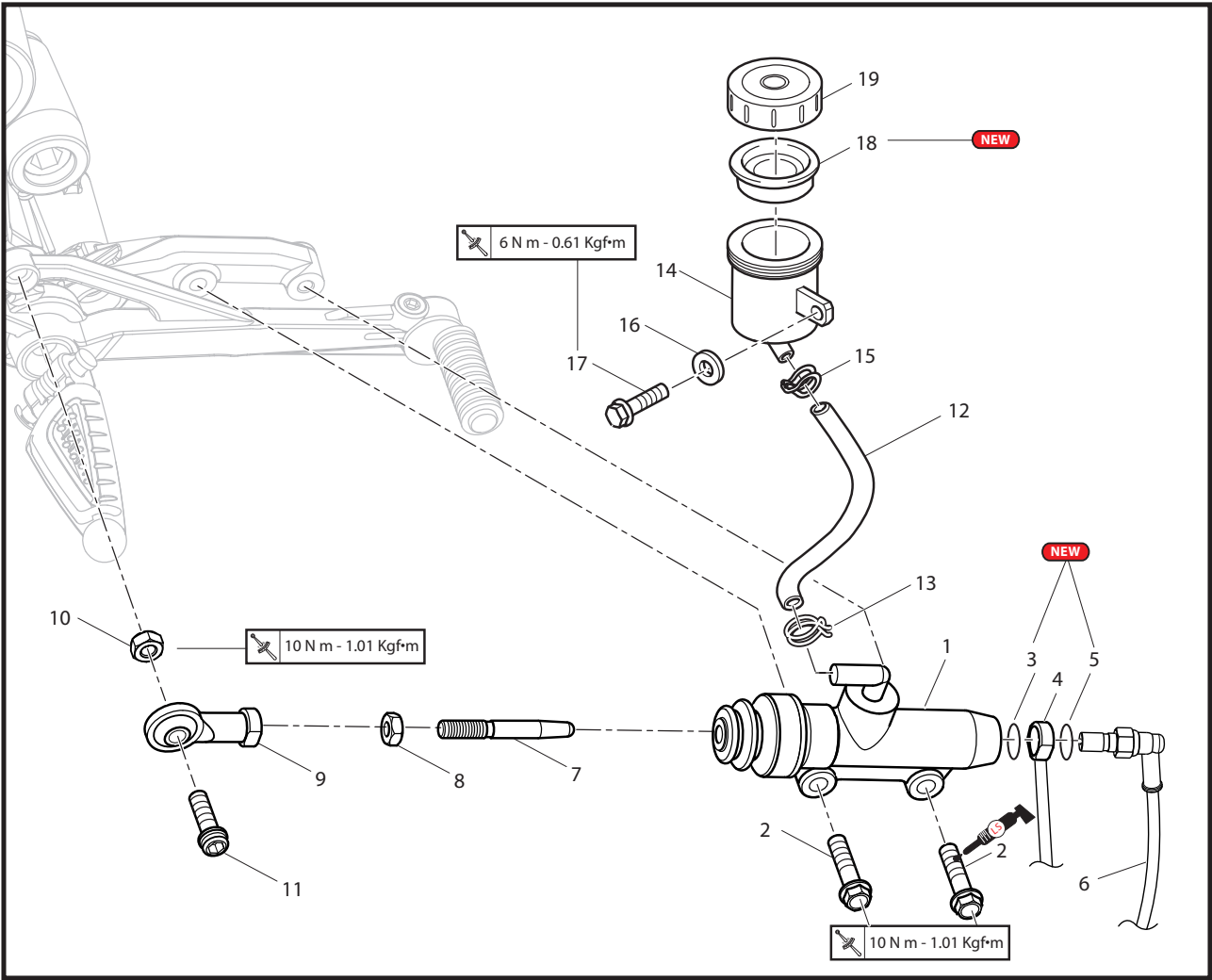
- ⑤ Bleed:
- **the braking plant**
See "ROUTINE INSPECTIONS AND ADJUSTMENTS 3.58" paragraph.



- ⑥ Check:
- **the brakes liquid level**
If below the minimum level notch © → Top-up to the correct level using the recommended brake liquid.
See "ROUTINE INSPECTIONS AND ADJUSTMENTS 3.55" paragraph.

- ⑦ Check:
- **the functioning of the brake lever**
If the brake lever is soft or spongy to touch → Bleed the braking plant.
See "ROUTINE INSPECTIONS AND ADJUSTMENTS 3.58" paragraph.

REAR BRAKE PUMP INSTALLATION



SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1		Rear Brake Pump Installation	1	Install the pieces in the given order.
2		Rear Brake Pump	2	
3		Screw	1	
4		Gasket	1	
5		Brake Tube	1	
6		Gasket	1	
7		Hydrostop	1	Connect the central wiring pin.
8		Regulator Rod	1	
9		Nut	1	
10		Ball Joint	1	
11		Nut	1	
12		Screw	1	
13		Tube	1	
14		Spring Strip	1	
15		Brakes Liquid Tub	1	
16		Spring Strip	1	
17		Bush	1	
18		Screw	1	
19		Brakes Liquid Tub Diaphragm	2	NOTE: <u>Once operations have been completed, top-up with brakes liquid.</u>
		Brakes Liquid Tub Cap	1	

REAR BRAKE PUMP INSTALLATION

WARNING

- Before installation, clean all brake internal components, lubricating them using clean or new brakes liquid.
- Do not use solvents on the internal components of the brake.



Recommended brakes liquid
**TUTELA BRAKE FLUID
 TOP 4 - DOT 4**

- 1
- Install:

 - the main cylinder kit
 - the seeger
 - the dust seal rubber
 See paragraph "4.43".

- 2
- Install:

 - the brake pump



Recommended lubricant
TUTELA MR2 GREASE

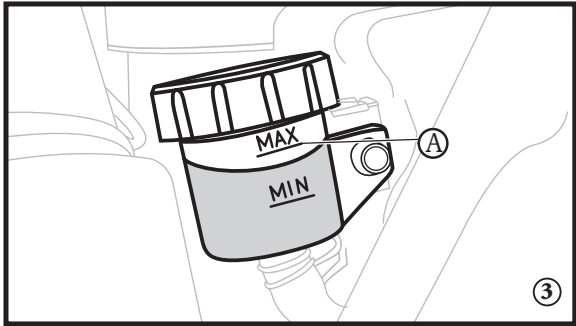
Torque fasten:

 10 N m - 1.01 Kgfm

See paragraph "4.48".

WARNING

To guarantee bike safety, it is essential that the path of the brake flexible tube is correct.



- 3
- Fill:

 - the brakes liquid tub
 (up to the maximum level mark **A**)



Recommended brakes liquid
**TUTELA BRAKE FLUID
 TOP 4 - DOT 4**

**WARNING**

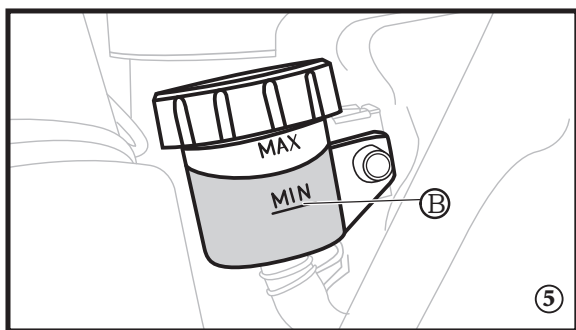
- Use only the prescribed brakes liquid. The use of other types of brakes liquid may damage the rubber gaskets, causing leaks and deteriorating the performances of the brakes.
- Top-up using the same type of brakes liquid already present inside the system. The brakes liquid must never be mixed with liquids of other brands, in that it may cause a dangerous chemical reaction, with the consequent deterioration of the performances of the brakes.
- During top-up, be careful not to let water flow inside the tub. The presence of water will significantly reduce the boiling point of the brakes liquid and may cause vapour to form.

ATTENTION

- The brakes liquid can damage the painted surfaces and the plastic parts. Therefore, always immediately clean all brakes liquid spills.

④ Bleed:**• the braking plant**

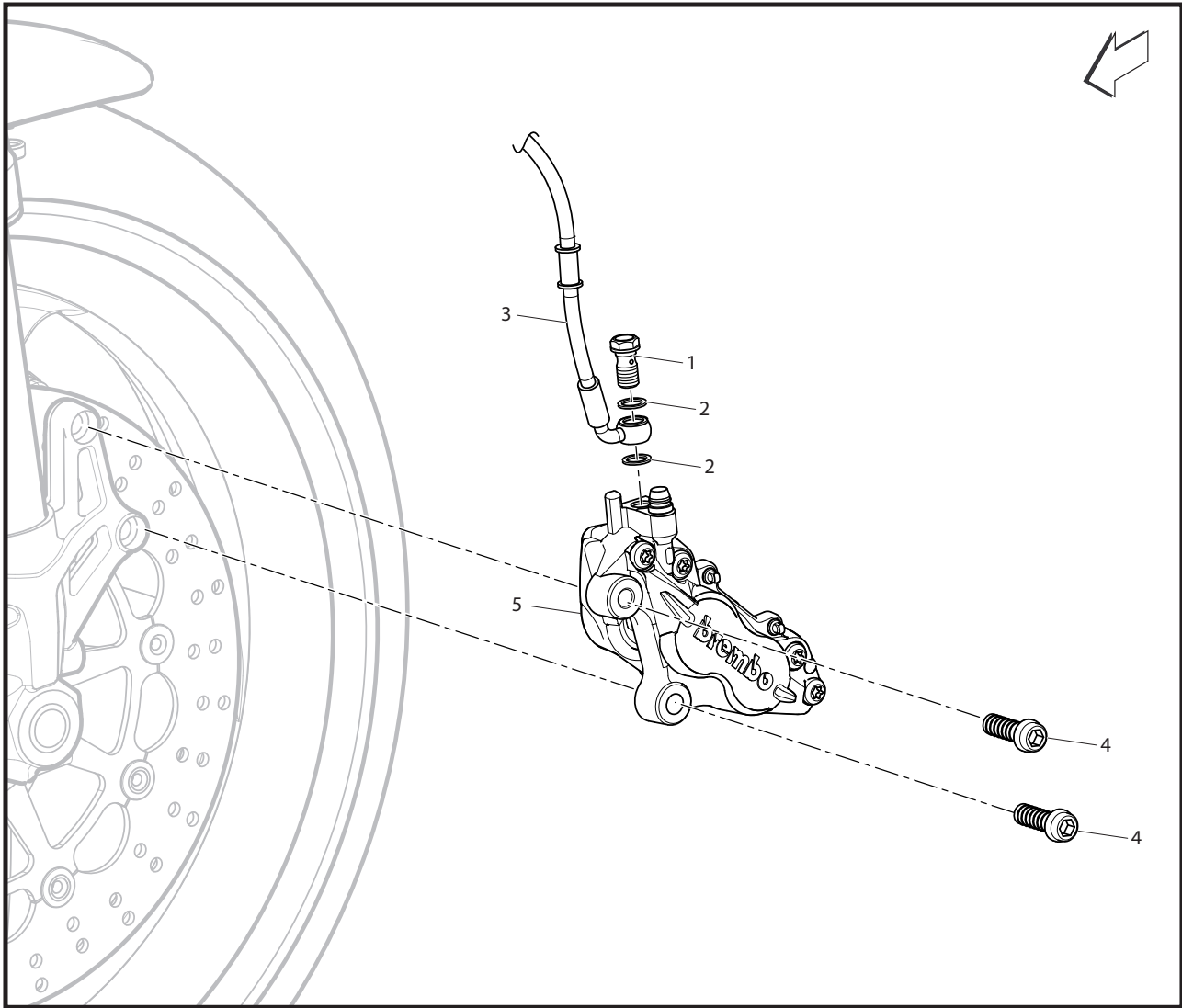
See "ROUTINE INSPECTIONS AND ADJUSTMENTS 3.58" paragraph.

**⑤ Check:****• the brakes liquid level**

If below the minimum level notch (B) → Top-up to the correct level using the recommended brakes liquid.

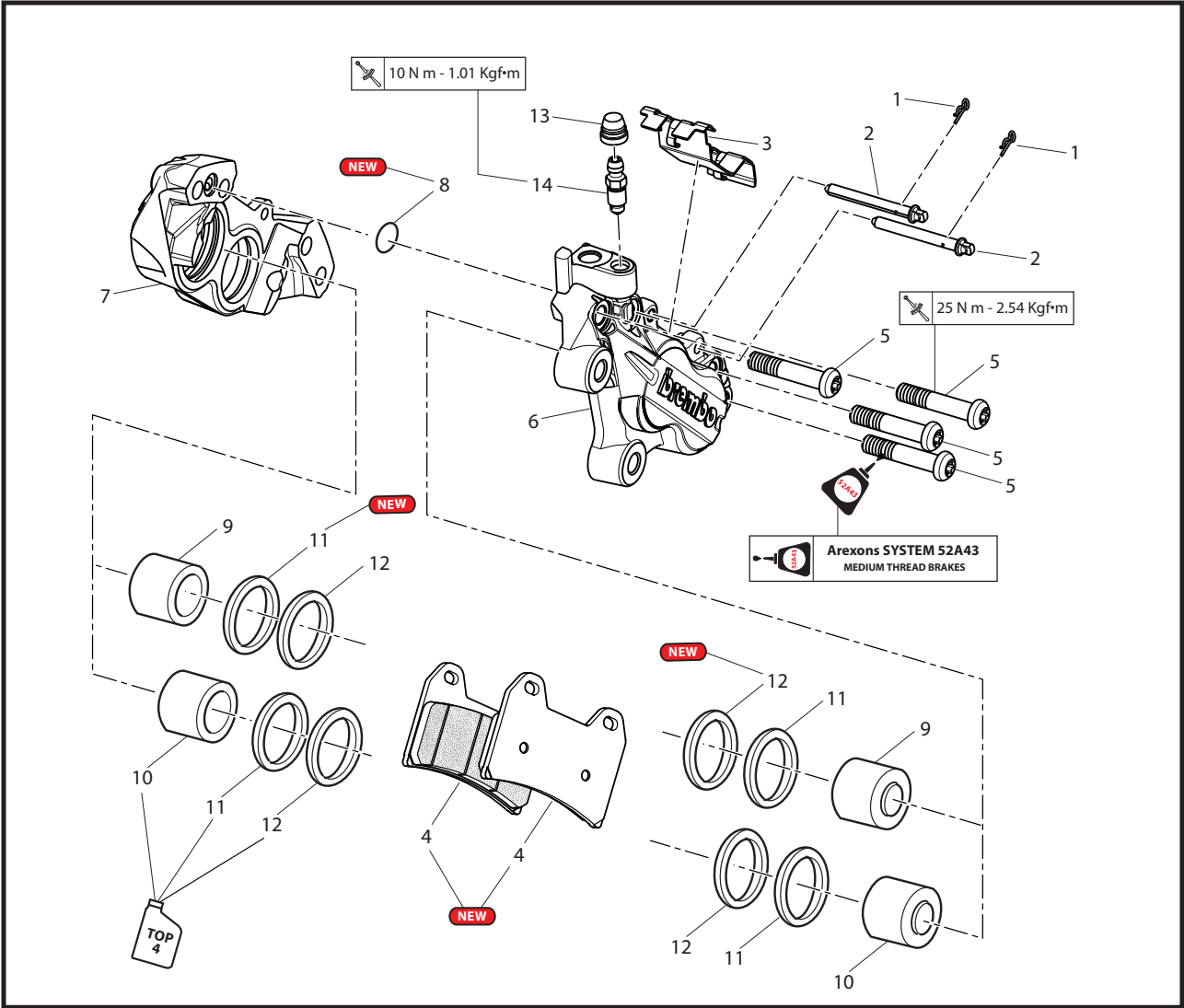
See "ROUTINE INSPECTIONS AND ADJUSTMENTS 3.55" paragraph.

FRONT BRAKE CALLIPERS REMOVAL



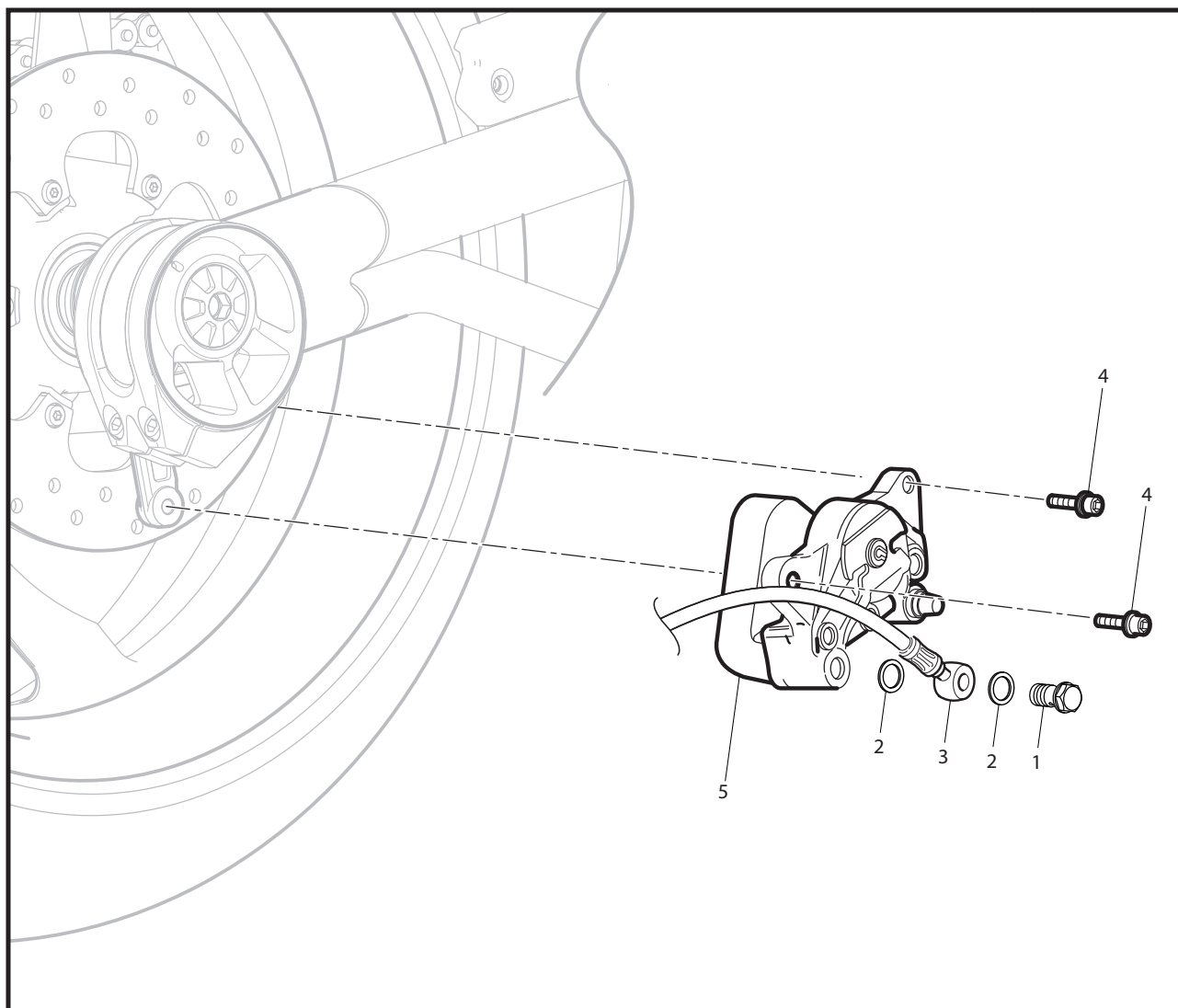
SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
		Front Brake Calliper Removal Brakes Liquid Special Screw Washer Front Brake Tube Screw Front Brake Calliper	 1 2 1 2 1	Remove the pieces in the given order. NOTE: _____ The procedure below can be applied to both front brake callipers. _____ NOTE: _____ Drain the brakes liquid before carrying out the operations. See "ROUTINE INSPECTIONS AND ADJUSTMENTS 3.58" paragraph. _____
1			1	
2			2	
3			1	
4			2	
5			1	

FRONT BRAKE CALLIPERS DECOMPOSITION



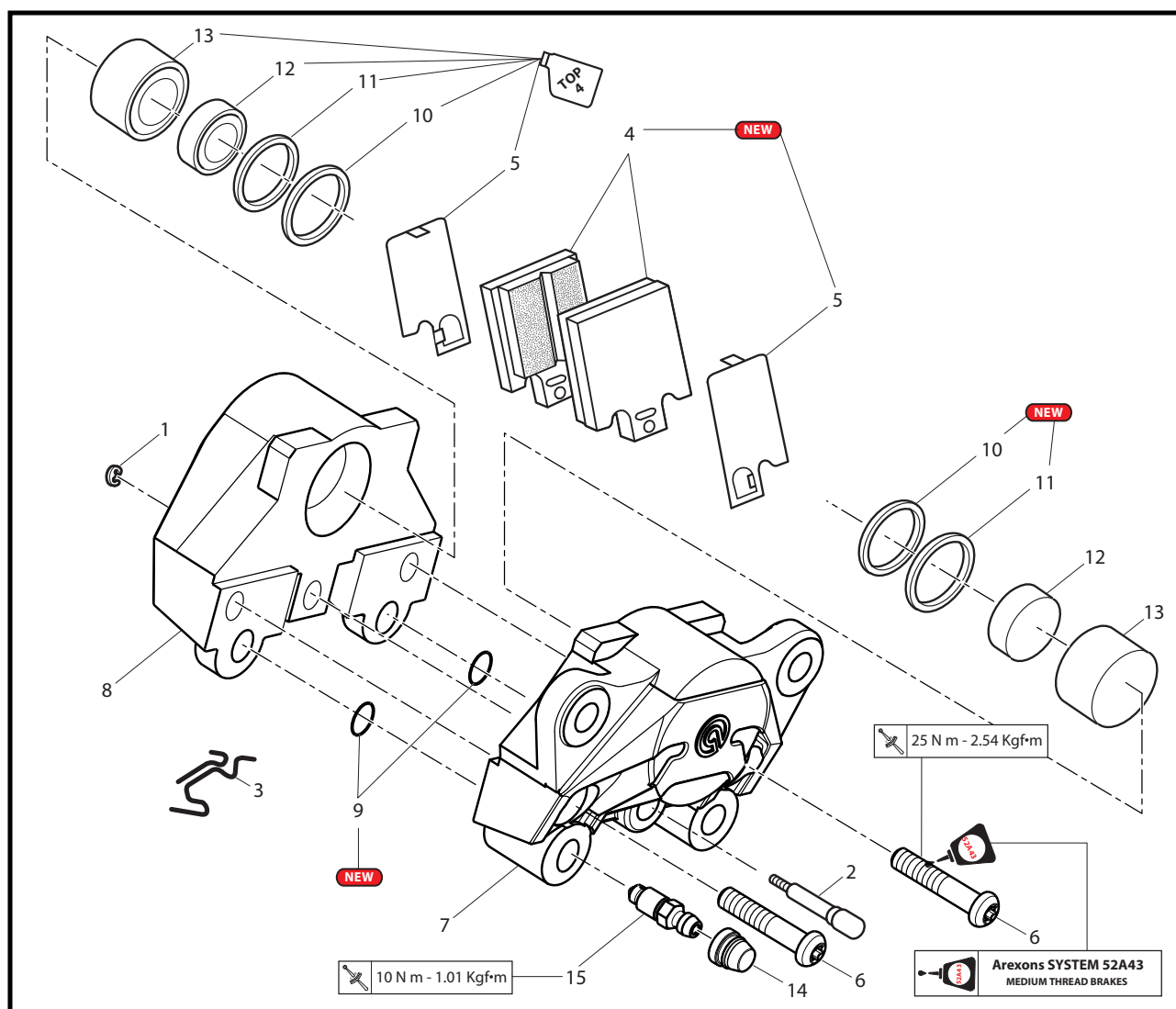
SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
		Front Brake Calliper Decomposition		Decompose the pieces in the given order.
1		Clip	2	NOTE: _____ The procedure below can be applied to both front brake callipers. _____
2		Pin	2	
3		Safety Spring	1	
4	NEW	Pad	2	
5		Screw	4	
6		Left Half-bearing	1	
7		Right Half-bearing	1	
8	NEW	O-Ring Gasket	1	
9		Ø 34 mm Piston	2	
10		Ø 30 mm Piston	2	
11	NEW	Oil retainer	4	
12	NEW	Seal Ring	4	
13		Bleed Screw Cap	1	
14		Bleeding Screw	1	
				NOTE: _____ To install, invert the order of the removal operations. _____

REAR BRAKE CALLIPER REMOVAL



SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1		Rear Brake Calliper Removal		Remove the pieces in the given order.
2		Brakes Liquid		NOTE: _____
3		Special Screw	1	Drain the brakes liquid before carrying out the
4		Washer	2	operations. See paragraph "ROUTINE
5		Rear Brake Tube	1	INSPECTIONS AND ADJUSTMENTS 3.58"._____
		Screw	2	
		Rear Brake Calliper	1	

REAR BRAKE CALLIPER DECOMPOSITION



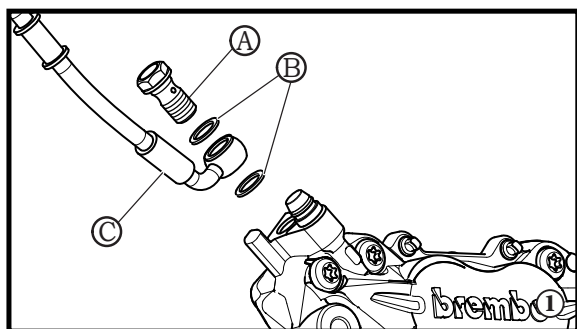
SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1		Rear Brake Calliper Decomposition	1	Decompose the pieces in the given order. NOTE: _____ To install, invert the order of the removal operations. _____
2		Seeger	1	
3		Pin	1	
4		Clip	1	
5		Pad	2	
6		Brake Pads Thickness	2	
7		Screw	2	
8		Right Half-bearing	1	
9		Left Half-bearing	1	
10		O-Ring Gasket	2	
11		Oil retainer	2	
12		Seal Ring	2	
13		Insulator	2	
14		Ø 32 mm Piston	2	
15		Bleed Screw Cap	1	
		Bleeding Screw	1	



FRONT BRAKE CALLIPERS REMOVAL

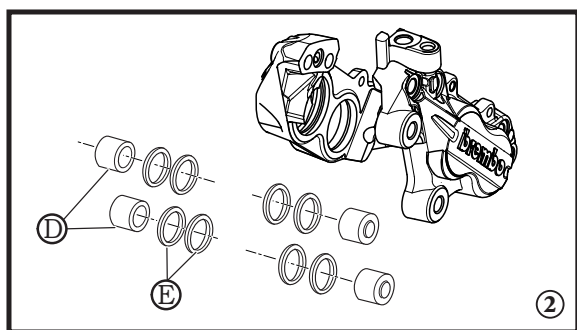
The following procedure is applied to both the brake callipers.

NOTE: Drain the brakes liquid from the entire braking plant before dismantling the brake calliper. See "ROUTINE INSPECTIONS AND ADJUSTMENTS 3.58" paragraph.

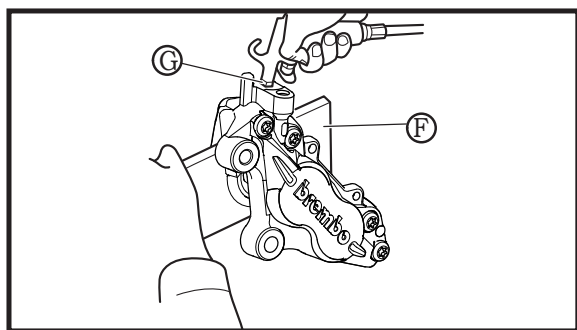


- ① Disconnect:
- the special screw (A)
 - the washers (B)
 - the front brake tube (C)
- See paragraph "4.51".

NOTE: Insert the end of the brake flexible tube in a container and slowly drain the brakes liquid by pumping it.



- ② Disconnect:
- the brake calliper pistons (D)
(2 Ø 34 mm and 2 Ø 30 mm)
 - the gaskets of the brake calliper pistons (E)
(first the oil retainers - smaller gaskets, then the seal rings - larger gaskets)
- See paragraph "4.52".



- (a) Fix the pistons of the brake calliper with a wedge of wood (F)
- (b) Blow compressed air inside the attachment for the flexible tube of the brake (C) to force the left side pistons out from the brake calliper.

WARNING Never attempt to remove the pistons from the calliper with force.

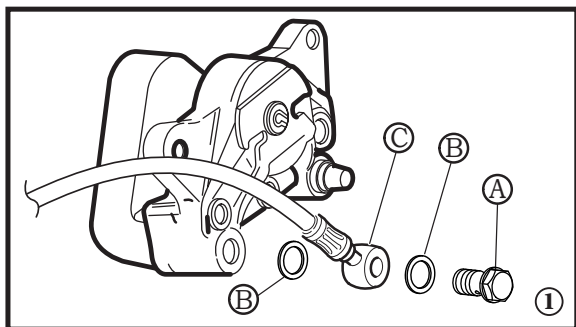
- (c) Remove the gaskets of the brake calliper pistons.
- (d) Repeat the above procedure to force the right side pistons out from the brake calliper.



REAR BRAKE CALLIPER REMOVAL

NOTE:

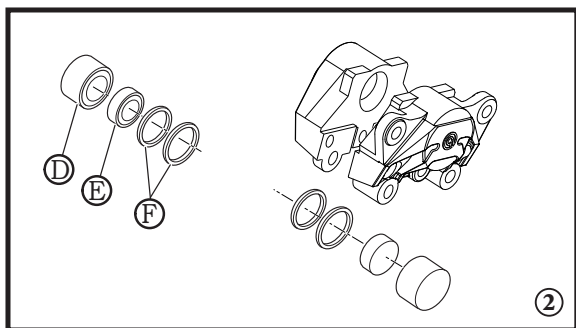
Drain the brakes liquid from the entire braking plant before dismantling the brake calliper. See "ROUTINE INSPECTIONS AND ADJUSTMENTS 3.58" paragraph.



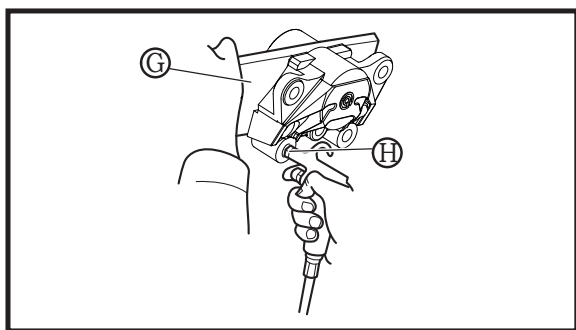
- ① Disconnect:
- the special screw **A**
 - the washers **B**
 - the front brake tube **C**
- See paragraph "4.53".

NOTE:

Insert the end of the brake flexible tube in a container and slowly drain the brakes liquid by pumping it.



- ② Disconnect:
- the brake calliper pistons **D**
 - the insulators **E**
 - the gaskets of the brake calliper pistons **F**
- (first the oil retainers - smaller gaskets, then the seal rings - larger gaskets)
See paragraph "4.54".



- (a) Fix the pistons of the brake calliper with a wedge of wood **G**
- (b) Blow compressed air inside the attachment for the flexible tube of the brake **H** to force the pistons out from the brake calliper.

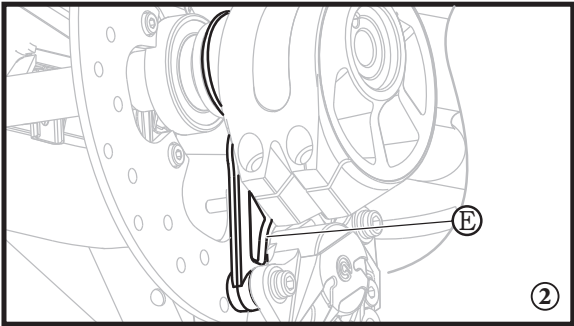
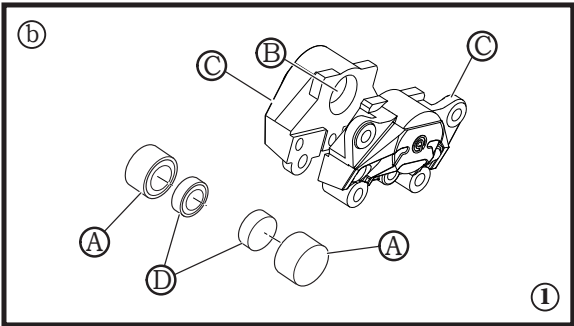
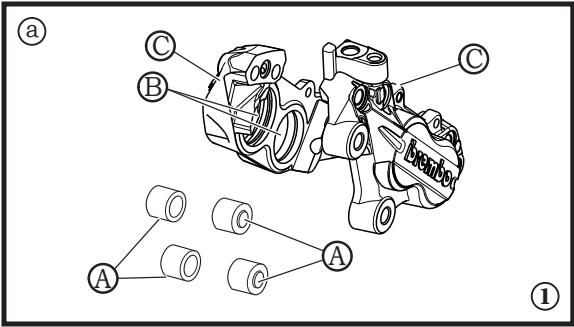
WARNING

- Cover the pistons of the brake calliper with a cloth. Careful not to injure yourself when the pistons are expelled from the brake calliper.
- Never attempt to remove the pistons from the calliper with force.

- (c) Remove the gaskets of the brake calliper pistons.

FRONT CALLIPER AND REAR
CALLIPER CONTROL

RECOMMENDED REPLACEMENT PROGRAM FOR THE BRAKE COMPONENTS	
BRAKES PADS	CHECK: After 1.000 Km Every 10.000 Km REPLACEMENT: If required
BRAKE FLEXIBLE TUBES	CHECK: After 1.000 Km - REPLACEMENT: Every 10.000 Km However, every 4 years.
BRAKES LIQUID	CHECK: Before every use REPLACEMENT: Every 20,000 Km However, every 2 years



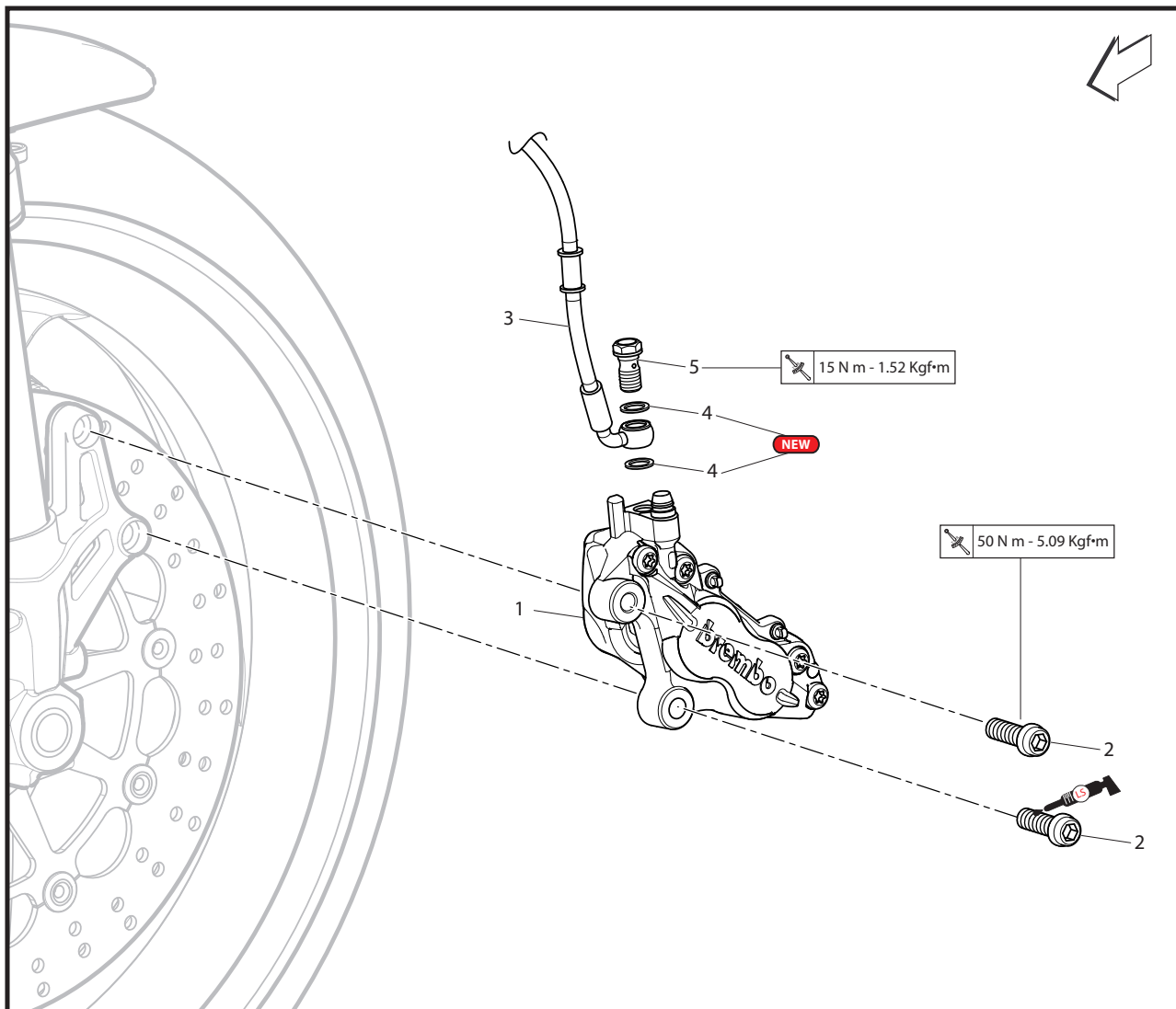
- ① Check:
- **the brake calliper pistons ①A**
In the presence of rust/scratches/wear lines → Replace the pistons of the brake calliper.
 - **the brake calliper cylinders ①B**
In the presence of scratches/wear lines → Replace the brake calliper set.
 - **the brake calliper body ①C**
In the presence of cracks/damages → Replace the brake calliper set.
 - **the brakes liquid flow passages (brake calliper body)**
In the presence of obstructions → Clean using a jet of compressed air.
 - **the insulators ①D**
In the presence of rust/scratches/wear lines → Replace the insulators of the brake calliper.

ATTENTION _____
Every time the brake calliper is dismantled, replace the gaskets of the pistons. _____

- ①a Front
 ①b Rear

- ② Check:
- **the brake calliper bracket ②E**
In the presence of cracks/damages → Replace.

FRONT BRAKE CALLIPERS INSTALLATION



SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1		Front Brake Calliper	1	Install the pieces in the given order. NOTE: _____ The procedure below can be applied to both front brake callipers. _____
2		Screw	2	
3		Front Brake Tube	1	
4		Washer	2	
5		Special Screw	1	
				Restore the torque twice after having loosened. NOTE: _____ Once operations have been completed, top-up with brakes liquid. _____



FRONT BRAKE CALLIPERS INSTALLATION

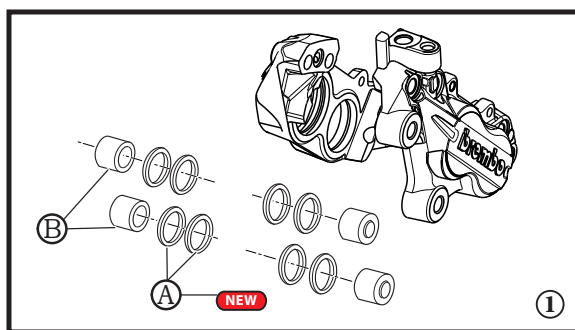
The following procedure is applied to both the brake callipers.

WARNING

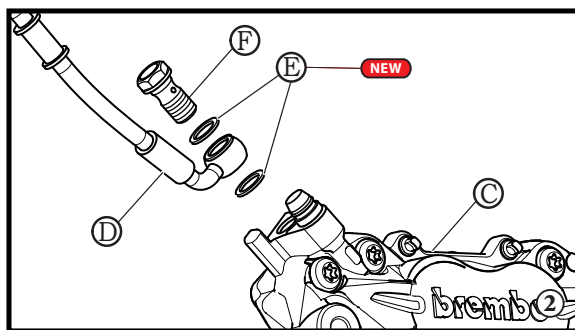
- Before installation, clean all brake internal components, lubricating them using clean or new brakes liquid.
- Never use solvents on the inside components of the brake as the gaskets of the pistons would inflate and deform.
- Every time the brake calliper is dismantled, replace the gaskets of the pistons.



Recommended brakes liquid
**TUTELA BRAKE FLUID
TOP 4 - DOT 4**



- ① Install:
- the gaskets of the brake calliper pistons **(A)** (firstly the seal rings - larger gaskets, then the oil retainers - smaller gaskets)
 - the brake calliper pistons **(B)** (2 Ø 34 mm and 2 Ø 30 mm)
See paragraph "4.52".



- ② Install:
- the brake calliper **(C)**

Torque fasten:

50 N m - 5.09 Kg·m



Recommended lubricant
TUTELA MR2 GREASE

- the front brake tube **(D)**
- the copper washers **(E)**
- the special screw **(F)**

Fasten by restoring the torque twice after having loosened:

15 N m - 1.52 Kg·m

WARNING

To guarantee bike safety, it is essential that the path of the brake flexible tube is correct.

- ③ Fill:
- **the brakes liquid tub**
(with the specified amount of recommended brakes liquid)



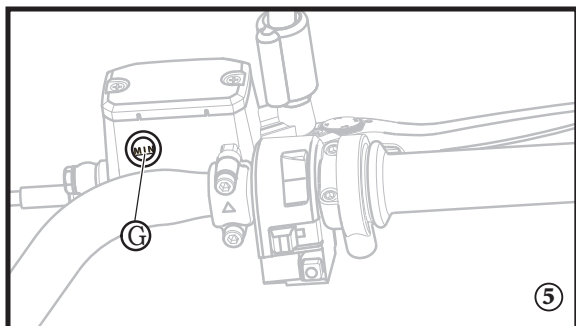
WARNING

- Use only the prescribed brakes liquid. The use of other types of brakes liquid may damage the rubber gaskets, causing leaks and deteriorating the performances of the brakes.
- Top-up using the same type of brakes liquid already present inside the system. The brakes liquid must never be mixed with liquids of other brands, in that it may cause a dangerous chemical reaction, with the consequent deterioration of the performances of the brakes.
- During top-up, be careful not to let water flow inside the tub. The presence of water will significantly reduce the boiling point of the brakes liquid and may cause vapour to form.

ATTENTION

- The brakes liquid can damage the painted surfaces and the plastic parts. Therefore, always immediately clean all brakes liquid spills.

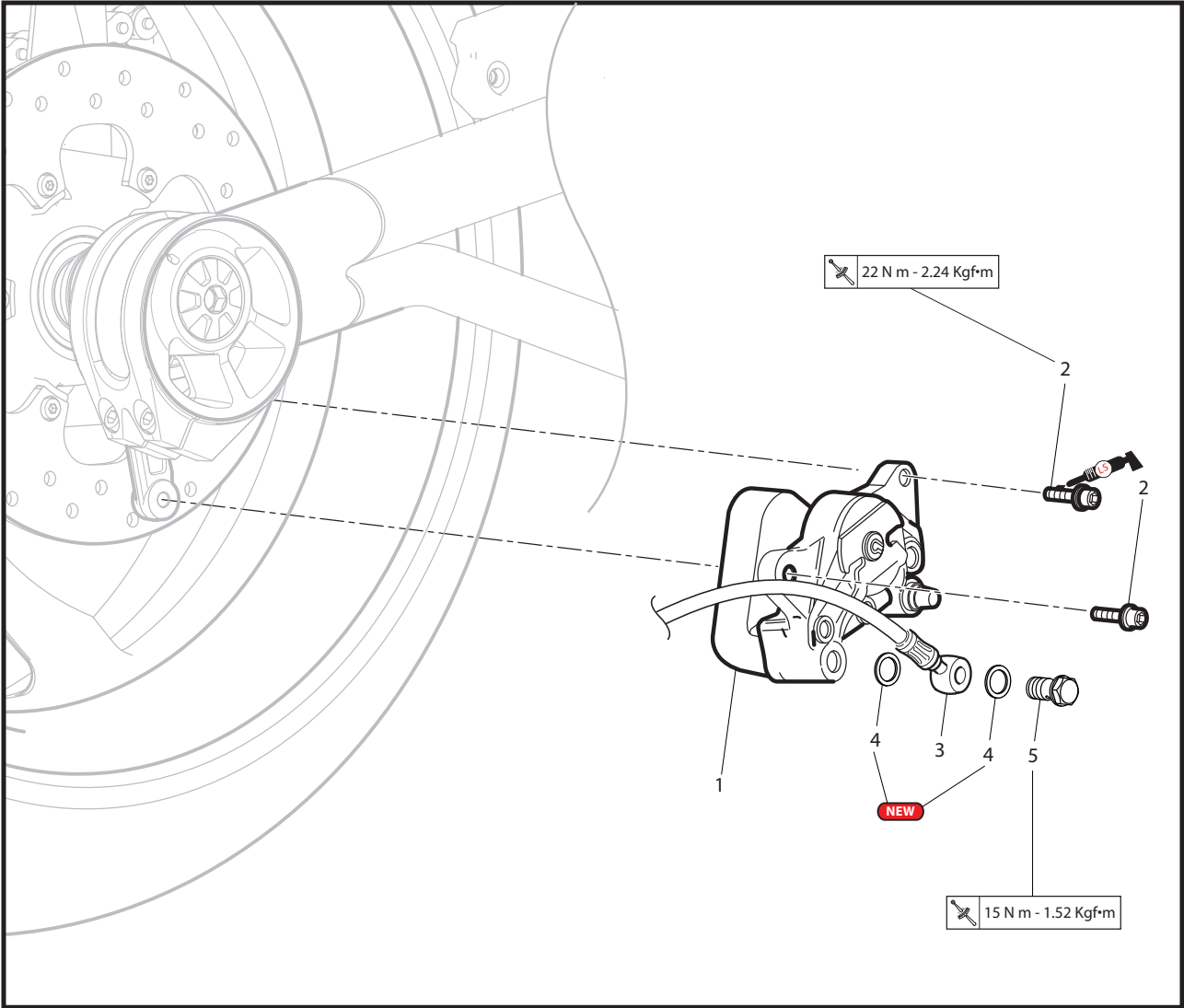
- ④ Bleed:
- **the braking plant**
See "ROUTINE INSPECTIONS AND ADJUSTMENTS 3.58" paragraph.



- ⑤ Check:
- **the brakes liquid level**
If below the minimum level notch **G** → Top-up to the correct level using the recommended brakes liquid.
See "ROUTINE INSPECTIONS AND ADJUSTMENTS 3.55" paragraph.

- ⑥ Check:
- **the functioning of the brake lever**
If the brake lever is soft or spongy to touch → Bleed the braking plant.
See "ROUTINE INSPECTIONS AND ADJUSTMENTS 3.58" paragraph.

REAR BRAKE CALLIPER INSTALLATION



SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1		Rear Brake Calliper Installation	1	Install the pieces in the given order. Restore the torque twice after having loosened. NOTE: <u>Once operations have been completed, top-up with brakes liquid.</u>
2		Rear Brake Calliper	2	
3		Screw	1	
4		Rear Brake Tube	2	
5		Washer	1	
		Special Screw		



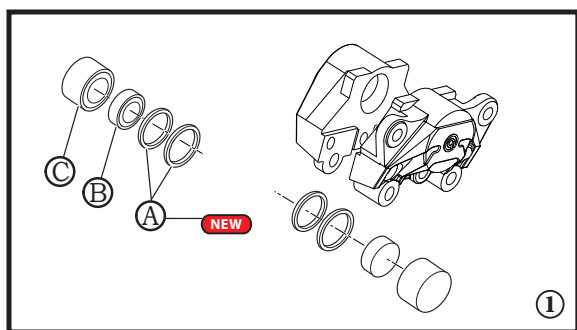
REAR BRAKE CALLIPER INSTALLATION

WARNING

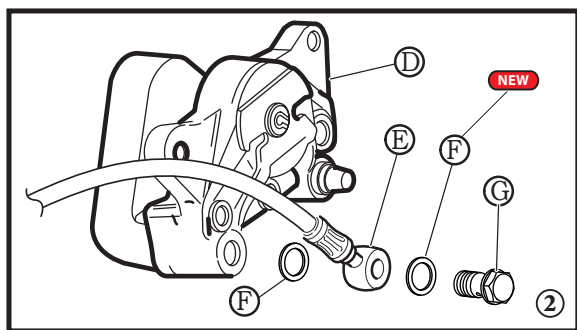
- Before installation, clean all brake internal components, lubricating them using clean or new brakes liquid.
- Never use solvents on the inside components of the brake as the gaskets of the pistons would inflate and deform.
- Every time the brake calliper is dismantled, replace the gaskets of the pistons.



Recommended brakes liquid
TUTELA BRAKE FLUID
TOP 4 - DOT 4



- ① Install:
- the gaskets of the brake calliper pistons ① (firstly the seal rings - larger gaskets then the oil retainers - smaller gaskets)
 - the insulators ②
 - the brake calliper pistons ③
See paragraph "4.54".



- ② Install:
- the brake calliper ④

Torque fasten:

22 N m - 2.24 Kg·m



Recommended lubricant
TUTELA MR2 GREASE

- the front brake tube ⑤
- the copper washers ⑥
- the special screw ⑦

Torque fasten by restoring twice after having loosened:

15 N m - 1.52 Kg·m

WARNING

To guarantee bike safety, it is essential that the path of the brake flexible tube is correct.

- ③ Fill:
- **the brakes liquid tub**
(with the specified amount of recommended brakes liquid).



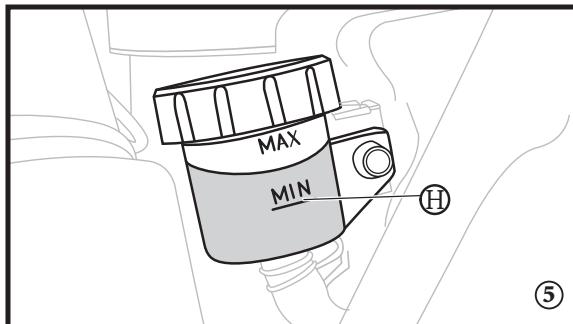
WARNING

- Use only the prescribed brakes liquid. The use of other types of brakes liquid may damage the rubber gaskets, causing leaks and deteriorating the performances of the brakes.
- Top-up using the same type of brakes liquid already present inside the system. The brakes liquid must never be mixed with liquids of other brands, in that it may cause a dangerous chemical reaction, with the consequent deterioration of the performances of the brakes.
- During top-up, be careful not to let water flow inside the tub. The presence of water will significantly reduce the boiling point of the brakes liquid and may cause vapour to form.

ATTENTION

- The brakes liquid can damage the painted surfaces and the plastic parts. Therefore, always immediately clean all brakes liquid spills.

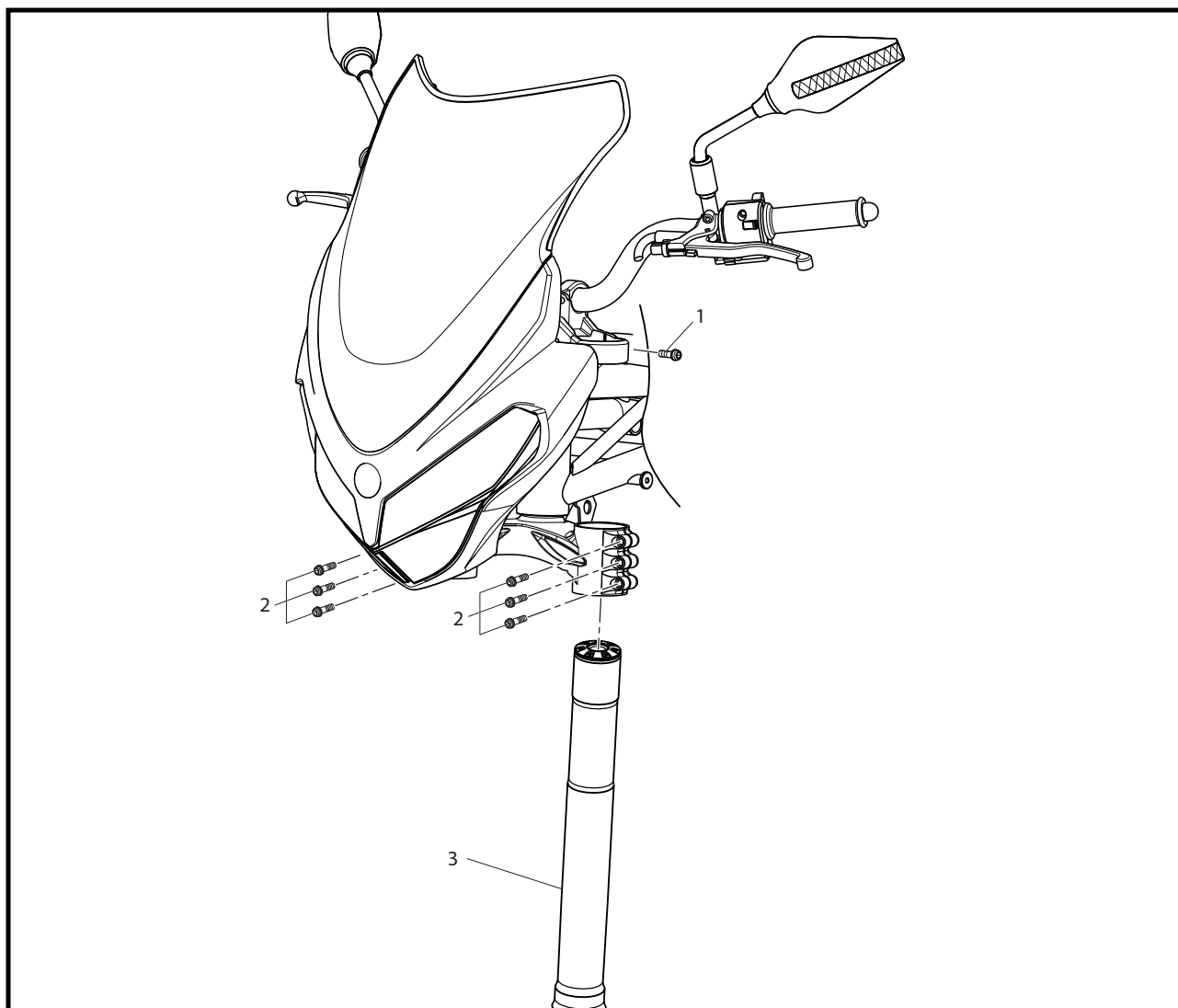
- ④ Bleed:
- **the braking plant**
See "ROUTINE INSPECTIONS AND ADJUSTMENTS 3.58" paragraph.



- ⑤ Check:
- **the brakes liquid level**
If below the minimum level notch (H) → Top-up to the correct level using the recommended brake liquid.
See "ROUTINE INSPECTIONS AND ADJUSTMENTS 3.55" paragraph.

- ⑥ Check:
- **the functioning of the brake pedal**
If the brake lever is soft or spongy to touch → Bleed the braking plant.
See "ROUTINE INSPECTIONS AND ADJUSTMENTS 3.58" paragraph.

FRONT FORK SHANKS REMOVAL



SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1 2 3		Front Brake Callipers Removal Front Wheel Removal Front Mudguard Removal Front Fork Shanks Removal Upper Plate Stop Screw Lower Plate Stop Screw Front Fork Shank	2 6 2	Remove the pieces in the given order. See paragraph "4.51". See paragraph "4.1". See paragraph "4.124" ATTENTION: <u>Before loosening the stop screws of the upper and lower brackets, install a support for the shank of the front fork.</u> Loosen. Loosen.



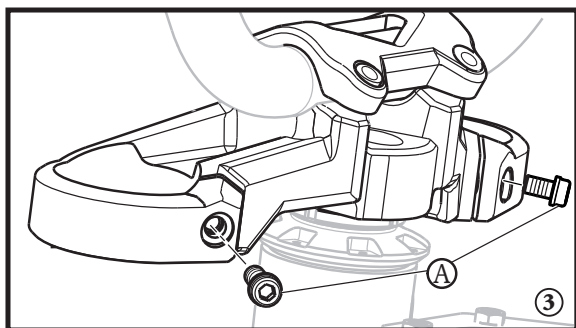
FRONT FORK SHANKS REMOVAL

The following procedure is applied to both shanks of the front fork.

- ① Park the bike levelled.

NOTE: Place the bike on a trestle of adequate support so that the front wheel is lifted.

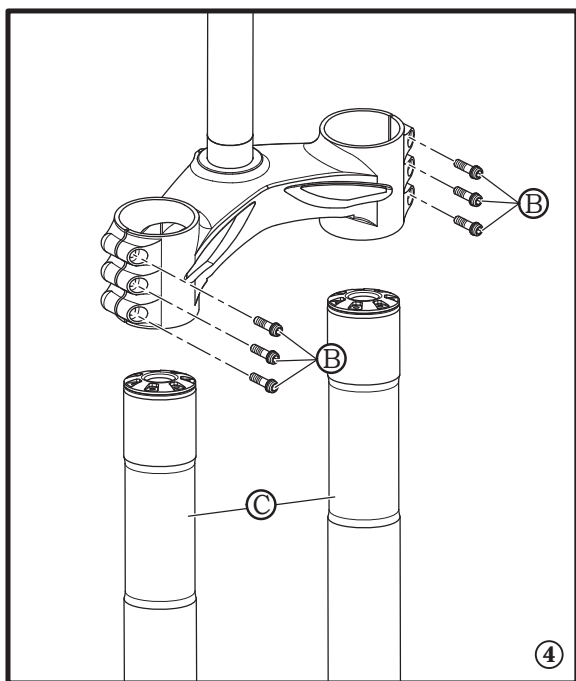
- ② Remove:
- the front brake calliper
See paragraph "4.51".
 - the front wheel
See paragraph "4.1".
 - the front mudguard
See paragraph "4.124".



- ③ Loosen:
- the stop screws of the steering plate upper **A**
 - the stop screws of the steering plate lower **B**

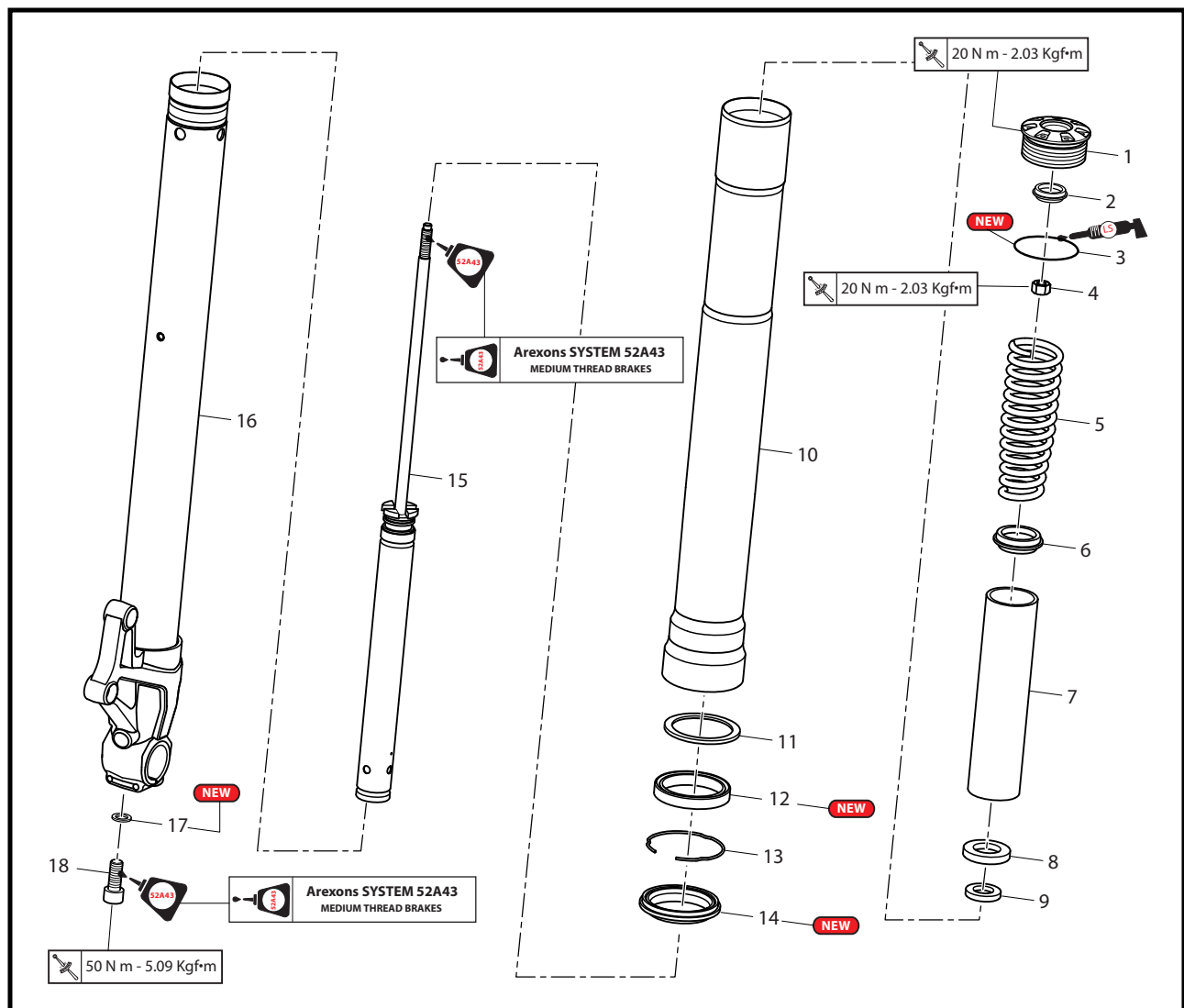
ATTENTION

Before loosening the stop screws of the upper and lower brackets, install a support for the shank of the front fork.

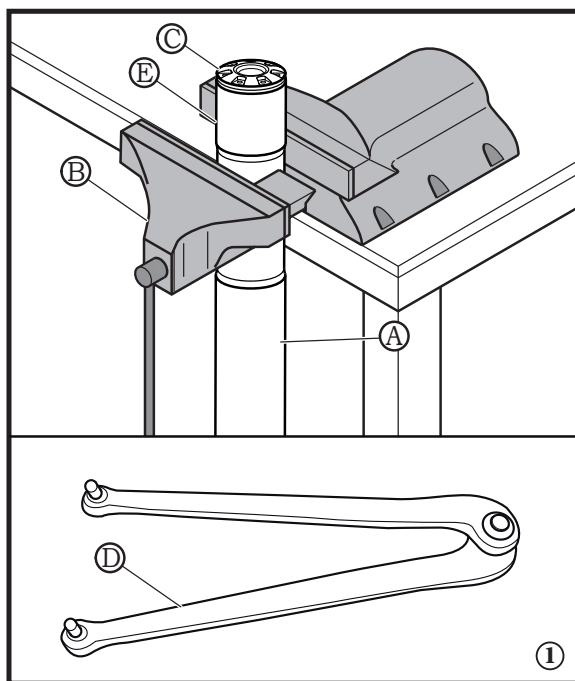


- ④ Remove:
- the shanks of the front fork **C**

FRONT FORK SHANKS DECOMPOSITION



SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
		Front fork shanks decomposition		Decompose the pieces in the given order. NOTE: <u>The procedure below can be applied to both shanks of the front fork.</u>
1		Cap	1	
2		Spring Pointer	1	
3		O-Ring Gasket	1	
4		Nut	1	
5		Fork Spring	1	
6		Upper Spring Guide Bush	1	
7		Spacer	1	
8		Lower Spring Guide Bush	1	
9		Spring Pointer	1	
10		Fork Sleeve	1	
11		Seal Ring	1	
12		Oil retainer	1	
13		Oil Retainer Clip	1	
14		Dust seal	1	
15		Dampener Rod Set	1	
16		Fork Shank	1	
17		Copper Washer	1	
18		Screw	1	NOTE: <u>To install, invert the order of the removal operations.</u>



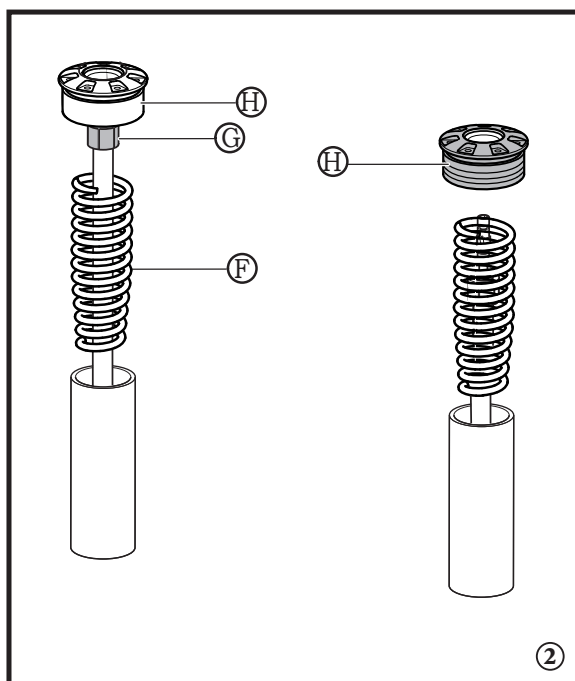
FRONT FORK SHANKS DECOMPOSITION

The following procedure is applied to both shanks of the front fork.

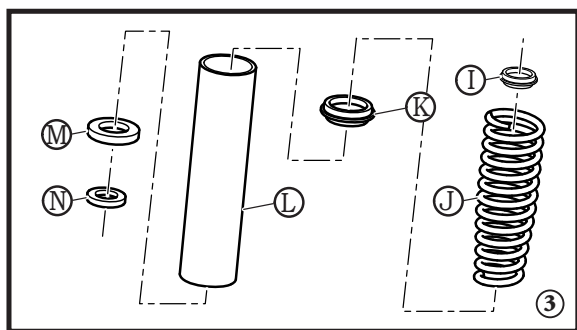
- ① Fix:
 - the stem (A) in vice (B)
- ② Completely loosen the closing cap unit (C) from the supporting tube, using a 4 mm compass spanner (D) .
- ③ Slowly lower the stem holder (E) on the supporting tube.

ATTENTION

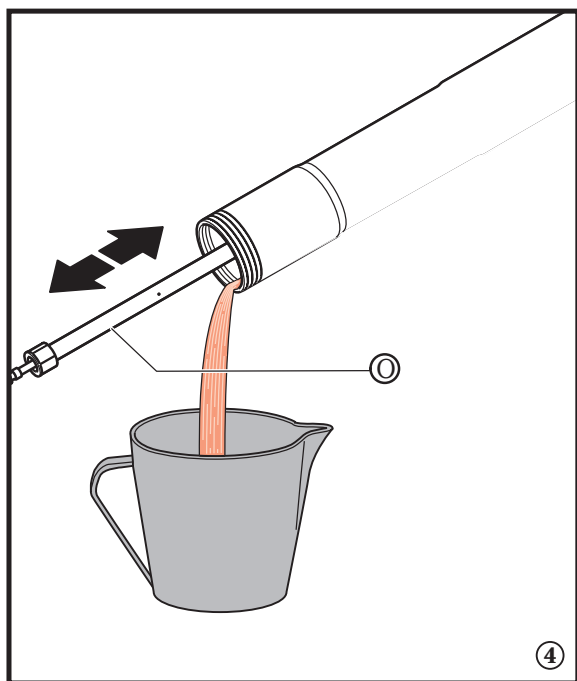
The fork spring is compressed.



- ② Push downwards:
 - the fork spring (F)
 - the preload spacer
 so that a 17 mm spanner can be inserted in the nut.
- ③ Using a 4 mm compass spanner, keep the cap unit (H) still and using a 17 mm spanner loosen the nut (G) .
- ④ Loosen and remove the upper cap unit (H) .



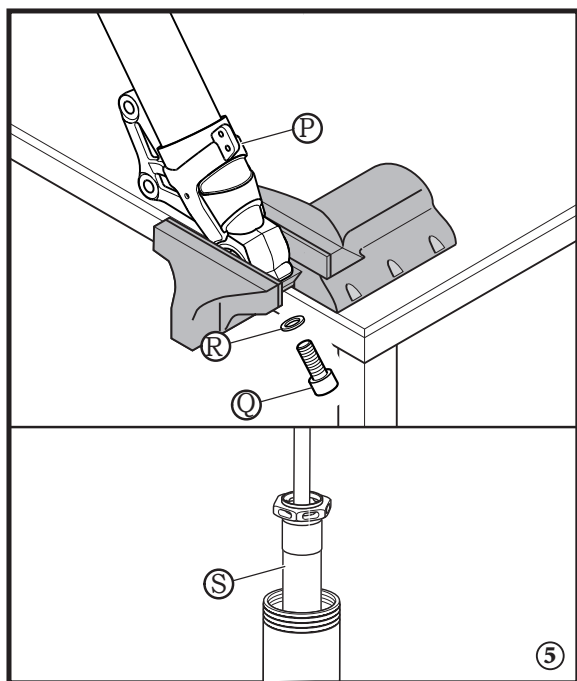
- ③ From inside the stem holder remove:
- the spring pointer ①
 - the fork spring ②
 - the upper spring guide bush ③
 - the spacer ④
 - the lower spring guide bush ⑤
 - the spring pointer ⑥



- ④ Release:
- the stem from the vice
- ⓔ Rotate the stem towards a container of adequate sizes so that the contained oil drains.

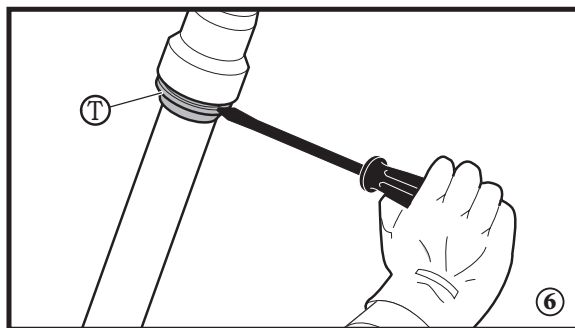
NOTE:

To favour the draining, it is necessary to perform a few pumps, repeatedly pushing the pumping rod forward-backwards ⑦.

**ATTENTION**

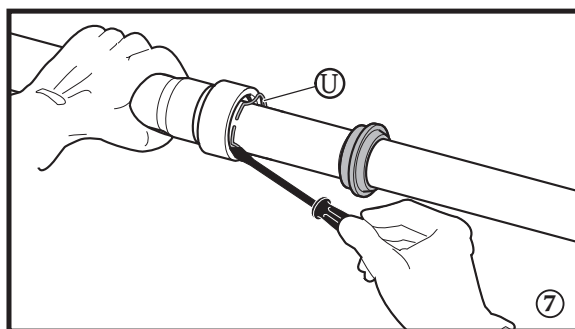
This operation must be carried out only after having drained the oil contained inside the stem.

- ⑦ Lock the wheel holder foot ⑧ in vice.
- ⑤ Remove:
- the pumping unit fixing screw ⑨
 - the washer ⑩
 - the pumping unit ⑪

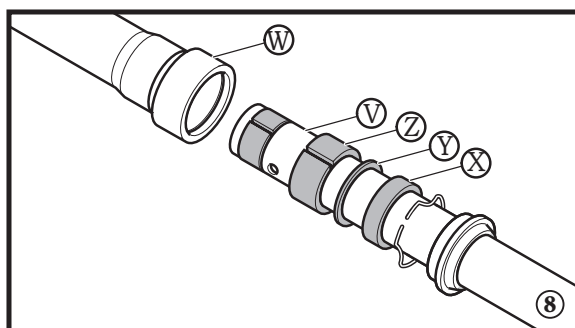
**ATTENTION**

This operation must be carried out only after having completely drained the oil contained inside the sleeve.

- ⑥ Remove:
- the dust seal ① from the seat, using a small sharp screwdriver.



- ⑦ Remove:
- the oil retainer clip ② using the same screwdriver.

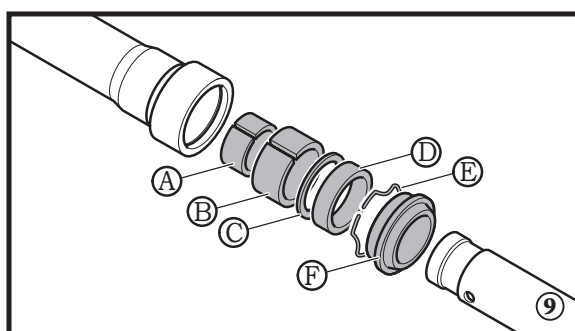


- ⑧ Remove:
- the fork shank ③ from the fork sleeve ④

NOTE:

To separate these two elements it is necessary to energetically pull them.

- oil retainer ⑤
- the seal ring ⑥
- the lower guide bush ⑦



- ⑨ Manually remove:
- the upper guide bush ⑧

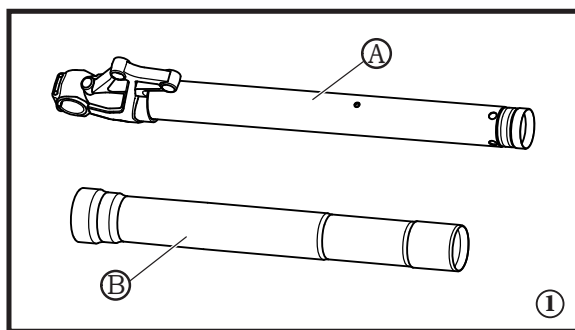
NOTE:

Should this operation result difficult to carry out manually, help yourself by inserting a sharp screwdriver inside the slot of the bush.

- the lower guide bush ⑨
- the seal ring ⑩
- oil retainer ⑪
- the dust seal clip ⑫
- the dust seal ⑬

NOTE:

The removed oil retainers and the dust seals must not be reused.



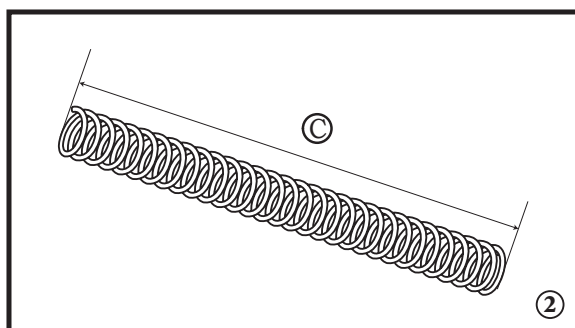
FRONT FORK SHANKS INSPECTION

The following procedure is applied to both shanks of the front fork.

- ① Check:
- the fork shank **A**
 - the fork sleeve **B**
- In the presence of deformations/damages/scratches
→ Replace.

WARNING

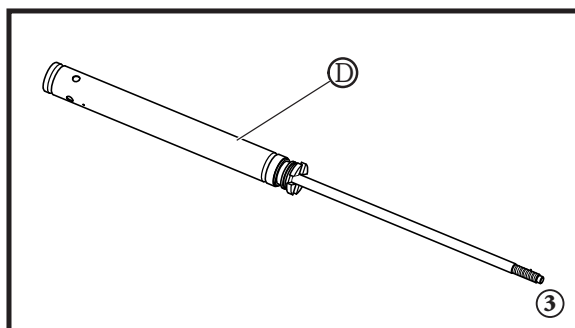
If deformed, do not attempt to straighten the internal fork shank in that, by weakening, it may become dangerous.



- ② Measure:
- the free length of the spring **C**
- If out of specification → Replace.



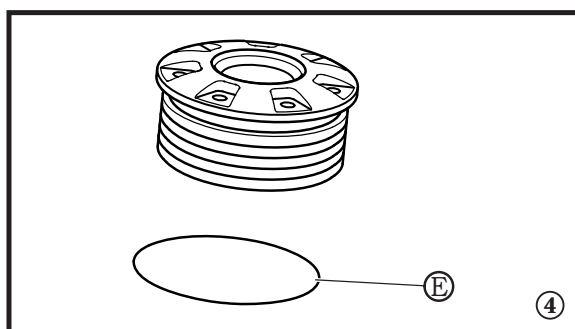
Free length of the spring
262 mm (10.31 in)



- ③ Check:
- the dampener rod **D**
- In the presence of damages/wear → Replace.
In the presence of obstructions → Clear all oil passages using compressed air.

ATTENTION

- The pumping unit contains elements particularly sensitive to foreign bodies.
- During dismantling and re-assembling of the front fork shaft, do not allow foreign bodies to enter the front fork.

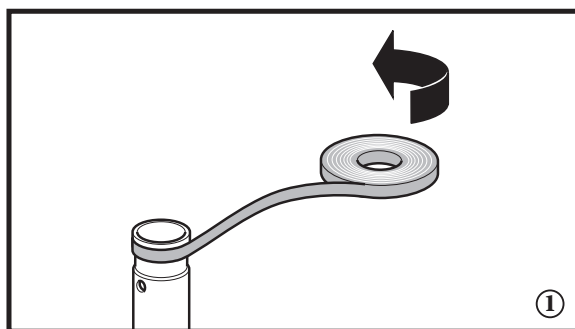


- ④ Check:
- the O-Ring of the cap **E**
- In the presence of damages/wear → Replace.

FRONT FORK SHANKS ASSEMBLY

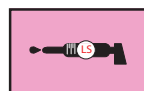
ATTENTION

The removed oil retainer and the dust seal must not be reused. Before re-assembling, check the conditions of the guide bushes; if scratches, replace them. Check that the Teflon[®] coating of the guide bushes is intact.

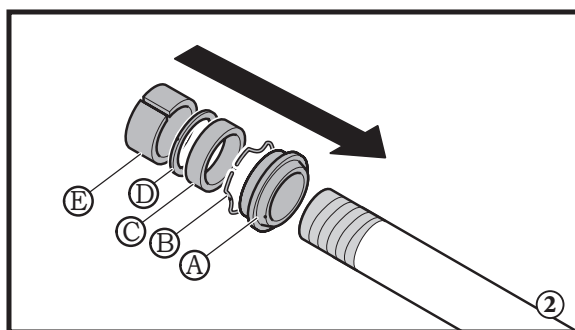


- ① Apply at the end of the supporting tube:
- **adhesive tape** so that the seat of the upper bush is covered.

- ⓐ Slightly lubricate the dust seal and oil retainer with grease.



Recommended lubricant
TUTELA MR2 GREASE

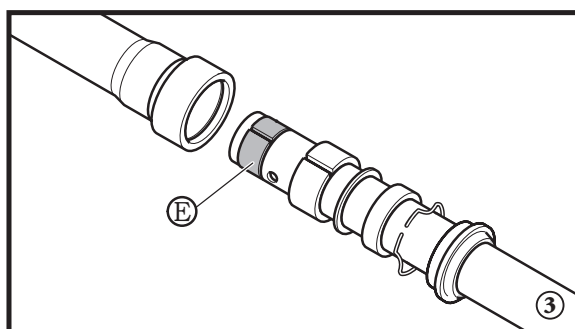


- ② Insert in the supporting tube:
- the dust seal Ⓐ
 - the dust seal clip Ⓑ
 - the oil retainer Ⓒ
 - the seal ring Ⓓ
 - the lower guide bush Ⓔ

ATTENTION

Pay attention to the direction of the oil retainer Ⓒ, it must be inserted so that the hollow part is facing the seal ring Ⓓ.

- ⓑ Remove the adhesive tape applied on the end of the fork shank, eliminating any traces of adhesive.

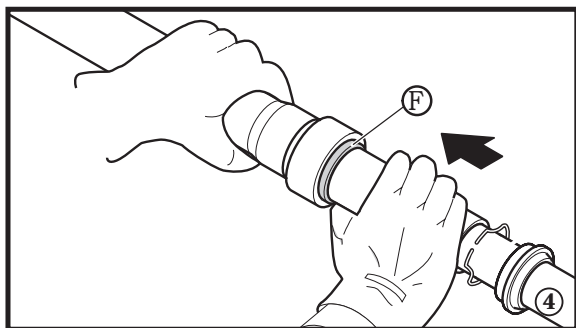


- ③ Manually insert:
- the upper guide bush Ⓔ

NOTE:

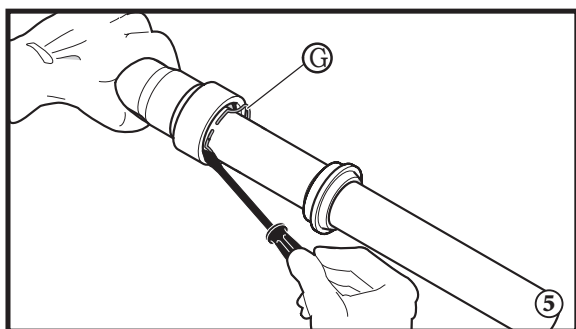
Should the insertion of the guide bush result difficult to carry out manually, help yourself by inserting a sharp screwdriver inside the slot of the bush.

- ⓒ Delicately introduce the fork shank inside the fork sleeve, being careful not to damage the upper guide bush.

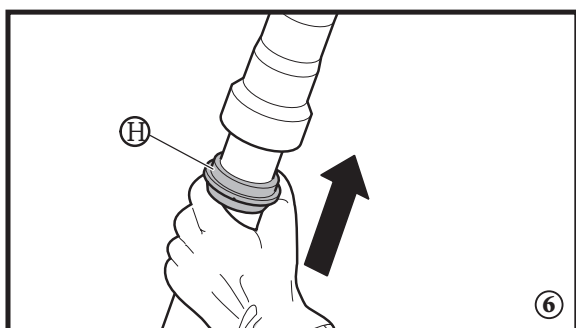


- ④ Accompany:
- **the lower guide bush** until it comes into contact with the fork sleeve
 - **the seal ring**
 - **the oil retainer** ⑥

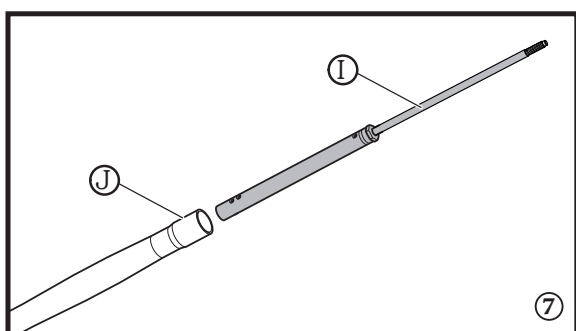
① Subsequently introduce them in the seat.



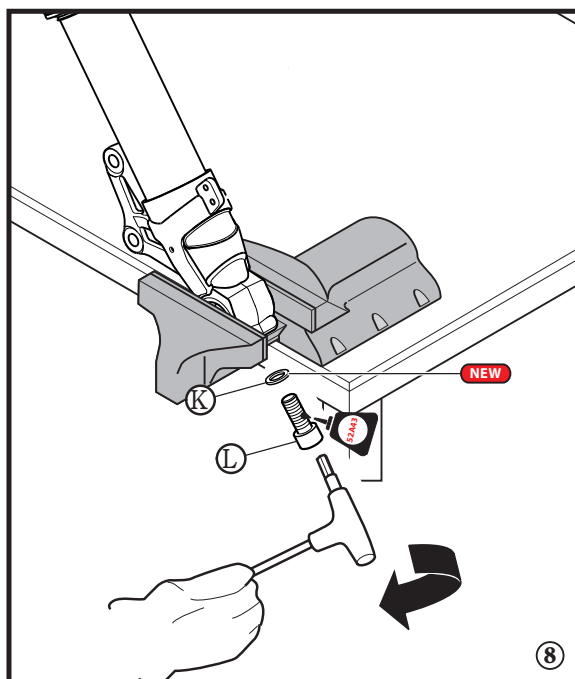
- ⑤ Assemble:
- **the oil retainer clip** ③ using a small sharp screwdriver, checking that it is perfectly inserted in the appropriate groove and being careful not to scratch the fork shank.



- ⑥ Insert in the seat:
- **the dust seal** ⑧ by manually pressing.



- ⑦ Insert:
- **the full pumping unit** ① inside the stem holder ②.



⑤ Assemble the fork in vice by fixing it from the wheel holder foot.

⑥ Lower the fork sleeve on to the fork shank.

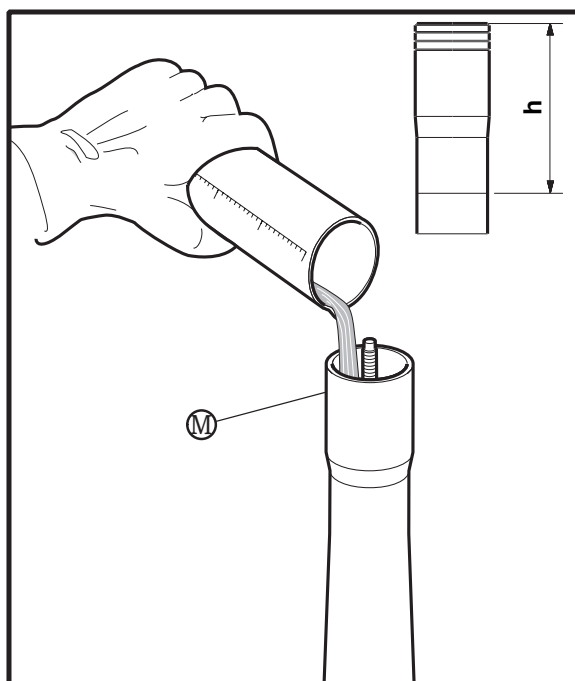
- ⑧ Insert:
- the washer (K)
 - the pumping unit fixing screw (L)

Fasten using an 8 mm Allen spanner:

50 N m - 5.09 Kgf·m



⑧ Completely lift the fork sleeve.



⑨ In a graduated beaker prepare the quantity of oil to pour into the stem.

TYPE: SAE 7.5
Quantity: 710 cc

⑩ Pour inside the fork sleeve (M) approximately 2/3 of the required oil, therefore pump a few times to eliminate the air.

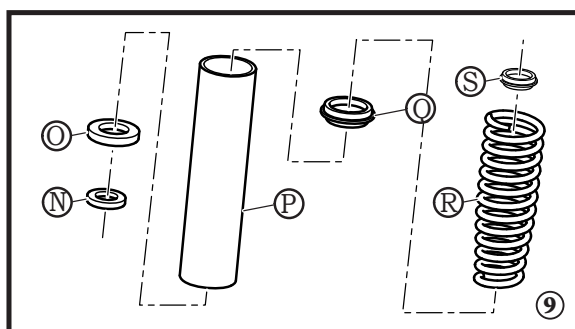
⑪ Proceed until the required amount is poured.

⑫ Lower the fork sleeve on to the fork shank to the stroke of the dust seal on the wheel holder foot.

⑬ Wait a few minutes and check the air volume and eventually restore the level.
h: 130 mm.

ATTENTION

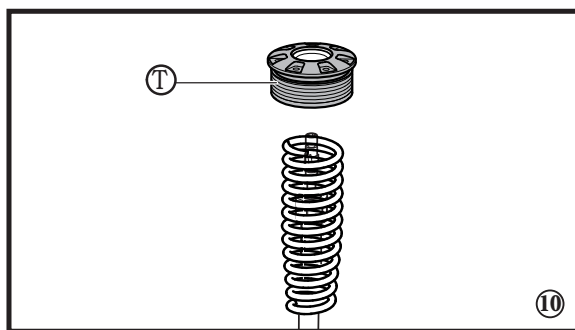
A lower or higher air volume, or a type of oil different to that prescribed, may change the behaviour of the fork in its every phase.



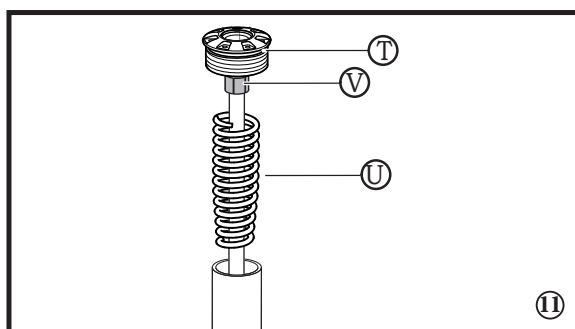
- ⑨ Insert inside the fork sleeve:
- the spring pointer (N)
 - the lower spring guide bush (O)
 - the spacer (P)
 - the upper spring guide bush (Q)
 - the fork spring (R)
 - the spring pointer (S)

ATTENTION

ATTENTION to the introduction direction of the spring. The tighter part must face upwards.



- ⑩ Tighten:
• the closing cap ⑩



- ⑪ Push downwards:
• the spring ⑪
• the preload spacer

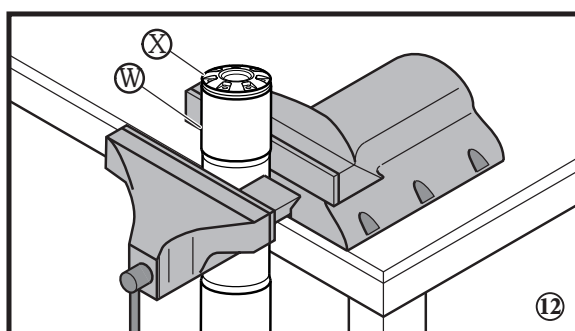
⑬ Insert a 17 mm spanner inside the nut ⑬ .

⑭ Using a 4 mm compass spanner, keep the closing unit ⑩ still and using a 17 mm spanner fasten the nut ⑬ .

Fasten:

20 N m - 2.03 Kgf·m

⑯ Lift the fork sleeve on to the fork shank.

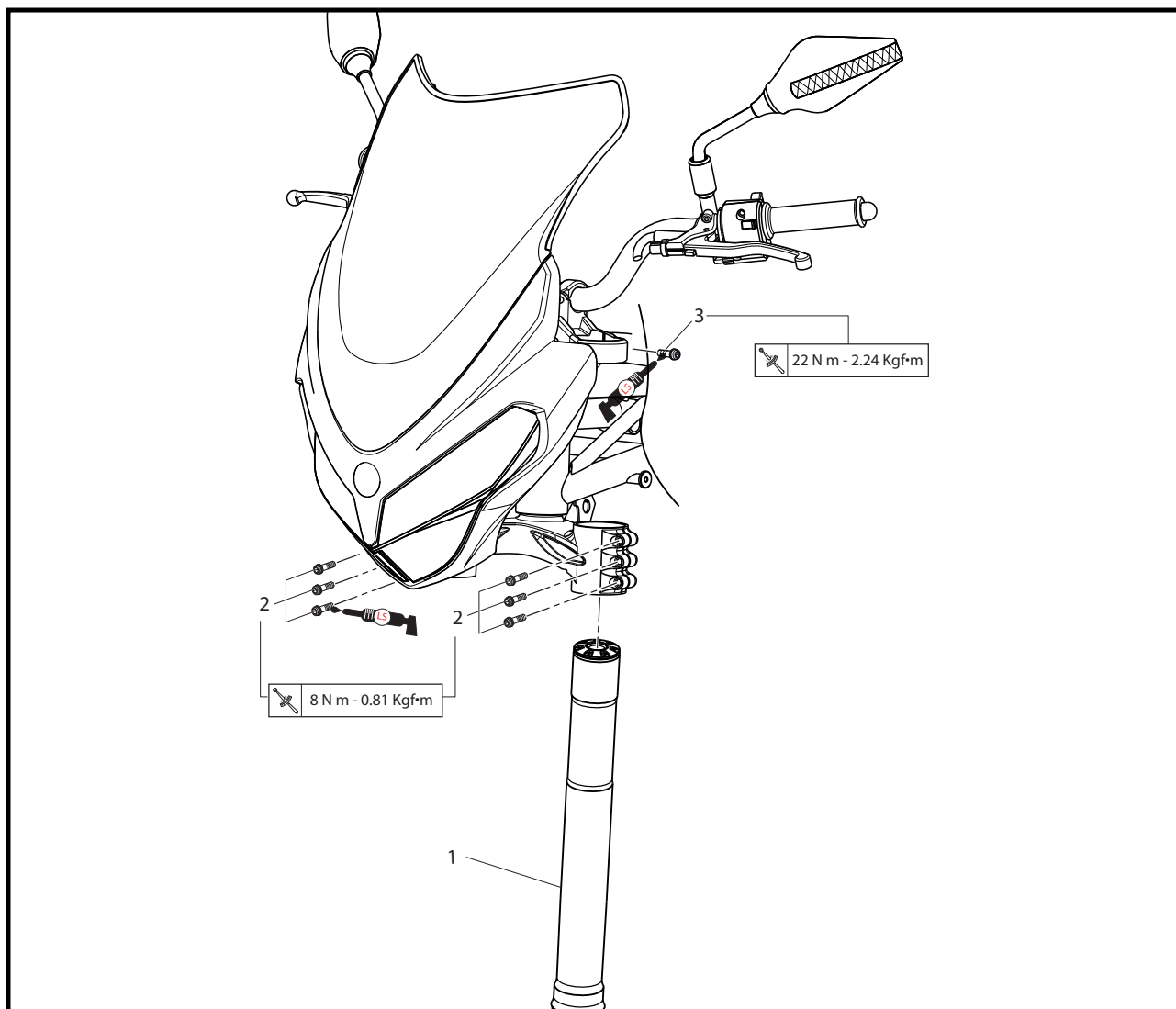


- ⑫ Fix:
• the fork sleeve ⑫ in vice
Fasten:
• the closing cap ⑫ on to the fork sleeve using a 4 mm compass spanner.

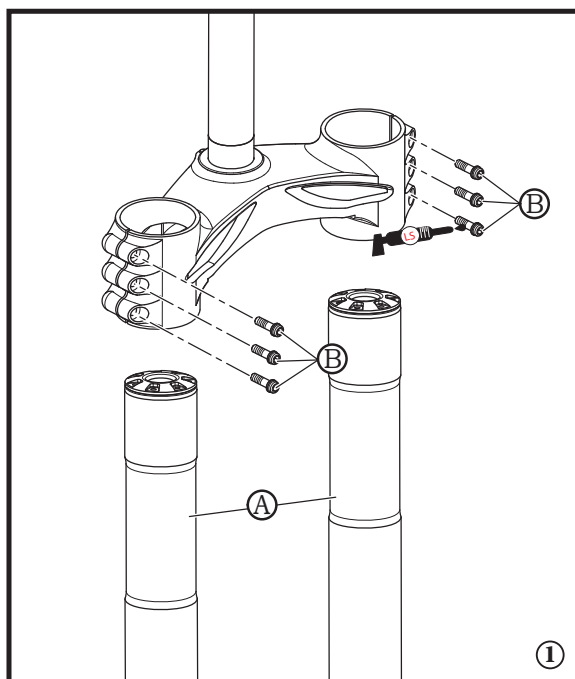
Fasten:

20 N m - 2.03 Kgf·m

FRONT FORK SHANKS INSTALLATION



SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1		Front Fork Shanks Installation	2	Install the pieces in the given order.
2		Front Fork Shank	6	
3		Lower Plate Stop Screw	2	Carry out a double passage.
		Upper Plate Stop Screw		



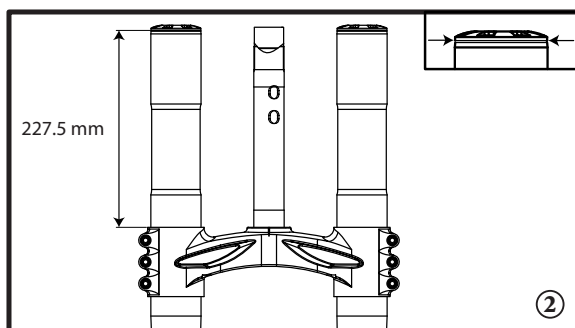
FRONT FORK SHANKS INSTALLATION

The following procedure is applied to both shanks of the front fork.

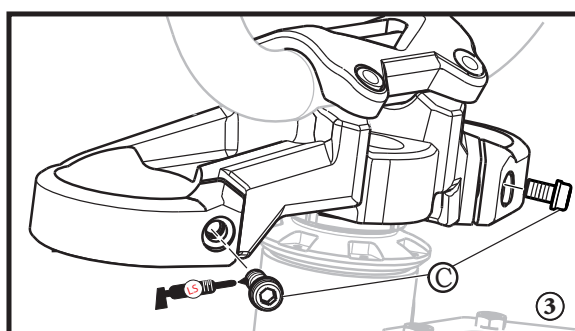
- ① Install:
- the shanks of the front fork (A)
- Temporarily fasten:
- the stop screws of the lower steering plate (B)



Recommended lubricant
TUTELA MR2 GREASE



NOTE: Check the assembly quota. Figure ②



- ③ Fasten:
- the stop screws of the lower steering plate (B)

Fasten by carrying out a double passage.

8 N m - 0.81 Kg f·m

- the stop screws of the upper steering plate (C)

Fasten:

22 N m - 2.24 Kg f·m



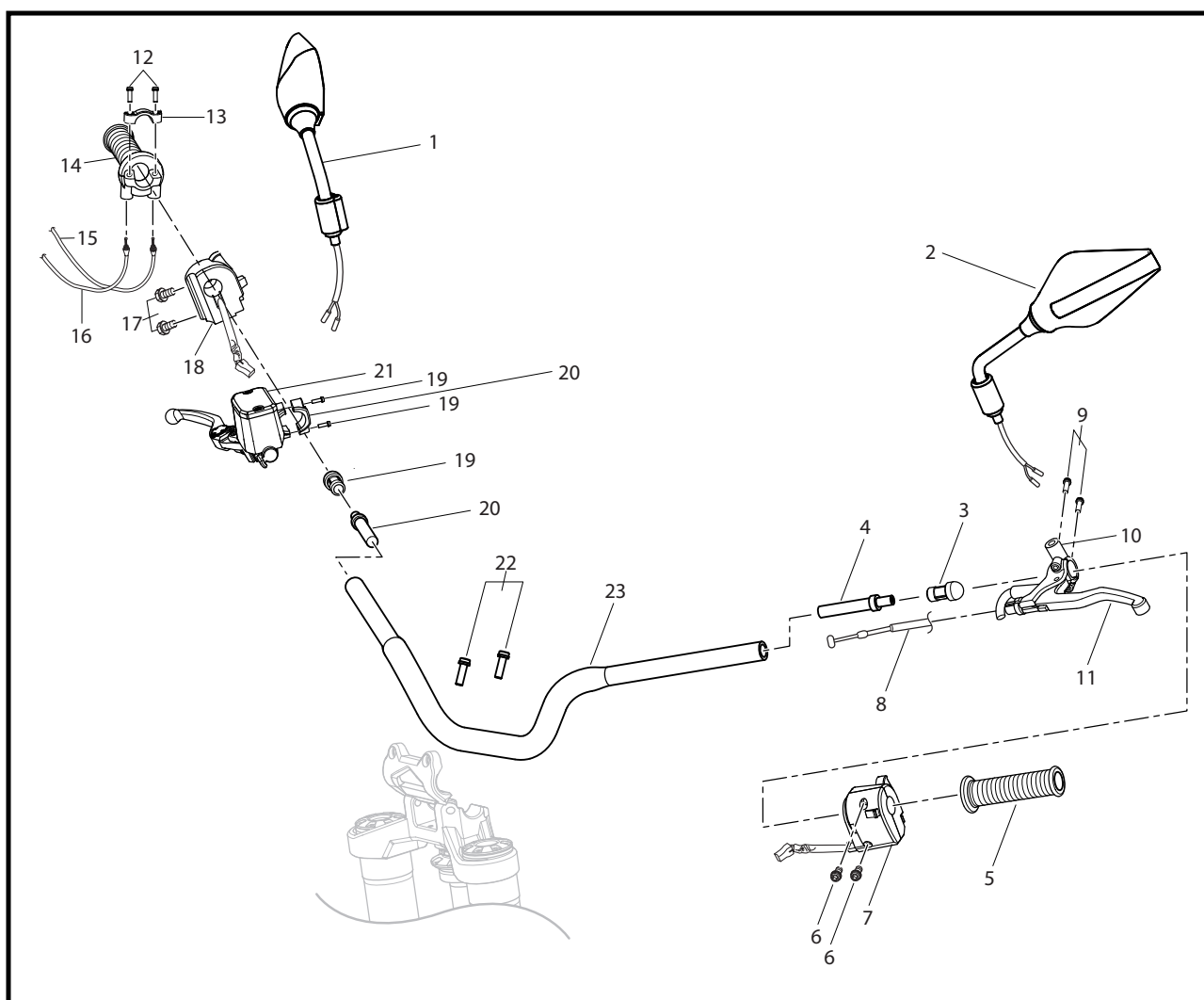
Recommended lubricant
TUTELA MR2 GREASE

ATTENTION

Check that the path of the brake flexible tubes is correct.



HANDLE BAR REMOVAL



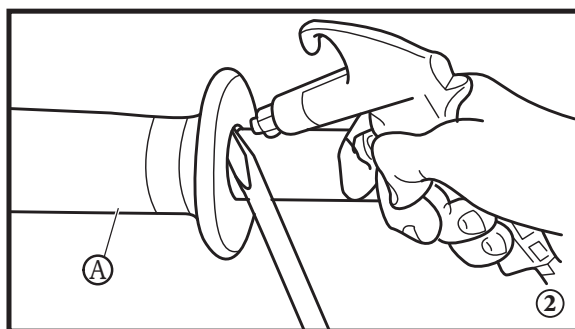
SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
		Handle Bar Removal		Remove the pieces in the given order.
1		Right Rear-view Mirror	1	Disconnect indicator wire.
2		Left Rear-view Mirror	1	Disconnect indicator wire.
3		Cap	1	
4		Knob Terminal	1	
5		Left Knob	1	
6		Screw	2	
7		Left Switch	1	Disconnect.
8		Clutch Cable	1	
9		Screw	2	
10		Trestle	1	Disconnect indicator wire.
11		Clutch Command Lever	1	Disconnect clutch switch.
12		Screw	2	
13		Trestle	1	
14		Accelerator Knob	1	
15		Gas Opening Cable	1	
16		Gas Closing Cable	1	
17		Screw	2	
18		Right Switch	1	Disconnect.
19		Screw	2	
20		Trestle	1	
21		Front Brake Pump	2	Disconnect switch.
22		Screw	2	
23		Handle Bar	1	

HANDLE BAR REMOVAL

- ① Park the bike levelled.

WARNING

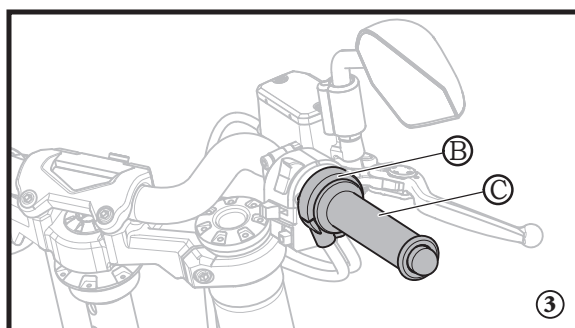
Support the bike using suitable supports so that it cannot fall.



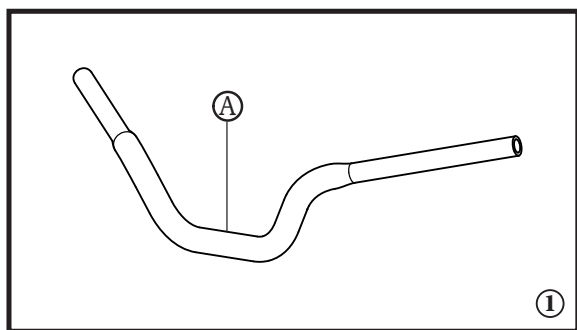
- ② Disconnect:
• the knob of the handle bar (A)

NOTE:

Direct a jet of compressed air between the left part of the handle bar and the relative knob, to gradually remove it from the handle bar.



- ③ Disconnect:
• the slot of the accelerator cable (B)
• the accelerator knob (C)



HANDLE BAR INSPECTION

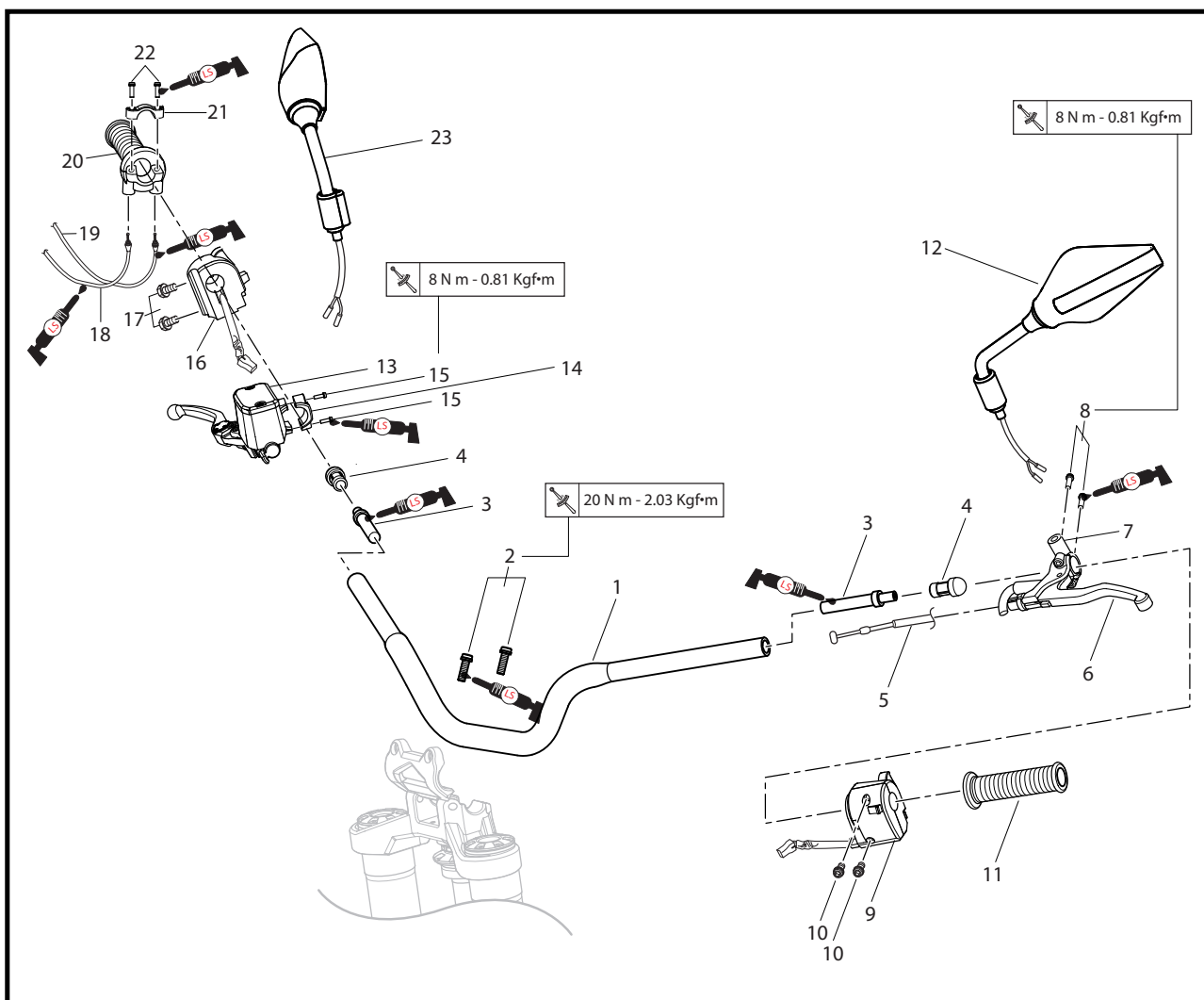
- ① Check:
- the handle bar ①
- In the presence of deformations/cracks/damages
→ Replace.

WARNING

If deformed, do not attempt to straighten the handle bar in that, by weakening, it may become dangerous.



HANDLE BAR INSTALLATION



SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
		Handle Bar Installation		Install the pieces in the given order.
1		Handle Bar	1	
2		Screw	2	
3		Knob Terminal	2	Carry out a double passage.
4		Cap	2	
5		Clutch Cable	1	
6		Clutch Command Lever	1	
7		Trestle	1	
8		Screw	2	
9		Left Switch	1	
10		Screw	2	Manually fasten.
11		Left Knob	1	
12		Left Rear-view Mirror	1	
13		Front Brake Pump	1	
14		Trestle	1	
15		Screw	2	
16		Right Switch	1	
17		Screw	2	Manually fasten.
18		Gas Closing Cable	1	
19		Gas Opening Cable	1	
20		Accelerator Knob	1	
21		Trestle	1	
22		Screw	2	
23		Right Rear-view Mirror	1	

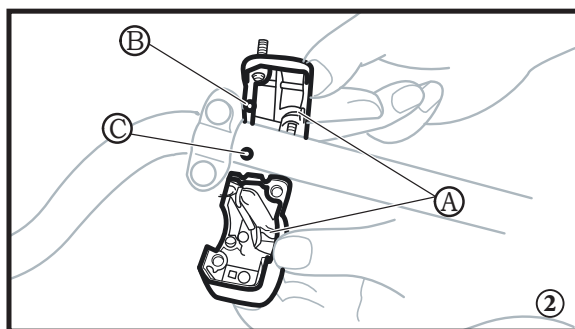


HANDLE BAR INSTALLATION

- ① Park the bike levelled.

WARNING

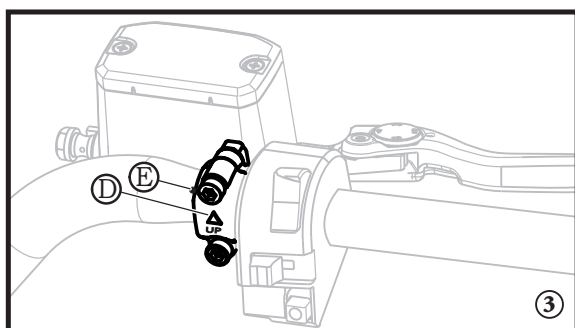
Support the bike using suitable supports so that it cannot fall.



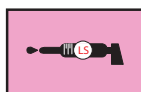
- ② Install:
• the right side handle bar switch (A)

NOTE:

Align the protrusion (B) of the switch with the hole (C) on the right side handle bar.



- ③ Install:
• the brake trestle (D)



Recommended lubricant
TUTELA MR2 GREASE

Fasten:

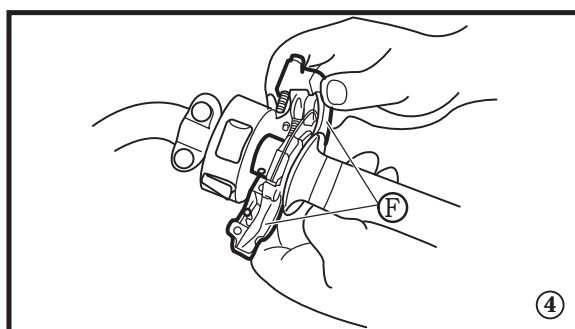
8 N m - 0.81 Kgf·m

NOTE:

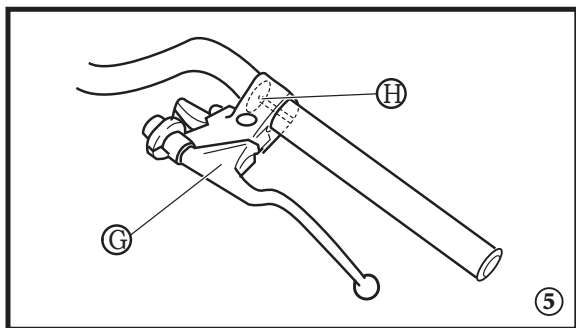
- Install the trestle of the brake pump with the mark "UP" facing upwards.
- Firstly, fasten the upper screw, then the lower screw.

NOTE:

- Align the coupling surfaces of the retainer element of the brake pump trestle with THE punching (E) on the right side handle bar.
- There must be a 2 mm (0.07 in) space between the switch on the right side handle bar and the brake pump trestle.



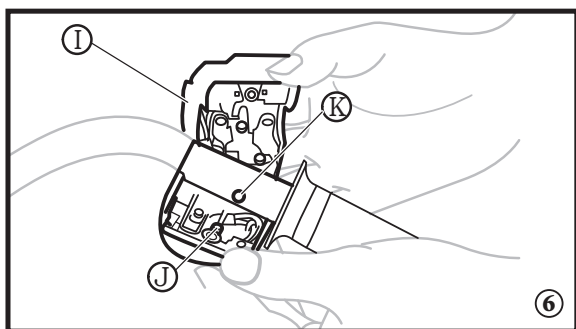
- ④ Install:
• the accelerator knob
• the slot of the accelerator cable (F)
• the accelerator cables



- ⑤ Install:
• the trestle for the clutch lever ④

NOTE:

Align the slot of the retainer element of the clutch lever with the punching ① on the left side handle bar.



- ⑥ Install:
• the left side handle bar switch ①

NOTE:

Align the protrusion ① of the left side handle bar switch with the hole ② on the left side handle bar.

- ⑦ Install:
• the knob of the handle bar

- a) Apply a thin layer of rubber adhesive on the end of the left side handle bar.
- b) Make the knob slide on the end of the left side handle bar knob.
- c) Remove any trace of excess rubber adhesive using a clean cloth.

ATTENTION

Do not touch the handle bar knob until the rubber adhesive has completely dried.

- ⑧ Adjust:
• the clutch cable clearance
See paragraph "ROUTINE INSPECTIONS AND ADJUSTMENTS 3.17".



**Clearance of clutch cable
(at the end of the clutch lever)**
3 ~ 5 mm (0.11 ~ 0.19 in)

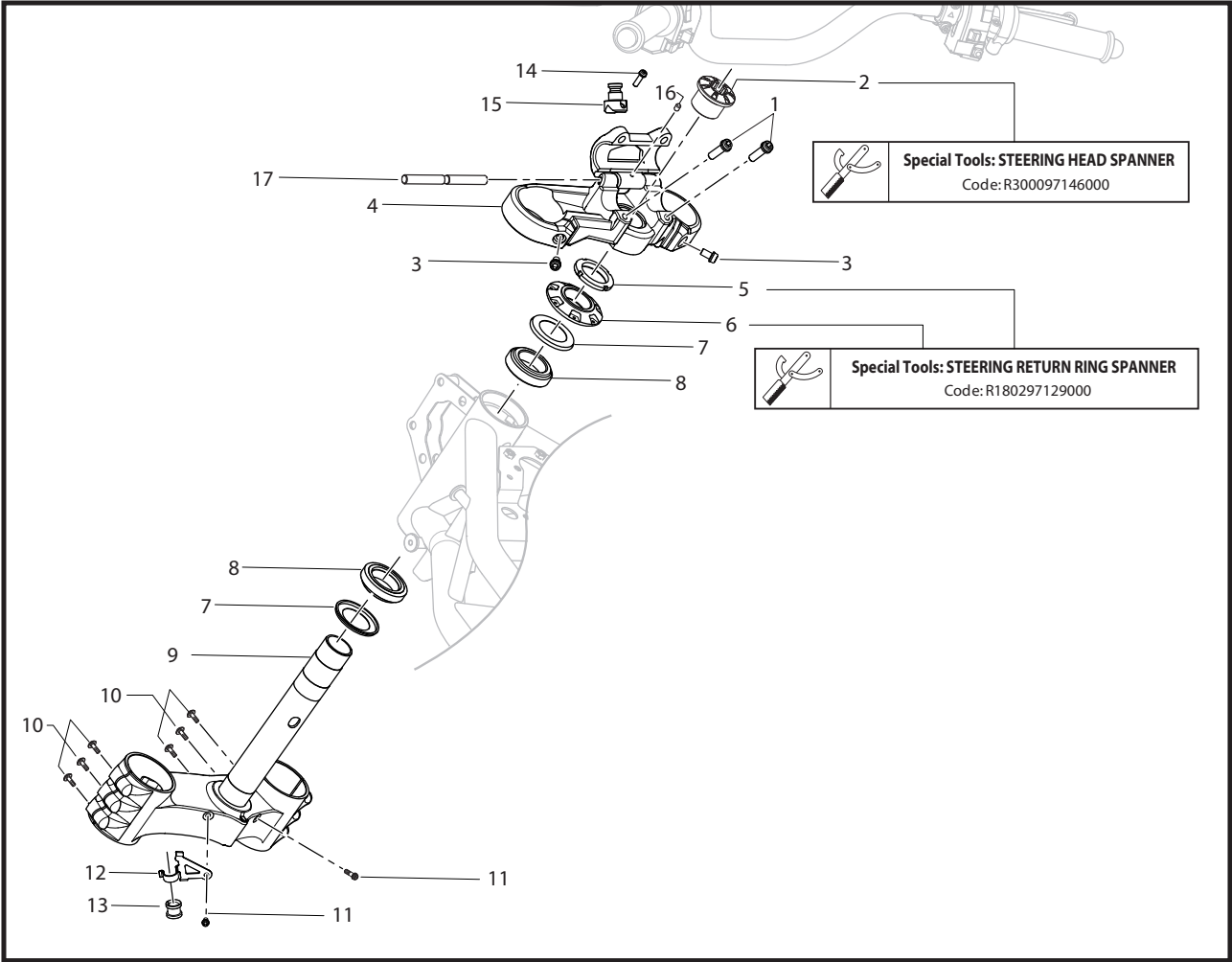
- ⑨ Adjust:
• the accelerator cable clearance
See paragraph "ROUTINE INSPECTIONS AND ADJUSTMENTS 3.16".



**Accelerator cable clearance
(at accelerator knob flange)**
3 ~ 5 mm (0.11 ~ 0.19 in)

UPPER AND LOWER STEERING

WHEEL BASE REMOVAL



SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
		Mobile and Fixed Cap Removal Front Wheel Removal Front Fork Shanks Removal Handle Bar Removal Upper And Lower Steering Wheel Base Removal		Remove the pieces in the given order. See paragraph "4.110" See paragraph "4.1" See paragraph "4.64" See paragraph "4.77"
1		Screw	2	
2		Cap	1	NOTE: _____ Remove cap using the special tool. _____
3		Screw	2	
4		Upper Steering Head	1	
5		Kingpin Ring Nut	1	
6		Steering Ring Nut	1	NOTE: _____ Remove cap using the special tool. _____
7		Dust Seal Ring	2	
8		Bearing	2	
9		Lower Steering Base	1	
10		Screw	6	
11		Screw	2	
12		Front Brake Tube Guide Support Small Plate	1	
13		Front Brake Tube Guide	1	
14		Screw	1	
15		GPS Support	1	
16		Grain	1	
17		Pin	1	

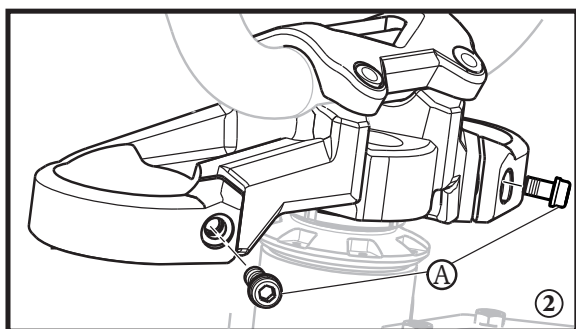


UPPER AND LOWER STEERING WHEEL BASE REMOVAL

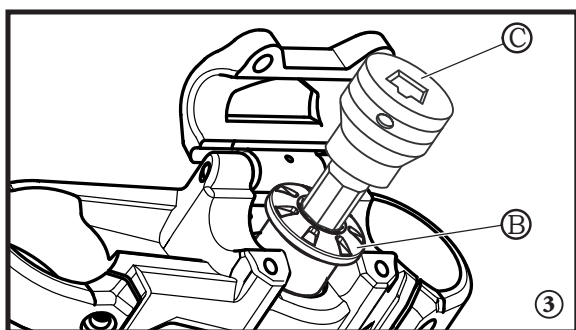
- ① Park the bike levelled.

WARNING

Support the bike using suitable supports so that it cannot fall.



- ② Remove:
• the stop screws of the steering plate upper **A**

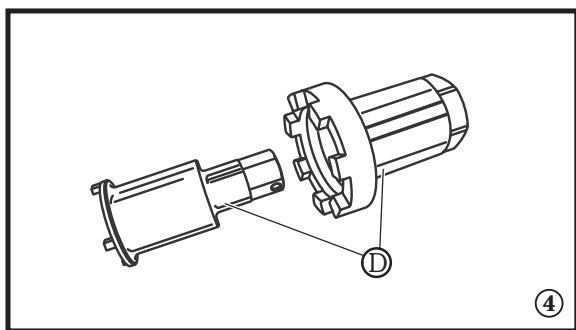


- ③ Remove:
• the cap **B**
(using the special tool **C**)



Special Tools: STEERING HEAD SPANNER

Code: R300097146000



- ④ Loosen:
• the kingpin ring nut
• the steering ring nut
(using the spanner for the steering ring nut **D**)



Special Tools: STEERING WHEEL RETURN RING SPANNER

Code: R180297129000

WARNING

Firmly support the lower steering base so that it cannot fall.

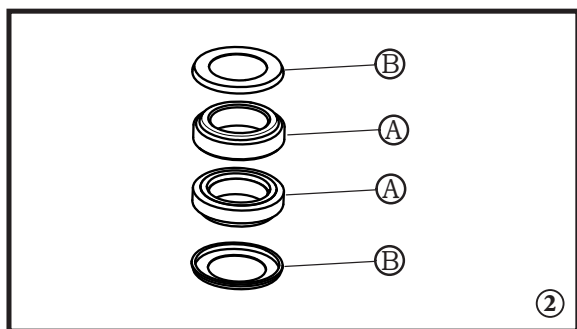


UPPER AND LOWER STEERING WHEEL BASE INSPECTION

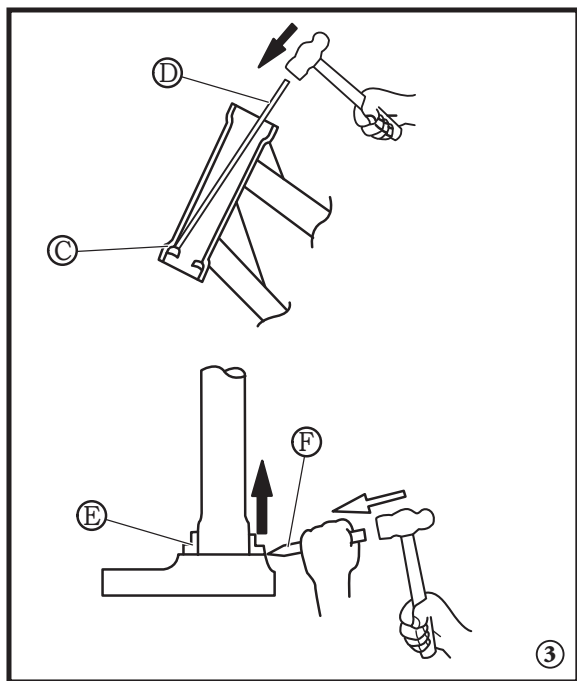
- ① Wash:
- the bearings
 - the bearings tracks



Recommended solvent
TUTELA MOTOR CLEAN



- ② Check:
- the bearings ^(A)
 - the dust seal rings ^(B)
- In the presence of damages/pitting → Replace.



- ③ Replace:
- the bearings
 - the bearings tracks

- (a) Remove the bearings tracks ^(C) from the column tube of the steering wheel using a long rod ^(D) and a hammer.
- (b) Remove the bearing track ^(E) from the lower bracket using a scalpel ^(F) and a hammer.
- (c) Install a new rubber seal and new bearings tracks.

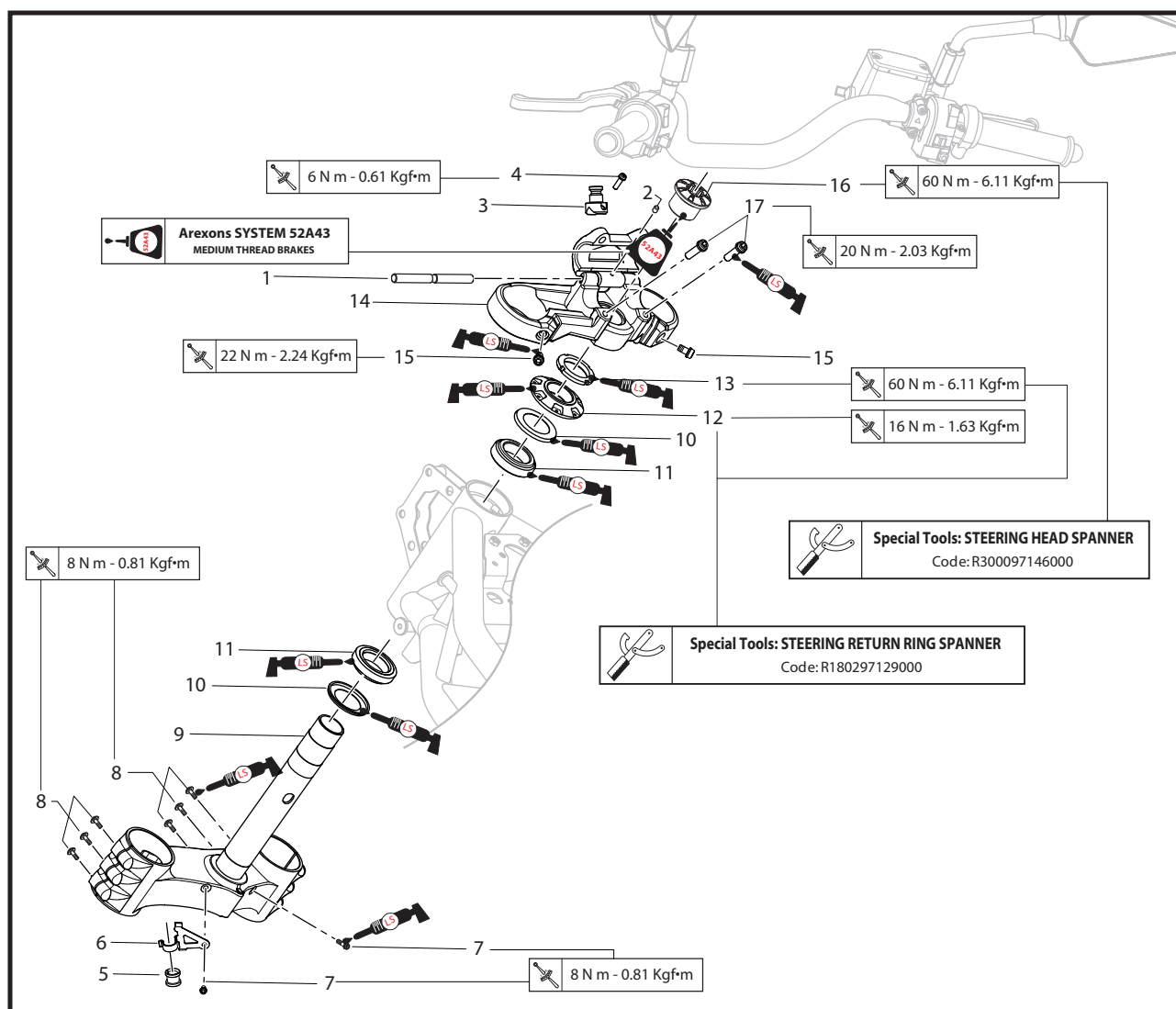
ATTENTION

If a track for bearings is not installed correctly, the tube for the steering head may be damaged.

NOTE:

- The bearings and the relative tracks must always be replaced together.
- Every time the steering tube is dismantled, the rubber seal must be replaced.

- ④ Check:
- the upper steering base
 - the lower steering base
- (together with the steering tube)
- In the presence of deformations/cracks/damages → Replace.



SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
		Upper And Lower Steering Wheel Base Installation		Install the pieces in the given order.
1		Pin	1	
2		Grain	1	
3		GPS Support	1	
4		Screw	1	
5		Front Brake Tube Guide	1	
6		Front Brake Tube Guide Support Small Plate	1	
7		Screw	2	
8		Screw	6	
9		Lower Steering Base	1	Carry out a double passage.
10		Bearing	2	
11		Dust Seal Ring	2	
12		Steering Ring Nut	1	
13		Kingpin Ring Nut	1	NOTE: _____ Install both ring nuts using the special tool._____
14		Steering Head	1	
15		Screw	2	
16		Cap	1	
17		Screw	2	Carry out a double passage.

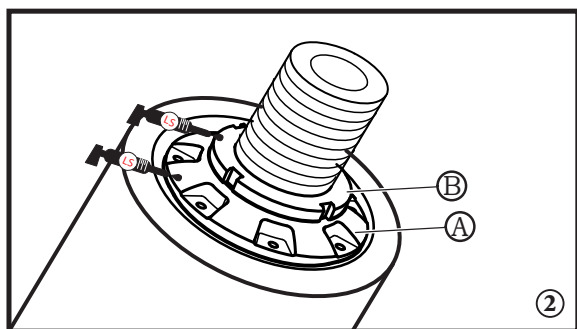


UPPER AND LOWER STEERING WHEEL BASE INSTALLATION

- ① Lubricate:
- the bearings
 - the dust seal rings
 - the bearings tracks



Recommended lubricant
TUTELA MR2 GREASE



- ② Install:
- the steering ring nut (A) using the special tool

Fasten:

16 N m - 1.63 Kgf·m

ATTENTION

Do not excessively fasten the steering ring nut. ____

- the kingpin ring nut (B) using the special tool

Fasten:

60 N m - 6.11 Kgf·m

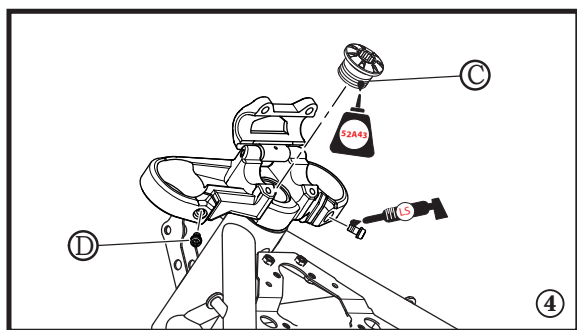


Recommended lubricant
TUTELA MR2 GREASE



Special Tools: STEERING RETURN RING SPANNER
Code: R180297129000

- ③ Install:
- the front fork shanks
- See paragraph "4.75".



- ④ Install:
• **the cap** ③ using the special tool

Fasten with:

60 N m - 6.11 Kgf•m



**AREXONS SYSTEM 52A43
MEDIUM THREAD BRAKES**

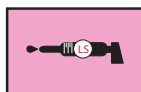


Special Tools: STEERING HEAD SPANNER
Code: R300097146000

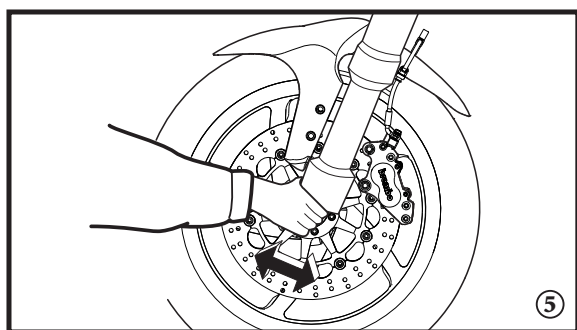
- **the stop screws of the upper steering plate** ①

Torque fasten:

22 N m - 2.24 Kgf•m

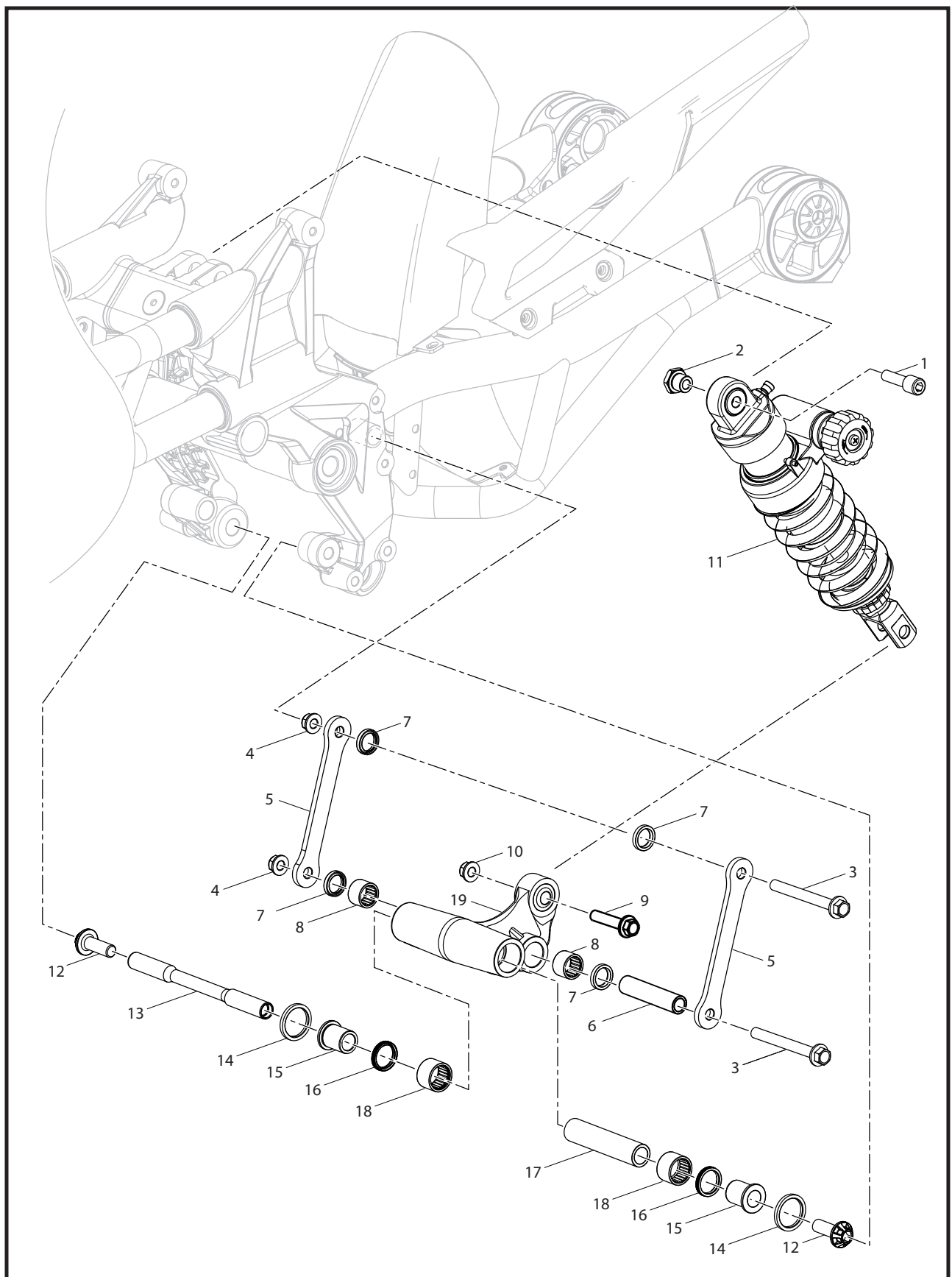


**Recommended lubricant
TUTELA MR2 GREASE**



- ⑤ Check:
• **the steering tube**
Make the front fork oscillate delicately grabbing it by the tubes' ends.
In the presence of jamming/loosening points →
Adjust the steering tube.

REAR SHOCK ABSORBER SET REMOVAL



REAR SHOCK ABSORBER SET REMOVAL

SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
		REAR SHOCK ABSORBER SET REMOVAL		Remove the pieces in the given order.
1		Screw	1	
2		Nut	1	
3		Screw	2	
4		Nut	2	
5		Articulated Connecting Rod	2	
6		Spacer	1	
7		Seal Ring	4	
8		Rollers Bearing	2	
9		Screw	1	
10		Nut	1	
11		Shock Absorber	1	
12		Screw	2	
13		Pin	1	
14		Washer	2	
15		Bush	2	
16		Seal Ring	2	
17		Spacer	1	
18		Rollers Bearing	2	
19		Balancing Device	1	

REAR SHOCK ABSORBER AND GAS CYLINDER TREATMENT

WARNING

This rear shock absorber and this gas cylinder contain a highly compressed gas (nitrogen). Carefully read and understand the following information before handling the rear shock absorber and gas cylinder.

The manufacturer cannot be held responsible for any damages to property or personal injuries deriving from the improper use of the rear shock absorber and the gas cylinder.

- Do not tamper with, do not attempt to open the rear shock absorber or the gas cylinder.
- Do not submit the rear shock absorber or the gas cylinder to naked flames or other sources of high heat.

A high overheating may cause an explosion due to the excessive gas pressure.

- Do not deform, do not damage the rear shock absorber or the gas cylinder in any way.

In case of damages to the rear shock absorber, to the gas cylinder or both, the damping performances will be jeopardised.

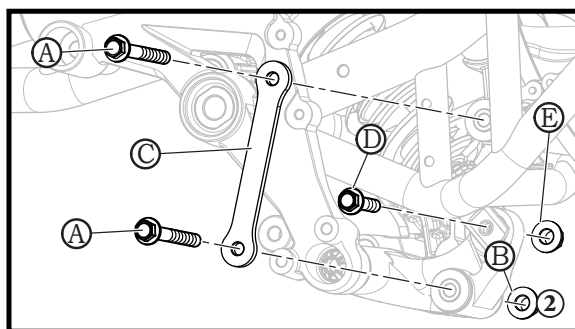


REAR SHOCK ABSORBER SET REMOVAL

- ① Park:
- the bike levelled

WARNING

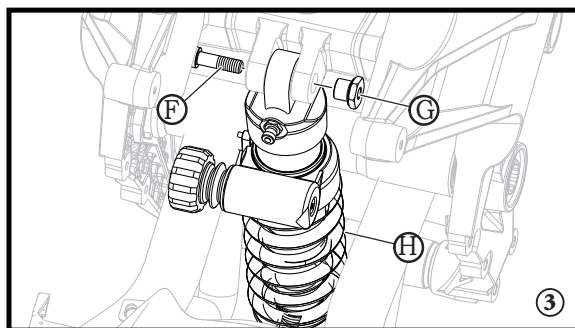
Support the bike using suitable supports so that it cannot fall.



- ② Disconnect:
- the articulated connecting rods fixing screws **A**
 - the relative nuts **B**
 - the two articulated connecting rods **C**
 - the lower screw of the rear shock absorber set **D**
 - the relative nut **E**

NOTE:

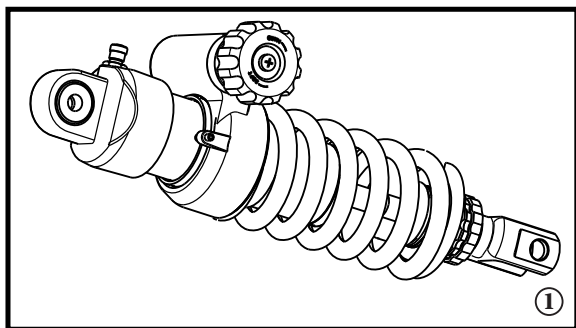
To remove the articulated connecting rods fixing screws and the lower screw of the rear shock absorber set hold the swing arm to avoid it falling.



- ③ Disconnect:
- the fixing screw of the rear shock absorber set **F**
 - the relative nut **G**
 - the rear shock absorber set **H**

NOTE:

Lift the swing arm and remove the rear shock absorber set from the connecting point on the swing arm.

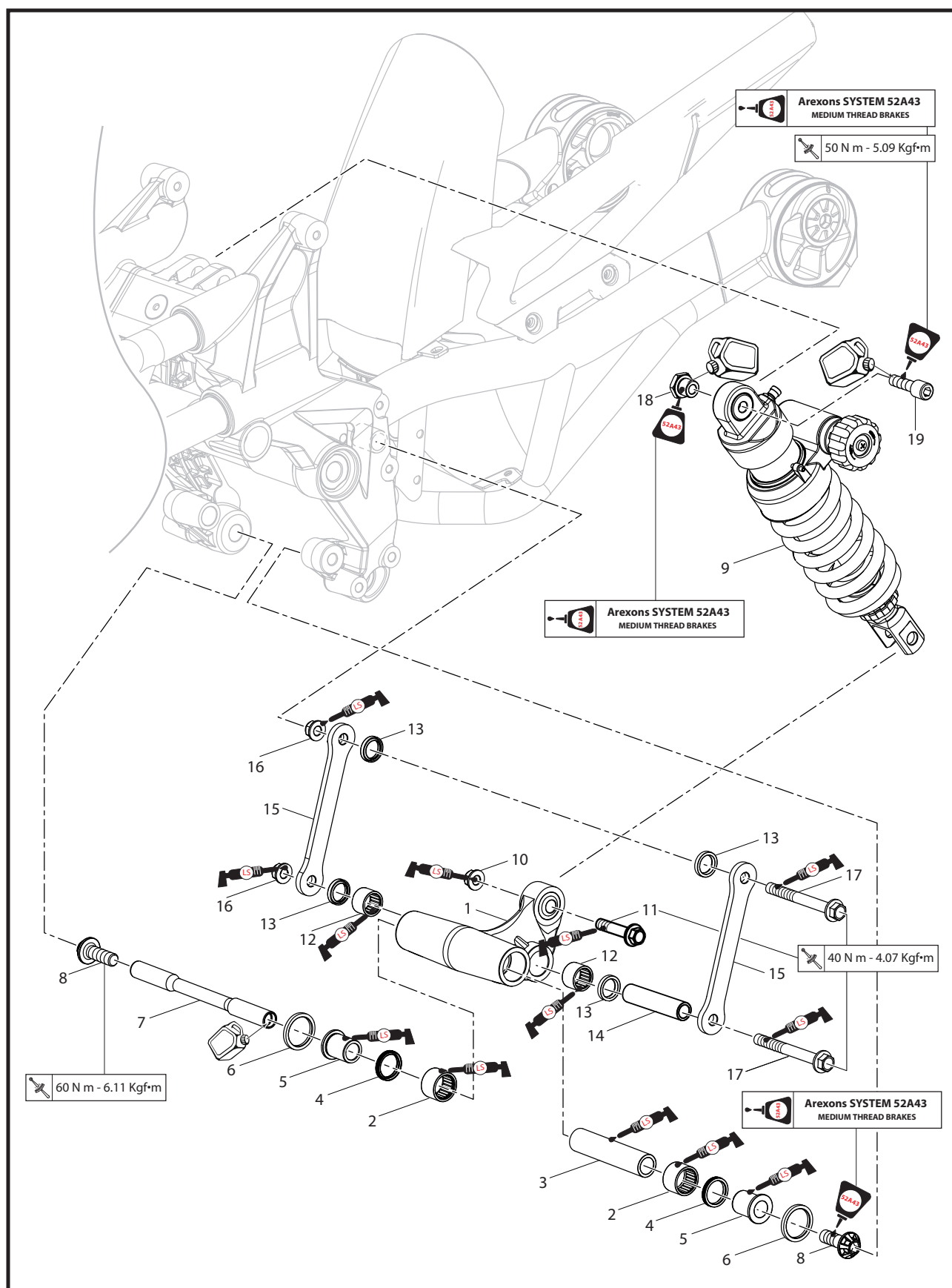


REAR SHOCK ABSORBER SET CONTROL

- ① Check:
- **rear shock absorber rod**
In the presence of deformations/damages → Replace the rear shock absorber set.
 - **the rear shock absorber**
In the presence of gas/oil leaks → Replace the rear shock absorber set.
 - **the spring**
In the presence of damages/wear → Replace the rear shock absorber set.
 - **the bushes**
In the presence of damages/wear → Replace.
 - **the dust seals**
In the presence of damages/wear → Replace.
 - **the screws**
In the presence of deformations/damages/wear lines → Replace.



REAR SHOCK ABSORBER SET INSTALLATION

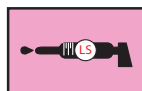


REAR SHOCK ABSORBER SET INSTALLATION

SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
		REAR SHOCK ABSORBER SET INSTALLATION		Install the pieces in the given order.
1		Balancing Device	1	
2		Rollers Bearing	2	
3		Spacer	1	
4		Seal Ring	2	
5		Bush	2	
6		Washer	2	
7		Pin	1	
8		Screw	2	
9		Shock Absorber	1	
10		Nut	1	
11		Screw	1	
12		Rollers Bearing	2	
13		Seal Ring	4	
14		Spacer	1	
15		Articulated Connecting Rod	2	
16		Nut	2	
17		Screw	2	
18		Nut	1	
19		Screw	1	

REAR SHOCK ABSORBER SET INSTALLATION

- ① Lubricate:
- the spacers
 - the bearings



Recommended lubricant
TUTELA MR2 GREASE

- ② Clean:
- the nut of the rear shock absorber set
 - the screw of the rear shock absorber set



Recommended solvent
TUTELA MOTOR CLEAN

- ③ Install:
- the rear shock absorber set

NOTE: _____

- Lift the swing arm to install the rear shock absorber set.
- Install the fixing screw of the rear shock absorber set. _____

- ④ Fasten:
- the nut of the rear shock absorber set

Fasten with:

 50 N m - 5.09 Kgf·m



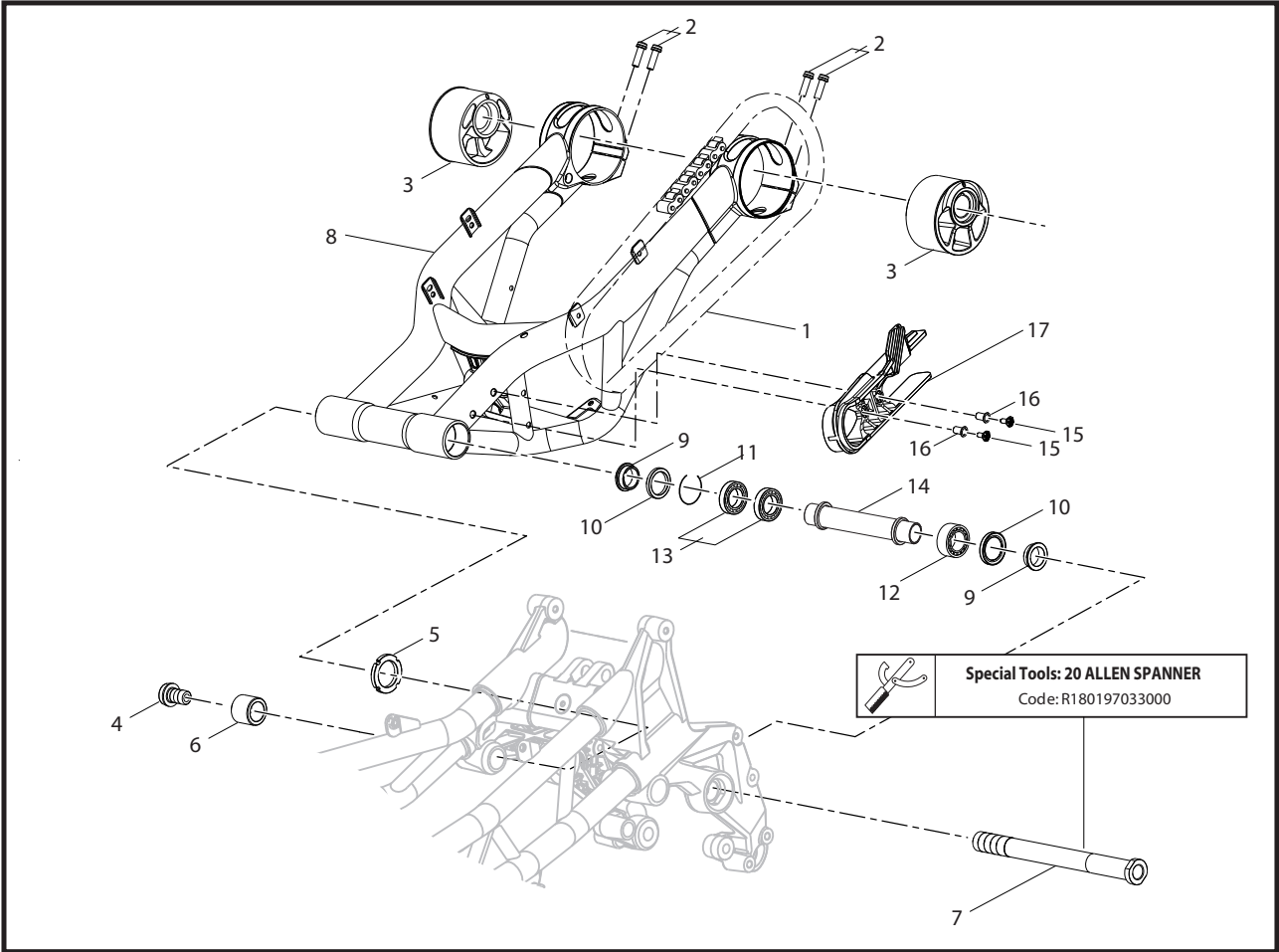
AREXONS SYSTEM 52A43
MEDIUM THREAD BRAKES

- the lower fixing nut of the rear shock absorber set
- the fixing screws of the articulated connecting rods

Fasten:

 40 N m - 4.07 Kgf·m

TRANSMISSION CHAIN AND SWING
ARM REMOVAL



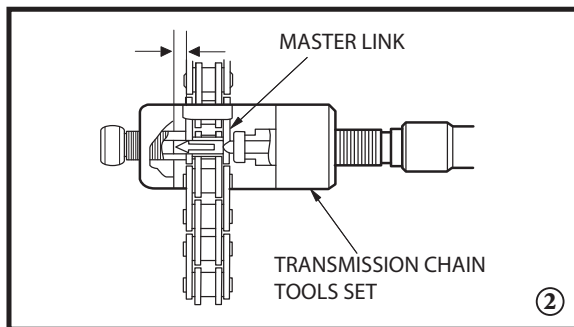
SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
		Rear Brake Calliper Removal Disconnect Speed Sensor Connector Rear Wheel Removal Rear Mudguard Removal Chain Carter Removal Set Removal Rear Shock Absorber Transmission Chain And Swing Arm Removal		Remove the pieces in the given order. See paragraph "4.53". See paragraph "ELECTRIC PLANT 7.11" See paragraph "4.16". See paragraph "4,126" See paragraph "4,122" See paragraph "4.89" NOTE: _____ Support the bike using suitable supports so that it cannot fall. _____
1		Transmission Chain	1	
2		Screw	4	
3		Eccentric	2	
4		Special Screw	1	
5		Ring Nut	1	Loosen.
6		Register	1	Loosen.
7		Pin	1	NOTE: _____ Remove using the special tool. _____
8		Swing Arm	1	
9		Bush	2	
10		Seal Ring	2	
11		Seeger	1	
12		Rollers Bearing	1	
13		Bearing	2	
14		Inside Spacer	1	
15		Screw	2	
16		Welnut	2	
17		Upper Chain Slide	1	

TRANSMISSION CHAIN REMOVAL

- ① Park:
 - **the bike** levelled

WARNING

Place the bike on a trestle of adequate support so that the bike does not fall and the rear wheel is lifted.



- ② Disconnect:
 - **the transmission chain**
(using a transmission chain cutter or the provided tool, according to the transmission chain manufacturer specifications.)

NOTE:

Cut the transmission chain only if it, or the swing arm, has to be replaced.

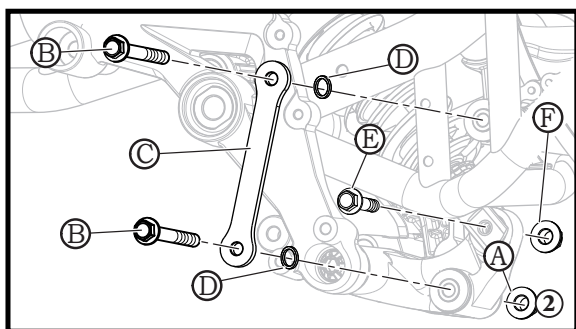


SWING ARM REMOVAL

- ① Park:
- the bike levelled

WARNING

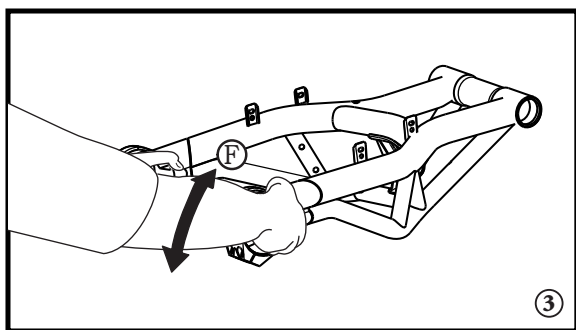
Place the bike on a trestle of adequate support so that the bike does not fall and the rear wheel is lifted.



- ② Disconnect:
- the nuts **A**
 - the articulated connecting rods fixing screws **B**
 - the two articulated connecting rods **C**
 - the washers **D**
 - the lower screw of the rear shock absorber set **E**
 - the relative nut **F**

NOTE:

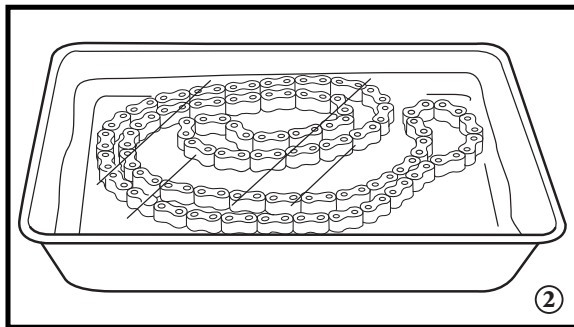
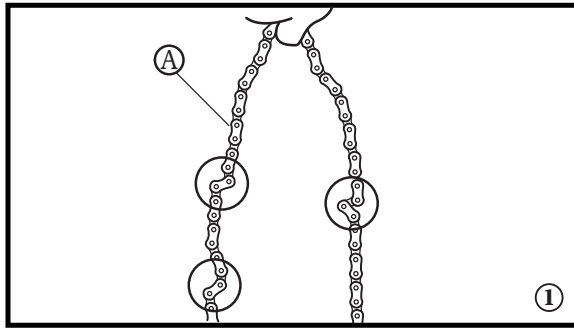
To remove the articulated connecting rods fixing screws and the lower screw of the rear shock absorber set hold the swing arm to avoid it falling.



- ③ Check:
- the swing arm vertical movement **F** by moving it up and down.
- If the vertical movement of the swing arm is not smooth or is blocked, check the spacers, the bearings, the washers and the dust seal lids.

NOTE:

The shock absorber must be dismantled.



TRANSMISSION CHAIN INSPECTION

- ① Check:
 - **the transmission chain ①**
Stiffness → Clean and lubricate, or replace.
- ② Clean:
 - **the transmission chain**
 - ③ Clean the transmission chain using a clean cloth.
 - ④ Place the transmission chain in kerosene and remove all residue dirt.
 - ⑤ Remove the transmission chain from the kerosene and leave it to dry completely.

ATTENTION:

This bike is equipped with a transmission chain with small rubber O-Rings ⑥ placed between one side plate and the other.

To clean the transmission chain we recommend not using high pressure jets of air or water, not to use vapour, petrol, aggressive solvents (for example petrol oil), or brushes with very hard bristles.

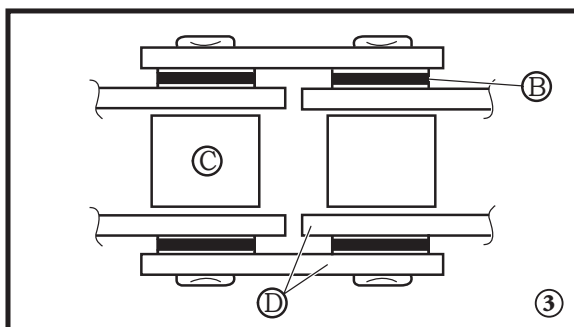
The use of high pressure objects may force dirt or water inside the internal cavities of the transmission chain whereas, the use of solvents may deteriorate the O-Rings.

Furthermore, the O-Rings may also be damaged by using a brush with very hard bristles.

We therefore suggest cleaning the transmission chain with kerosene.

Do not place the transmission chain in the kerosene for more than ten minutes.

Kerosene damages the O-Rings.



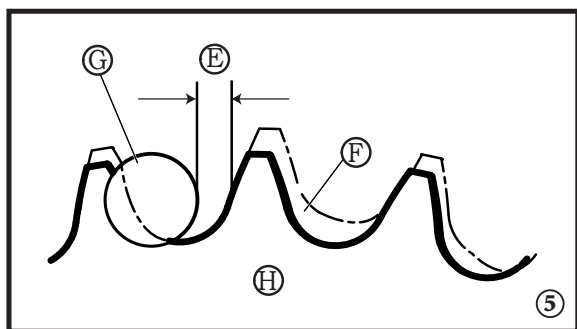
- ③ Check:
 - **the O-Rings ⑥**
In the presence of damages → Replace the transmission chain.
 - **the transmission chain rollers ⑦**
In the presence of damages/wear → Replace the transmission chain.
 - **the transmission chain side plates ⑧**
In the presence of damages/wear → Replace the transmission chain.
In the presence of cracks → Replace the transmission chain and ensure that the path of the battery vent tube is correct and sufficiently distant from the transmission chain and below the swing arm.



- ④ Lubricate:
• **the transmission chain**



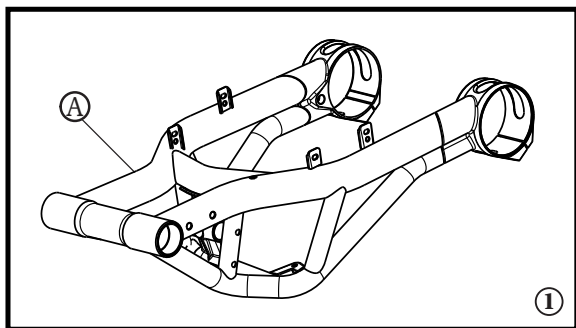
Recommended grease
SINTOFLOX



- ⑤ Check:
• **the conductor gear**
• **the rear cogwheel**
If more of a $\frac{1}{4}$ of each tooth (E) is worn → Replace the gears of the transmission chain.
If the teeth are bent → Replace the gears of the transmission chain.

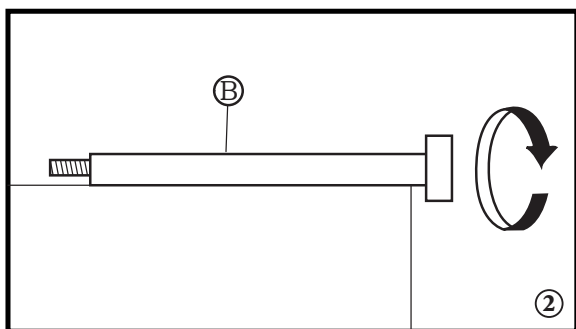
- (F) Correct
(G) Distribution chain roller
(H) Transmission chain gears

NOTE: _____
Never use a new chain with worn cogwheels.
Both the chain and the cogwheels must be in good conditions or the new chain will rapidly wear out.—



SWING ARM INSPECTION

- ① Check:
- **the swing arm** **A**
In the presence of deformations/cracks/damages → Replace.



- ② Check:
- **the swing arm pin** **B**
Roll the swing arm pin on a flat surface.
In the presence of deformations → Replace.

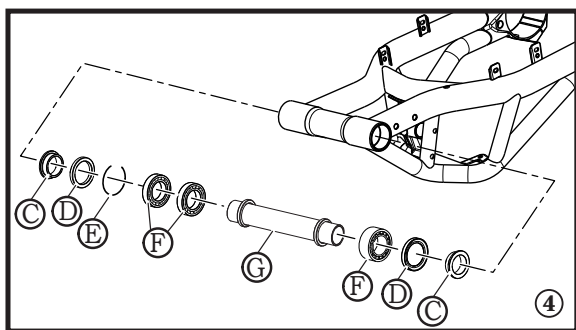
WARNING

Do not attempt to straighten the swing arm pin and the balancing axis if they are deformed.

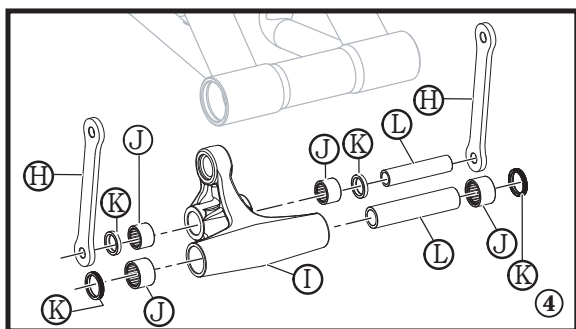
- ③ Wash:
- **the swing arm pin**
 - **the bushes**
 - **the seal rings**
 - **the spacer**
 - **the bearings**



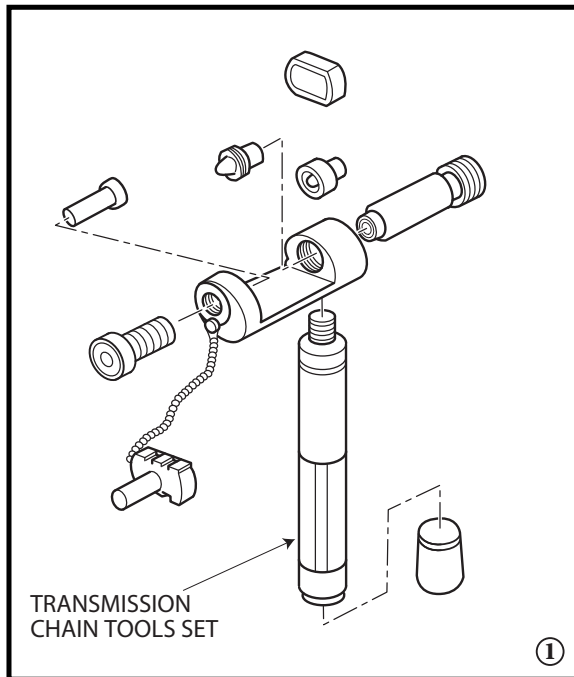
Recommended solvent
TUTELA MOTOR CLEAN



- ④ Check:
- **the bushes** **C**
 - **the seal rings** **D**
 - **the seeger** **E**
In the presence of damages/wear → Replace.
 - **the bearings** **F**
 - **the inside spacer** **G**
In the presence of damages/pitting → Replace.



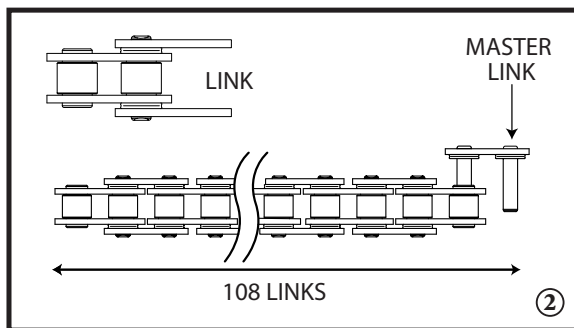
- ④ Check:
- **the articulated connecting rods** **H**
 - **the balancing device** **I**
In the presence of damages/wear → Replace.
 - **the roller bearings** **J**
 - **the seal rings** **K**
In the presence of damages/pitting → Replace.
 - **the spacers** **L**
In the presence of damages/scratches → Replace.



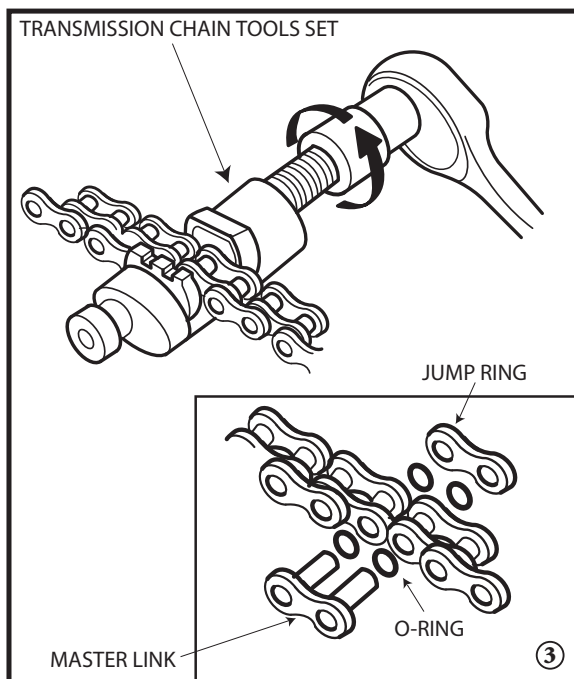
TRANSMISSION CHAIN REPLACEMENT

- ① Loosen:
- **the transmission chain**
- This chain uses a master link transmission chain with safety jump ring.
Using the provided tool according to the chain manufacturer specifications.

NOTE: Following the manufacturer instructions when using the special tool.



- ② **STANDARD NUMBER OF LINKS: 108**



WARNING

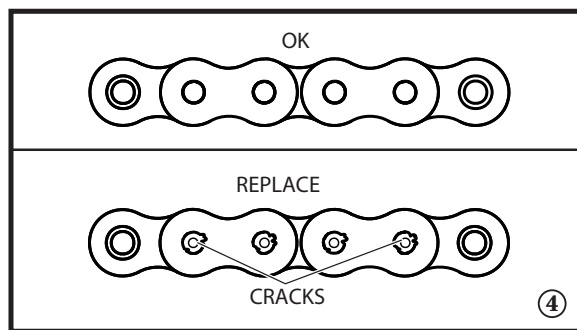
Do not reuse the old transmission chain, the master link, the jump ring of the master link and the O-Rings.

- ③ Insert:
- **the master link**
 - **the O-Rings**
 - **the jump ring**

ATTENTION

Insert the master link from inside the transmission chain, therefore apply the jump ring with the identification mark facing outwards.

- Assemble and fix the tools set for the transmission chain.
- Ensure that the pins of the master link are correctly assembled.
- Clinch the master link pins sideways.
- Ensure that the pins are correctly spotted.

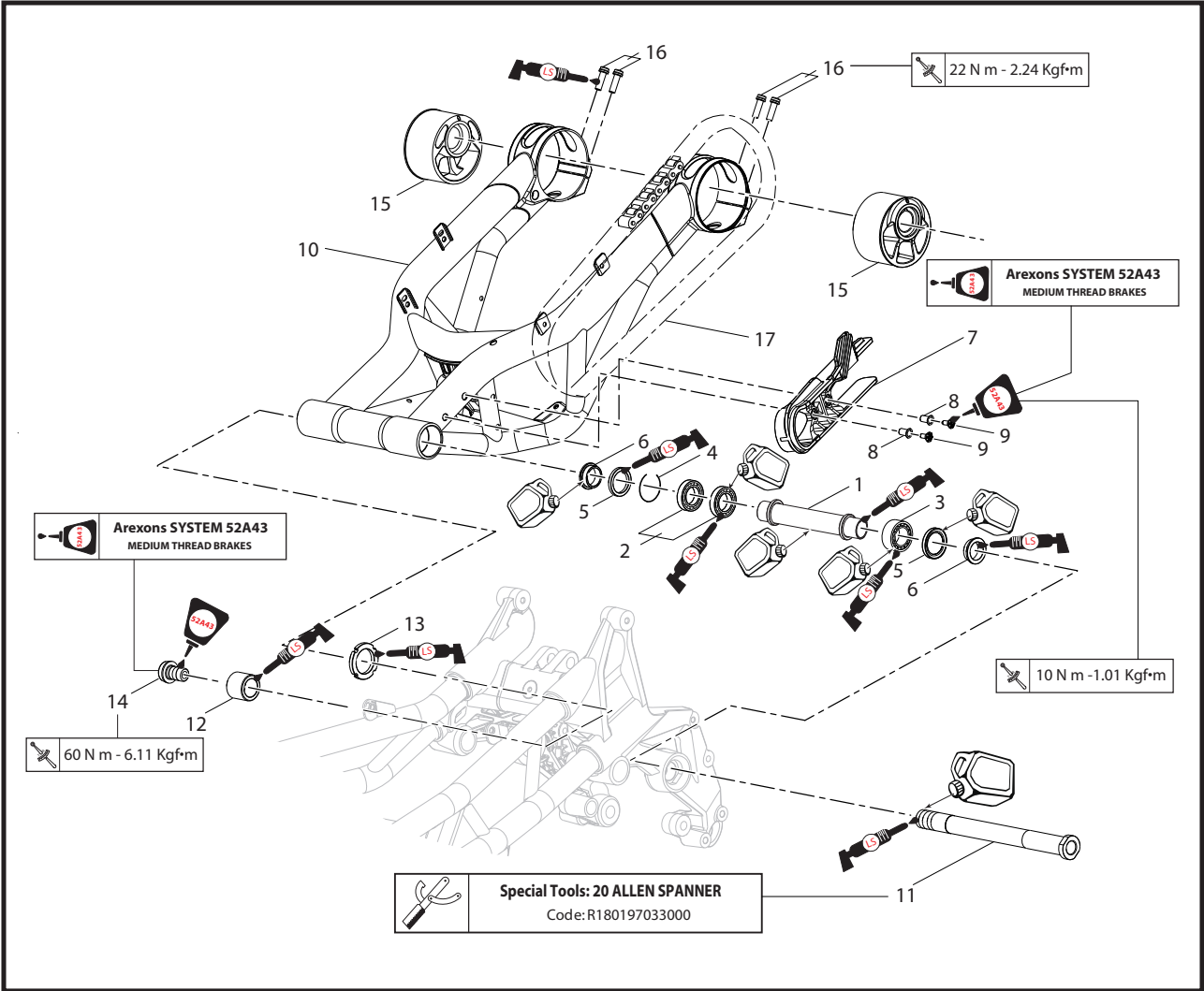


- ④ Check:
- **the surface interested** by the pressing of the master link.
This must not show cracks.
If cracks are present, replace the master link, the seal rings and the jump ring.

ATTENTION

Do not use a transmission chain with clip type master link.

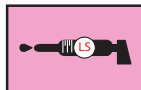
TRANSMISSION CHAIN AND SWING
ARM INSTALLATION



SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
		Transmission Chain And Swing Arm Installation		Install the pieces in the given order.
1		Inside Spacer	1	NOTE: _____ Install using the special tool. _____
2		Bearing	2	
3		Rollers Bearing	1	
4		Seeger	1	
5		Seal Ring	1	
6		Bush	2	
7		Upper Chain Slide	2	
8		Welnut	1	
9		Screw	2	
10		Swing Arm	2	
11		Pin	1	
12		Register	1	
13		Ring Nut	1	
14		Special Screw	1	
15		Eccentric	1	
16		Screw	2	
17		Transmission Chain	4	
			1	

SWING ARM INSTALLATION

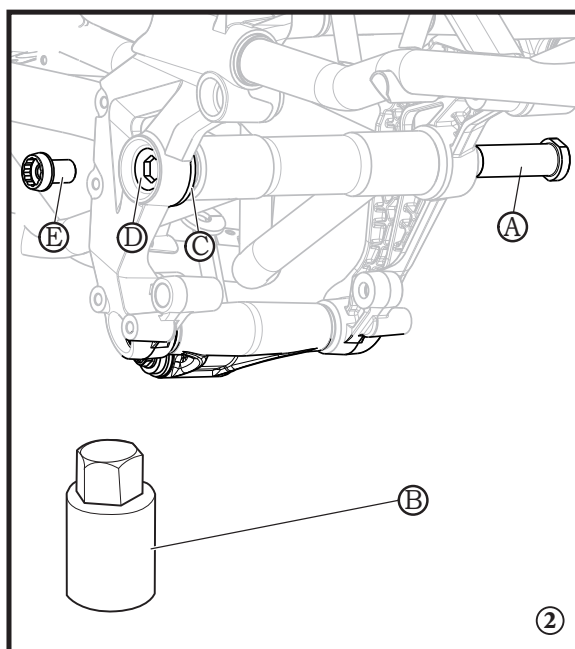
- ① Lubricate and clean:
- the bearings
 - the spacer
 - the seal rings
 - the bushes
 - the swing arm pin



Recommended lubricant
TUTELA MR2 GREASE



Recommended solvent
TUTELA MOTOR CLEAN



- ② Install:
- the swing arm
 - the swing arm pin ① using the special tool ②



Special Tools: **STEERING HEAD SPANNER**

Code: R300097146000

- the ring nut ③
- the regulator ④
- the special screw ⑤

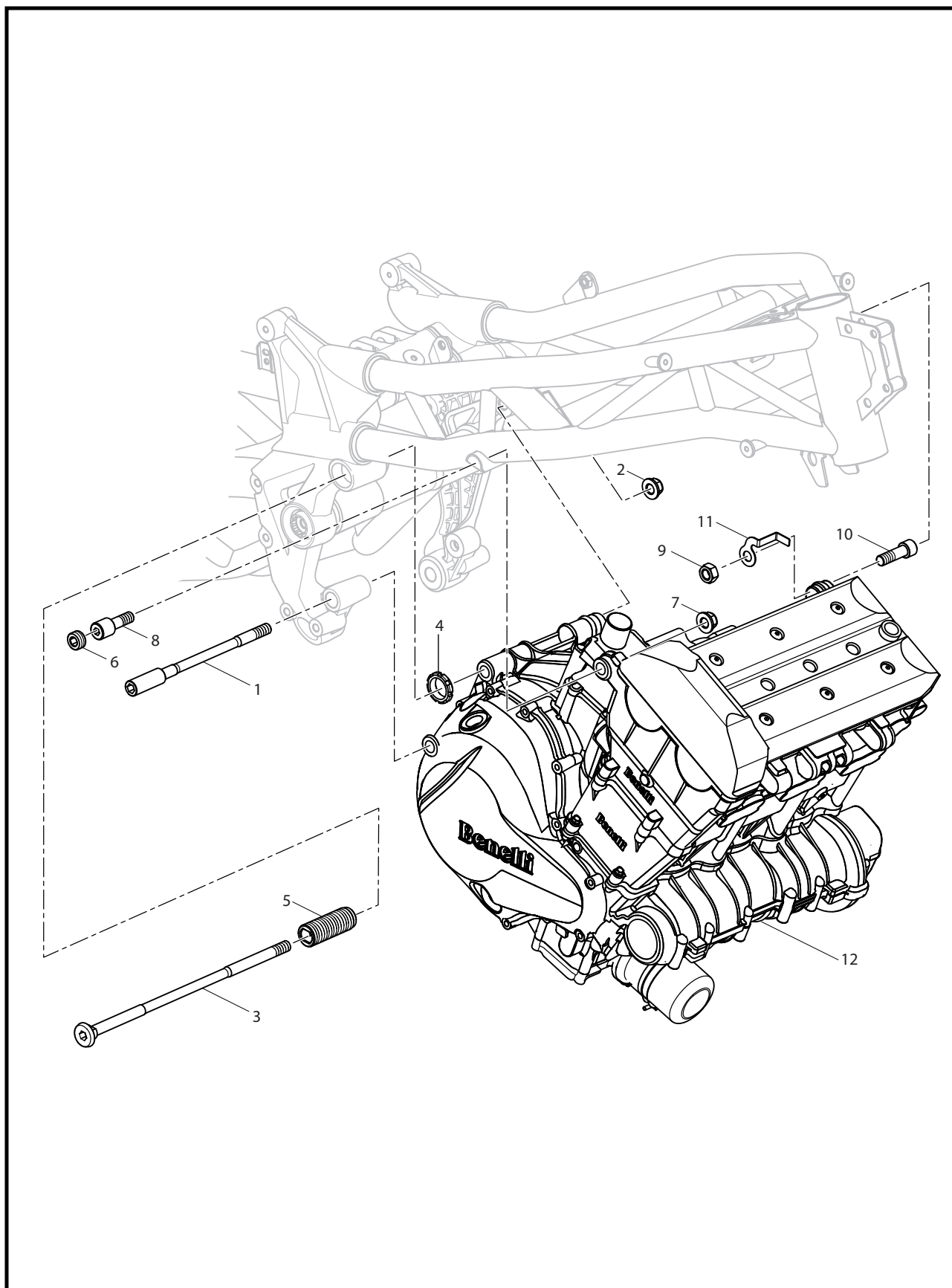
- ③ Install:
- the rear shock absorber set
See paragraph "4.94".
 - the rear wheel
See paragraph "4.26".

- ④ Adjust:
- the loosening of the transmission chain
See paragraph "ROUTINE INSPECTIONS AND ADJUSTMENTS 3.62".



Check there are approximately
15 mm (0.59 in) between the swing
arm and the lower chain slide

ENGINE REMOVAL



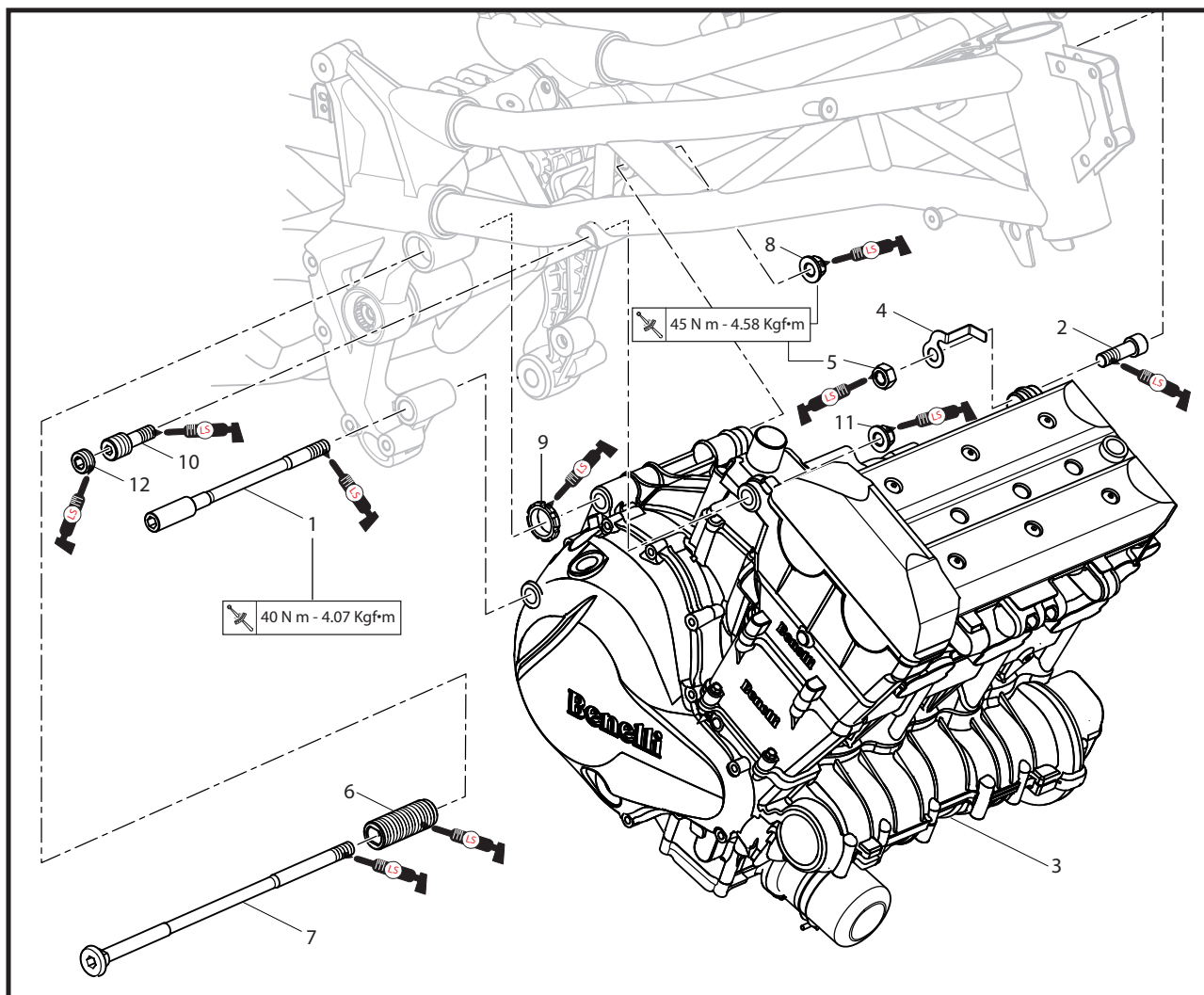


ENGINE REMOVAL

SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
		Engine Protection Removal Empty Cooling Liquid Right And Left Tank Lids Removal Tank Removal Air Box Removal Actuator Cables Removal Disconnect Lambda Probe Connector Drain Fitting and Collectors Removal Radiator Removal Disconnect Battery Disconnect Remote Control Switch Start-Up Motor Removal Disconnect Gas Cables Clutch Cable Removal Disconnect Reels Disconnect Injectors Disconnect Potentiometer Connector Disconnect Phase Sensor Connector Disconnect Sensor Connector Cooling Liquid Temperature Disconnect Stepper Sensor Connector Disconnect Oil Pressure Sensor Connector Disconnect Sensor Connector Side Trestle Disconnect Neutral Sensor Connector Transmission Chain Removal Gear Change Removal Right Front Footboard Holder Plate Removal Engine Removal		Remove the pieces in the given order. NOTE: <u>Place a suitable trestle underneath frame and engine</u> See paragraph "4.122" NOTE: <u>Drain the cooling liquid before carrying out the operations. See paragraph "ROUTINE INSPECTIONS AND ADJUSTMENTS 3.44".</u> See paragraph "4.112" See paragraph "4.118" See paragraph "ROUTINE INSPECTIONS AND ADJUSTMENTS 3.10". See paragraph "ELECTRIC PLANT 7.28" See "ELECTRIC PLANT 7.13" paragraph. See paragraph "4.155" See "COOLING PLANT 6.1" paragraph. See paragraph "ROUTINE INSPECTIONS AND ADJUSTMENTS 3.79" See paragraph "ELECTRIC PLANT 7.38" See "ENGINE 5.125" paragraph. See paragraph "4.77" See "ENGINE 5.88" paragraph. See "ENGINE 5.1" paragraph. See paragraph "ELECTRIC PLANT 7.31" See paragraph "ELECTRIC PLANT 7.6" See paragraph "ELECTRIC PLANT 7.4" See paragraph "ELECTRIC PLANT 7.5" See paragraph "ROUTINE INSPECTIONS AND ADJUSTMENTS 3.25". See paragraph "ELECTRIC PLANT 7.16" See paragraph "4.151" See paragraph "ELECTRIC PLANT 7.7" See paragraph "4.97" See "ENGINE 5.91" paragraph. See paragraph "4.147"
1		Engine Support Screw	1	
2		Nut	1	
3		Engine Screw	1	
4		Regulator Ring Nut	1	
5		Engine Register	1	
6		Adjustment Grain	1	
7		Nut	1	
8		Engine Right Front Screw	1	
9		Nut	1	
10		Left Engine Screw	1	
11		Small Plate	1	
12		Engine	1	

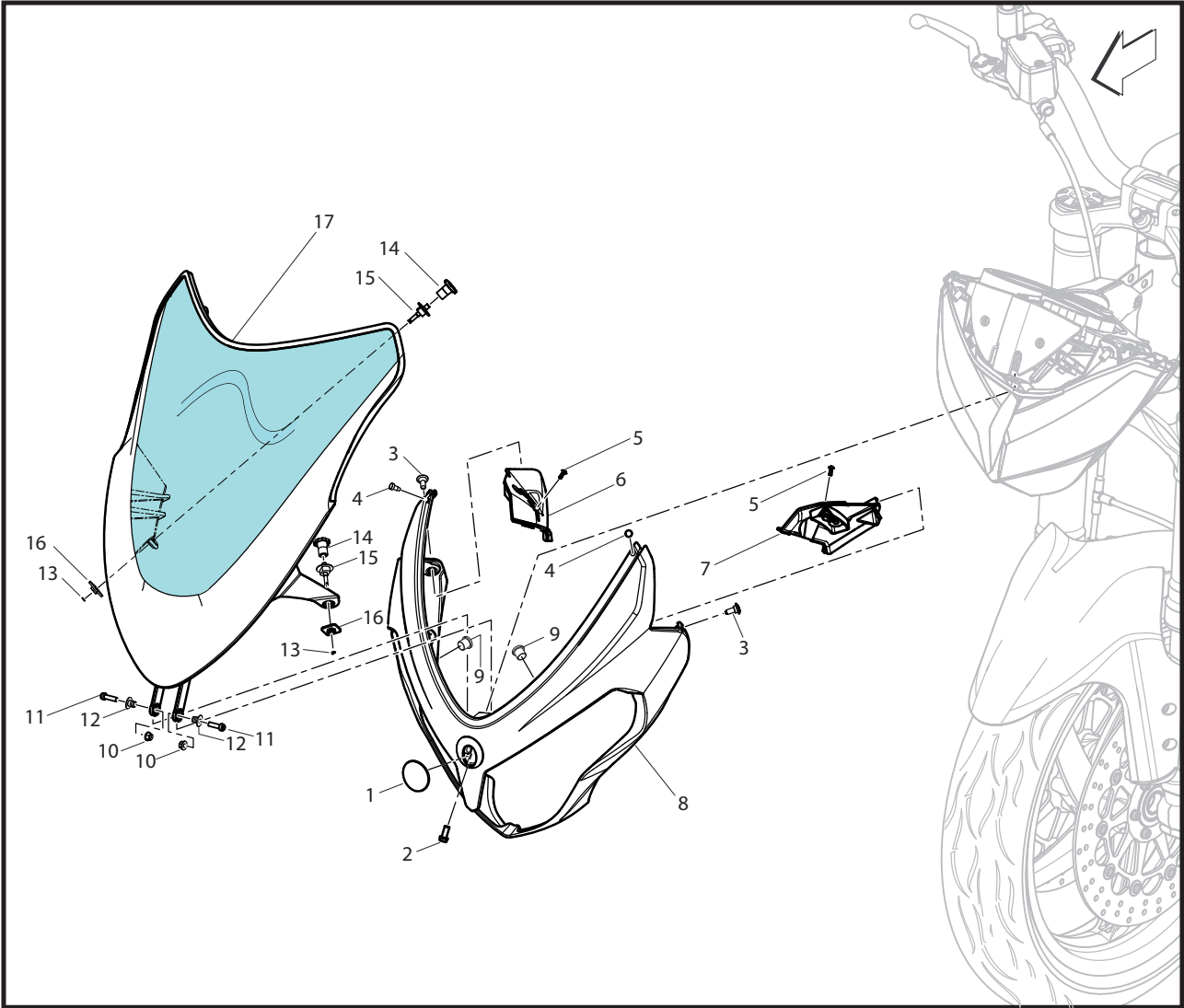


ENGINE INSTALLATION



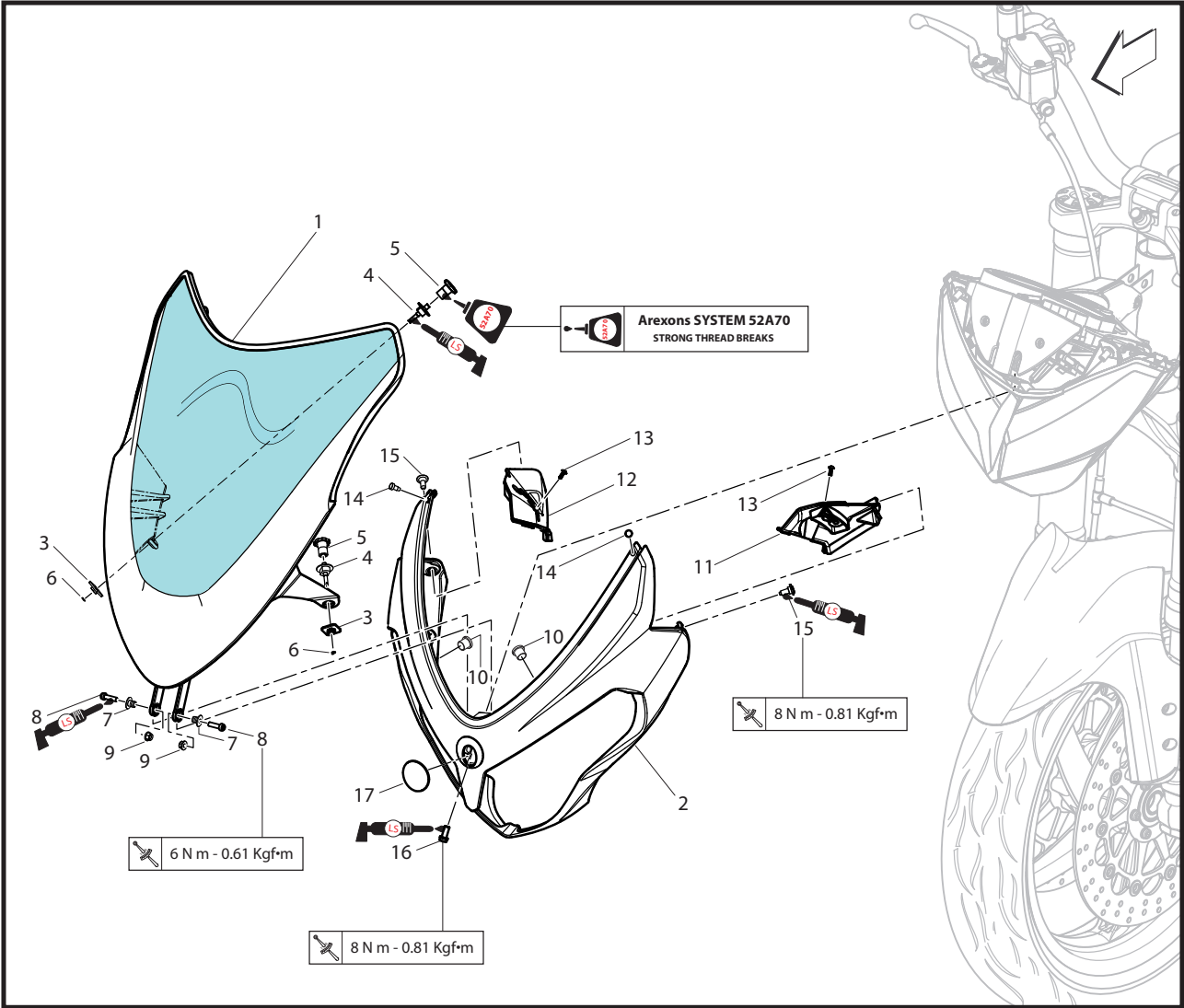
SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
		Engine Installation		Install the pieces in the given order.
1		Engine Support Screw (222.5 mm)	1	ATTENTION: Careful not to damage frame and engine when installing the engine.
2		Left Engine Screw	1	NOTE: Place a suitable trestle underneath frame and engine.
3		Engine	1	Torque fasten
4		Small Plate	1	
5		Nut	1	Torque fasten
6		Engine Register	1	Near to the engine without fastening and near the regulator ring nut to the frame without fastening
7		Engine Screw	1	Lock the screw using the spanner
8		Nut	1	Torque fasten
9		Regulator Ring Nut	1	Fasten by hand
10		Engine Right Front Screw	1	Lock screw using the spanner
11		Nut	1	Fasten by hand
12		Adjustment Grain	1	Fasten by hand
				NOTE: Insert the cooling liquid once operations have been completed.

MOBILE AND FIXED CAP REMOVAL



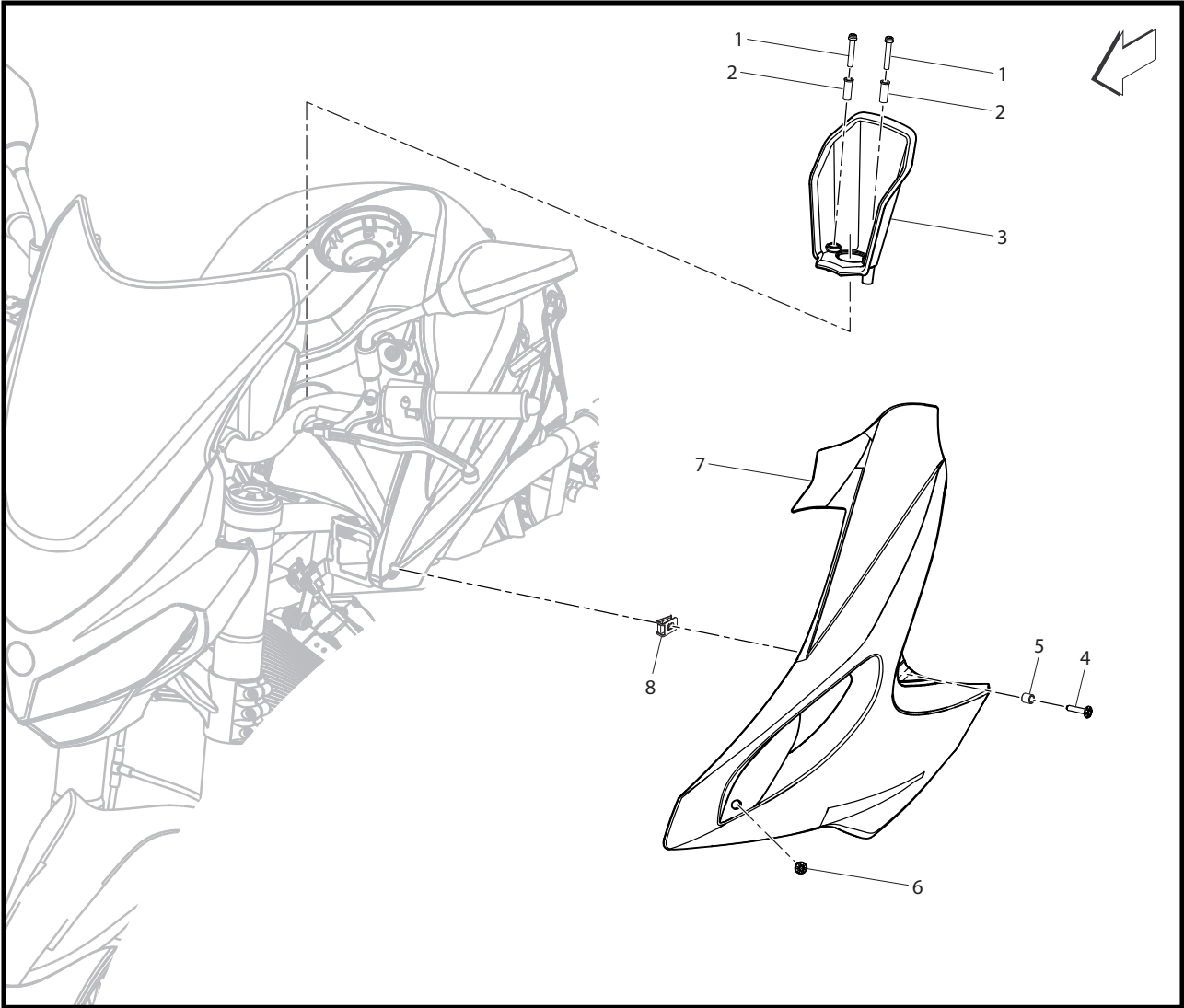
SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1		Mobile And Fixed Cap Removal	1	Remove the pieces in the given order.
2		Benelli Decalcomania	1	
3		Screw	2	
4		Special Screw	2	
5		Cap	2	
6		Screw	2	
7		Right Headlight Lid	1	
8		Left Headlight lid	1	
9		Fixed Cap	1	
10		Anti-vibration	2	
11		Nut	2	
12		Screw	2	
13		Bush	2	
14		Split pin	2	
15		Knob	2	
16		Pin	2	
17		Small Plate	2	
		Mobile Cap	1	

MOBILE AND FIXED CAP INSTALLATION



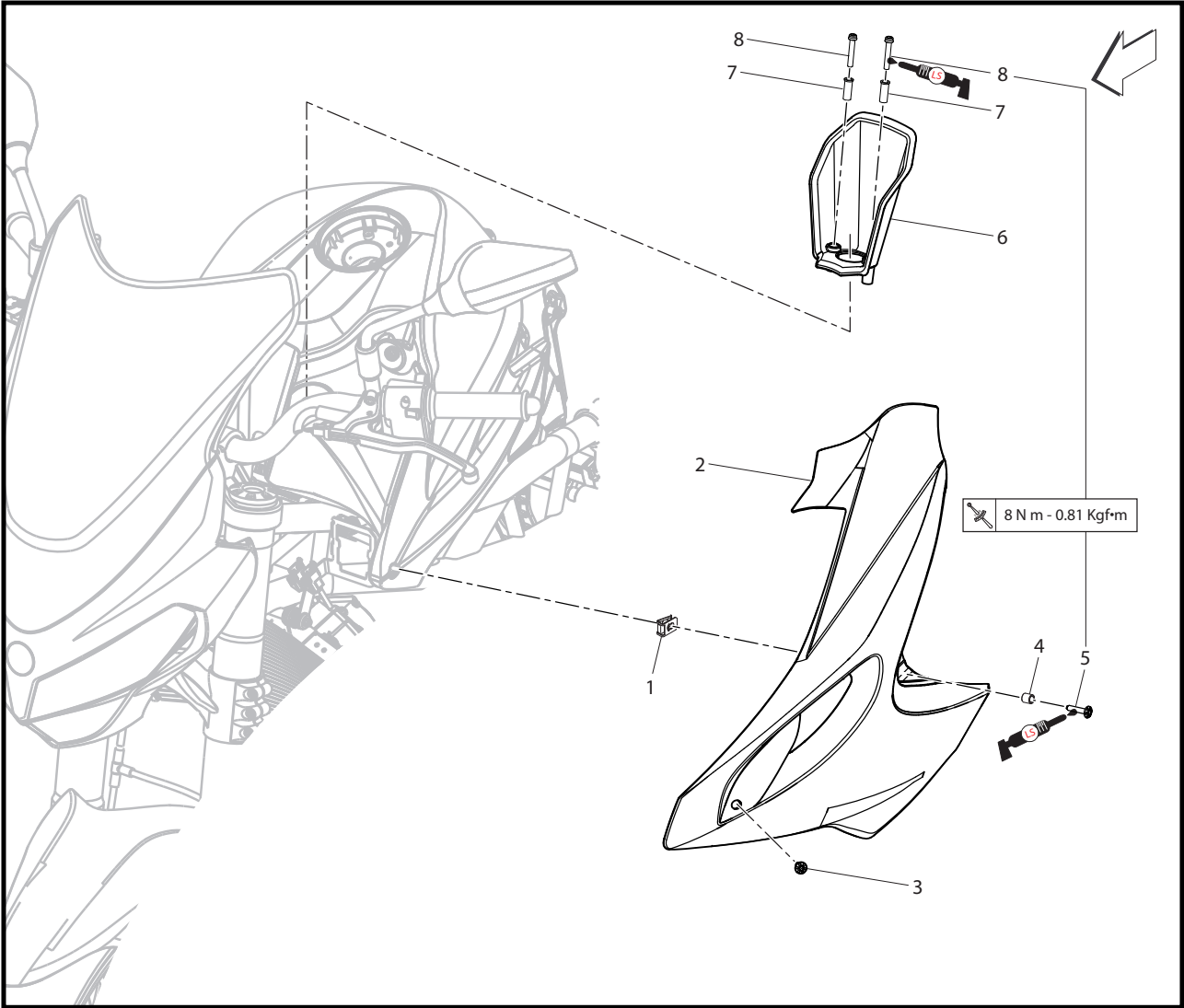
SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1		Mobile And Fixed Cap Installation	1	Install the pieces in the given order.
2		Mobile Cap	1	
3		Fixed Cap	1	Manually fasten.
4		Small Plate	2	
5		Pin	2	
6		Knob	2	
7		Split pin	2	
8		Bush	2	
9		Screw	2	
10		Nut	2	
11		Anti-vibration	2	
12		Left Headlight lid	2	
13		Right Headlight Lid	1	
14		Screw	1	
15		Cap	2	
16		Special Screw	2	
17		Screw	1	
		Benelli Decalcomania	1	

RIGHT AND LEFT TANK LIDS REMOVAL



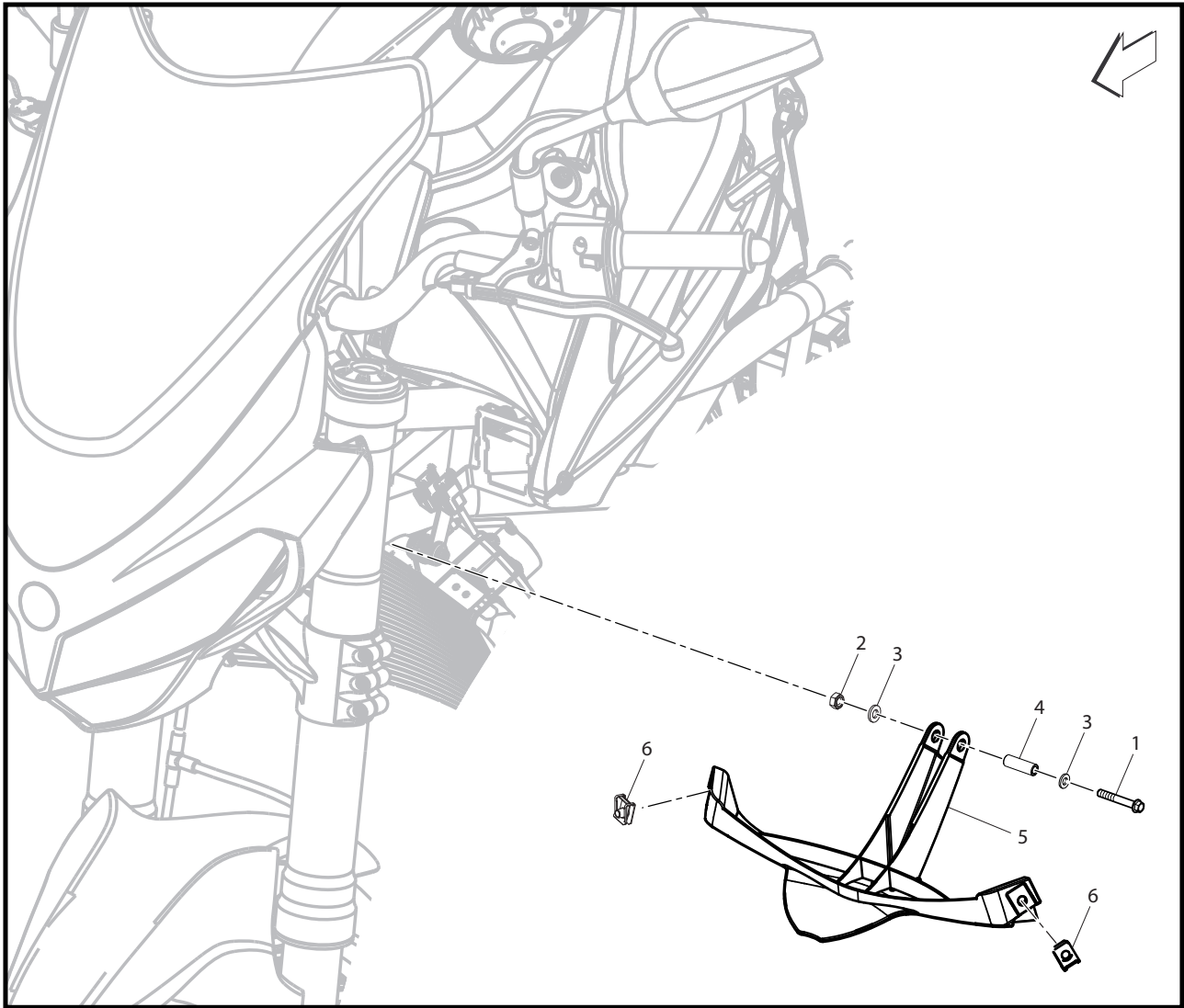
SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1		Right And Left Tank Lids Removal	2	Remove the pieces in the given order. NOTE: <u>The procedure below can be applied to both tank lids.</u>
2		Screw	2	
3		Bush	1	
		Steering Lock Lid		
4		Special Screw	1	
5		Bush	1	
6		Special Screw	1	
7		Left Tank Lid	1	
8		Quick Fixing Clip	1	

RIGHT AND LEFT TANK LIDS INSTALLATION



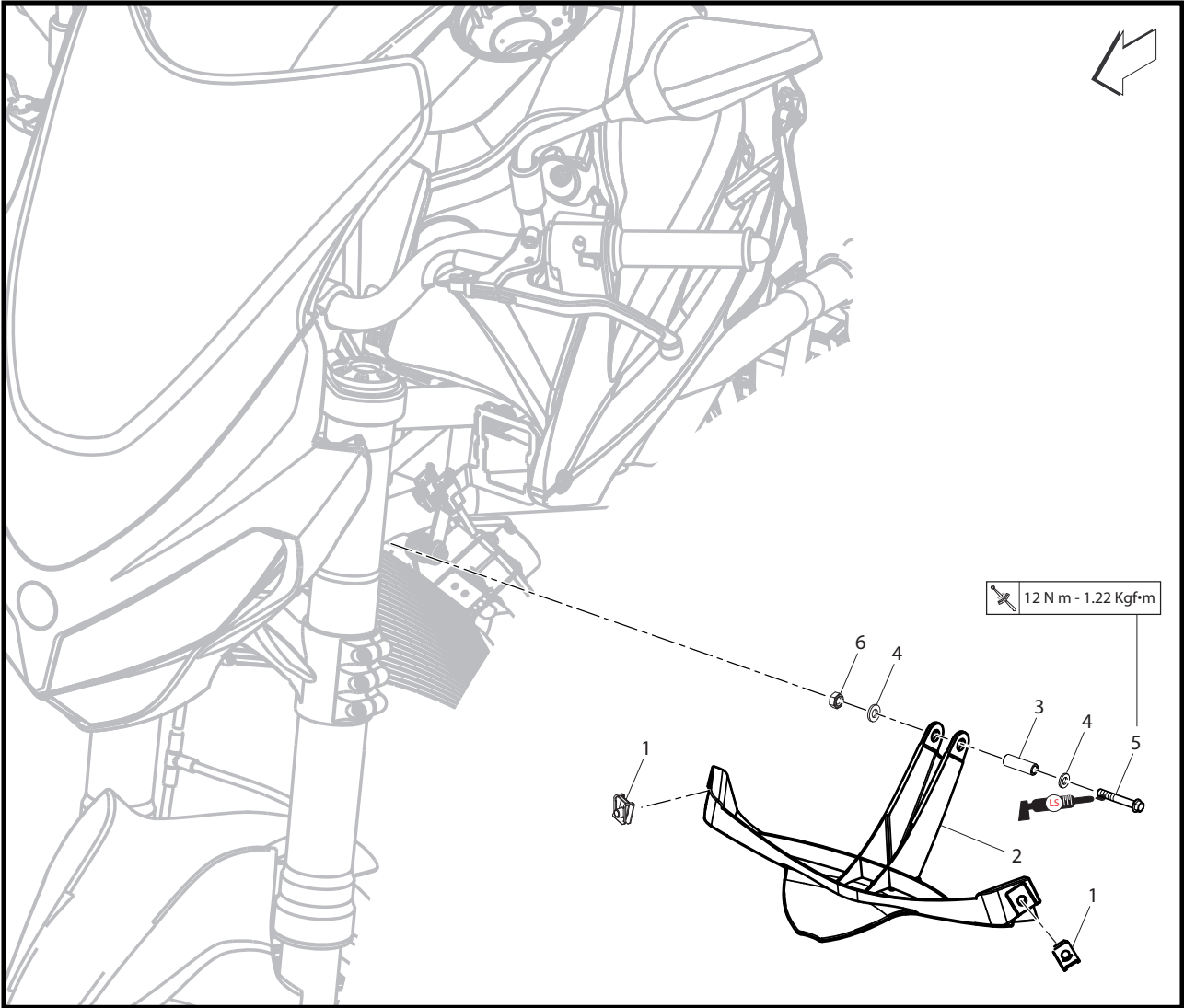
SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
		Right And Left Tank Lids Installation		Install the pieces in the given order.
1		Quick Fixing Clip	1	NOTE: <u>The procedure below can be applied to both tank lids.</u>
2		Left Tank Lid	1	
3		Special Screw	1	Manually fasten.
4		Bush	1	
5		Special Screw	1	
6		Steering Lock Lid	1	
7		Bush	2	
8		Screw	2	

FAIRING SUPPORT BRACKET REMOVAL



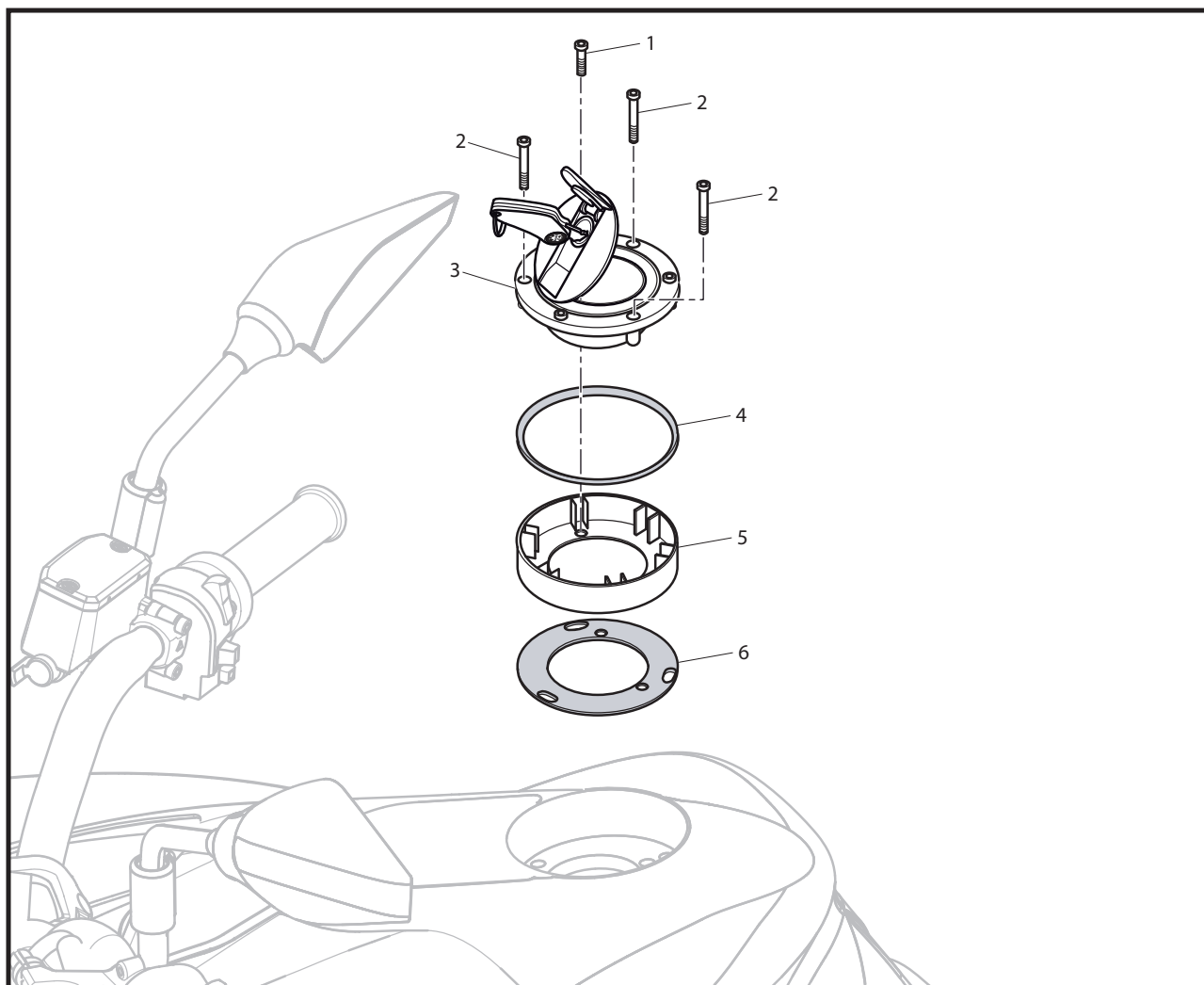
SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1		Right And Left Tank Lids Removal	1	Remove the pieces in the given order. See paragraph "4.112".
2		Fairing Support Bracket Removal Screw	1	
3		Nut	1	
4		Washer	2	
5		Bush	1	
6		Fairing Support Bracket	1	
		Quick Fixing Clip	2	

FAIRING SUPPORT BRACKET INSTALLATION



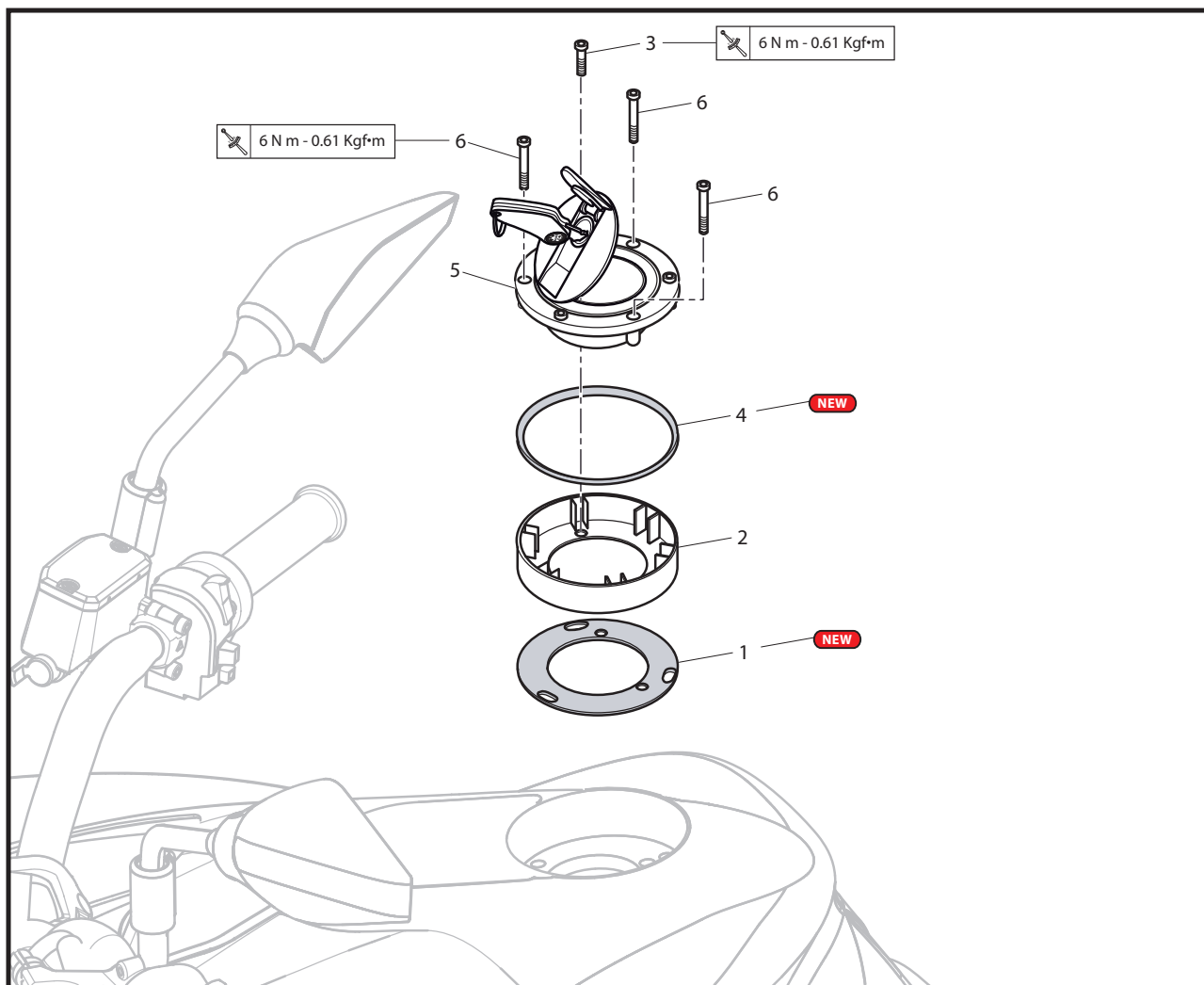
SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1		Fairing Support Bracket Installation	2	Install the pieces in the given order.
2		Quick Fixing Clip	1	
3		Fairing Support Bracket	1	
4		Bush	1	
5		Washer	2	
6		Screw	1	
		Nut	1	

TANK CAP REMOVAL



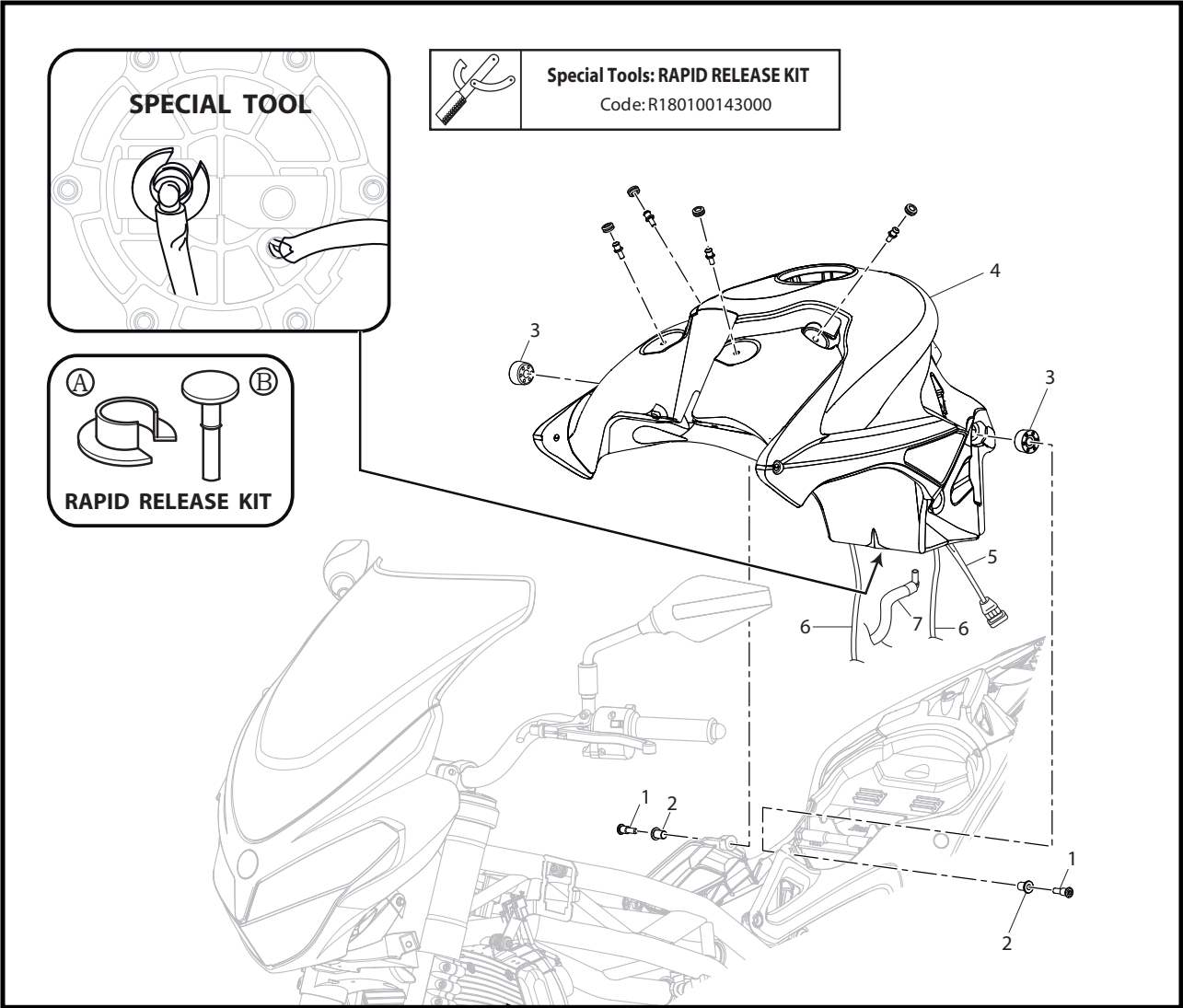
SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1		Tank Cap Removal	1	Remove the pieces in the given order.
2		Screw	3	Insert key.
3		Screw	1	Open cap.
4		Tank Cap	1	
5		Seal For Ring Nut	1	
6		Collector	1	
		Gasket	1	

TANK CAP INSTALLATION



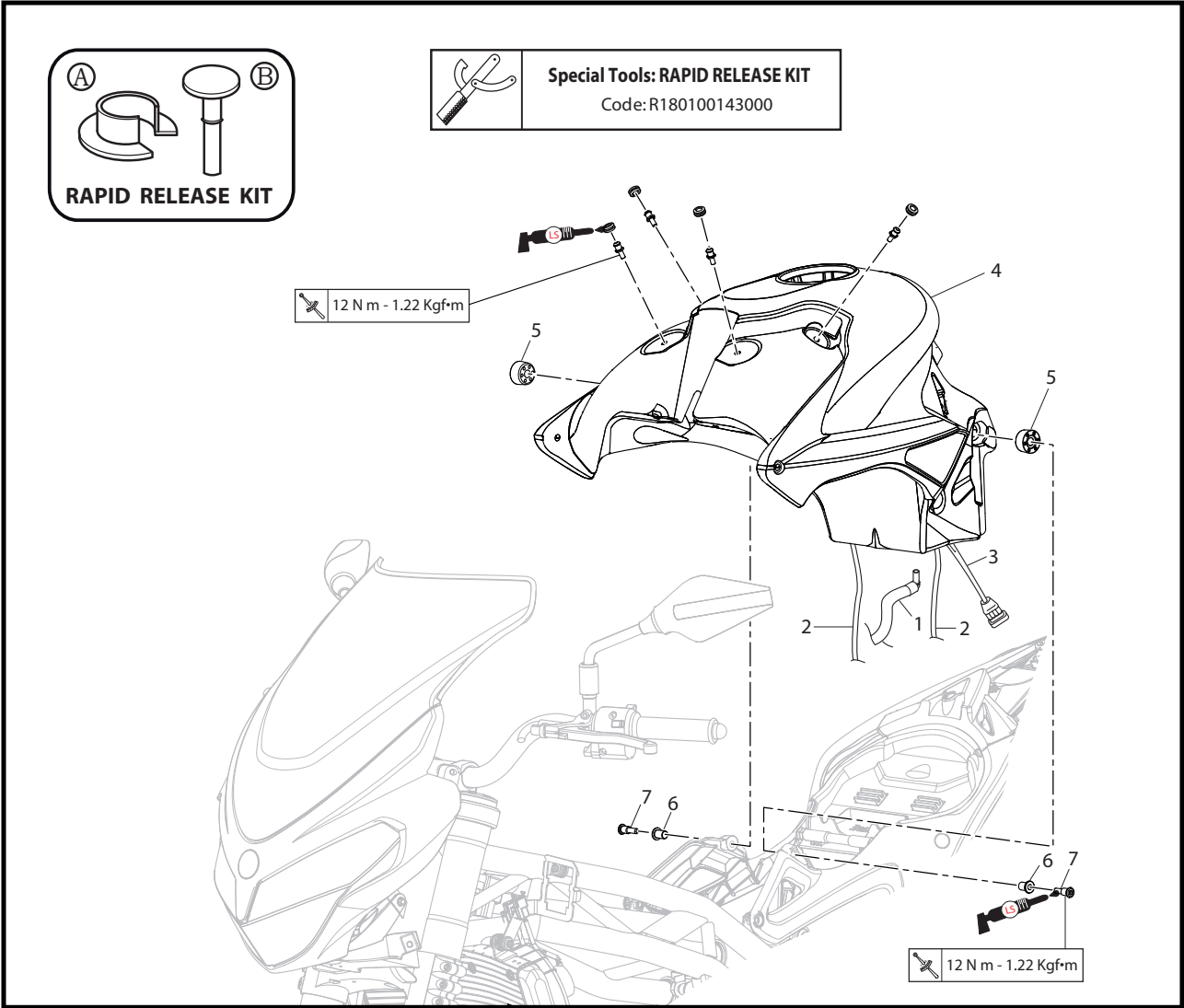
SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1	NEW	Tank Cap Installation	1	Install the pieces in the given order.
2		Gasket	1	
3		Collector	1	
4	NEW	Screw	1	
5		Seal For Ring Nut	1	
6		Tank Cap	1	
		Screw	3	

TANK REMOVAL



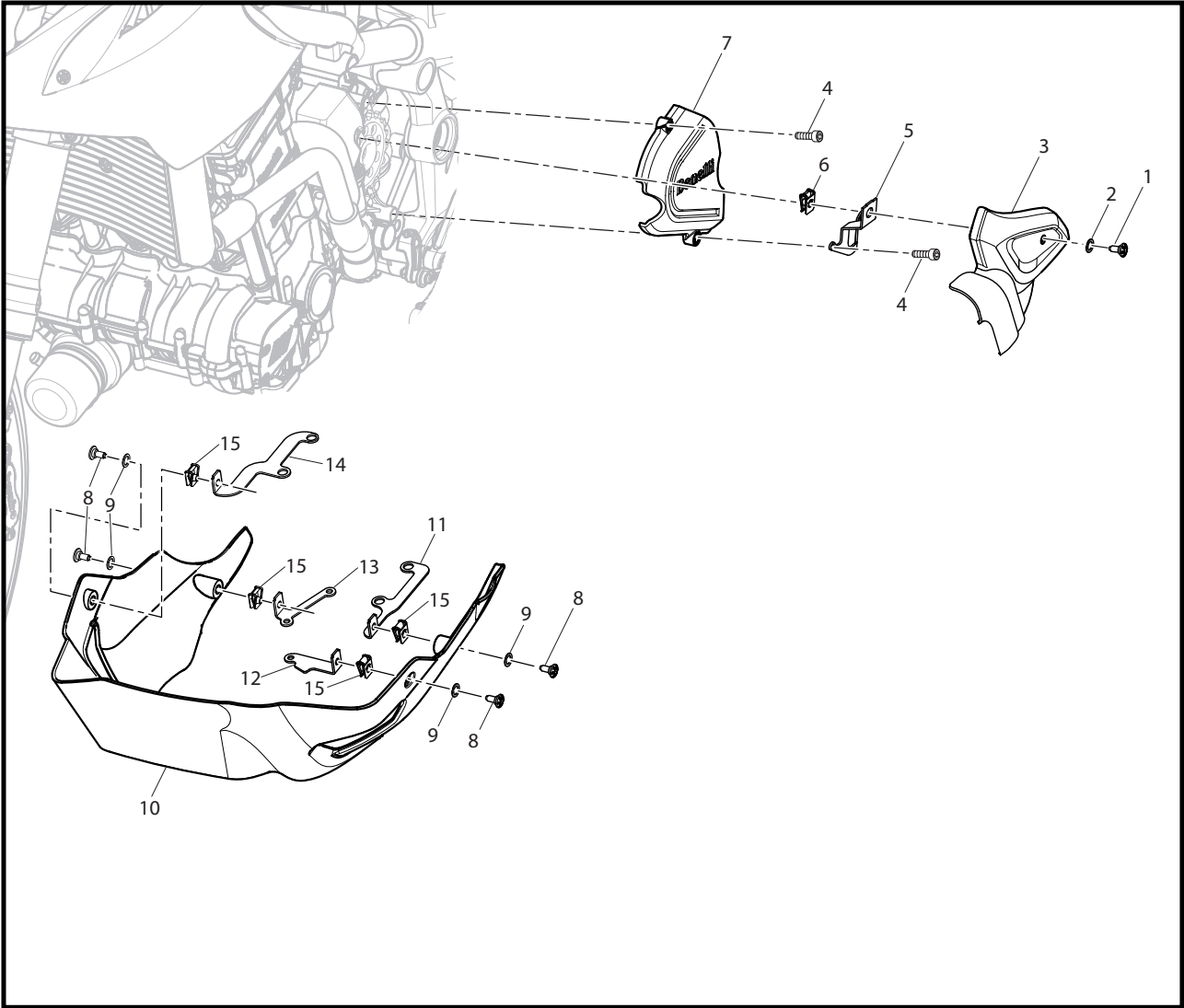
SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1		Steering Lock Lid Removal	2	Remove the pieces in the given order. See paragraph "4.112". See paragraph "4.112". See paragraph "4.130". Lift the tank slightly. Disconnect. Disconnect. Disconnect the petrol fitting tube using the special tool. ATTENTION: <u>When using the special tool, the two flaps of the petrol pump must be pressed. Once the petrol tube is removed, insert the special tool (B) to avoid petrol leaking.</u>
2		Right And Left Tank Lids Removal	2	
3		Seat Removal	2	
4		Tank Removal	1	
5		Special Screw	1	
6		Bush	1	
7		Rubber Buffer	2	
		Tank	1	
		Petrol Pump Connector	1	
		Tank Vent Tube	2	
		Petrol Tube Fitting	1	

TANK INSTALLATION



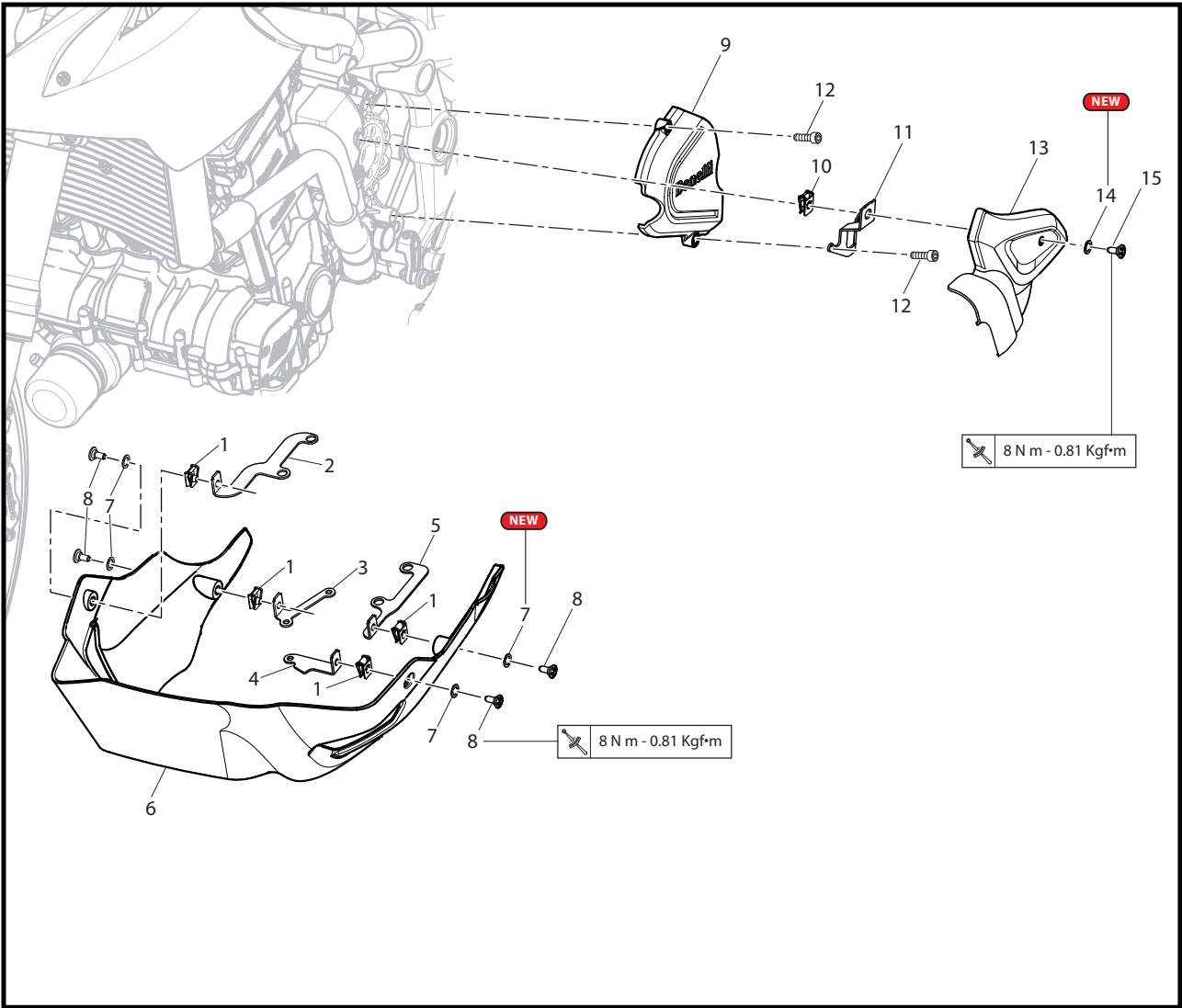
SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
		Tank Installation		Install the pieces in the given order.
1		Petrol Tube Fitting	1	ATTENTION: _____ Remove special tool (B) using special tool (A) rapidly connecting the petrol tube fitting. _____
2		Tank Vent Tube	2	
3		Petrol Pump Connector	1	
4		Tank	1	
5		Rubber Buffer	2	
6		Bush	2	
7		Special Screw	2	

ENGINE LIDS REMOVAL



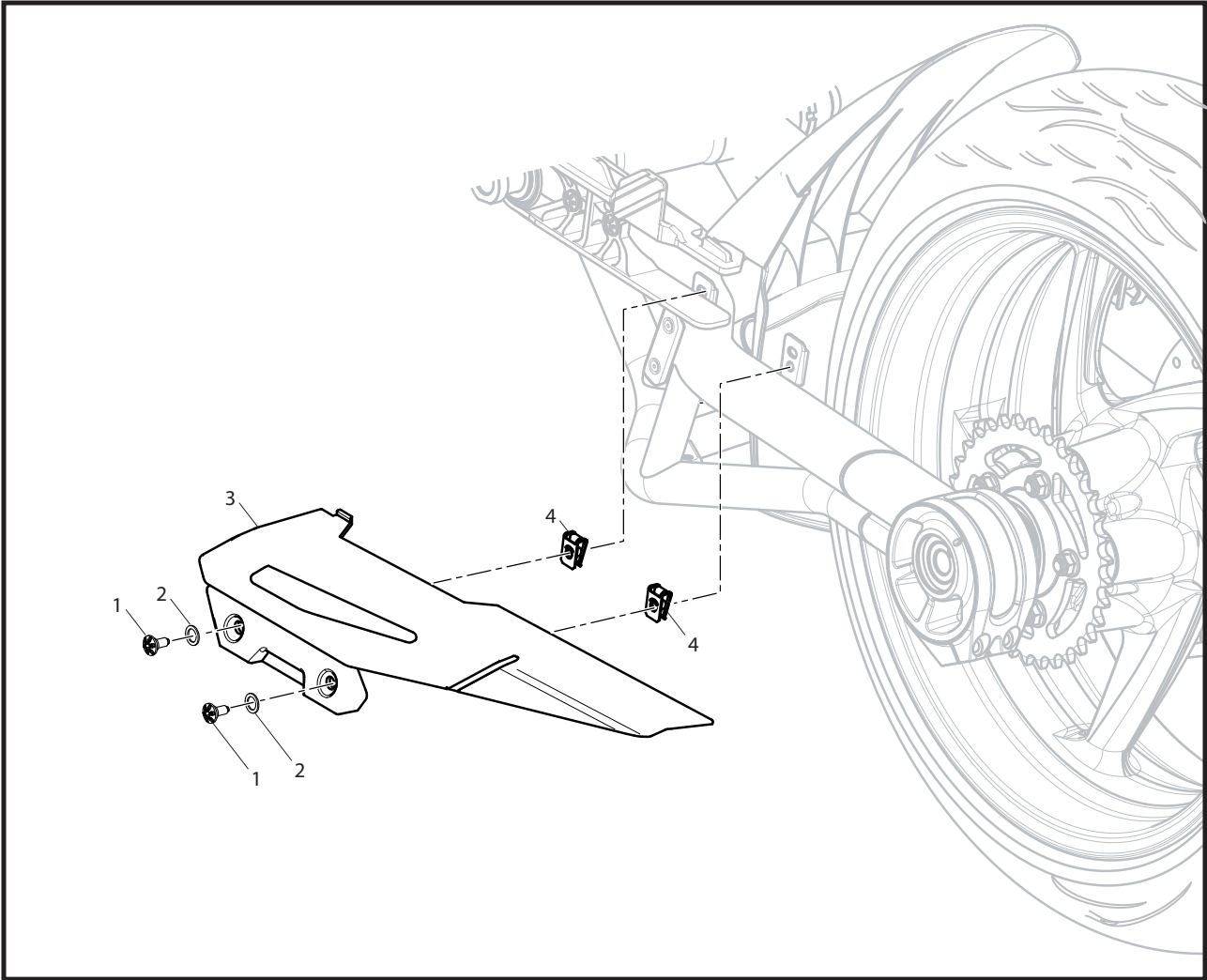
SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1		Engine Lids Removal	1	Remove the pieces in the given order.
2		Special Screw	1	
3		Nylon Washer	1	
4		Alternator Lid	1	
5		Screw	2	
6		Small Plate	1	
7		Quick Fixing Clip	1	
8		Pinion Lid	1	
9		Special Screw	4	
10		Nylon Washer	4	
11		Engine Protection	1	
12		Left Front Small Plate	1	
13		Left Rear Small Plate	1	
14		Right Rear Small Plate	1	
15		Right Front Small Plate	1	
		Quick Fixing Clip	4	

ENGINE LIDS INSTALLATION



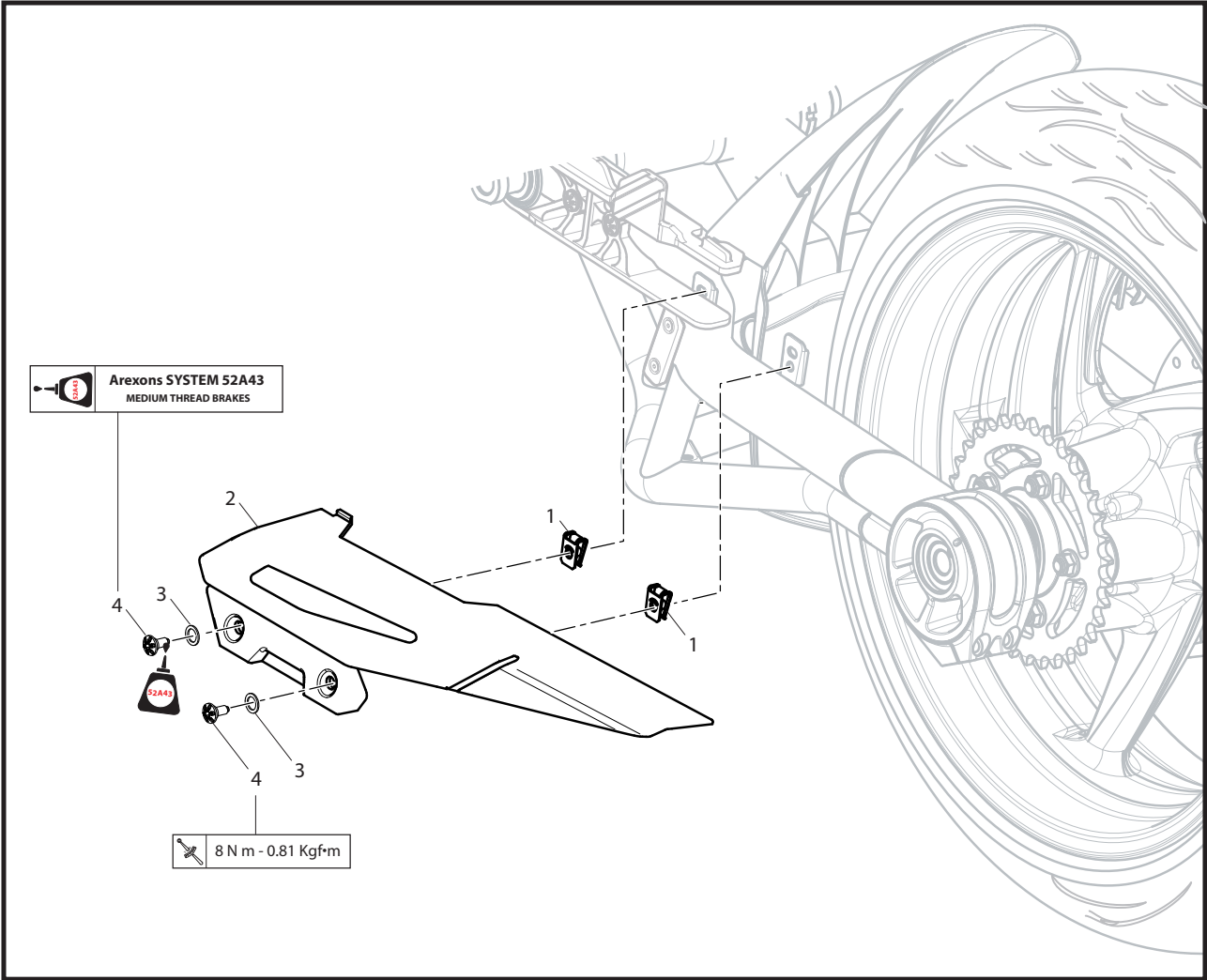
SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
		Engine Lids Installation		Install the pieces in the given order.
1		Quick Fixing Clip	4	
2		Right Front Small Plate	1	
3		Right Rear Small Plate	1	
4		Left Rear Small Plate	1	
5		Left Front Small Plate	1	
6		Engine Protection	1	
7	NEW	Nylon Washer	4	
8		Special Screw	4	
9		Pinion Lid	1	
10		Quick Fixing Clip	1	
11		Small Plate	1	
12		Screw	2	
13		Alternator Lid	1	
14	NEW	Nylon Washer	1	
15		Special Screw	1	
				Manually fasten.

CHAIN CARTER REMOVAL



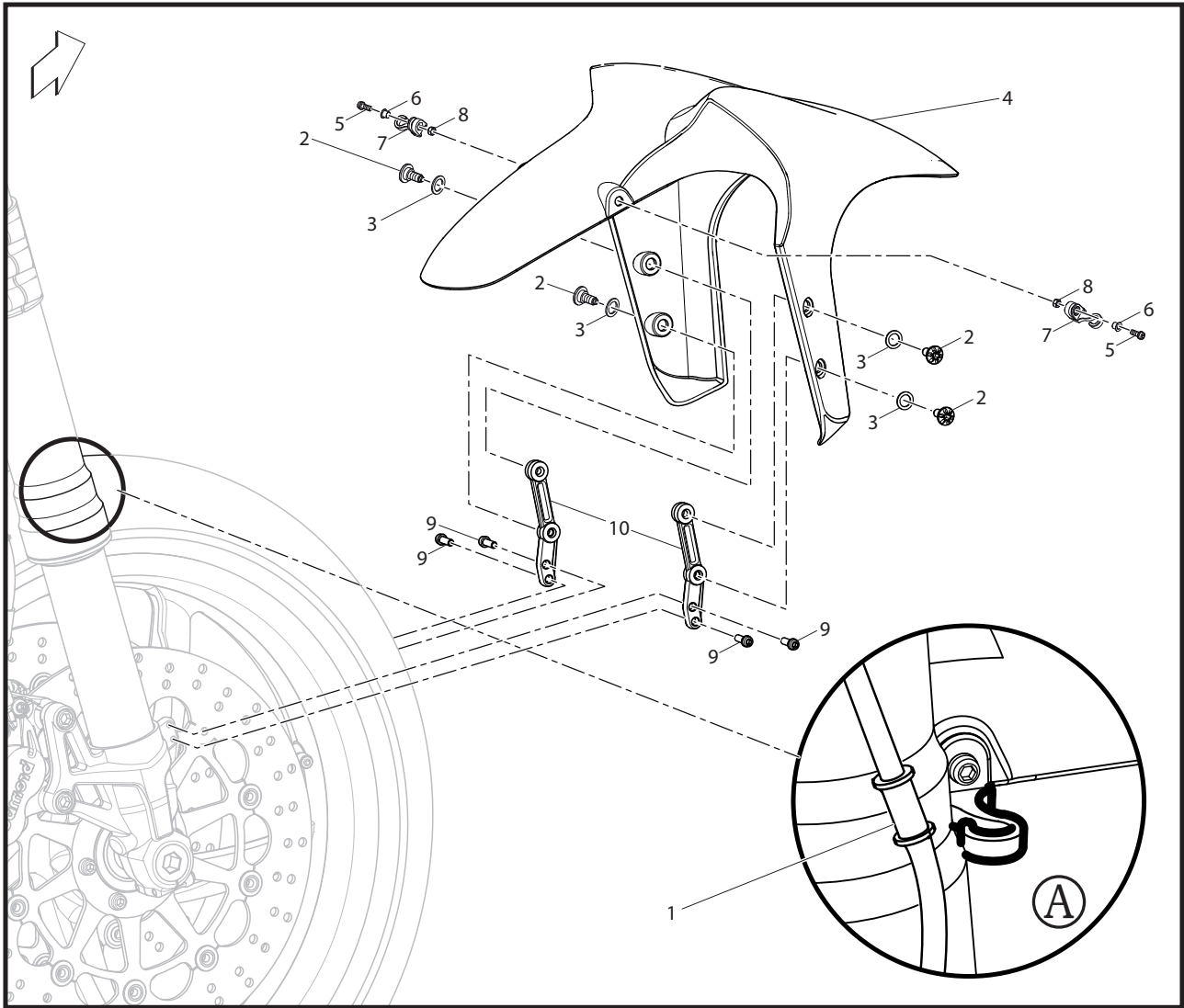
SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1 2 3 4		Chain Carter Removal Screw Washer Chain Carter Quick Fixing Clip	2 2 1 2	Remove the pieces in the given order.

CHAIN CARTER INSTALLATION



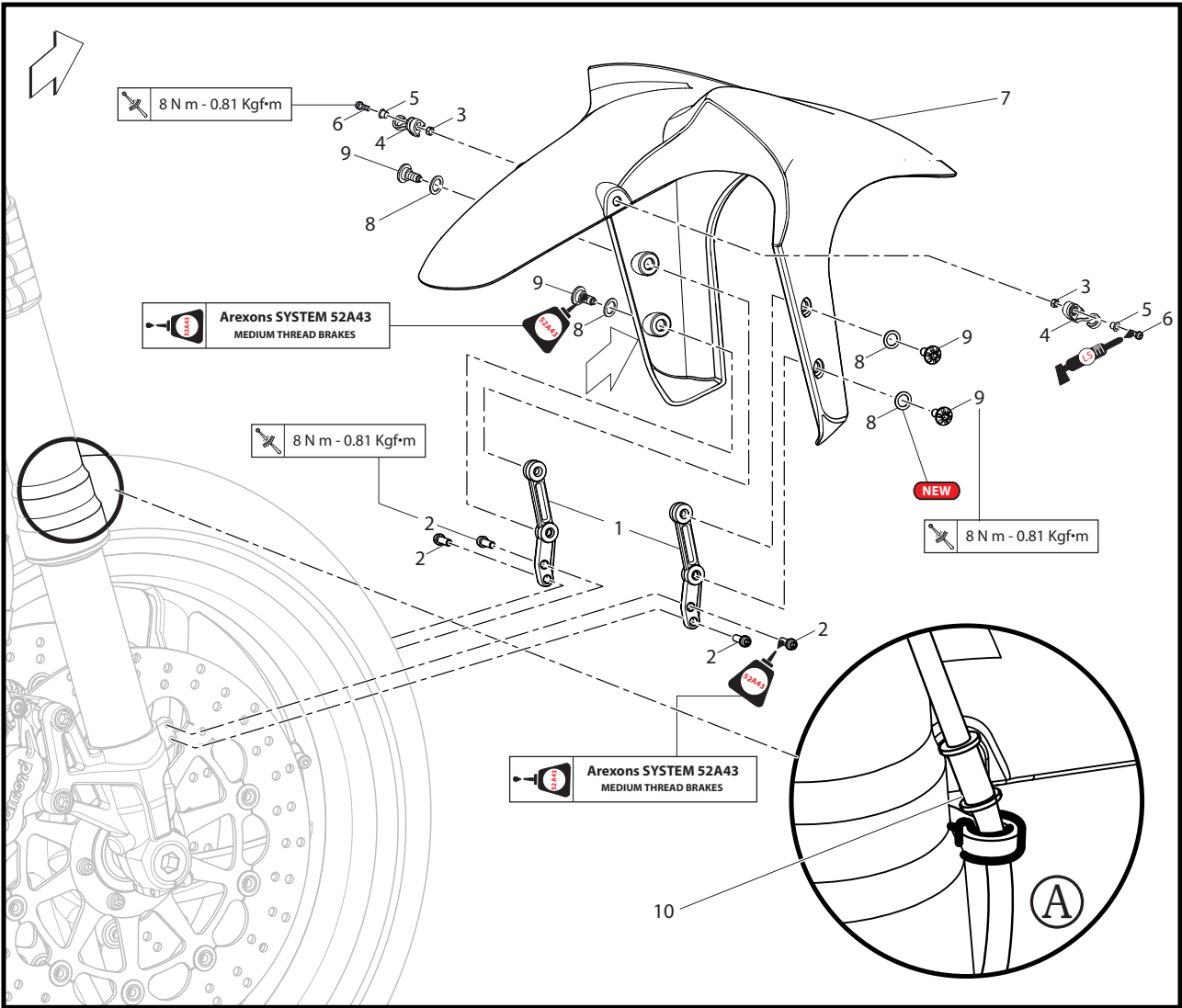
SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1		Chain Carter Installation	2	Install the pieces in the given order.
2		Quick Fixing Clip	1	
3		Chain Carter	2	
4		Washer	2	
		Screw		

FRONT MUDGUARD REMOVAL



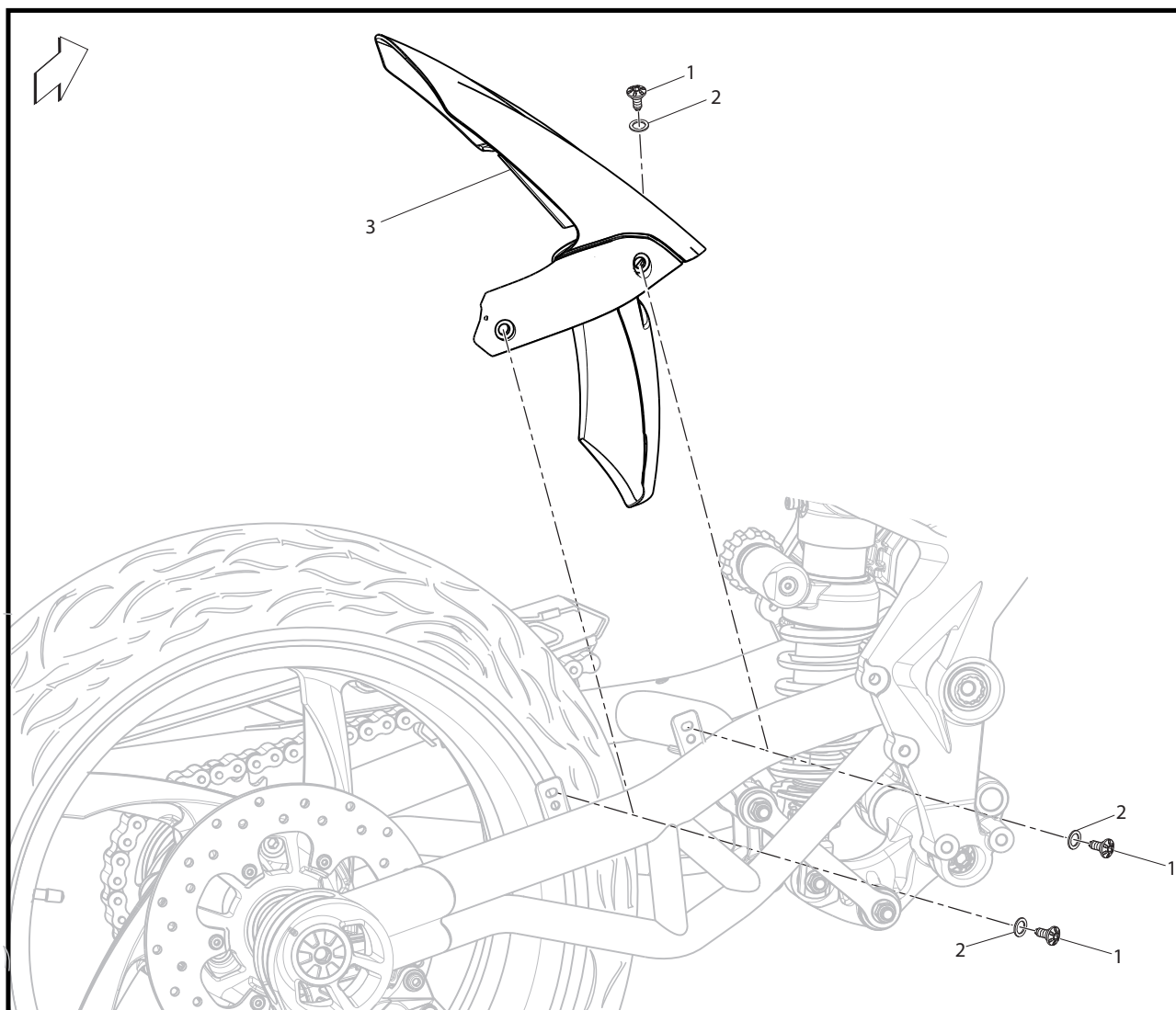
SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
		Front Mudguard Removal		Remove the pieces in the given order.
1		Brake Flexible Tube	1	NOTE: <u>It is not necessary to remove the brake flexible tube to remove the front mudguard, just unhook it from the pipe gland as shown in figure A.</u>
2		Special Screw	4	
3		Nylon Washer	4	
4		Front Mudguard	1	
5		Screw	2	
6		"T" Bush	2	
7		Pipe Gland	2	
8		Nut	2	
9		Screw	4	
10		Bracket	2	

FRONT MUDGUARD INSTALLATION



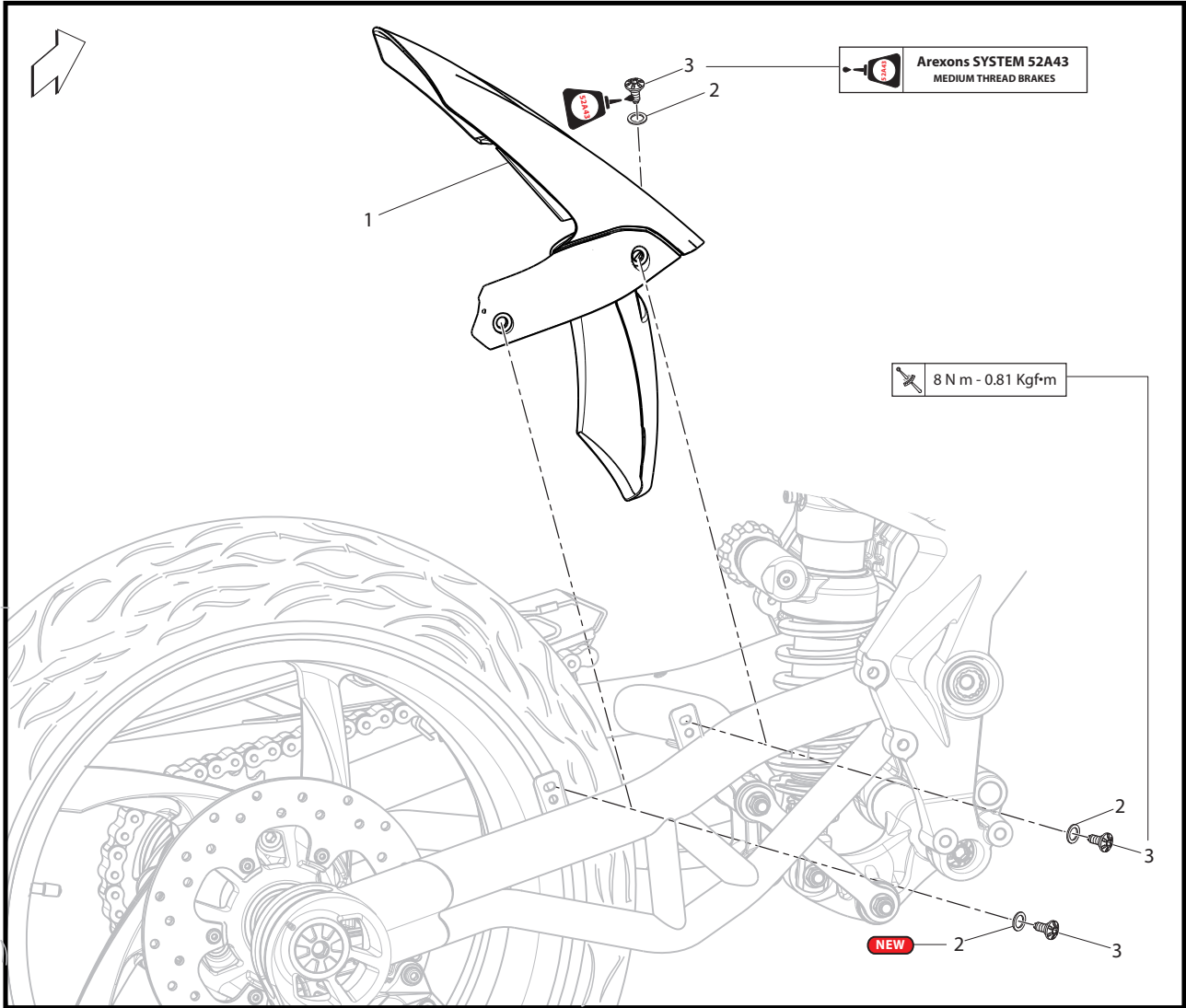
SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1		Front Mudguard Installation	2	Install the pieces in the given order. NOTE: To install the front mudguard, hook the brake flexible tube in the pipe gland, as shown in figure A.
2		Bracket	4	
3		Screw	2	
4		Nut	2	
5		Pipe Gland	2	
6		"T" Bush	2	
7		Screw	2	
8		Front Mudguard	1	
9		Nylon Washer	4	
10		Special Screw	4	
		Brake Flexible Tube	1	

REAR MUDGUARD REMOVAL



SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1 2 3		Rear Mudguard Removal Special Screw Nylon Washer Rear Mudguard	3 3 1	Remove the pieces in the given order.

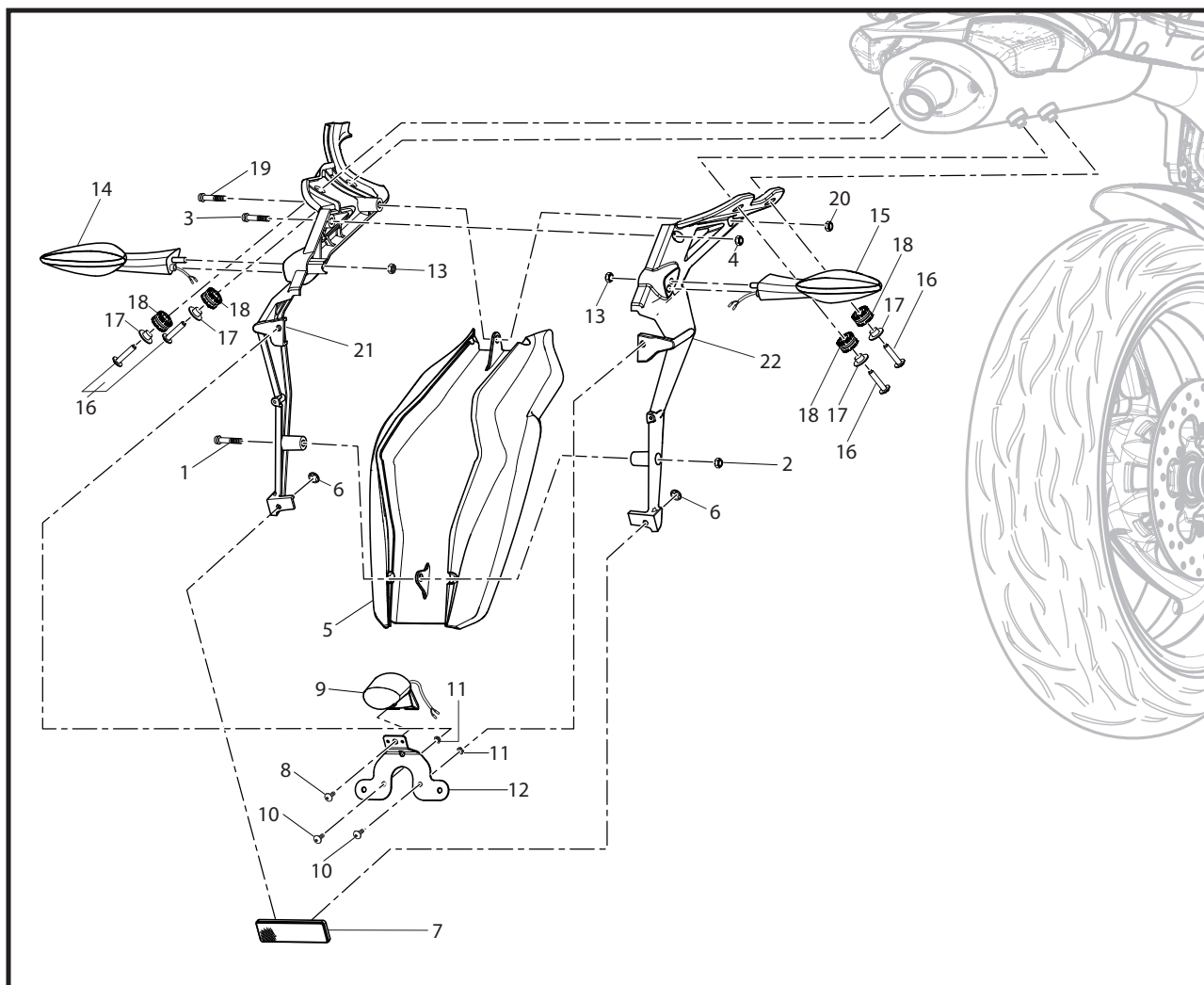
REAR MUDGUARD INSTALLATION



SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1 2 3		Rear Mudguard Installation Rear Mudguard Nylon Washer Special Screw	1 3 3	Install the pieces in the given order.



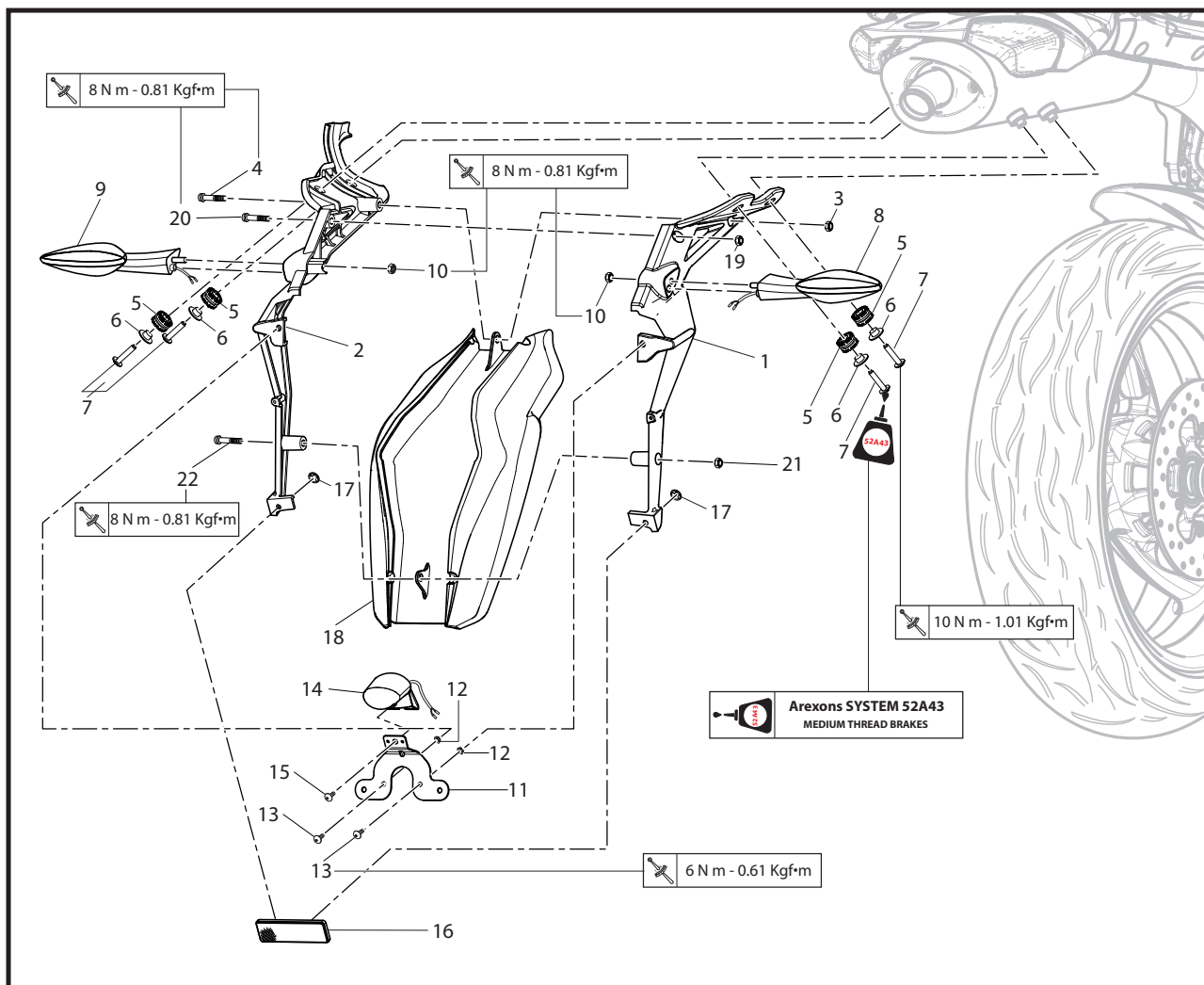
NUMBER PLATE BRACKET REMOVAL



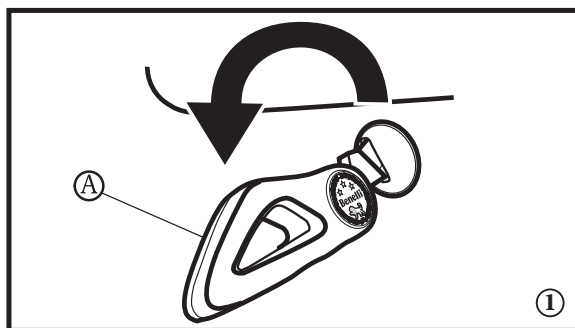
SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1		Number Plate Bracket Removal	1	Remove the pieces in the given order.
2		Screw	1	
3		Nut	1	Disconnect the indicators wiring and number plate light.
4		Screw	1	
5		Nut	1	
6		Number Plate Bracket Cover	1	
7				
8		Washer	2	
9		Reflector	1	
10		Screw	1	
11		Number plate light	1	
12		Screw	2	
13		Nut	2	
14		Small Plate	1	
15		Nut	2	
16		Left Rear Indicator	1	
17		Right Rear Indicator	1	
18		Screw	4	
19		Bush	4	
20		Rubber Pad	4	
21		Screw	1	
22		Nut	1	
		Left Number Plate Bracket	1	
		Right Number Plate Bracket	1	



NUMBER PLATE BRACKET INSTALLATION

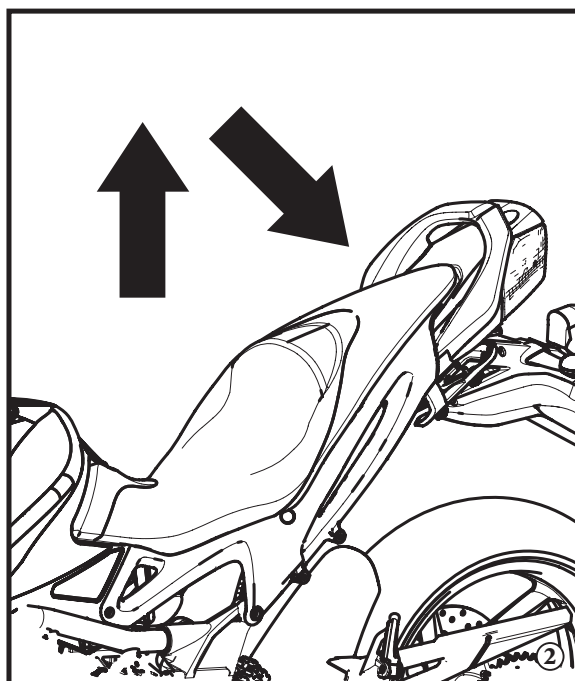


SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
		Number Plate Bracket Installation		Install the pieces in the given order.
1		Right Number Plate Bracket	1	
2		Left Number Plate Bracket	1	
3		Nut	1	
4		Screw	1	
5		Rubber Pad	4	
6		Bush	4	
7		Screw	4	
8		Right Rear Indicator	1	
9		Left Rear Indicator	1	
10		Nut	2	
11		Small Plate	1	
12		Nut	2	
13		Screw	2	
14		Number plate light	1	
15		Screw	1	Manually fasten.
16		Reflector	1	
17		Washer	2	Pressure push. Connect the indicators wiring and number plate light.
18		Number Plate Bracket Cover	1	
19		Nut	1	
20		Screw	1	
21		Nut	1	
22		Screw	1	

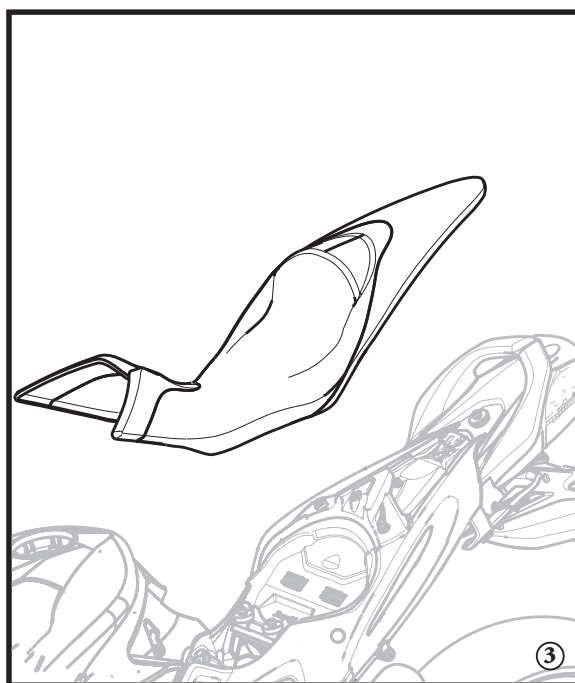


SEAT REMOVAL

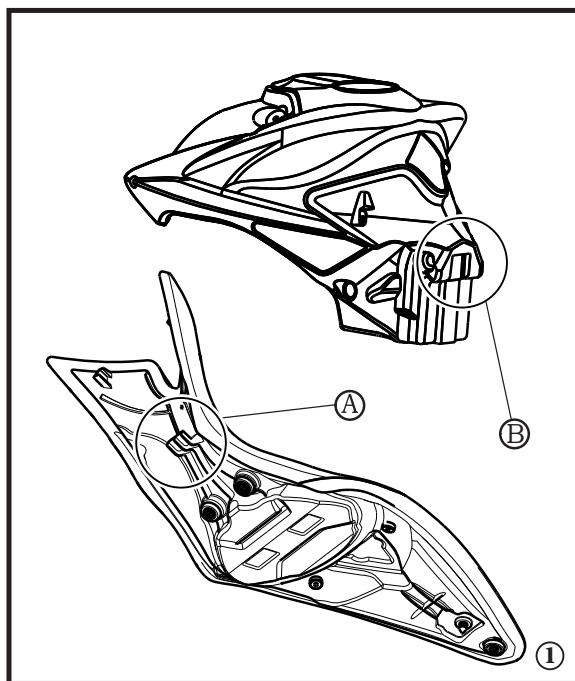
- ① Insert:
• the key ①



- ② Press:
• the seat in the end part
and simultaneously turn the key ① anti-clockwise.

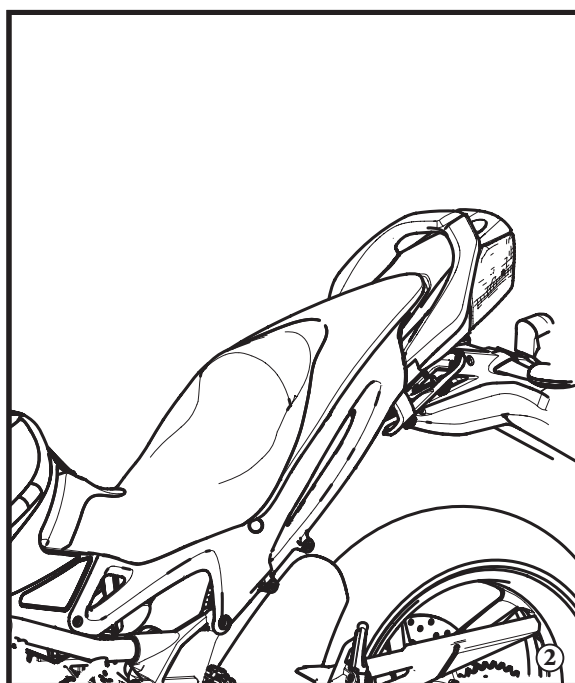


- ③ Remove:
• the seat by lifting it slightly from the rear end and
sliding it backwards.



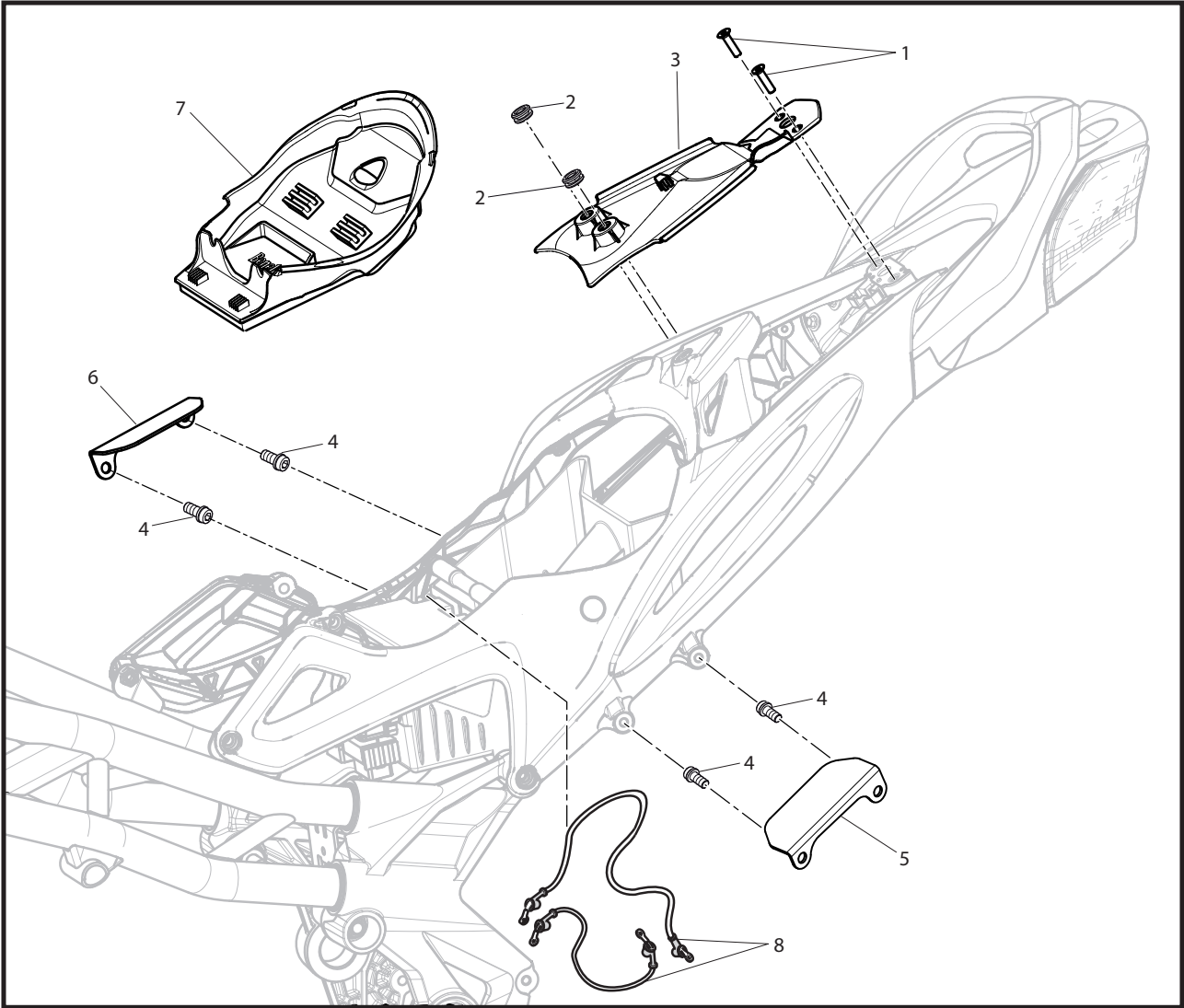
SEAT INSTALLATION

- ① Install:
- **the seat**
by resting the front hook (A) on the appropriate slot of the tank (B).



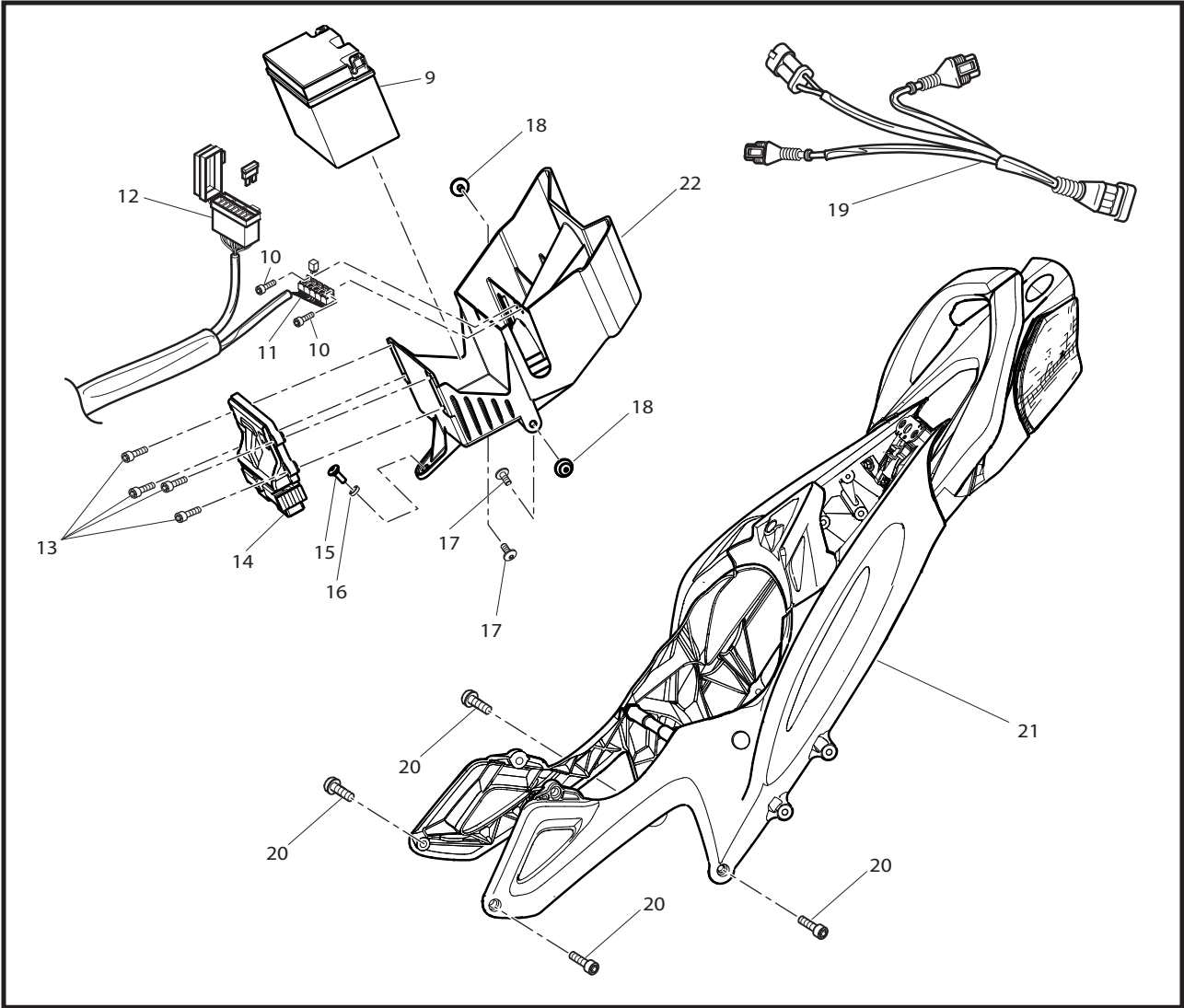
- ② Press:
- **the seat in the end part**
and hook it closed.

BATTERY BOX REMOVAL



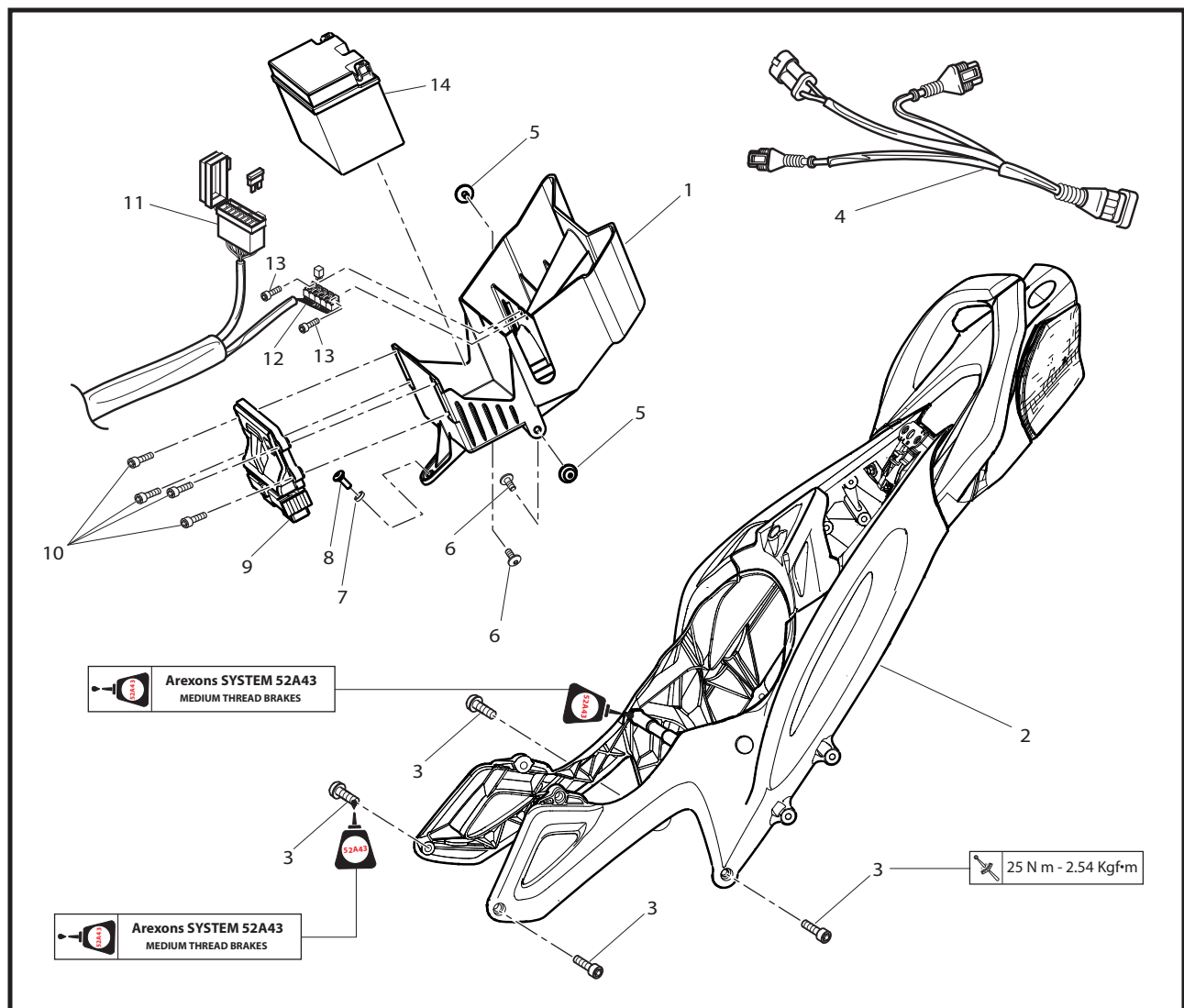
SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1		Seat Removal	2	Remove the pieces in the given order. See paragraph "4.130".
2		Screw	2	
3		Anti-vibration Rubber Pad	1	
		Heat Shield Lid		See paragraph "4.155". See paragraph "4.112". See paragraph "4.118".
		Silencing Device Removal		
		Right And Left Tank Lids Removal		
		Tank Removal		Disconnect. ATTENTION: <u>Disconnect the negative cable first then the positive one.</u>
		Battery Box Removal		
4		Screw	4	
5		Left Bracket	1	
6		Right Bracket	1	
7		Object Compartment	1	
8		Battery Wiring	1	

BATTERY BOX REMOVAL



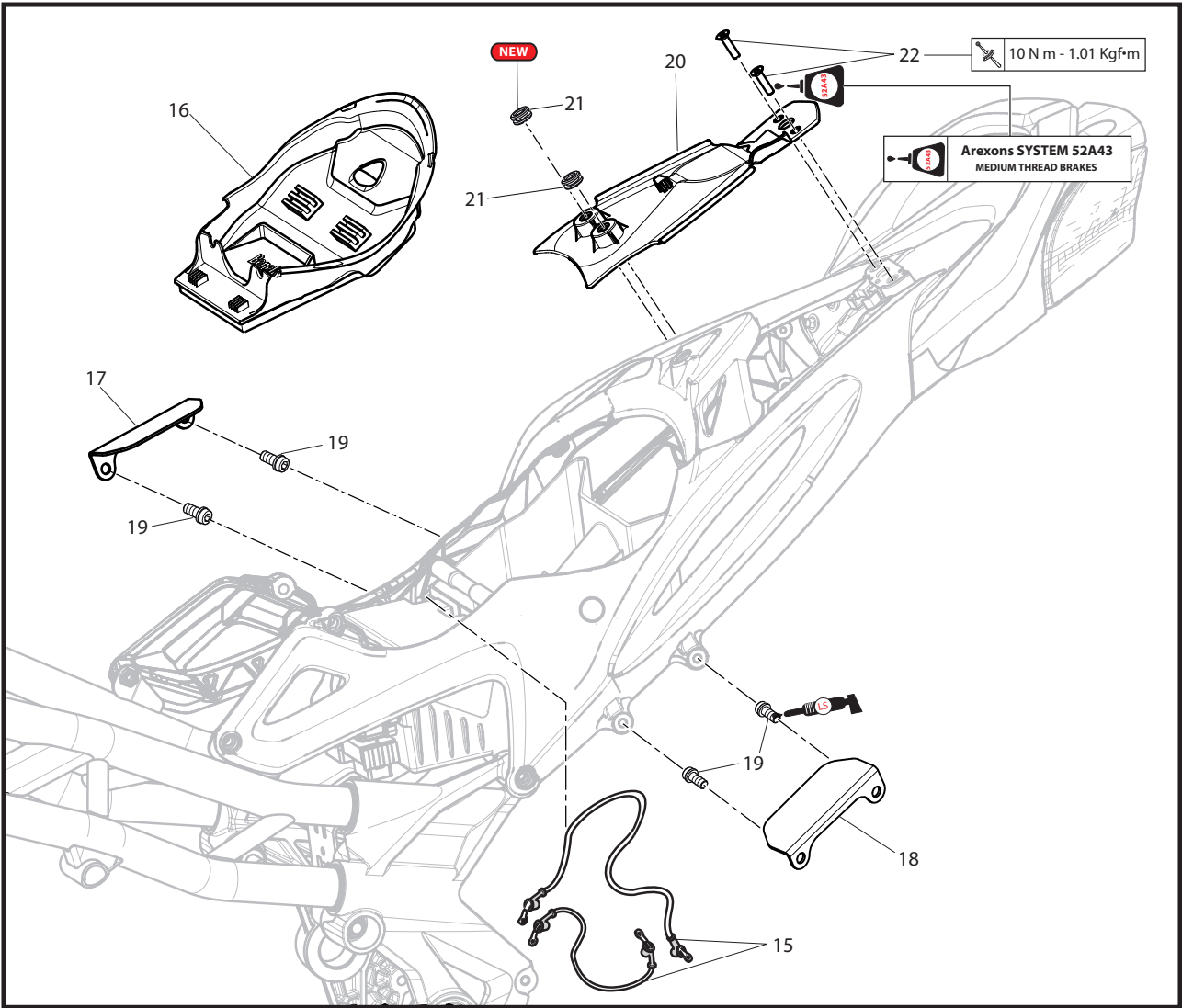
SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
9		Battery	1	Remove the pieces in the given order.
10		Screw	2	
11		Relay Box	1	
12		Fuses Box	1	
13		Screw	4	Disconnect.
14		Control Unit	1	
15		Screw	1	
16		Bush	1	
17		Screw	2	
18		Bush	2	
19		Rear Wiring	1	
20		Screw	4	
21		Rear Small Frame Set	1	
22		Battery Box	1	

BATTERY BOX INSTALLATION



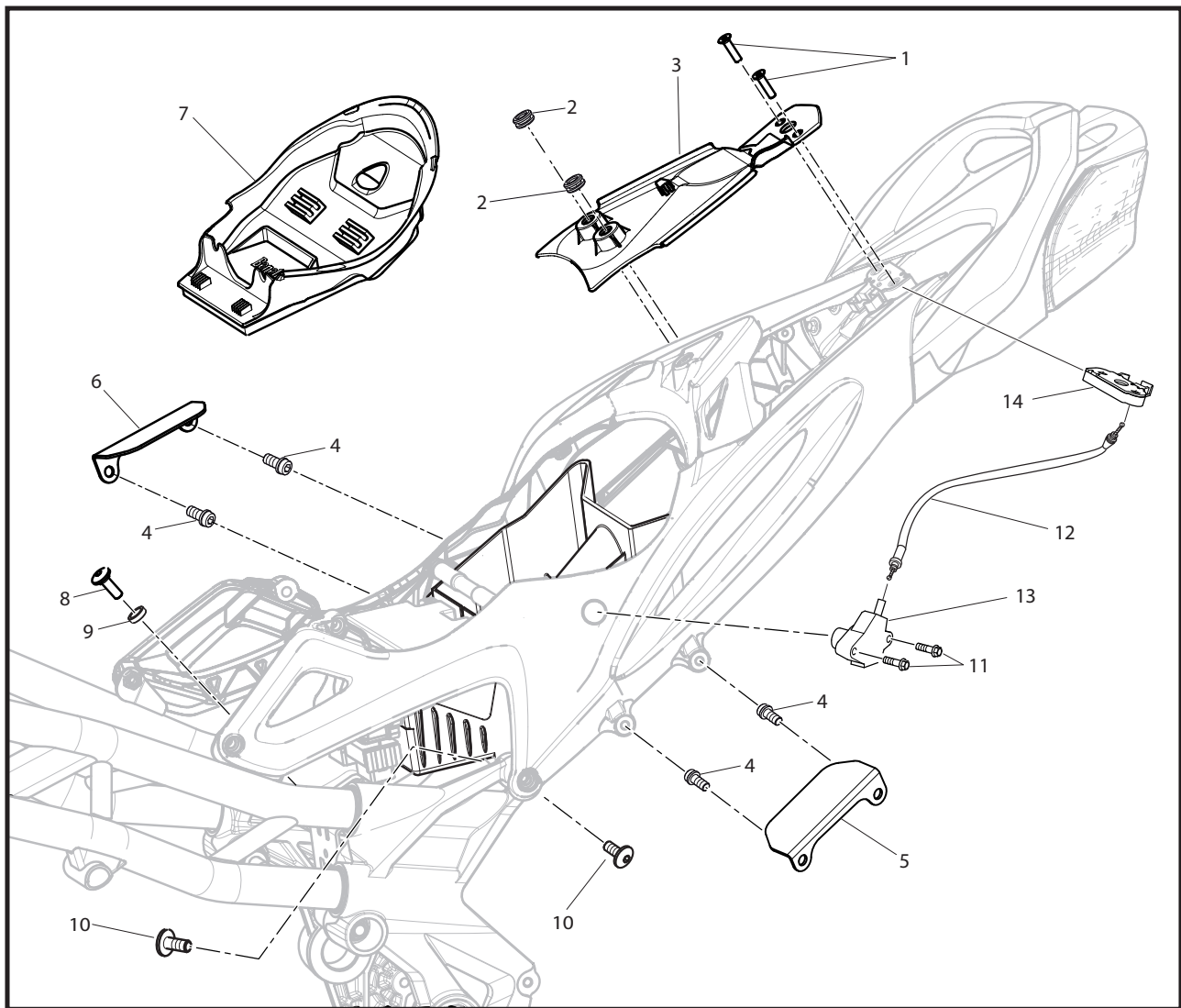
SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1		Battery Box Installation	1	Install the pieces in the given order. ATTENTION: <u>Before installing it, check that the threaded registers of the tie rod are intact.</u> Connect.
2		Battery Box Rear Small Frame Set	1	
3		Screw	4	
4		Rear Wiring	1	
5		Bush	2	
6		Screw	2	
7		Bush	1	
8		Screw	1	
9		Control Unit	1	
10		Screw	4	
11		Fuses Box	1	
12		Relay Box	1	
13		Screw	2	
14		Battery	1	

BATTERY BOX INSTALLATION



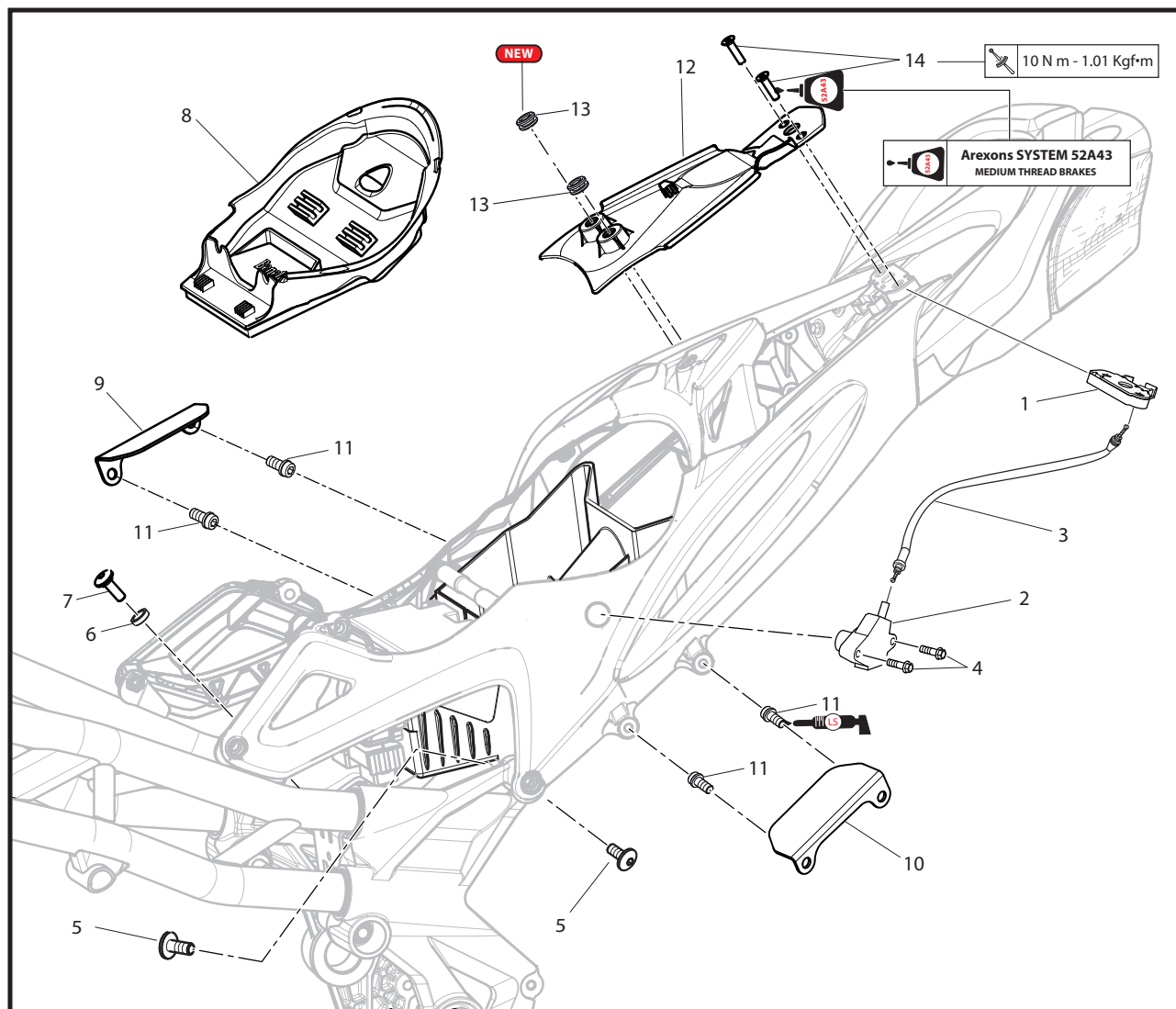
SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
15		Battery Box Installation Battery Wiring	1	Install the pieces in the given order. Connect. ATTENTION: <u>Connect the positive cable first then the negative one.</u>
16		Object Compartment	1	
17		Right Bracket	1	
18		Left Bracket	1	
19		Screw	4	
		Tank Installation Right And Left Tank Lids Installation Silencing Device Installation		See paragraph "4.119". See paragraph "4.113". See paragraph "4.158".
20		Heat Shield Lid		
21		Anti-vibration Rubber Pad		
22		Screw		

LOCK REMOVAL



SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1		Seat Removal	2	Remove the pieces in the given order. See paragraph "4.130". See paragraph "4.112". See paragraph "4.118". NOTE: Slightly move the battery box. _____
2		Screw	2	
3		Anti-vibration Rubber Pad	1	
		Heat Shield Lid		
		Right And Left Tank Lids Removal		
		Tank Removal		
		Lock Removal		
4		Screw	4	
5		Left Bracket	1	
6		Right Bracket	1	
7		Object Compartment	1	
8		Screw	1	
9		Bush	1	
10		Screw	1	
11		Screw	2	
12		Flexible Command	1	
13		Lock	1	
14		Seat Opening Lever	1	

LOCK INSTALLATION

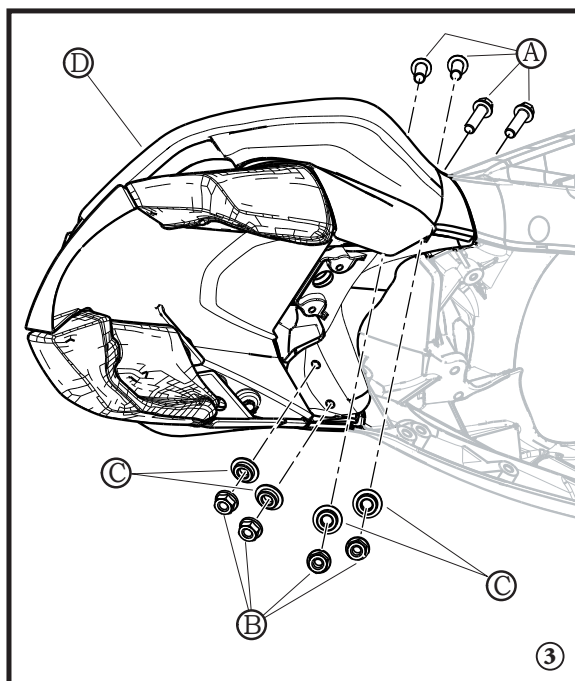


SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1		Lock Installation	1	Install the pieces in the given order.
2		Seat Opening Lever	1	
3		Lock	1	
4		Flexible Command	1	
		Screw	2	NOTE: Reposition the battery box in the initial position.
5		Screw		
6		Bush		
7		Screw		
8		Object Compartment		
9		Right Bracket		
10		Left Bracket		
11		Screw		
		Tank Installation		
		Tank Lids Installation Right And Left		
12		Heat Shield Lid		
13		Anti-vibration Rubber Pad		
14		Screw		

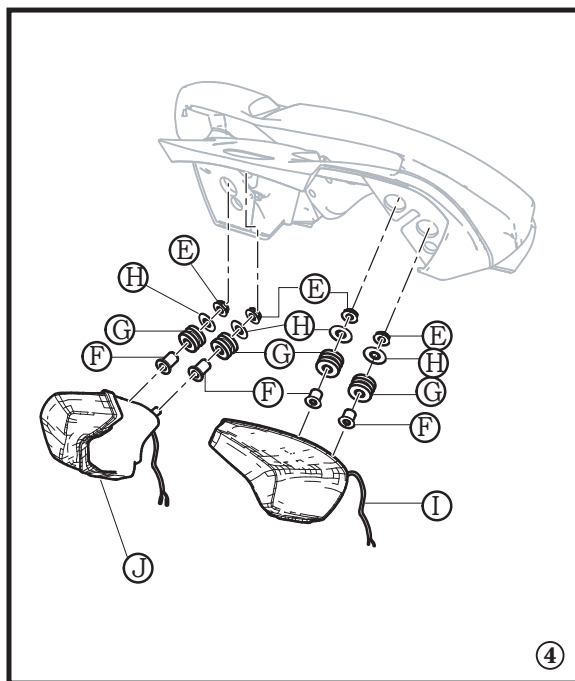


CODON REMOVAL

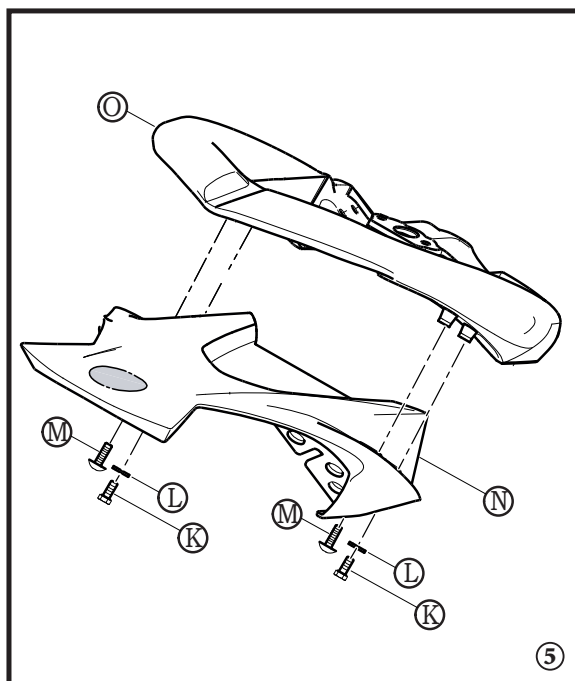
- ① Remove:
 - **the seat**
See paragraph "4.130".
 - **the heat shield lid**
See paragraph "4.132".
 - **the silencing device**
See paragraph "4.155".
- ② Disconnect:
 - **the right and left headlight connectors**



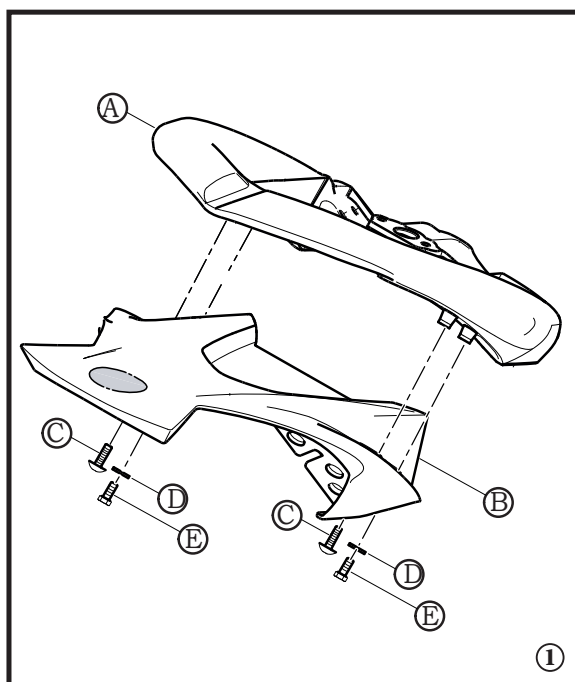
- ③ Remove:
 - **the screws** ①A
 - **the nuts** ①B
 - **the bushes** ①C
 - **the complete codon** ①D



- ④ Remove:
- the nuts **E**
 - the bushes **F**
 - the anti-vibrations **G**
 - the washers **H**
 - the right rear headlight **I**
 - the left rear headlight **J**



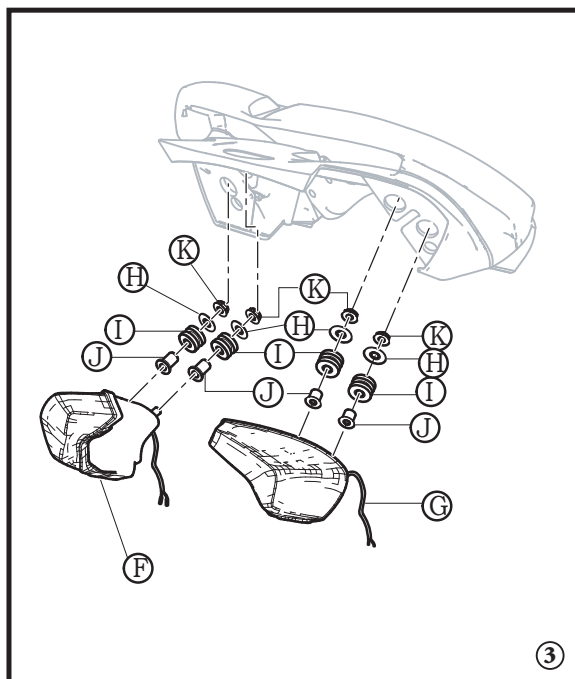
- ⑤ Remove:
- the screws **K**
 - the washers **L**
 - the screws **M**
 - the codon **N**
 - the handle **O**



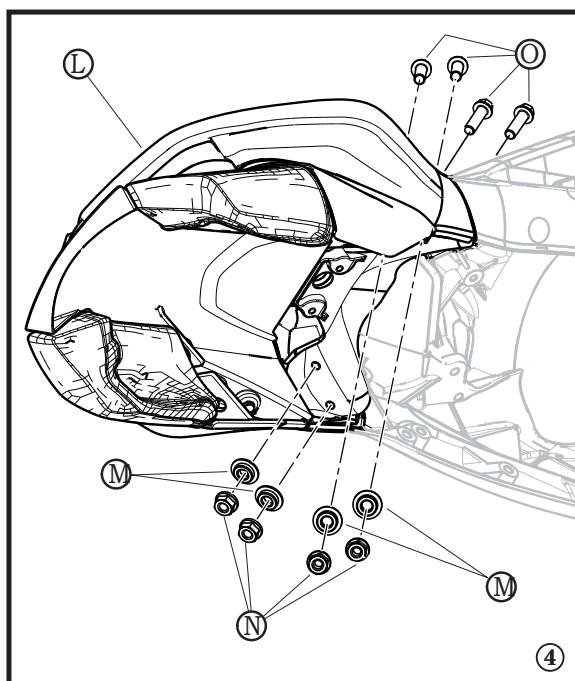
CODON INSTALLATION

- ① Install:
- the handle **A**
 - the codon **B**
 - the screws **C**
 - the washers **D**
 - the screws **E**

- ② Connect:
- the right and left headlight connectors



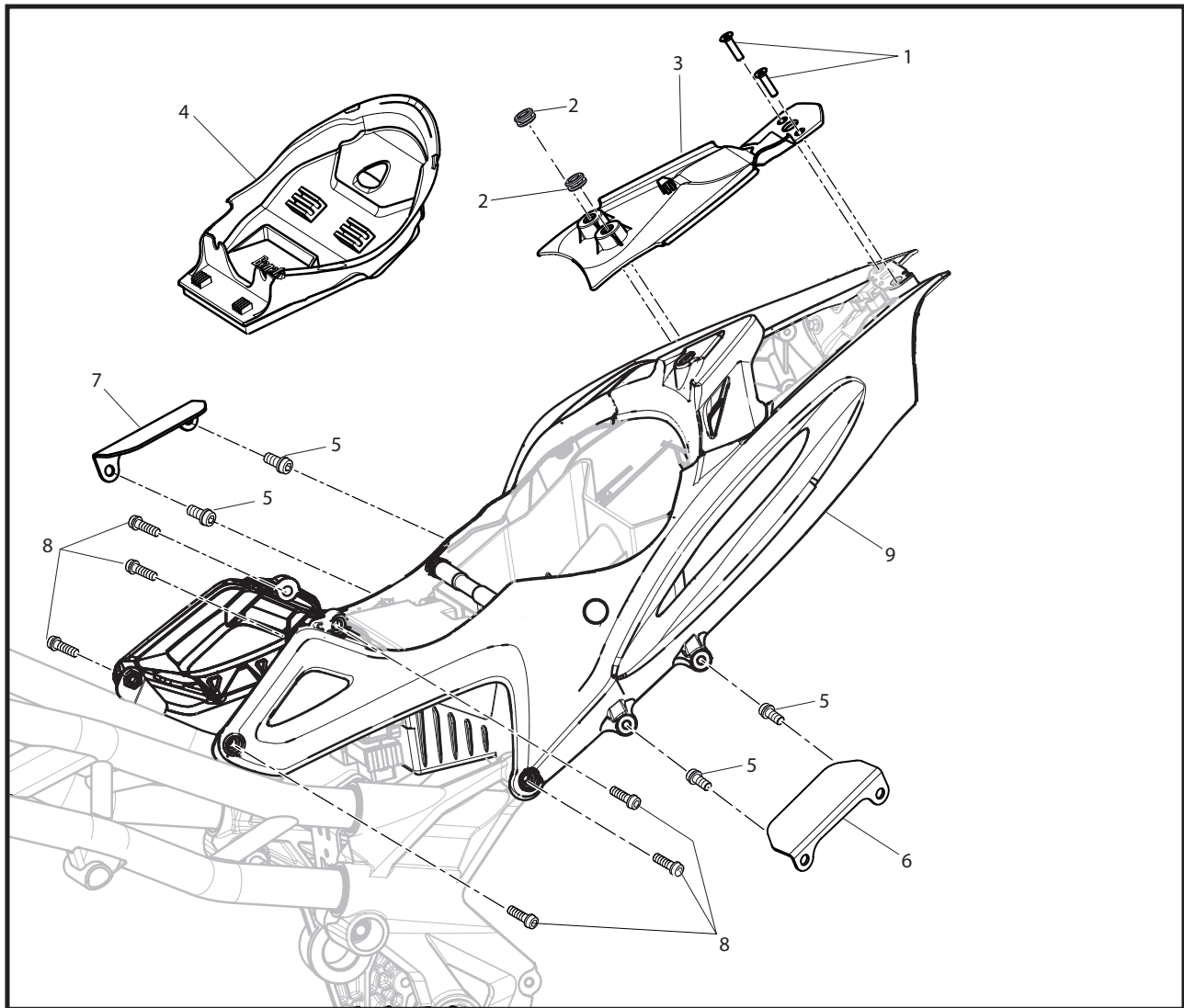
- ③ Install:
- the left rear headlight **F**
 - the right rear headlight **G**
 - the washers **H**
 - the anti-vibrations **I**
 - the bushes **J**
 - the nuts **K**



- ④ Install:
- **the complete codon** ①
 - **the bushes** ②
 - **the nuts** ③
 - **the screws** ④

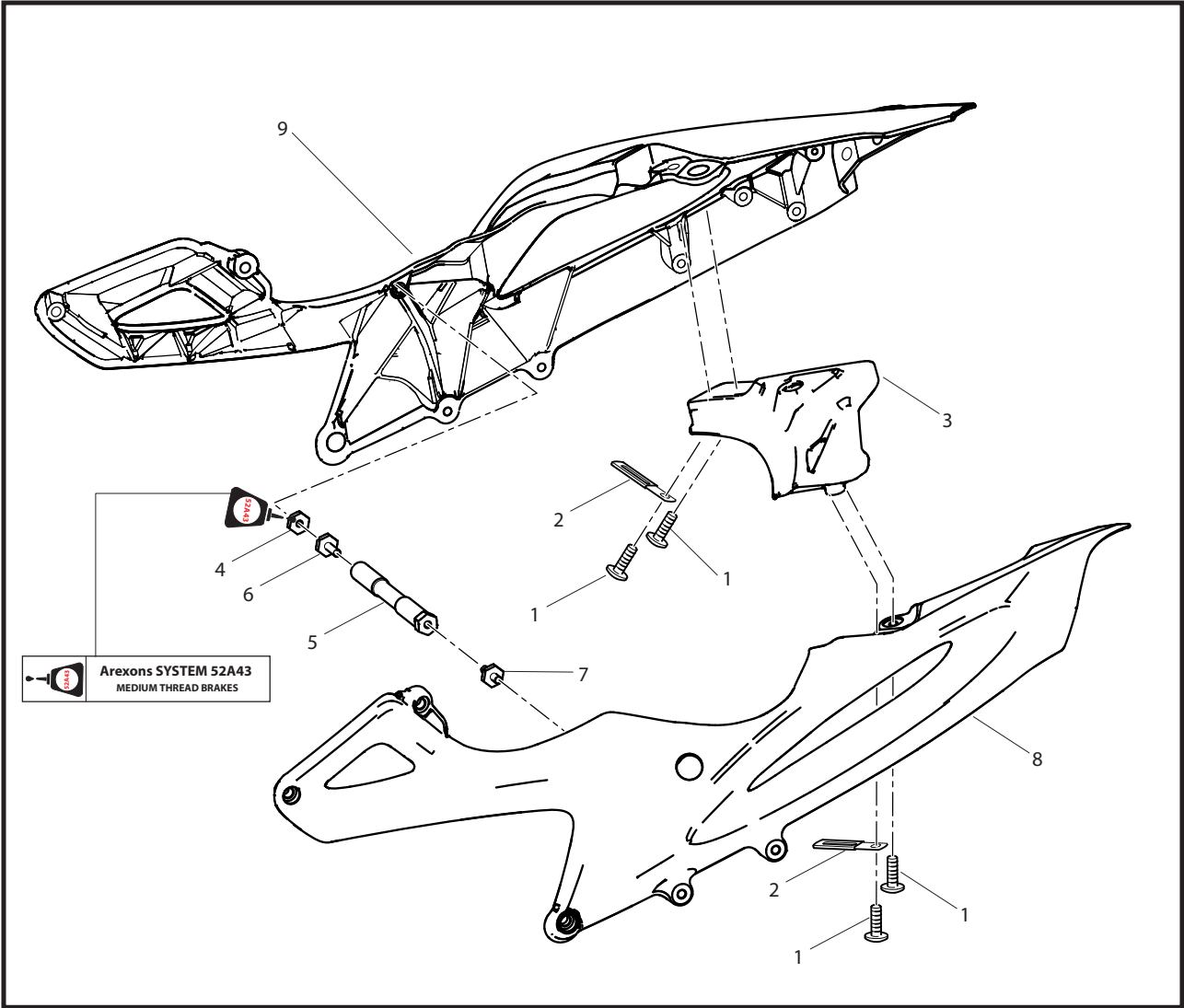
- ⑤ Install:
- **the silencing device**
See paragraph "4.158".
 - **the heat shield lid**
See paragraph "4.135".
 - **the seat**
See paragraph "4.131".

REAR SMALL FRAME SET REMOVAL



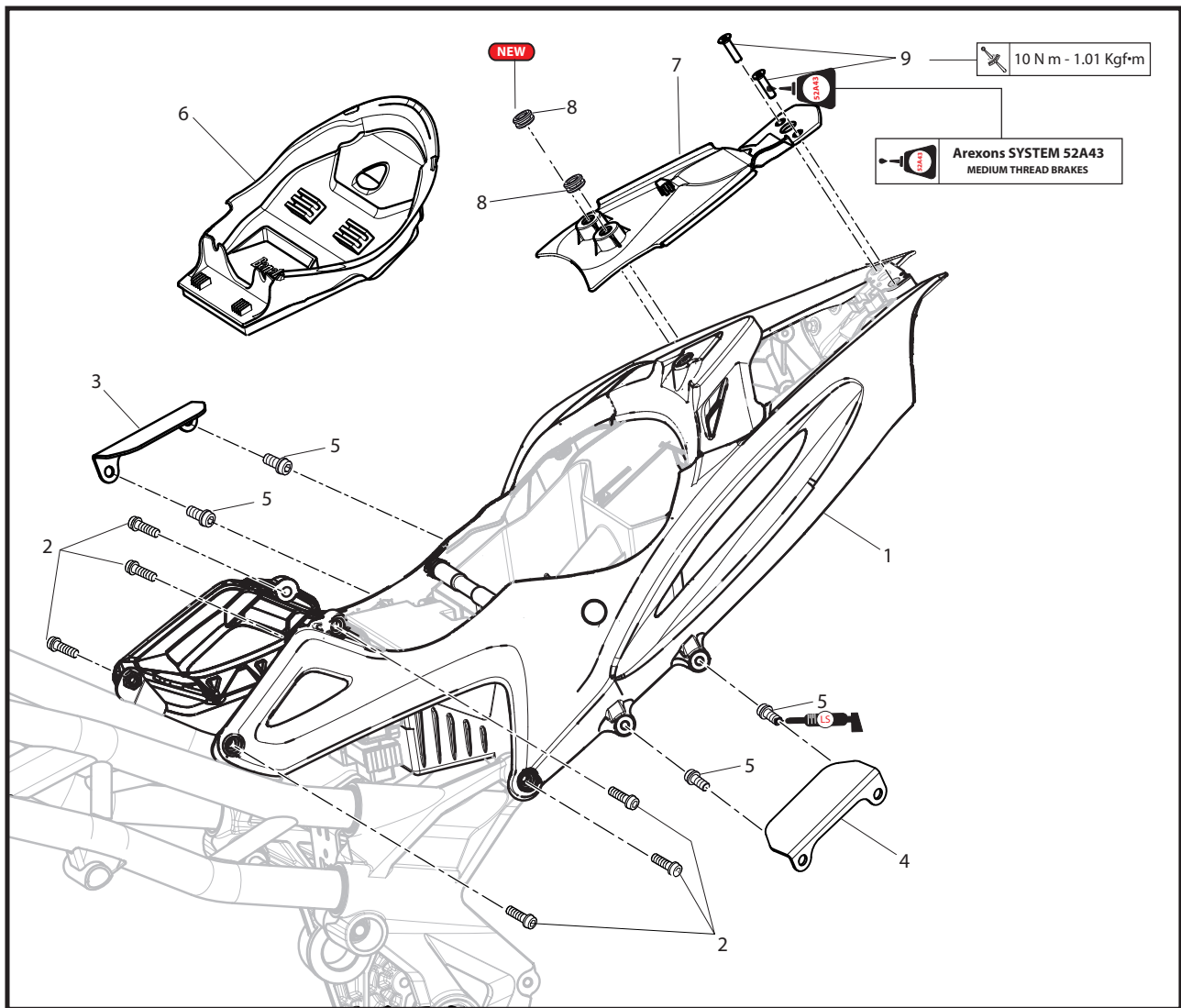
SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1		Seat Removal	2	Remove the pieces in the given order. See paragraph "4.130".
2		Screw	2	
3		Anti-vibration Rubber Pad	1	
		Heat Shield Lid		See paragraph "4.155". See paragraph "4.138".
		Silencing Device Removal		
		Codon Removal		
		Rear Small Frame Set Removal		
4		Object Compartment	1	
5		Screw	4	
6		Left Bracket	1	
7		Right Bracket	1	
8		Screw	6	
9		Rear Small Frame Set	1	

REAR SMALL FRAME SET DECOMPOSITION



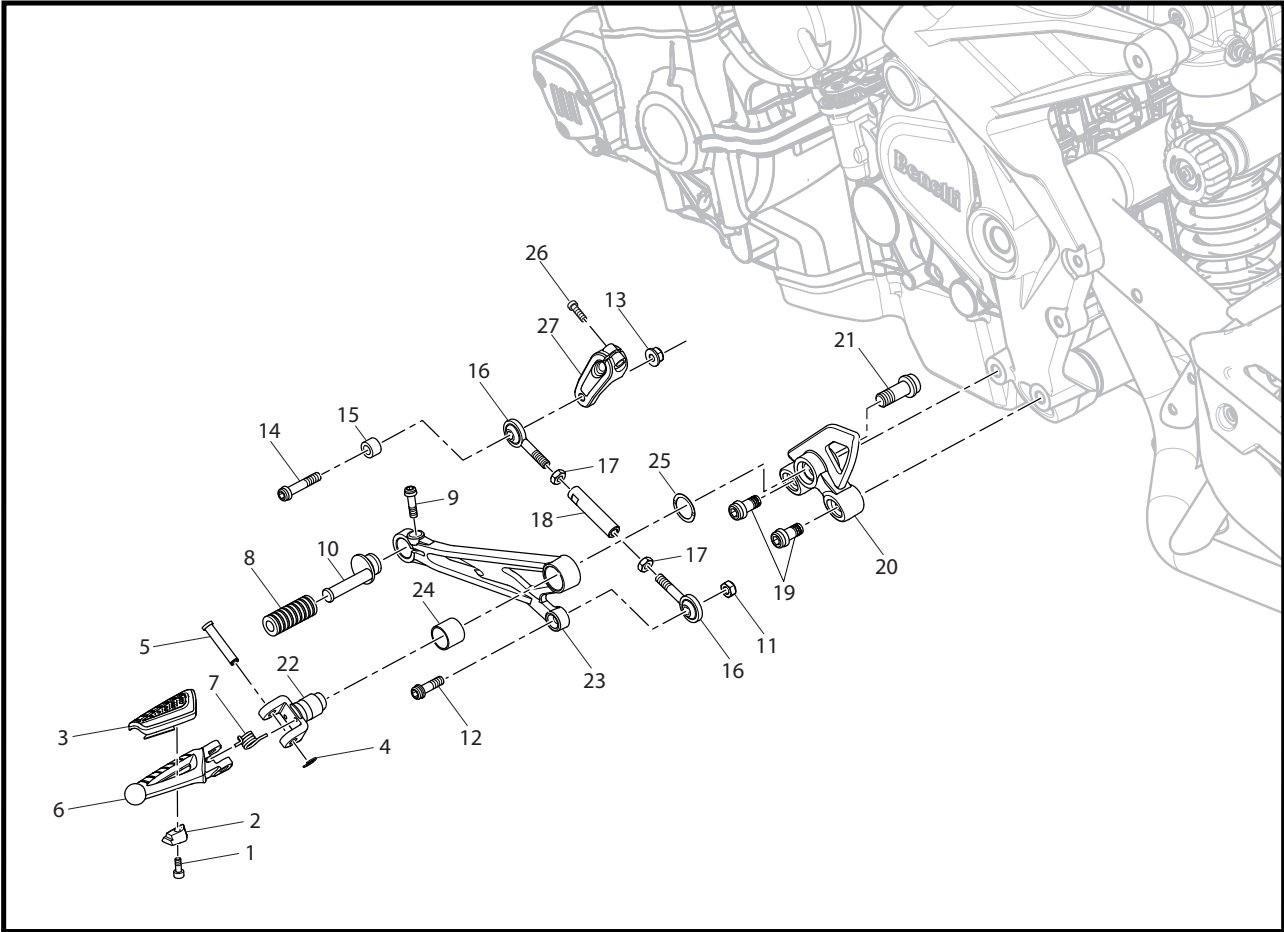
SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1		Rear Small Frame Set Decomposition	4	Decompose the pieces in the given order. NOTE: <u>To install, invert the order of the removal parts.</u>
2		Screw	2	
3		Rubber Strip	1	
4		Rear Beam	1	
5		Special Nut	1	
6		Small Column	1	
7		Right Special Screw	1	
8		Left Special Screw	1	
9		Left Rear Small Frame	1	
		Right Rear Small Frame	1	

REAR SMALL FRAME SET INSTALLATION



SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1		Complete Rear Small Frame Installation	1	Install the pieces in the given order.
2		Rear Small Frame Set	6	
3		Screw	1	
4		Right Bracket	1	
5		Left Bracket	1	
6		Screw	4	
7		Object Compartment	1	See paragraph "4.140". See paragraph "4.158".
8		Codon Installation		
9		Heat Shield Lid	1	
		Silencing Device Installation		
		Heat Shield Lid	1	
		Anti-vibration Rubber Pad	2	
		Screw	2	

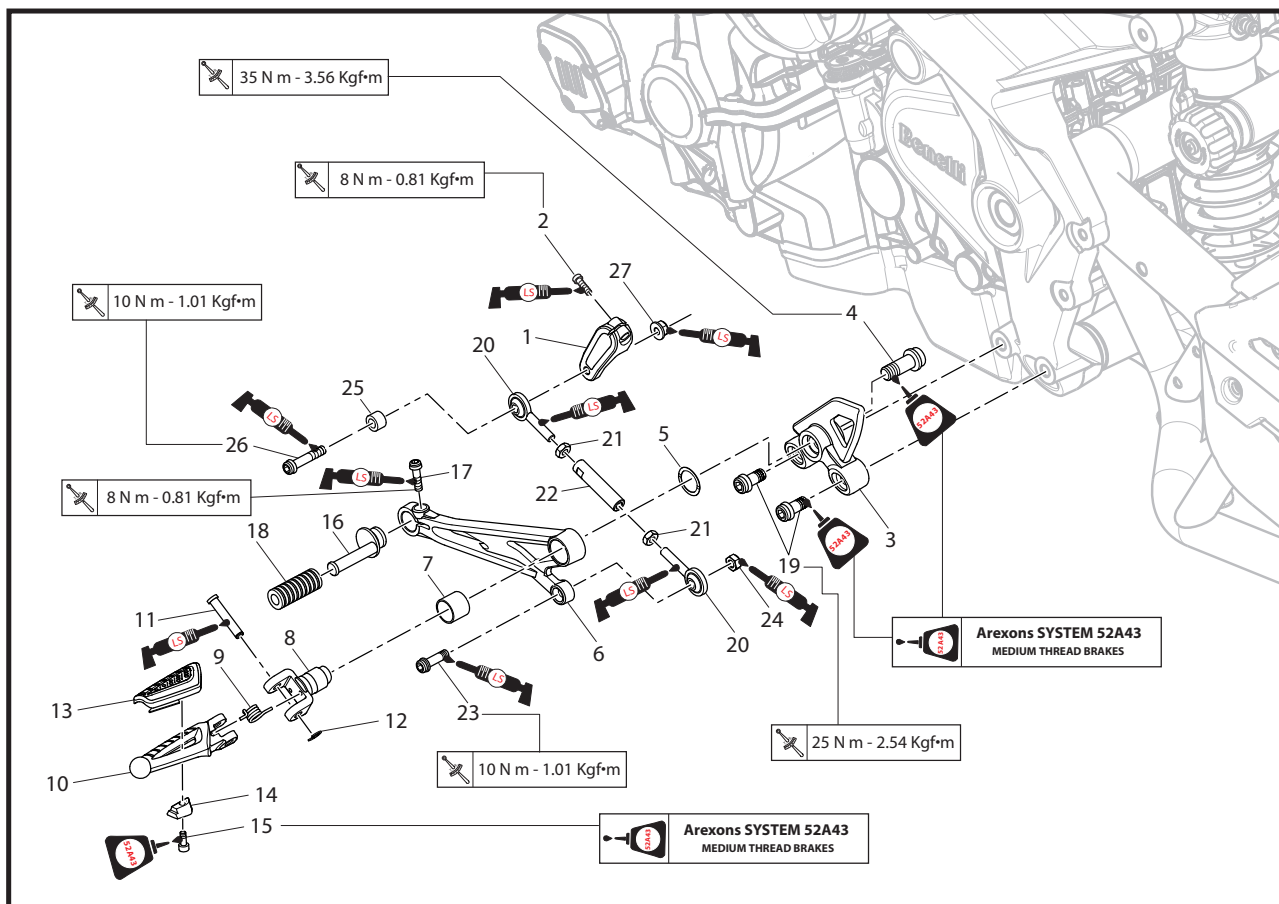
FRONT LEFT FOOTPEG UNIT REMOVAL



SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
		Front Left Footpeg Unit Removal		Remove the pieces in the given order.
1		Screw	1	
2		Left Fixing Rubber Pad	1	
3		Rubber Pad	1	
4		Seeger	1	
5		Pin	1	
6		Left Front Footpeg	1	
7		Spring	1	
8		Rubber Pad	1	
9		Screw	1	
10		Pointer Eccentric	1	
11		Nut	1	
12		Screw	1	
13		Nut	1	
14		Screw	1	
15		Spacer	1	
16		Ball Joint	2	
17		Nut	2	
18		Gear Change Rod	1	
19		Screw	2	
20		Left Front Footpeg Holder Plate	1	
21		Screw	1	
22		Fork	1	
23		Gear Change Command Lever	1	
24		Bush	1	
25		Elastic Washer	1	
26		Screw	1	
27		Gear Change Command Small Lever	1	

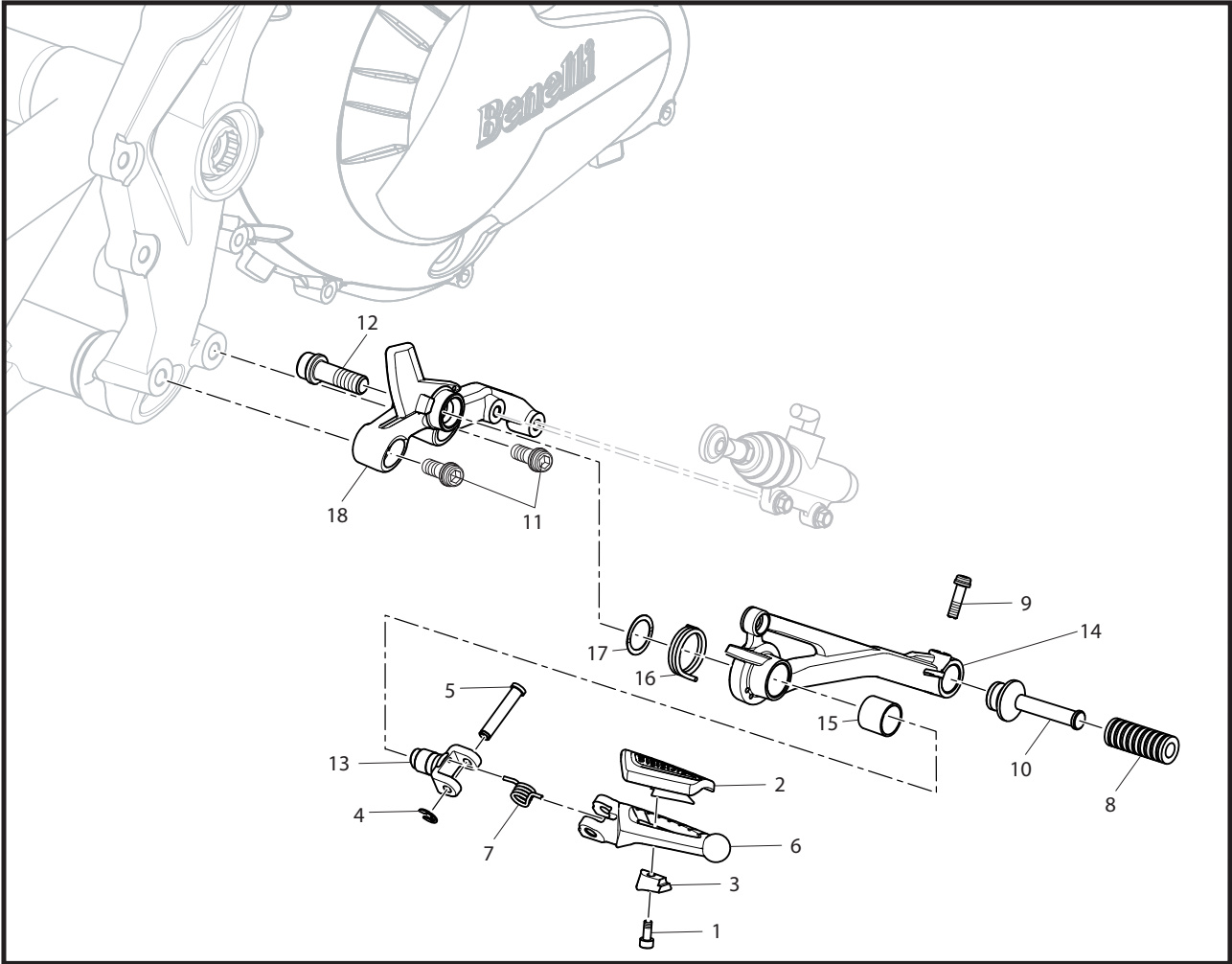


FRONT LEFT FOOTPEG UNIT INSTALLATION



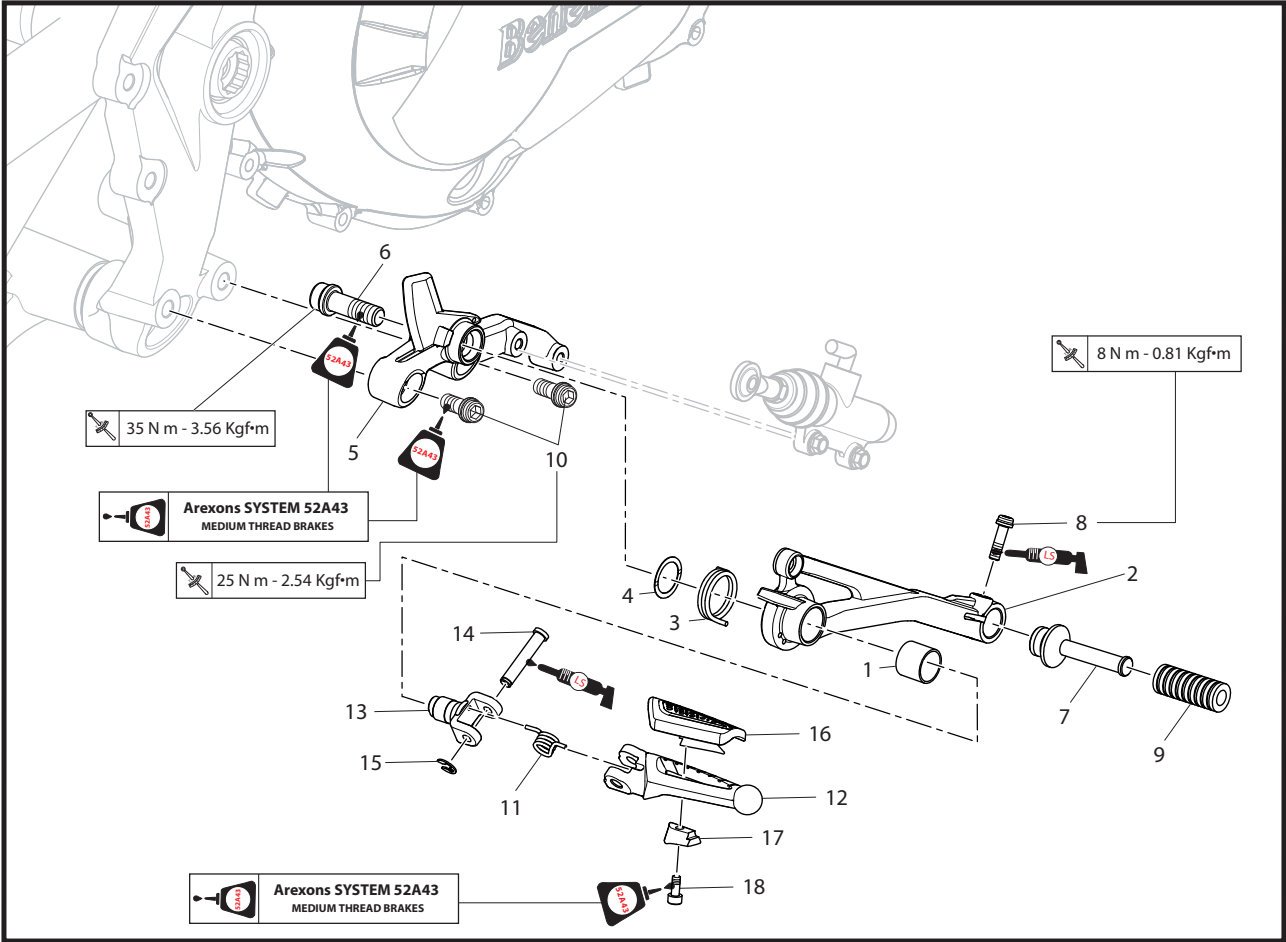
SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
		Front Left Footpeg Unit Installation		Install the pieces in the given order.
1		Gear Change Command Small Lever	1	NOTE: _____ If the rubber pads are worn, replace them. _____
2		Screw	1	
3		Left Front Footpeg Holder Plate	1	
4		Screw	1	
5		Elastic Washer	1	
6		Gear Change Command Lever	1	
7		Bush	1	
8		Fork	1	
9		Spring	1	
10		Left Front Footpeg	1	
11		Pin	1	
12		Seeger	1	
13		Rubber Pad	1	
14		Left Fixing Rubber Pad	1	
15		Screw	1	
16		Pointer Eccentric	1	
17		Screw	1	
18		Rubber Pad	1	
19		Screw	2	
20		Ball Joint	2	
21		Nut	2	
22		Gear Change Rod	1	
23		Screw	1	
24		Nut	1	
25		Spacer	1	
26		Screw	1	
27		Nut	1	
				Delicately fasten by hand.
				Manually fasten.

FRONT RIGHT FOOTPEG UNIT REMOVAL



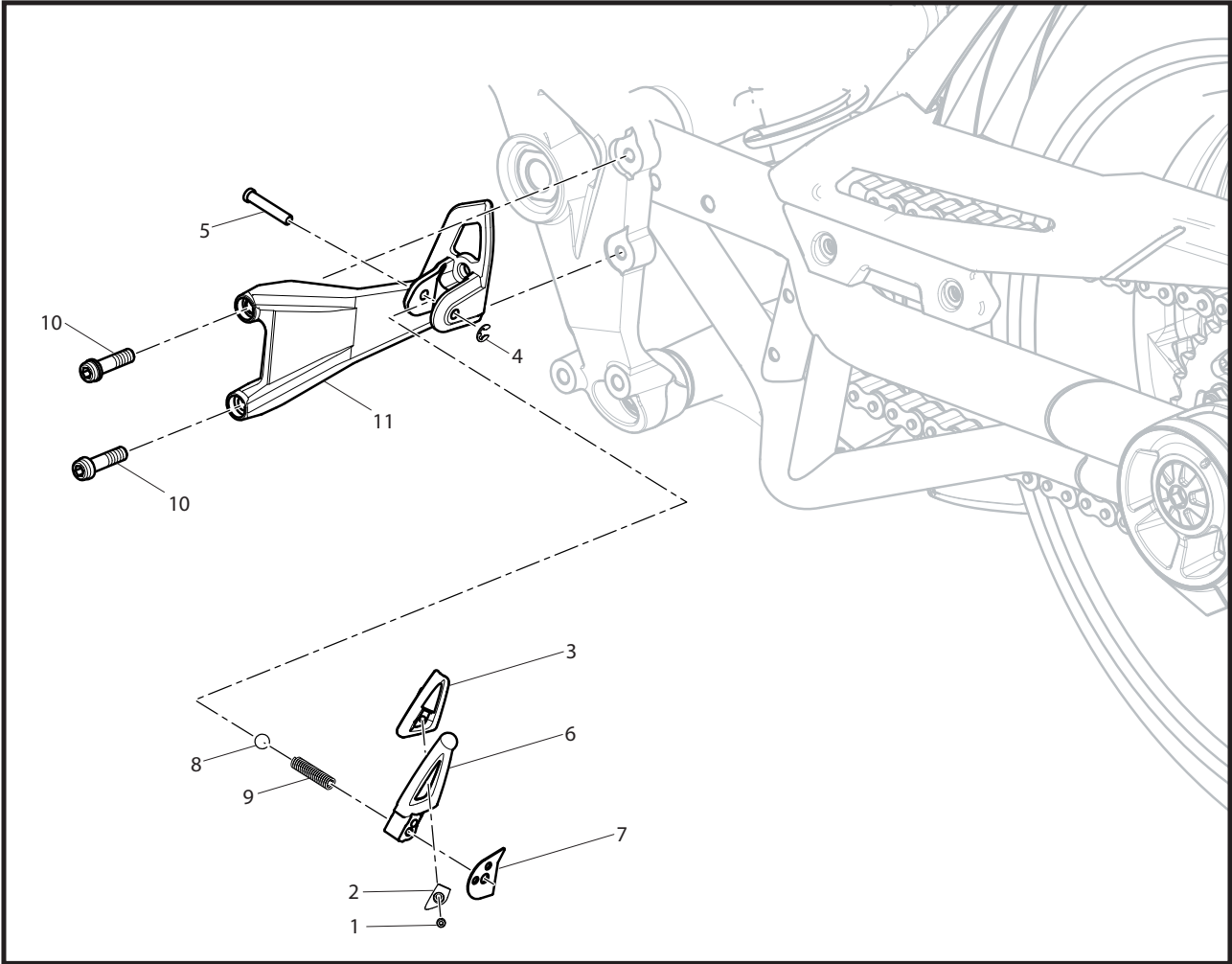
SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
		Rear Brake Pump Removal		Remove the pieces in the given order. See paragraph "4.42".
1		Screw	1	
2		Right Fixing Rubber Pad	1	
3		Rubber Pad	1	
4		Seeger	1	
5		Pin	1	
6		Right Front Footpeg	1	
7		Spring	1	
8		Rubber Pad	1	
9		Screw	1	
10		Pointer Eccentric	1	
11		Screw	2	
12		Screw	1	
13		Fork	1	
14		Brake Command Lever	1	
15		Bush	1	
16		Spring	1	
17		Elastic Washer	1	
18		Right Front Footpeg Holder Plate	1	

FRONT RIGHT FOOTPEG UNIT INSTALLATION

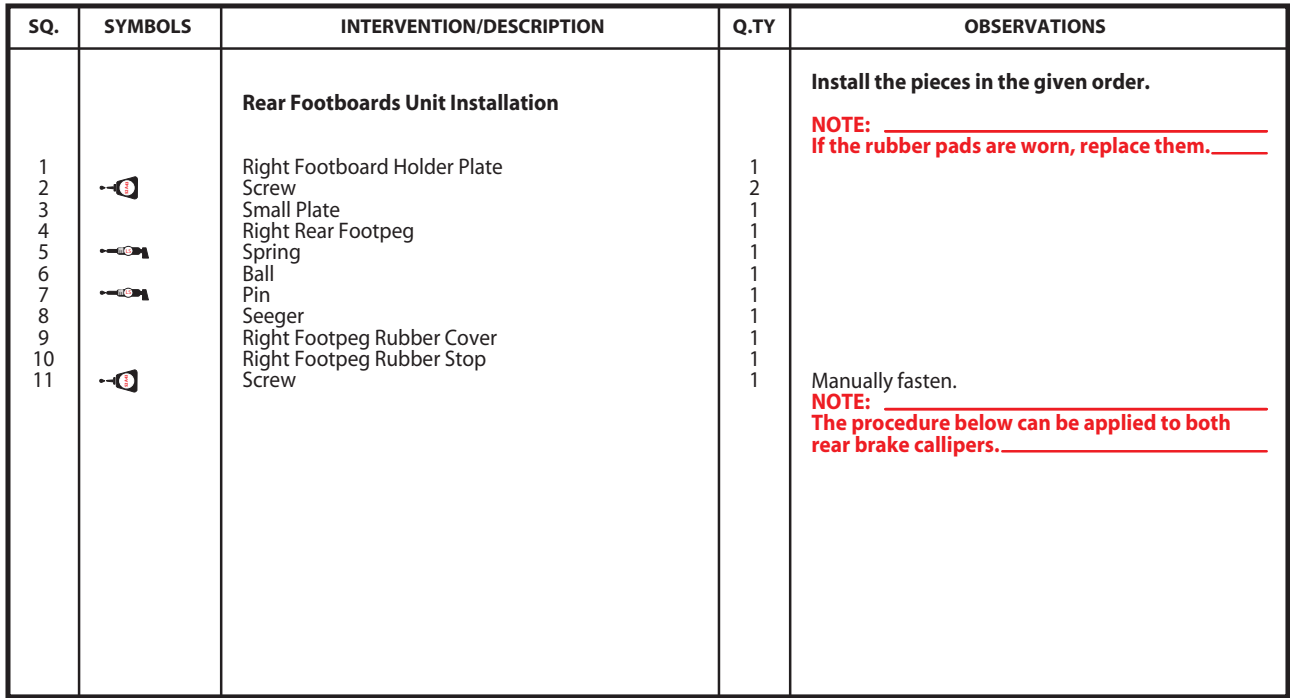


SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
		Front Right Footpeg Unit Installation		Install the pieces in the given order.
1		Bush	1	NOTE: _____ If the rubber pads are worn, replace them. _____
2		Brake Command Lever	1	
3		Spring	1	
4		Elastic Washer	1	
5		Right Front Footpeg Holder Plate	1	
6		Screw	1	
7		Pointer Eccentric	1	
8		Screw	1	
9		Rubber Pad	1	
10		Screw	2	
11		Spring	1	
12		Right Front Footpeg	1	
13		Fork	1	
14		Pin	1	
15		Seeger	1	
16		Right Fixing Rubber Pad	1	
17		Rubber Pad	1	
18		Screw	1	
				NOTE: _____ Ensure that the braking plant functions correctly once installation is complete. _____

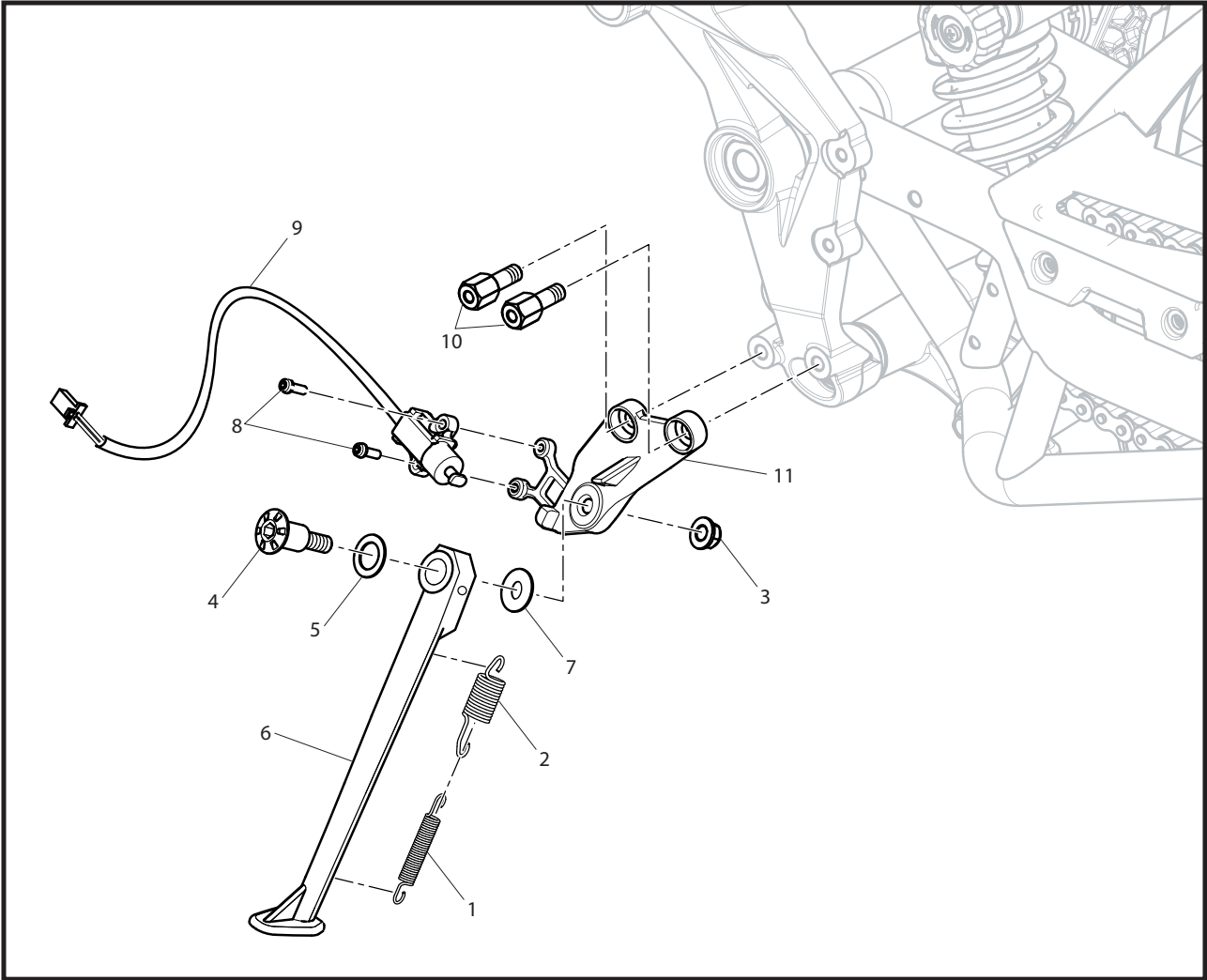
REAR FOOTPEGS UNIT REMOVAL



SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1		Rear Footpegs Unit Removal	1	Remove the pieces in the given order. NOTE: _____ The procedure below can be applied to both rear footpegs. _____
2		Screw	1	
3		Right Footpeg Rubber Stop	1	
4		Right Footpeg Rubber Cover	1	
5		Seeger	1	
6		Pin	1	
7		Right Rear Footpeg	1	
8		Small Plate	1	
9		Ball	1	
10		Spring	1	
11		Screw	2	
		Right Footboard Holder Plate	1	

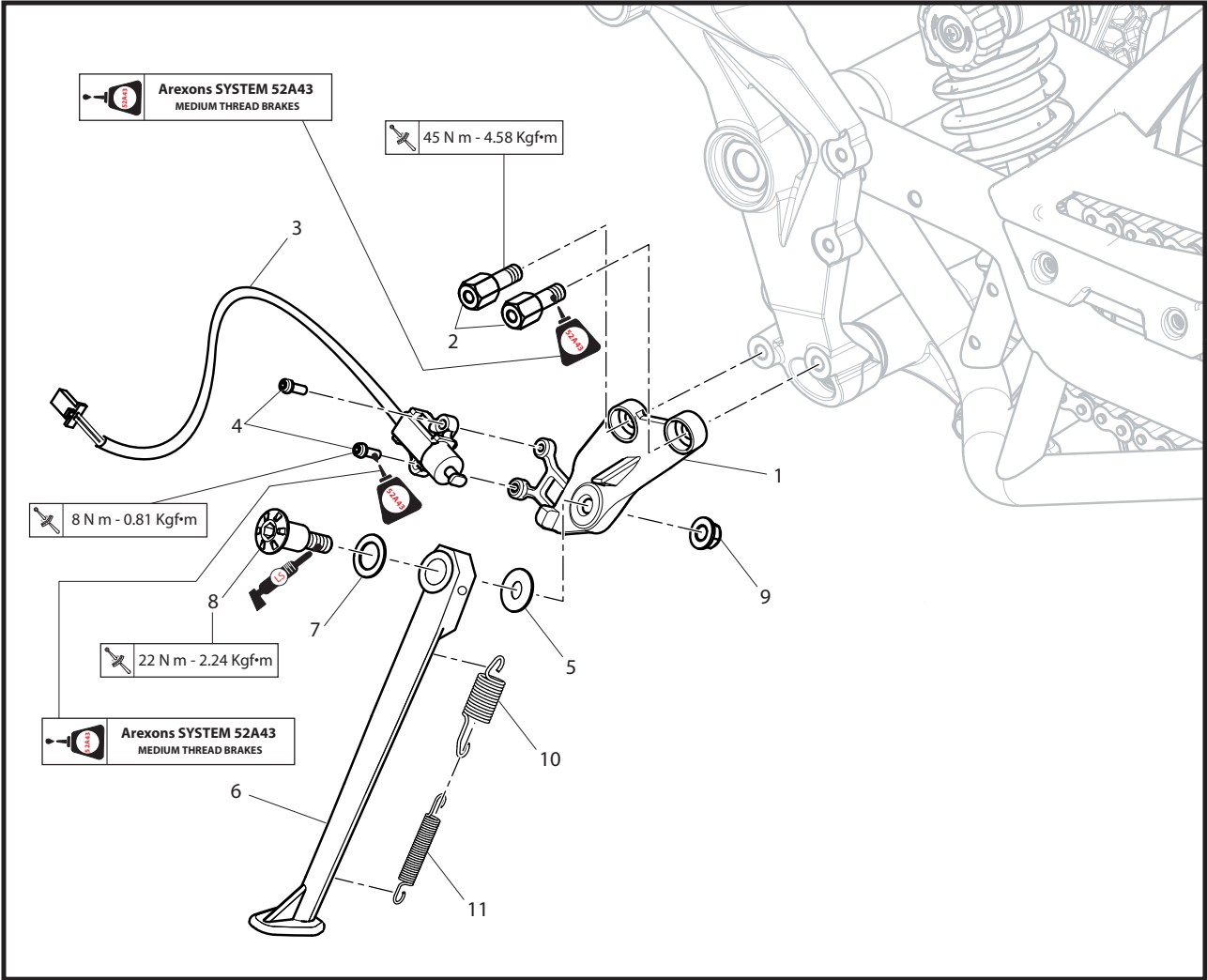


TRESTLE REMOVAL



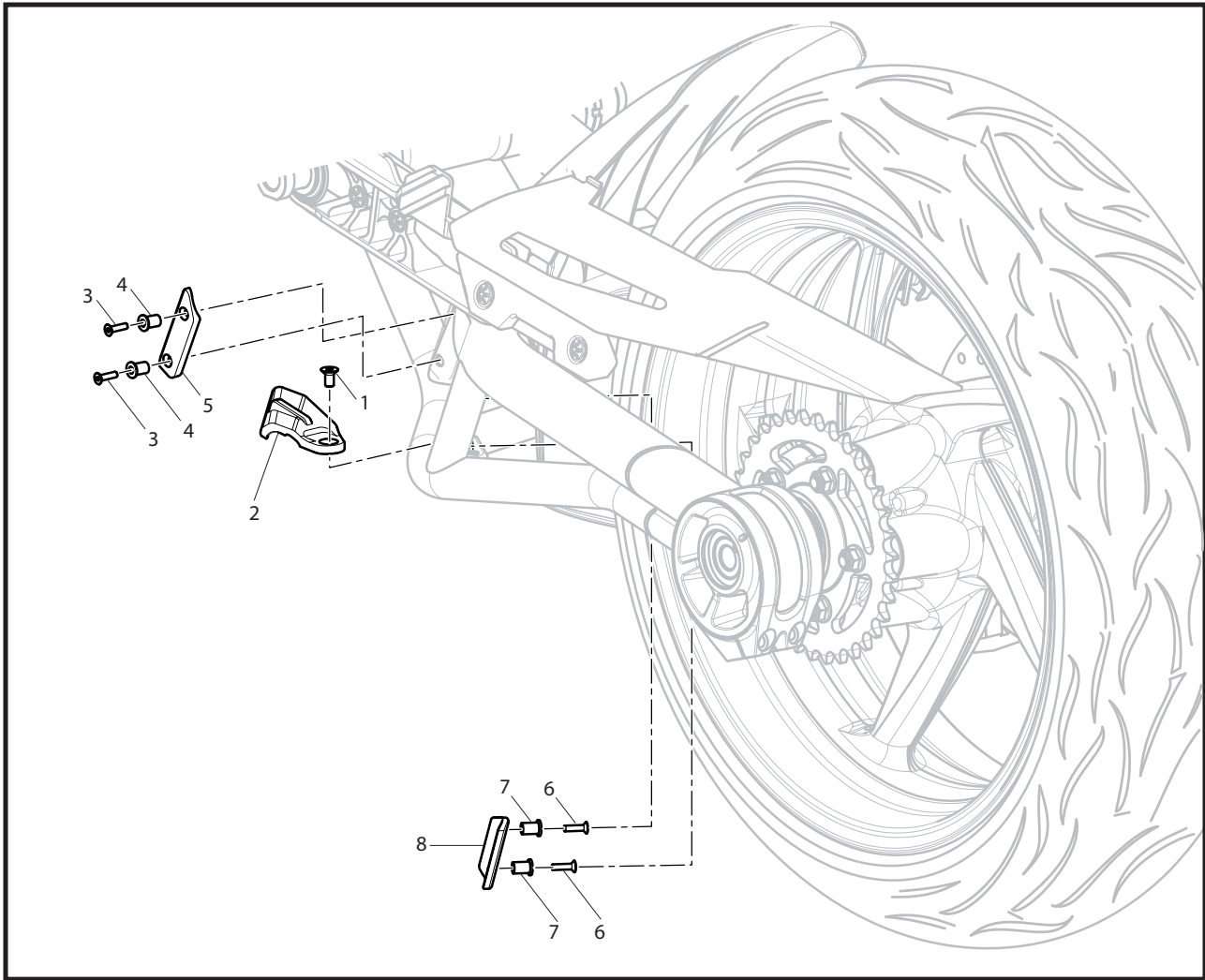
SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1		Trestle Removal	1	Remove the pieces in the given order.
2		Inside Spring	1	
3		External Spring	1	Disconnect connector.
4		Nut	1	
5		Special Screw	1	
6		Washer	1	
7		Side Trestle	1	
8		Washer	1	
9		Screw	2	
10		Side Trestle Sensor	1	
11		Screw	2	
		Plate	1	

TRESTLE INSTALLATION



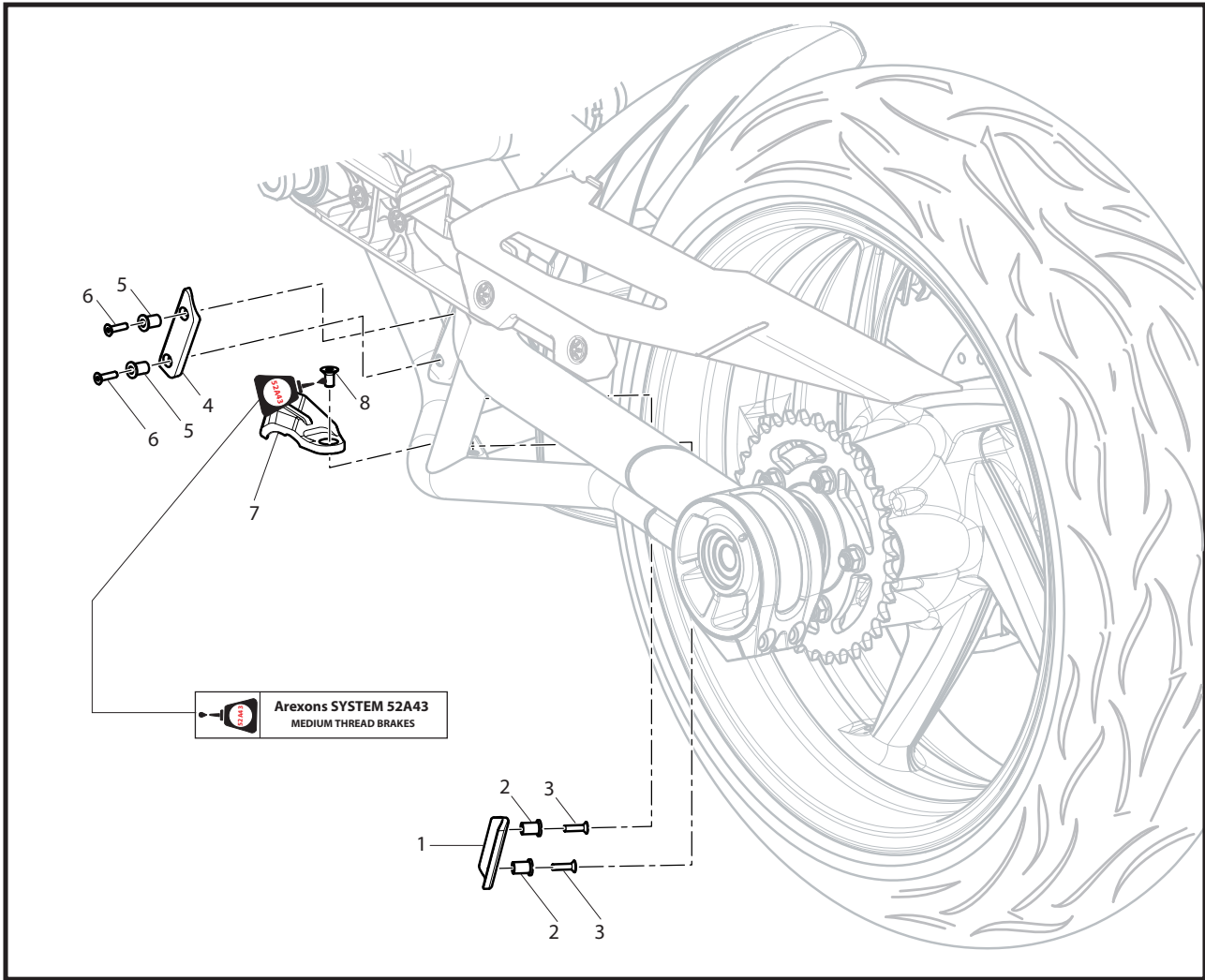
SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1		Trestle Installation	1	Install the pieces in the given order.
2		Plate	2	
3		Screw	1	Connect connector.
4		Side Trestle Sensor	2	
5		Washer	1	
6		Side Trestle	1	
7		Washer	1	
8		Special Screw	1	
9		Nut	1	
10		External Spring	1	
11		Inside Spring	1	

CHAIN SLIDES REMOVAL



SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1		Chain Slides Removal	1	Remove the pieces in the given order. NOTE: <u>To remove the upper chain slide see paragraph "4.97".</u>
2		Screw	1	
3		Lower Chain Slide	2	
4		Screw	2	
5		Weldnut	1	
6		Chain Slide	2	
7		Screw	2	
8		Weldnut	1	
		Chain Slide		

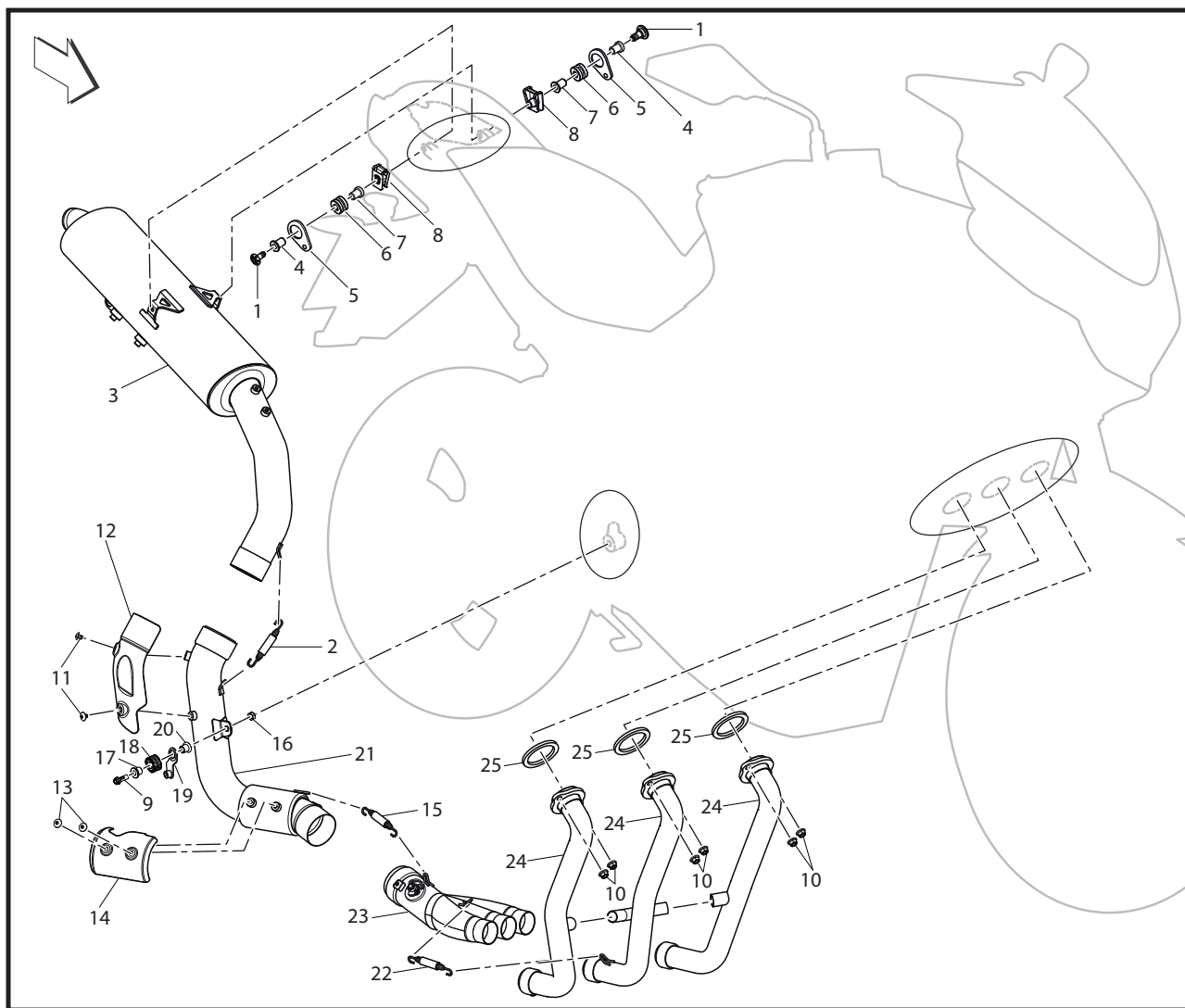
CHAIN SLIDES INSTALLATION



SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1		Chain Slides Installation	1	Install the pieces in the given order. NOTE: To install the upper chain slide see paragraph "4.105".
2		Chain Slide	2	
3		Walnut	2	
4		Screw	1	
5		Chain Slide	2	
6		Walnut	2	
7		Screw	1	
8		Lower Chain Slide	1	



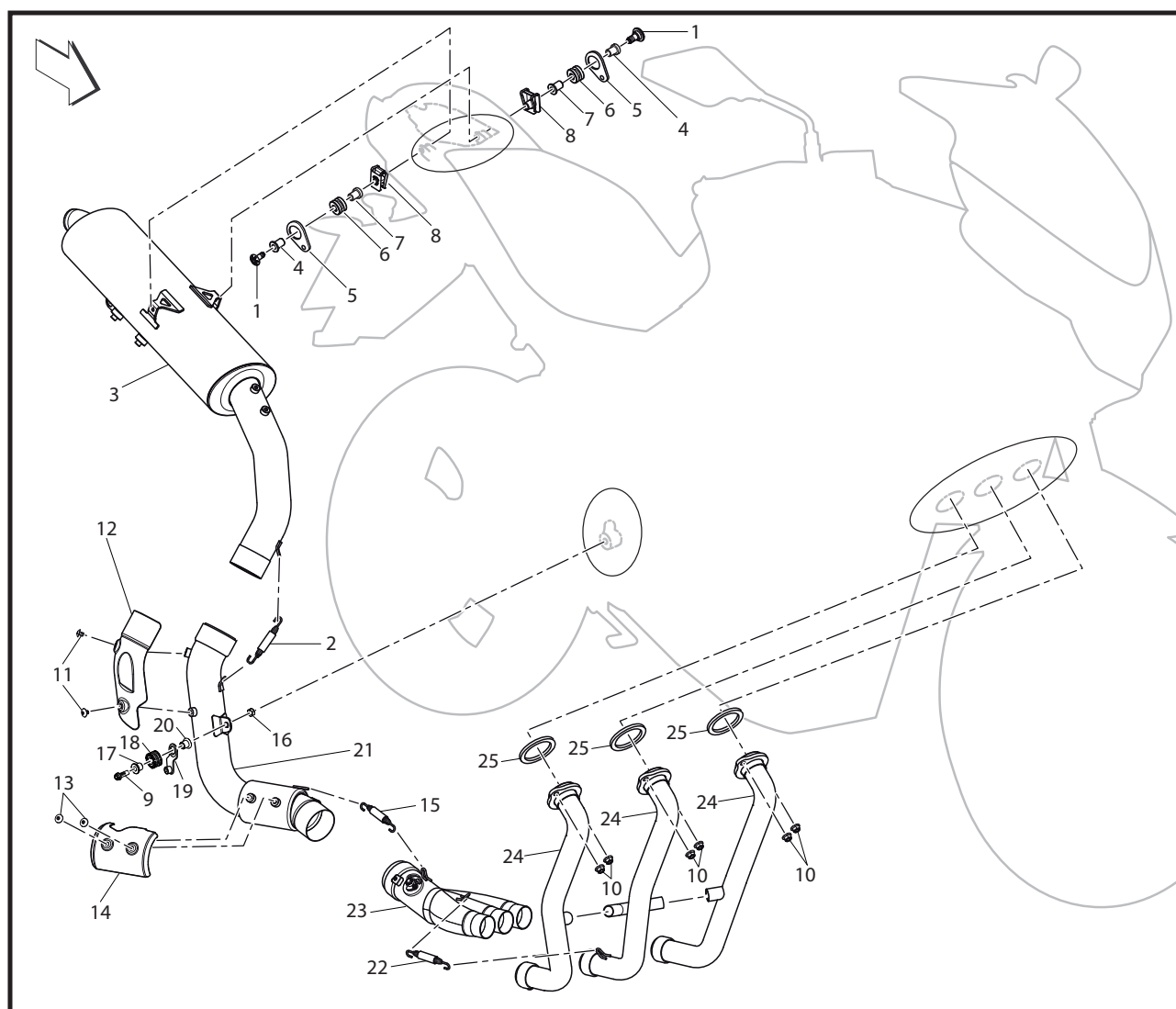
DRAIN UNIT REMOVAL



SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
		Number Plate Bracket Removal Seat Removal Heat Seal Lid Removal Lock Removal Tank Removal Disconnect Lambda Probe Connector Disconnect Drain Valve Cable Drain Unit Removal		Remove the pieces in the given order. See paragraph "4.128". See paragraph "4.130". See paragraph "4.136". See paragraph "4.136". See paragraph "4.118". See "ELECTRIC PLANT 7.13" paragraph. See paragraph "4.157".
1		Screw	2	
2		Spring	1	
3		Silencing Device	1	
4		Bush	2	
5		Silencing Device Articulated Connecting Rod	2	
6		Rubber Pad	2	
7		Bush	2	
8		Quick Fixing Clip	2	
9		Screw	1	
10		Nut	6	
11		Screw	2	
12		Thermal Protection	1	
13		Screw	2	
14		Catalyst Thermal Protection	1	
15		Spring	1	
16		Nut	1	

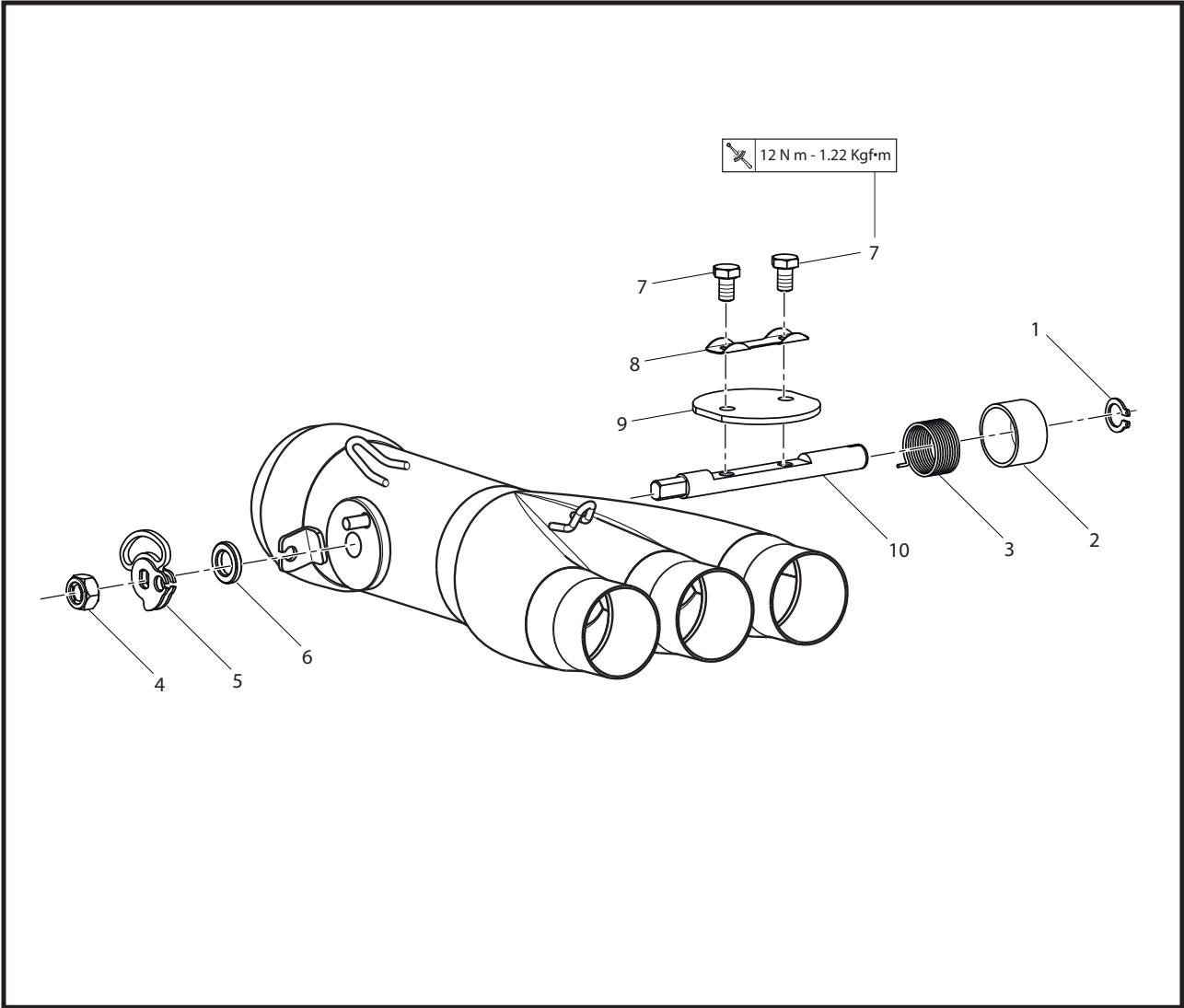


DRAIN UNIT REMOVAL



SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
17		Bush	2	
18		Rubber Pad	1	
19		Drain Collector Articulated Connecting Rod	1	
20		Bush	1	
21		Drain Collector Fitting	1	
22		Spring	1	
23		Three-In-One Drain Collector	1	
24		Drain Collector	3	
25		Drain Gasket	3	

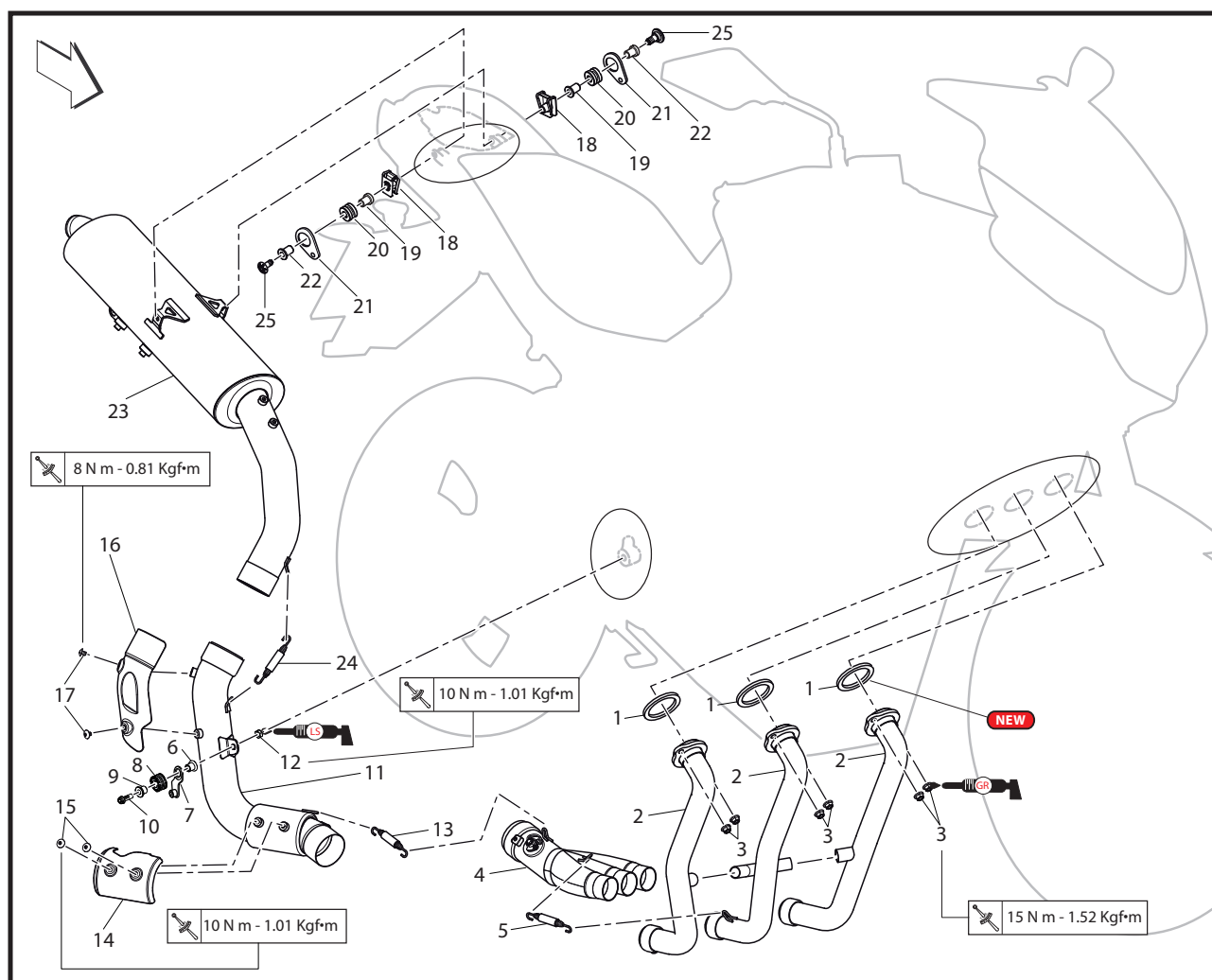
DRAIN COLLECTOR DECOMPOSITION



SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1		Drain Collector Decomposition	1	Remove the pieces in the given order.
2		Elastic Ring	1	
3		Drain Valve Cap	1	
4		Spring	1	
5		Nut	1	
6		Drain Valve Flange	1	
		Washer	1	Spread the wings of plate n. 8 to free the heads of screws n. 7.
7		Screw	2	
8		Plate	1	
9		Drain Valve	1	
10		Drain Valve Shaft	1	NOTE: _____ To install, invert the order of the removal operations. _____ ATTENTION: _____ To install, after having installed screws n. 7, tighten the wings of plate n. 8 on the hexagonal sides of the screws. _____ Manually fasten nut n. 4. _____



DRAIN UNIT INSTALLATION



SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
		Drain Unit Installation		Install the pieces in the given order.
1		Drain Gasket	3	
2		Drain Collector	3	
3		Nut	6	
4		Drain Collector	1	
5		Spring	1	
6		Bush	1	
7		Drain Collector Articulated Connecting Rod	1	
8		Rubber Pad	1	
9		Bush	1	
10		Screw	1	Manually fasten.
11		Drain Collector Fitting	1	
12		Nut	1	
13		Spring	1	
14		Three-In-One Thermal Protection	1	
15		Screw	2	
16		Thermal Protection	1	
17		Screw	2	
18		Quick Fixing Clip	2	
19		Bush	2	
20		Rubber Pad	2	
21		Silencing Device Articulated Connecting Rod	2	
22		Bush	2	
23		Silencing Device	1	
24		Spring	1	
25		Screw	2	Manually fasten.



ENG

LD

CHAPTER 5

ENGINE

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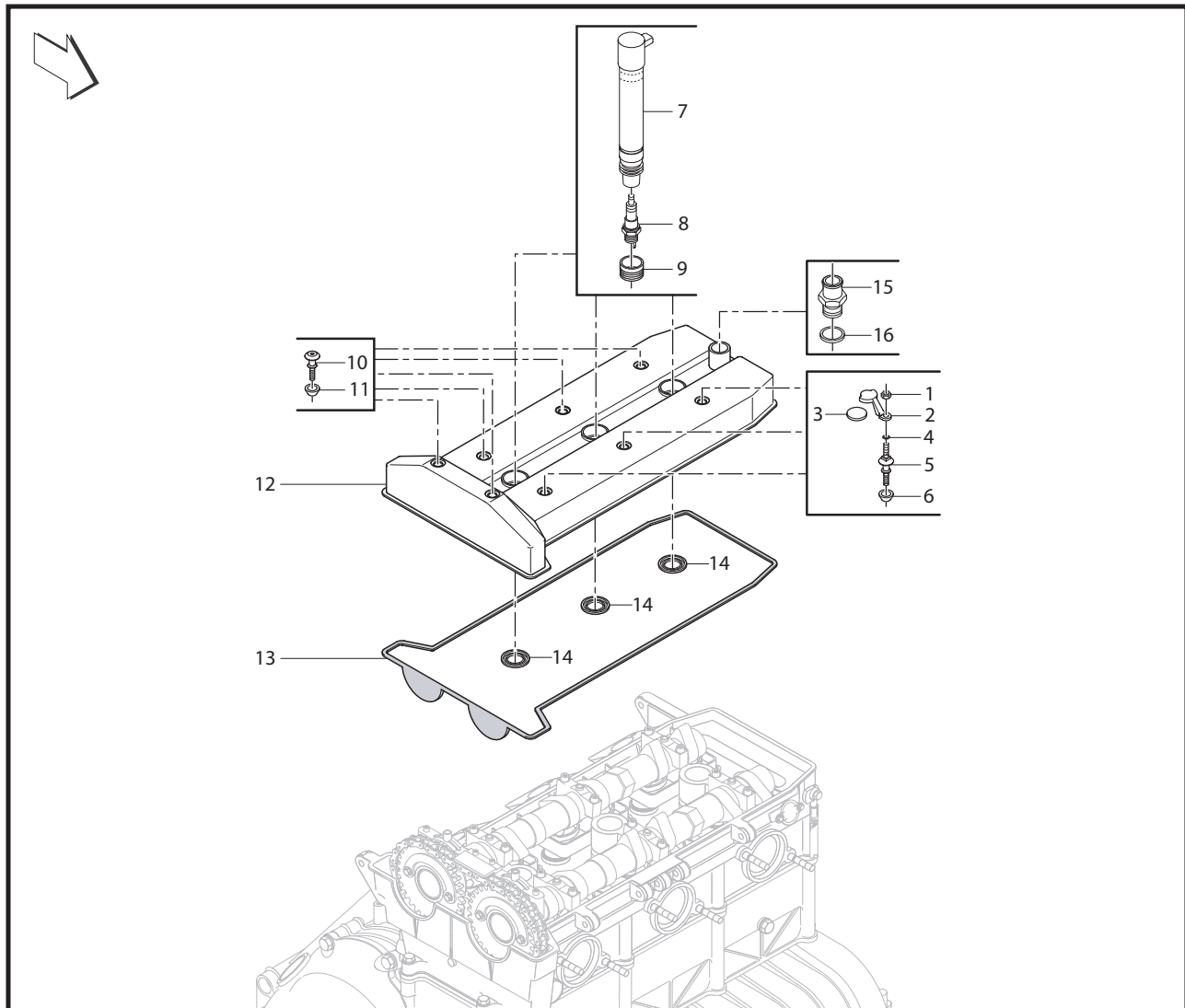
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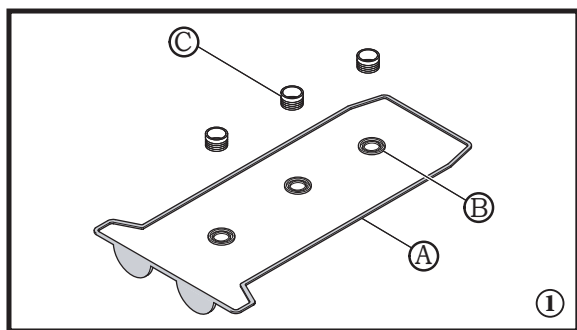




DISTRIBUTION LID REMOVAL



SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1		Distribution Lid Removal	3	Remove the pieces in the given order. Champion RG4HC - NGK CR9E
2		Nut	3	
3		Bracket	3	
4		Rubber Pad	3	
5		Washer	3	
6		Special Screw	3	
7		Rubber Pad	3	
8		Reel	3	
9		Spark Plug	3	
10		Rubber Pad	3	
11		Special Screw	5	
12		Rubber Pad	5	
13		Distribution Lid	1	
14		Lid Gasket	1	
15		O-Ring Gasket	3	
16		Quick Fitting	1	
		Seal Ring	1	

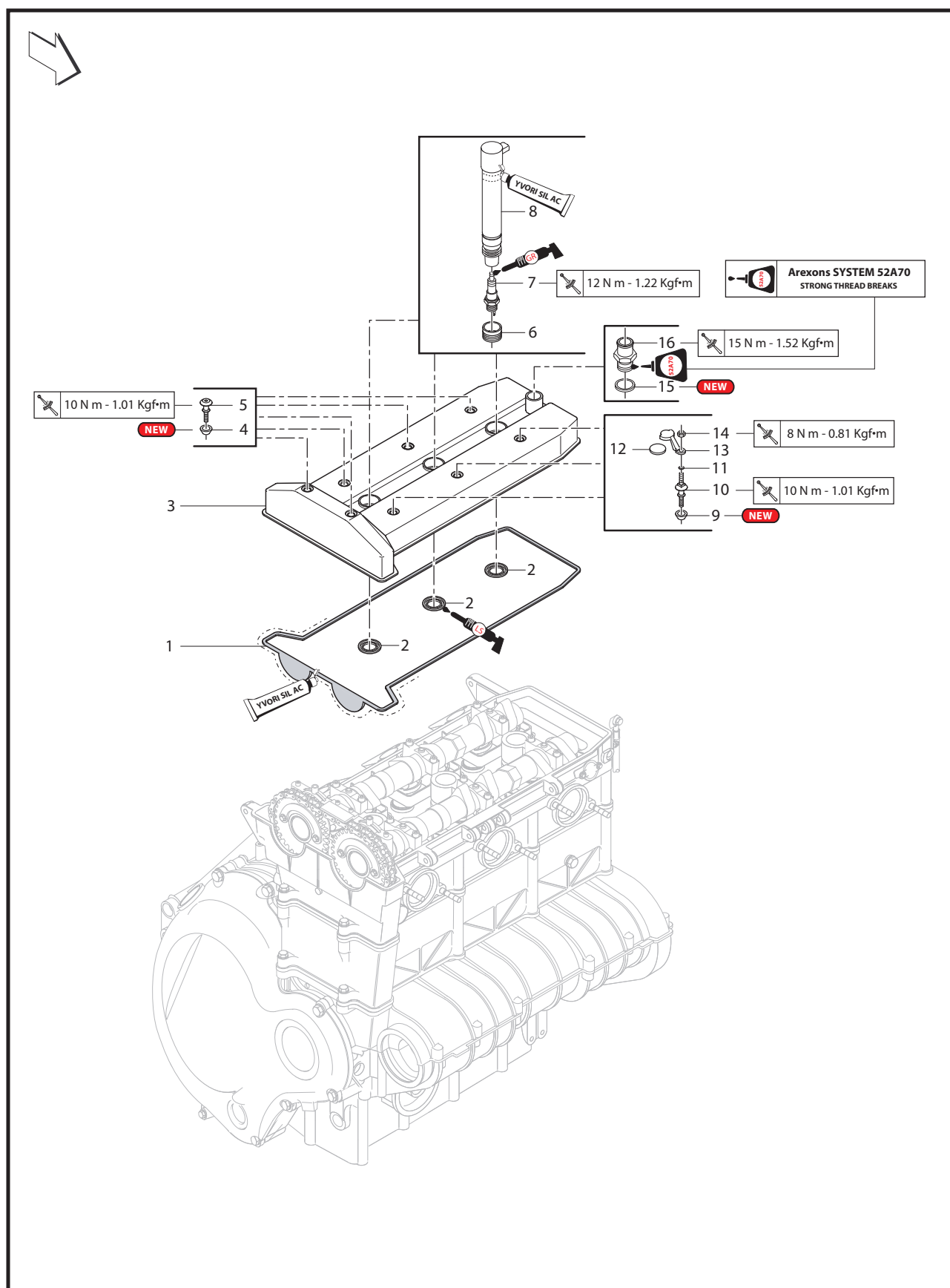


GASKETS CONTROL

- ① Check:
- the lid gasket ①A
 - the O-Ring gaskets ①B
 - the rubber pad ①C
- In the presence of damages/wear → Replace the faulty parts.



DISTRIBUTION LID INSTALLATION

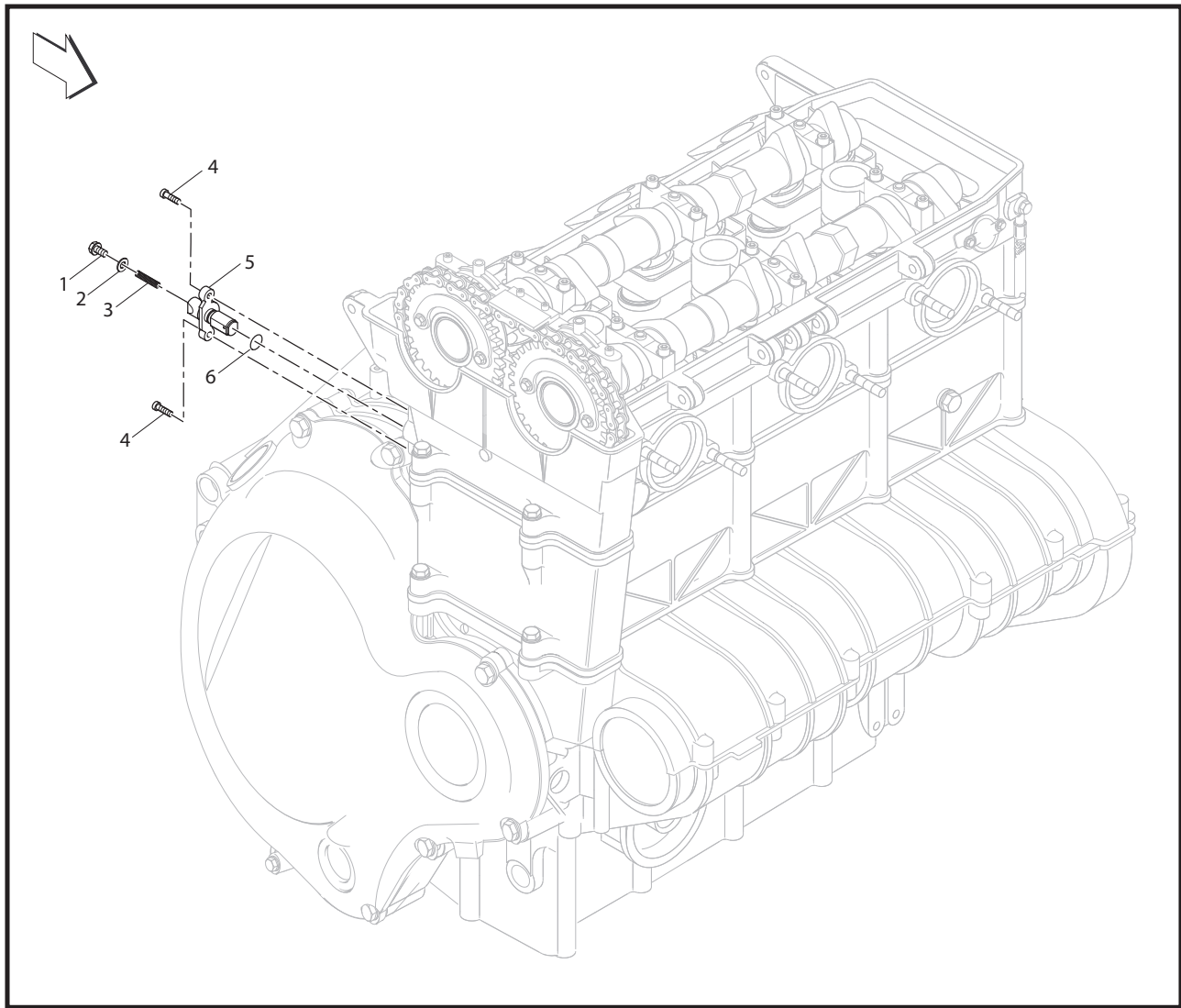




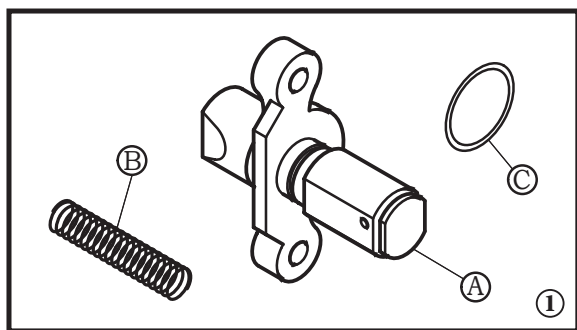
DISTRIBUTION LID INSTALLATION

SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1		Distribution Lid Installation Lid Gasket	1	Install the pieces in the given order. NOTE: _____ The Yvori Sil Ac sealing paste must only be applied on the highlighted surface, as shown in the figure. _____
2		O-Ring Gasket	3	
3		Distribution Lid	1	
4		Rubber Pad	5	
5		Special Screw	5	
6		Rubber Pad	3	
7		Spark Plug	3	Champion RG4HC - NGK CR9E
8		Reel	3	NOTE: _____ Do not exceed with the Copper Grease. _____
9		Rubber Pad	3	
10		Special Screw	3	
11		Washer	3	
12		Rubber Pad	3	
13		Bracket	3	
14		Nut	3	
15		Seal Ring	1	
16		Quick Fitting	1	

DISTRIBUTION CHAIN TENSIONER REMOVAL



SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1		Distribution Chain Tensioner Removal	1	Remove the pieces in the given order. Operations to be carried out with the engine in PMS.
2		Screw	1	
3		Seal Ring	1	
4		Spring	1	
5		Screw	2	
6		Chain Tensioner	1	
		O-Ring Gasket	1	



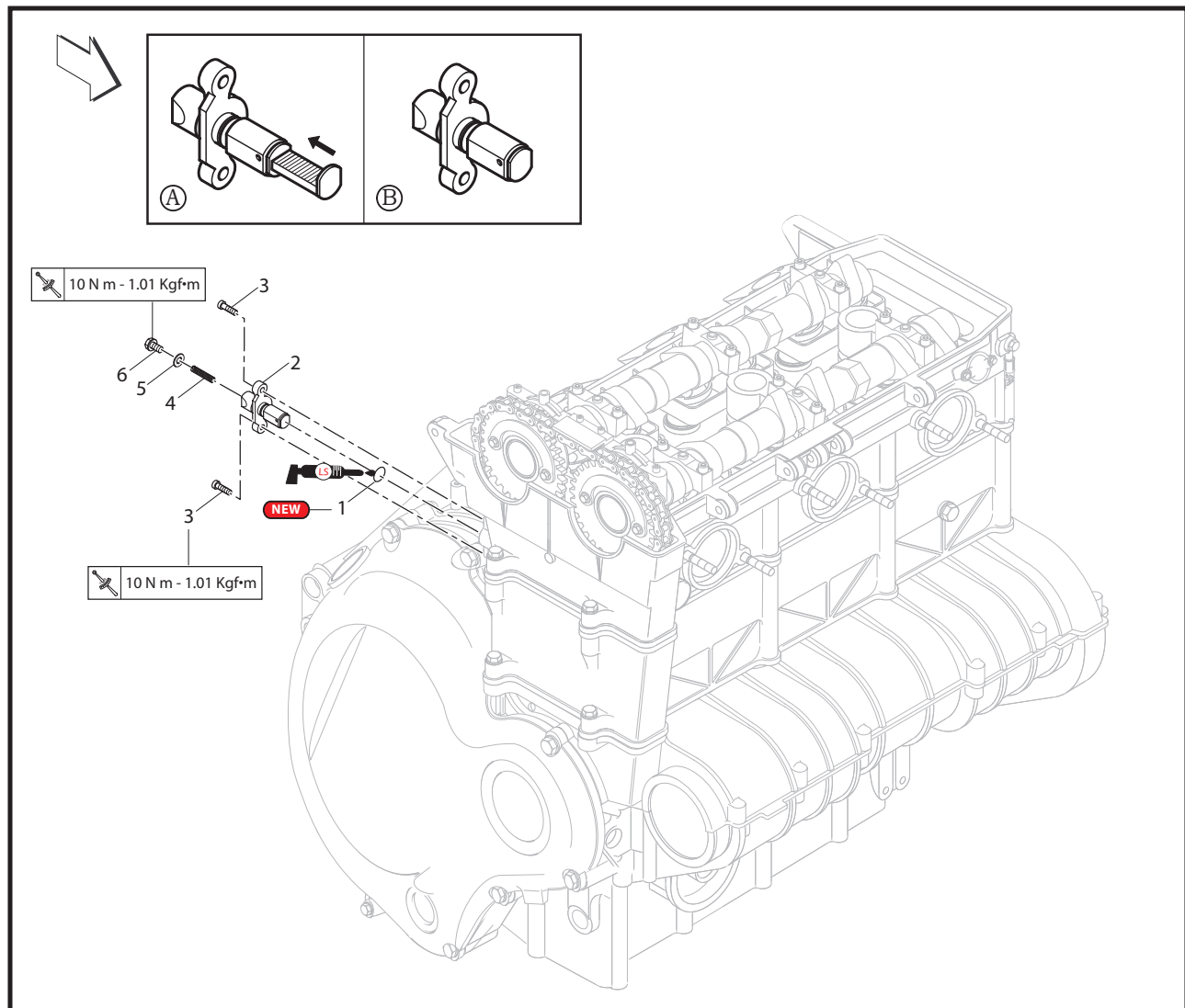
DISTRIBUTION CHAIN TENSIONER CONTROL

- ① Check:
- the chain tensioner ①
 - the spring ②
 - the seal ring ③

In the presence of damages/wear → Replace.



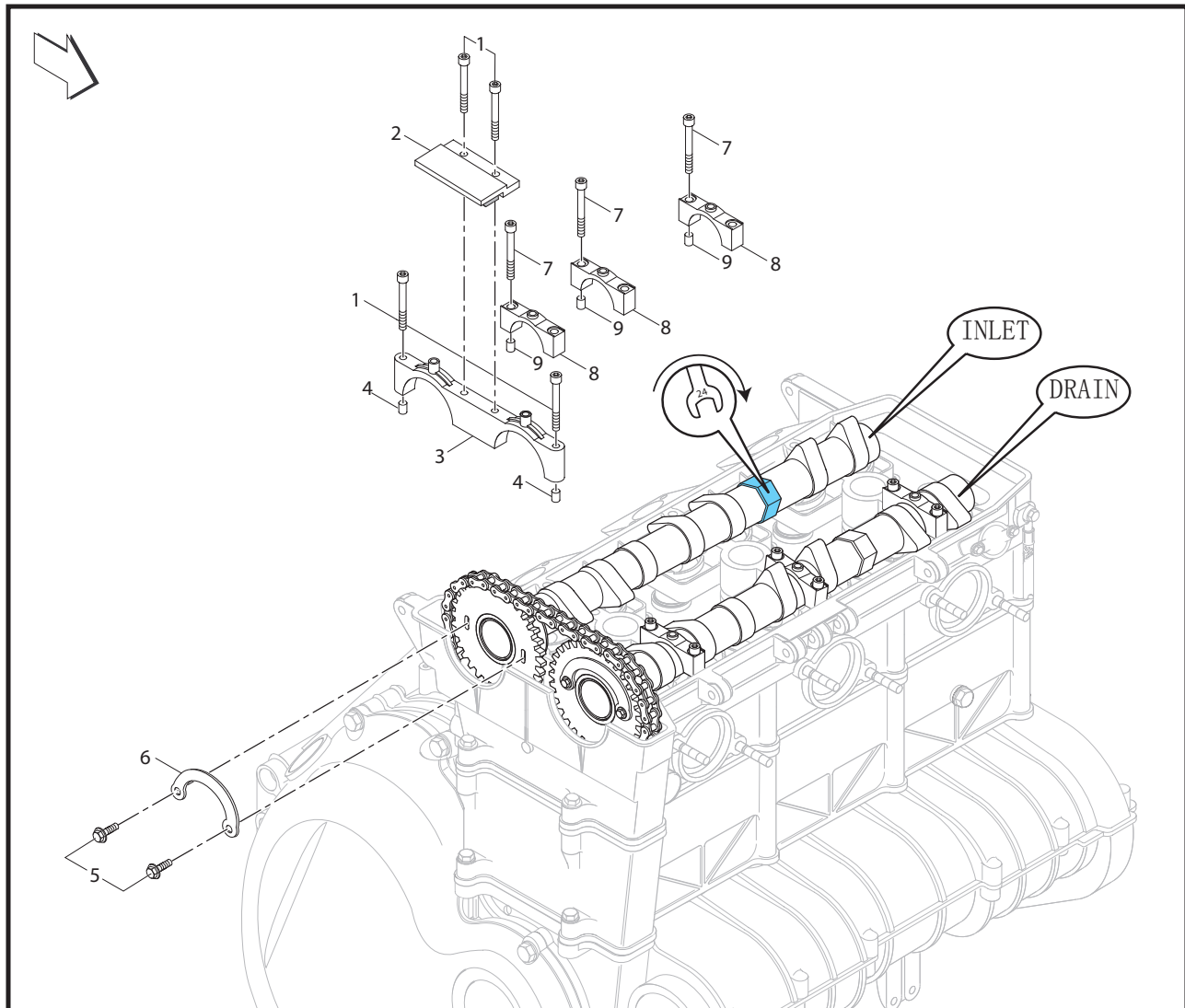
DISTRIBUTION CHAIN TENSIONER INSTALLATION



SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1 2 3 4 5 6	 NEW	Distribution Chain Tensioner Installation O-Ring Gasket Chain Tensioner Screw Spring Seal Ring Screw	1 1 2 1 1 1	Install the pieces in the given order. NOTE: <u>Bring the tensioner from position A to position B before installing it on the head.</u>

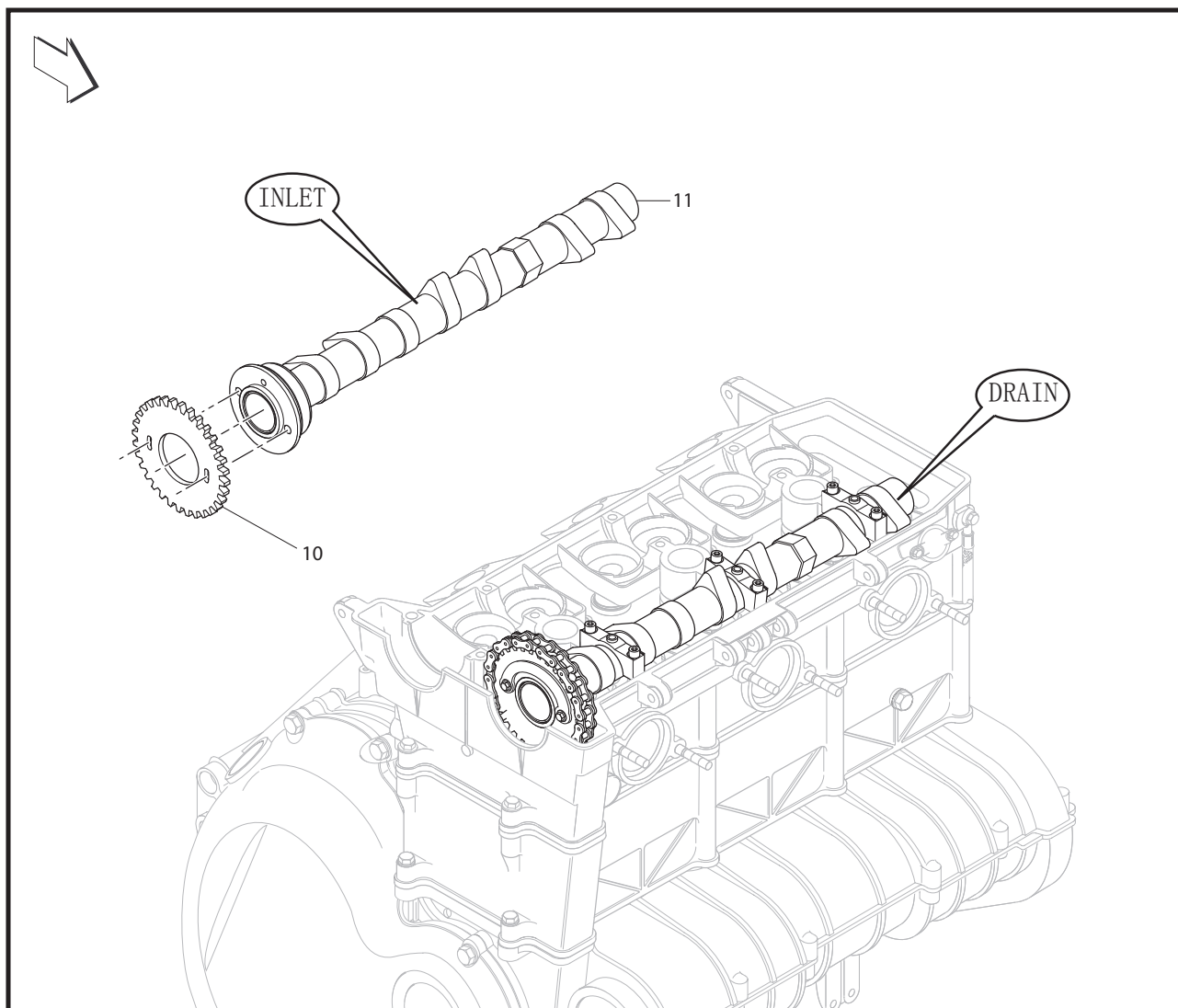


INLET CAM SHAFT REMOVAL



SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1 2 3		Distribution Lid Removal Distribution Chain Tensioner Removal Inlet Cam Shaft Removal Screw Upper Chain Slide Central Headgear	4 1 1	Remove the pieces in the given order. See paragraph "5.1" See paragraph "5.5" NOTE: <u>During removal the reference plugs may still be attached to the cam shafts lids.</u>
4 5		Reference Plug Screw	2 2	
6 7 8		Small Plate Screw Inlet Side Cam Shaft Headgear	1 6 3	Operations to be carried out with the engine in PMS. Slightly rotate the inlet cams clockwise using a 24 spanner, loosening the distribution chain. NOTE: <u>During removal the reference plugs may still be attached to the cam shafts lids.</u>
9		Reference Plug	6	

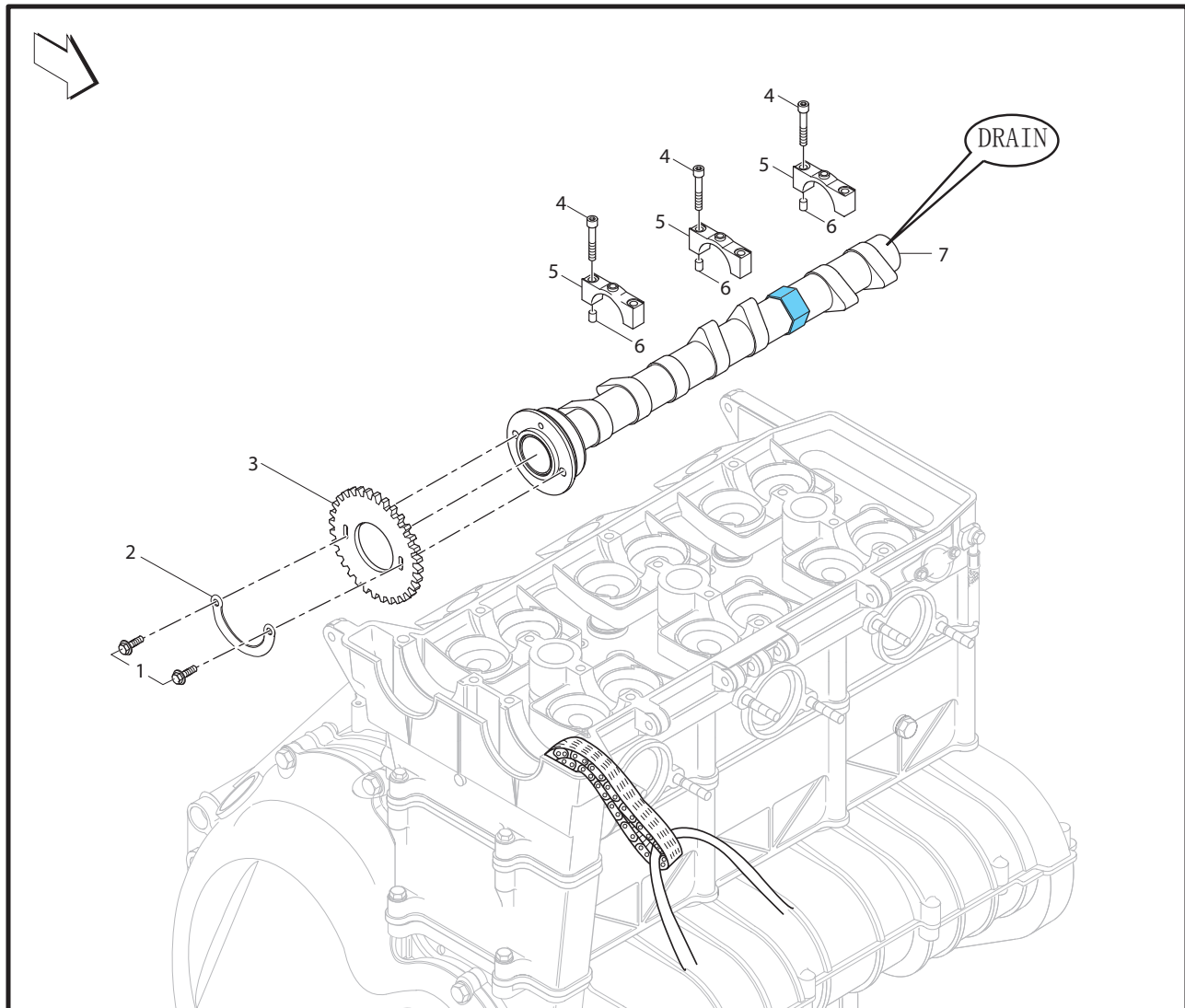
INLET CAM SHAFT REMOVAL



SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
10 11		Inlet Z34 Gear Inlet Distribution Shaft	1 1	Remove the pieces in the given order.



DRAIN CAM SHAFT REMOVAL

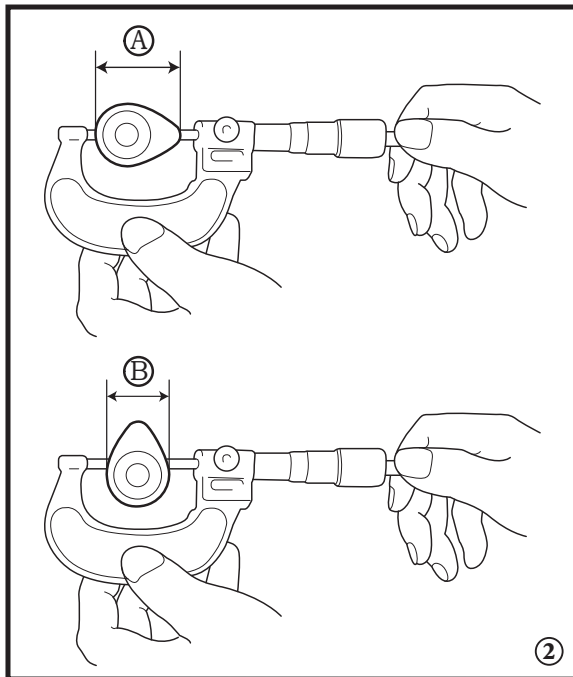


SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1		Distribution Lid Removal	2	Remove the pieces in the given order. Operations to be carried out with the engine in PMS. See paragraph "5.1". See paragraph "5.5". See paragraph "5.8".
2		Distribution Chain Tensioner Removal	1	
3		Inlet Cam Shaft Removal Screw Small Plate Drain Z34 Gear	1	
4		Drain Cam Shaft Removal Screw Drain Side Cam Shaft Headgear	6	NOTE: _____ Fasten the distribution chain with a wire to avoid it falling in the base. _____
5			3	
6		Reference Plug Drain Distribution Shaft	6	
7			1	NOTE: _____ During removal the reference plugs may still be attached to the cam shafts lids. _____



CAM SHAFTS CONTROL

- ① Check:
- **the cam shaft lobes**
In the presence of blue fading/pittings/scratches
→ Replace the cam shaft.



- ② Measure:
- **the sizes of the cam shaft lobes A and B**
If out of specification → Replace the cam shaft.



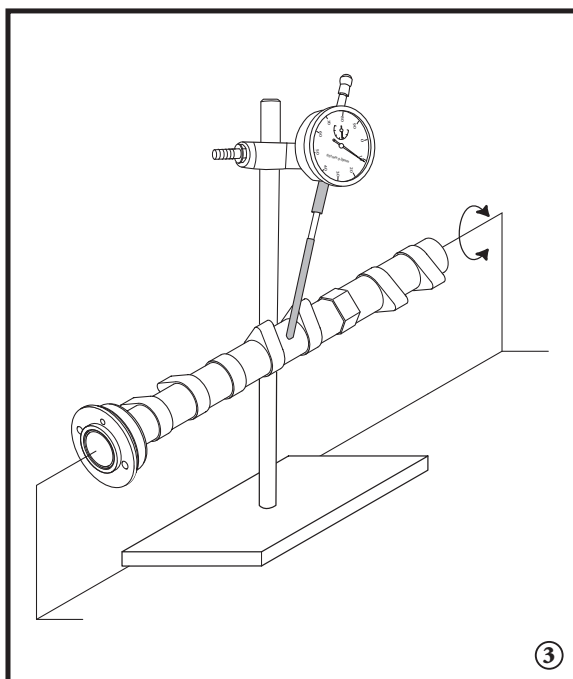
Size limit of the cam shaft lobes

Inlet side cam shaft

- Ⓐ <Limit>: 35.3 mm (1.38 in)
- Ⓑ <Limit>: 27.85 mm (2.77 cm)

Drain side cam shaft

- Ⓐ <Limit>: 35.3 mm (1.38 in)
- Ⓑ <Limit>: 27.85 mm (2.77 cm)

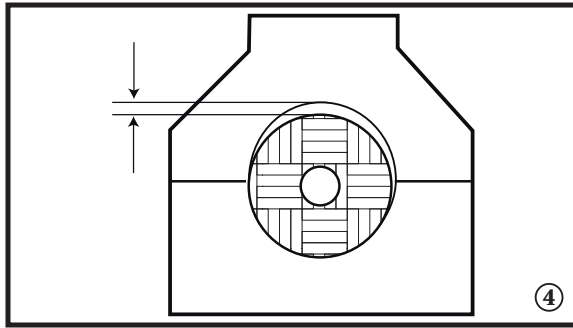


- ③ Measure:
- **the cam shaft eccentricity**
If out of specification → Replace the cam shaft.



Eccentricity limit of the cam shaft

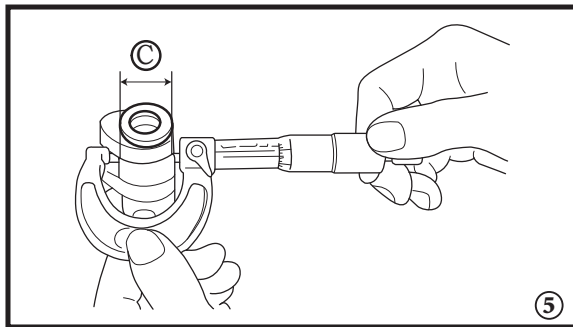
0.04 mm (0.001 in)



- ④ Measure:
- **the clearance between cam shaft support and cam shaft lid**
- If out of specification → Measure the diameter of the cam shaft support.



Clearance between cam shaft support and cap
 <Limit>: 0.1 mm (0.076 mm)



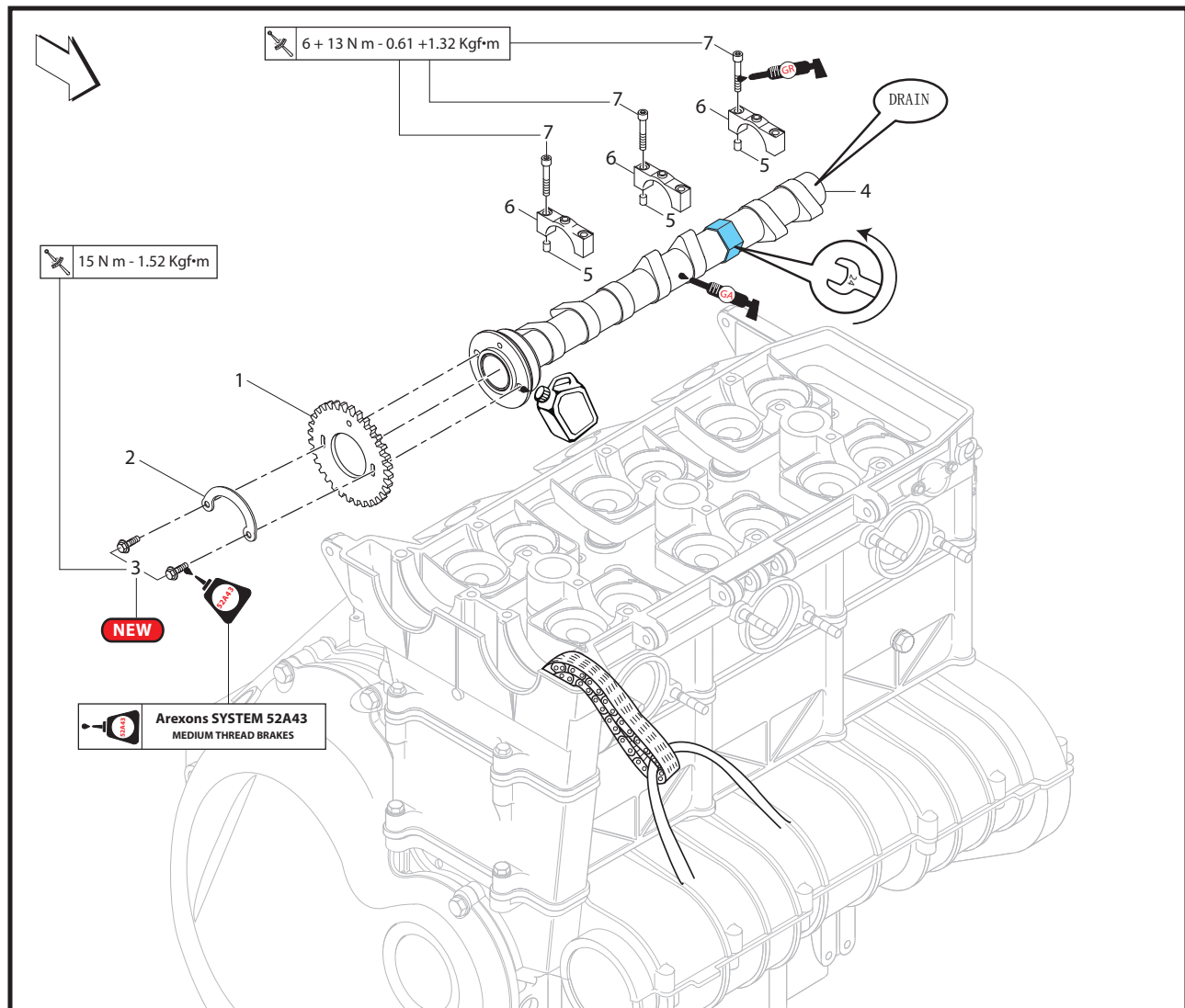
- ⑤ Measure:
- **the diameter of the cam shaft support ©**
- If out of specification → Replace the cam shaft.
 If within specification → Replace the cam shaft head and lids.



Cam shaft supports diameter
 22.459 ~ 22.472 mm
 (0.8842 ~ 0.8847 in)



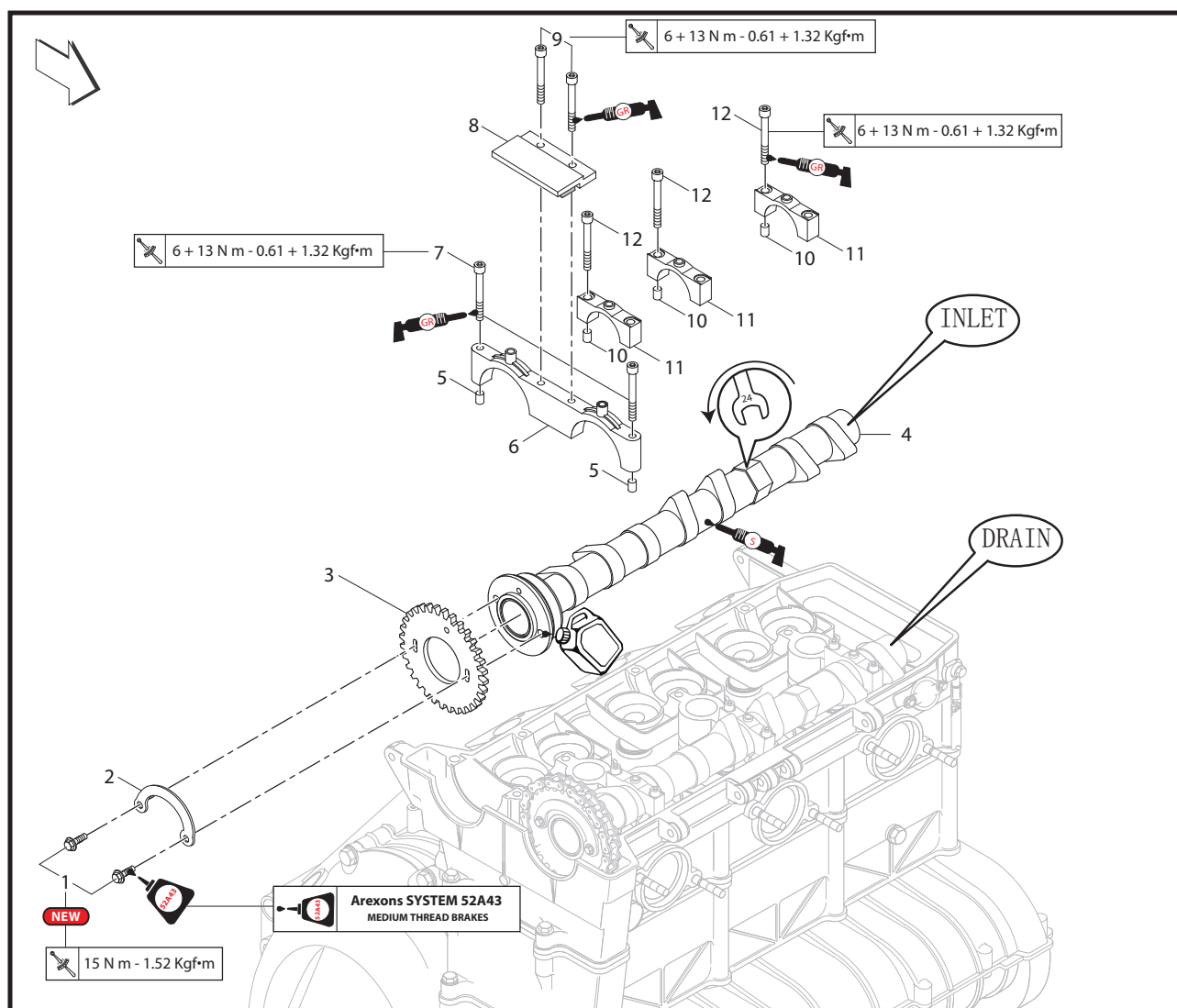
DRAIN CAM SHAFT INSTALLATION



SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1		Drain Cam Shaft Installation	2	Install the pieces in the given order. Operations to be carried out with the engine in PMS. NOTE: _____ We recommend removing all grease from threads for the plate fixing screws. _____ Slightly rotate the drain cams anti-clockwise using a 24 spanner, completely hooking the distribution chain on the gear.
2		Drain Z34 Gear	1	
3		Small Plate	2	
4		Drain Distribution Shaft	1	
5		Reference Plug	6	
6		Drain Side Cam Shaft Headgear	3	
7		Screw	6	



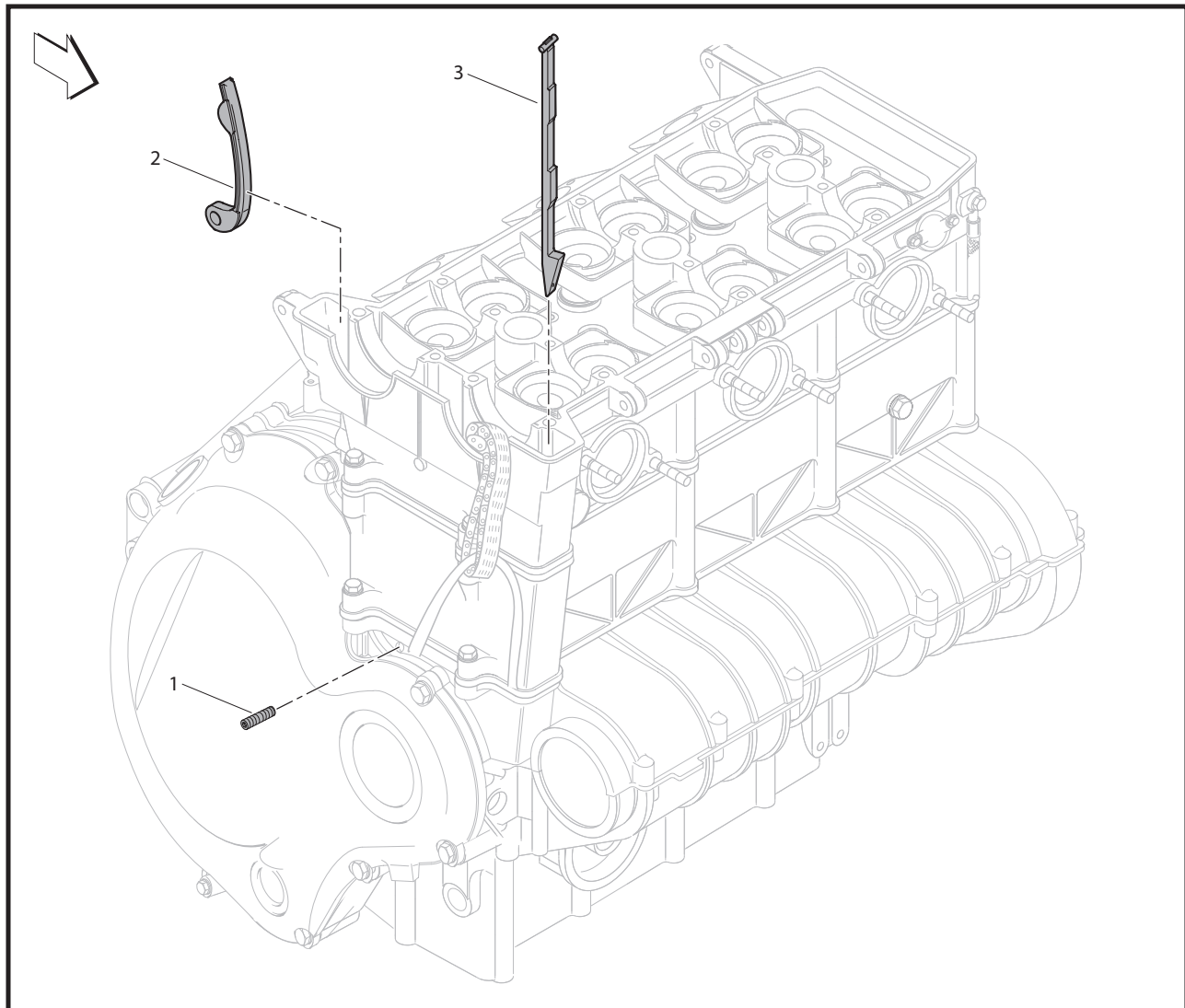
INLET CAM SHAFT INSTALLATION



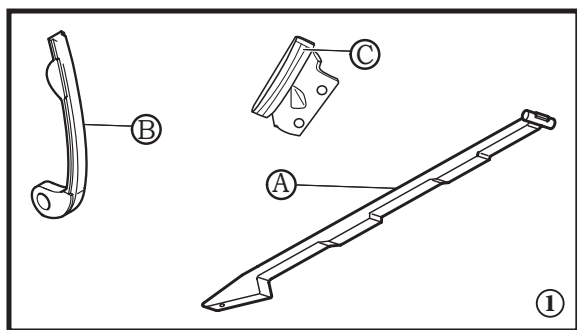
SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1		Inlet Cam Shaft Installation Screw	2	Install the pieces in the given order. NOTE: <u>We recommend removing all grease from threads for the plate fixing screws.</u> Slightly rotate the inlet cams anti-clockwise using a 24 spanner, completely hooking the distribution chain on the gear.
2		Small Plate	1	
3		Inlet Z34 Gear	1	
4		Inlet Distribution Shaft	1	
5		Reference Plug	2	
6		Central Headgear	1	
7		Screw	2	
8		Upper Chain Slide	1	
9		Screw	2	
10		Reference Plug	6	
11		Inlet Side Cam Shaft Headgear	3	
12		Screw	6	



CHAIN SLIDES REMOVAL



SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1 2 3		Distribution Lid Removal Distribution Chain Tensioner Removal Inlet Cam Shaft Removal Drain Cam Shaft Removal Chain Slides Removal Mobile Chain Slide Pin Mobile Slide Fixed Slide	1 1 1	Remove the pieces in the given order. Operations to be carried out with the engine in PMS. See paragraph "5.1" See paragraph "5.5" See paragraph "5.8" See paragraph "5.10" NOTE: <u>Always replace the chain slides together with the distribution chain.</u>

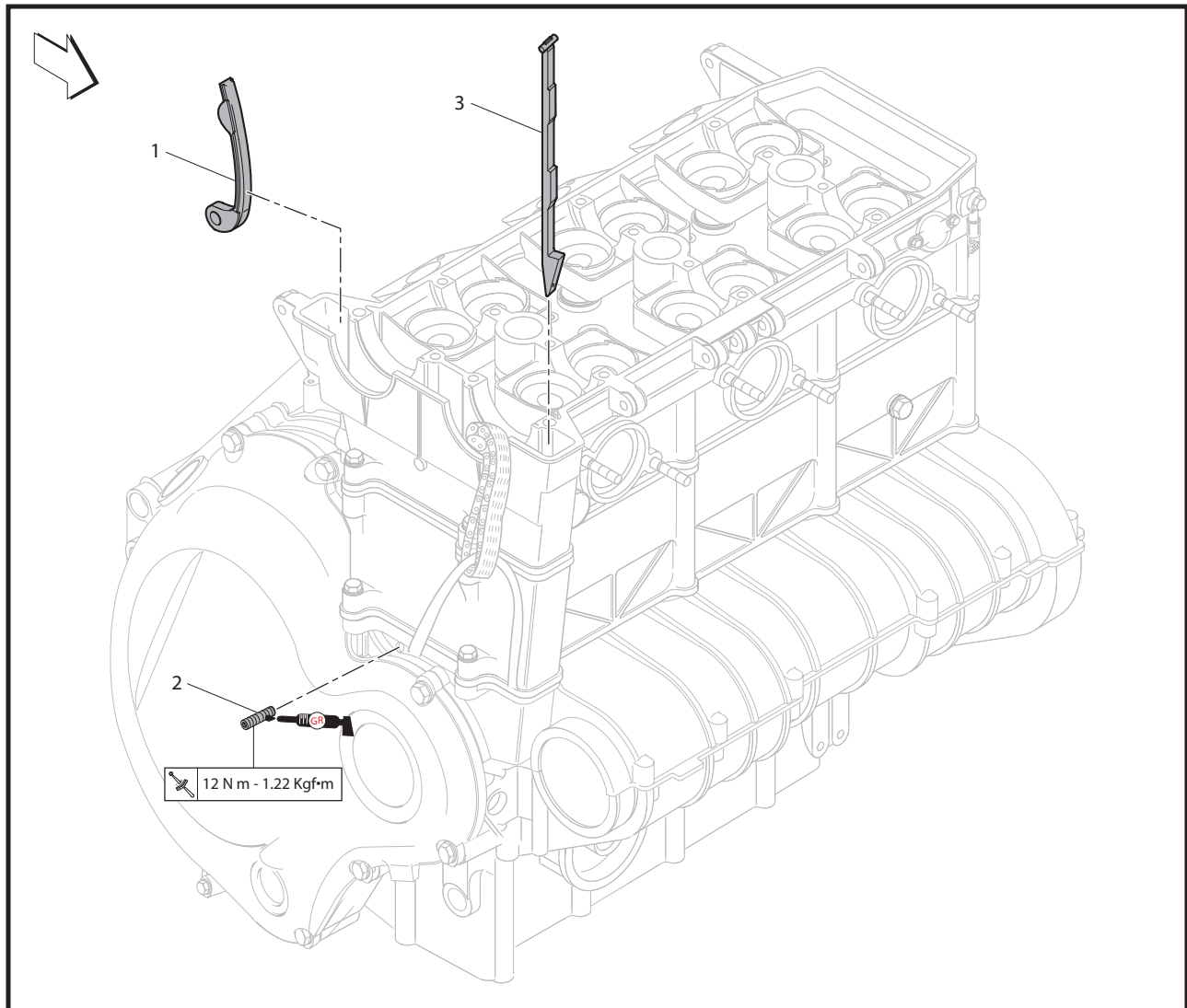


CHAIN SLIDES CONTROL

- ① Check:
- the contact surface of the fixed slide ①
 - the contact surface of the mobile slide ②
 - the contact surface of the upper chain slide ③
- In the presence of damages/wear → Replace the faulty parts.



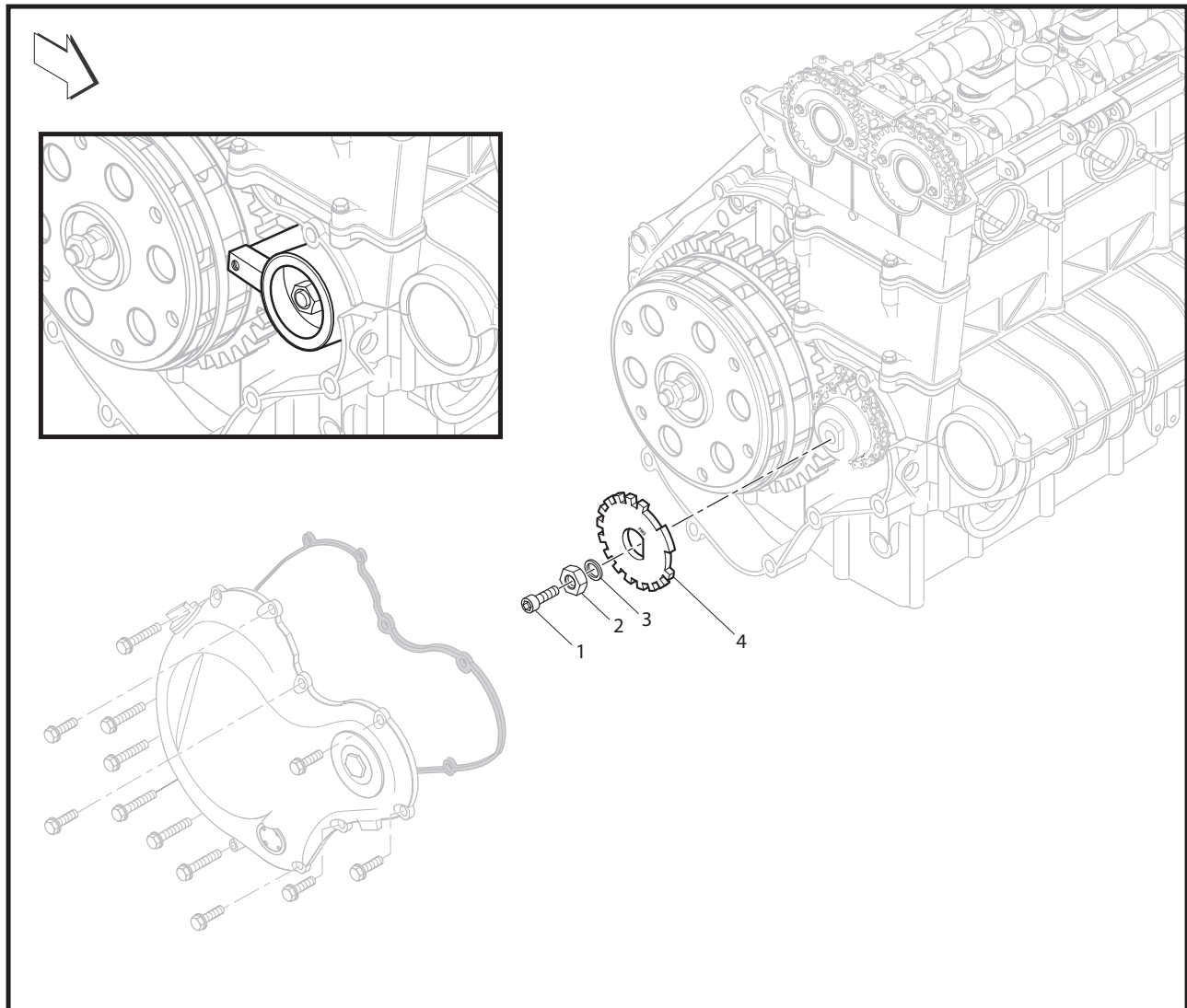
CHAIN SLIDES INSTALLATION



SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1 2 3		Chain Slides Installation Mobile Slide Mobile Chain Slide Pin Fixed Slide	1 1 1	Install the pieces in the given order. Operations to be carried out with the engine in PMS.



PHONIC WHEEL REMOVAL

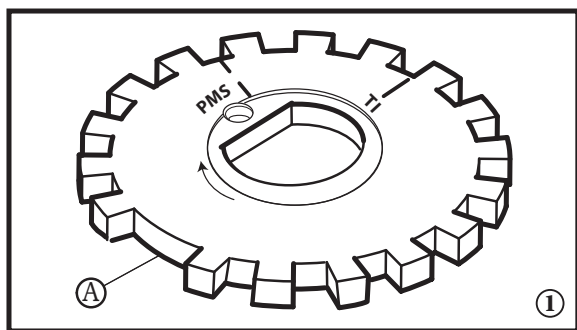


SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1 2 3 4		Clutch Lid Removal Phonic Wheel Removal Screw Nut Washer Phonic Wheel	1 1 1 1	Remove the pieces in the given order. See paragraph "5.69" NOTE: <u>Lock the phonic wheel using the appropriate tool.</u>



Special Tools: PHONIC WHEEL REMOVAL

Code: R300097083000

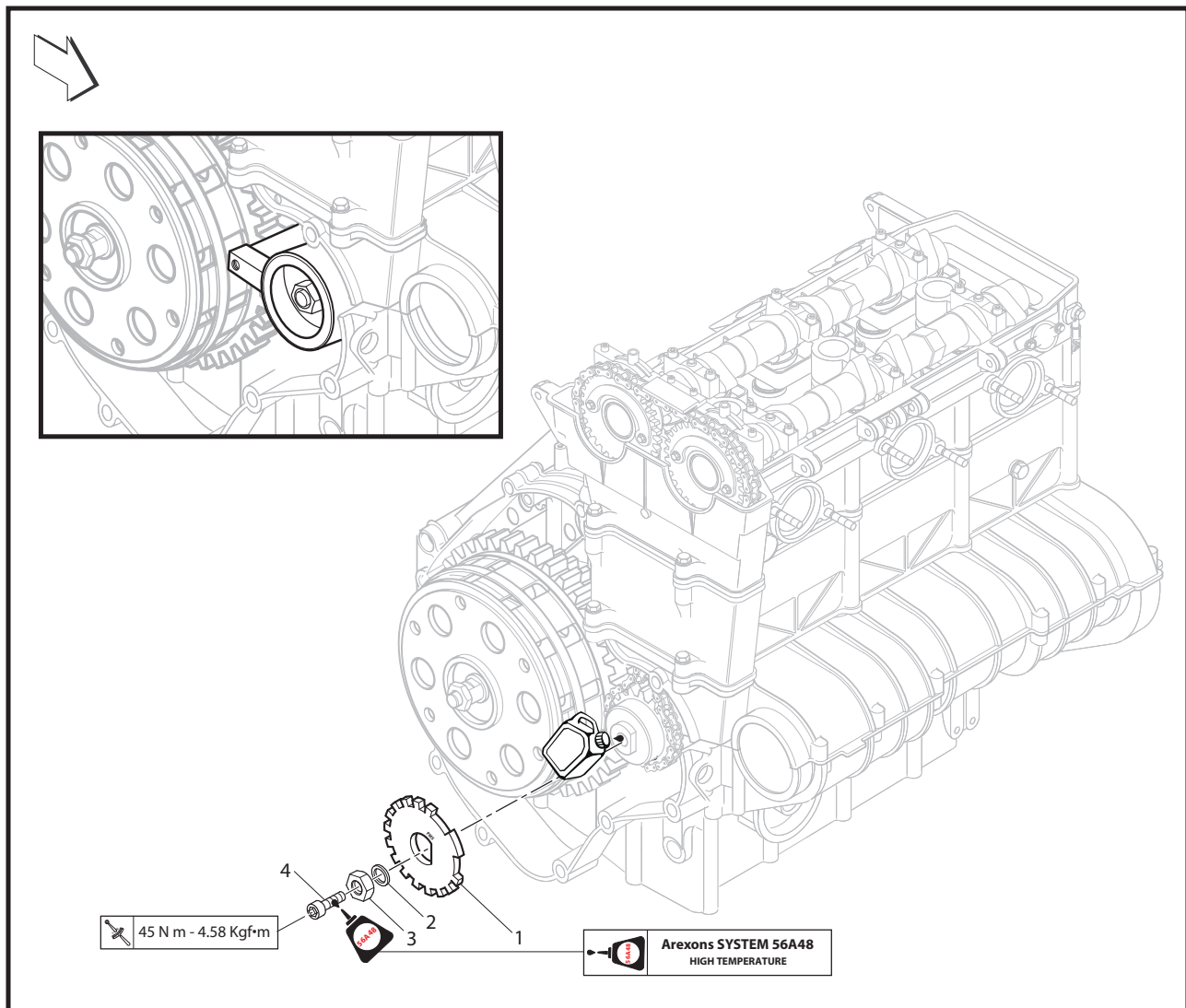


PHONIC WHEEL CONTROL

- ① Check:
- **the gear of the phonic wheel** ①
- In the presence of damages/cracks/wear →
Replace the faulty parts.



PHONIC WHEEL INSTALLATION



SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1		Phonic Wheel Installation Phonic Wheel	1	Install the pieces in the given order.
2		Washer	1	NOTE: <u>Lock the phonic wheel using the appropriate tool.</u>
3		Nut	1	
4		Screw	1	

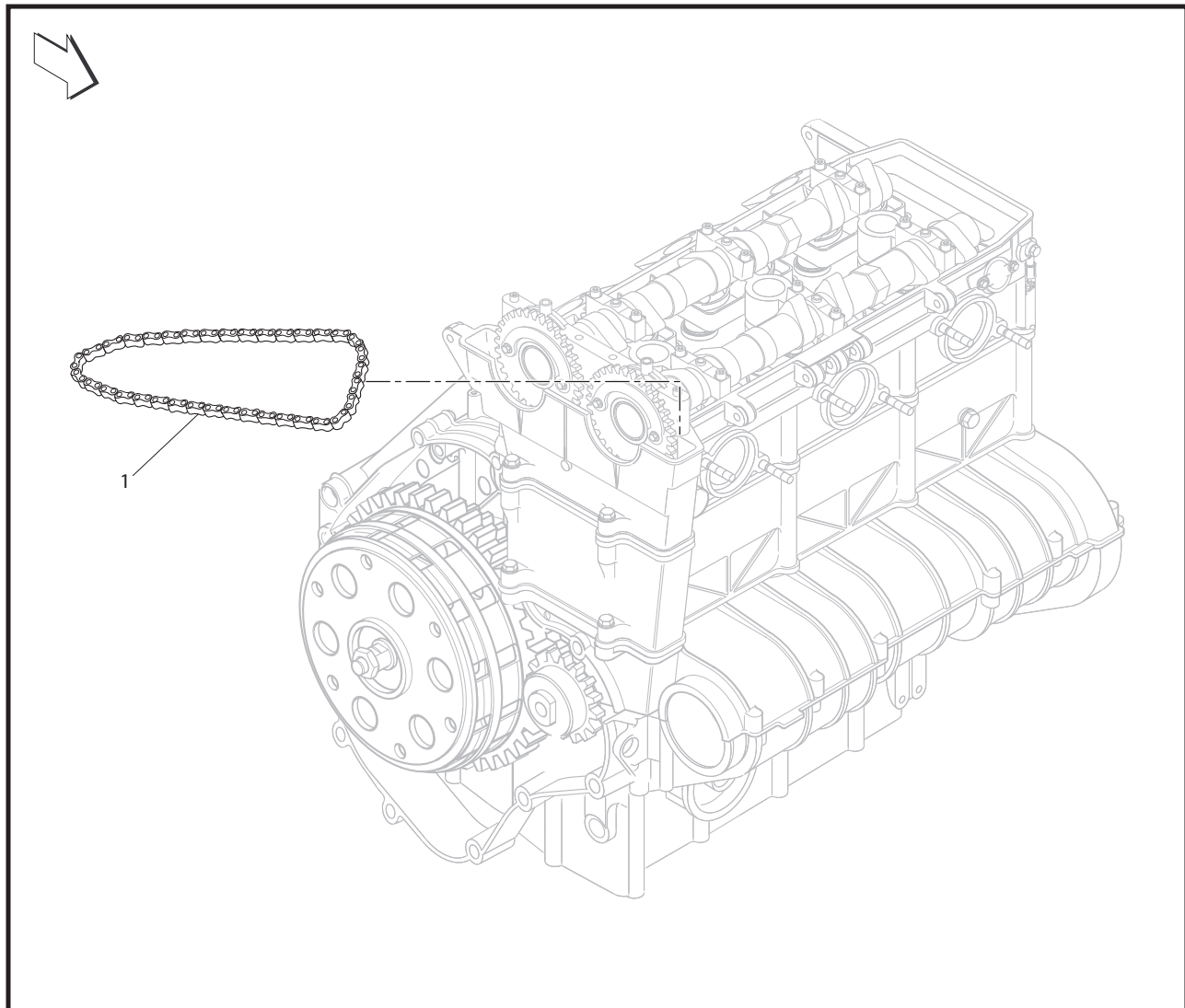


Special Tools: PHONIC WHEEL REMOVAL

Code: R300097083000



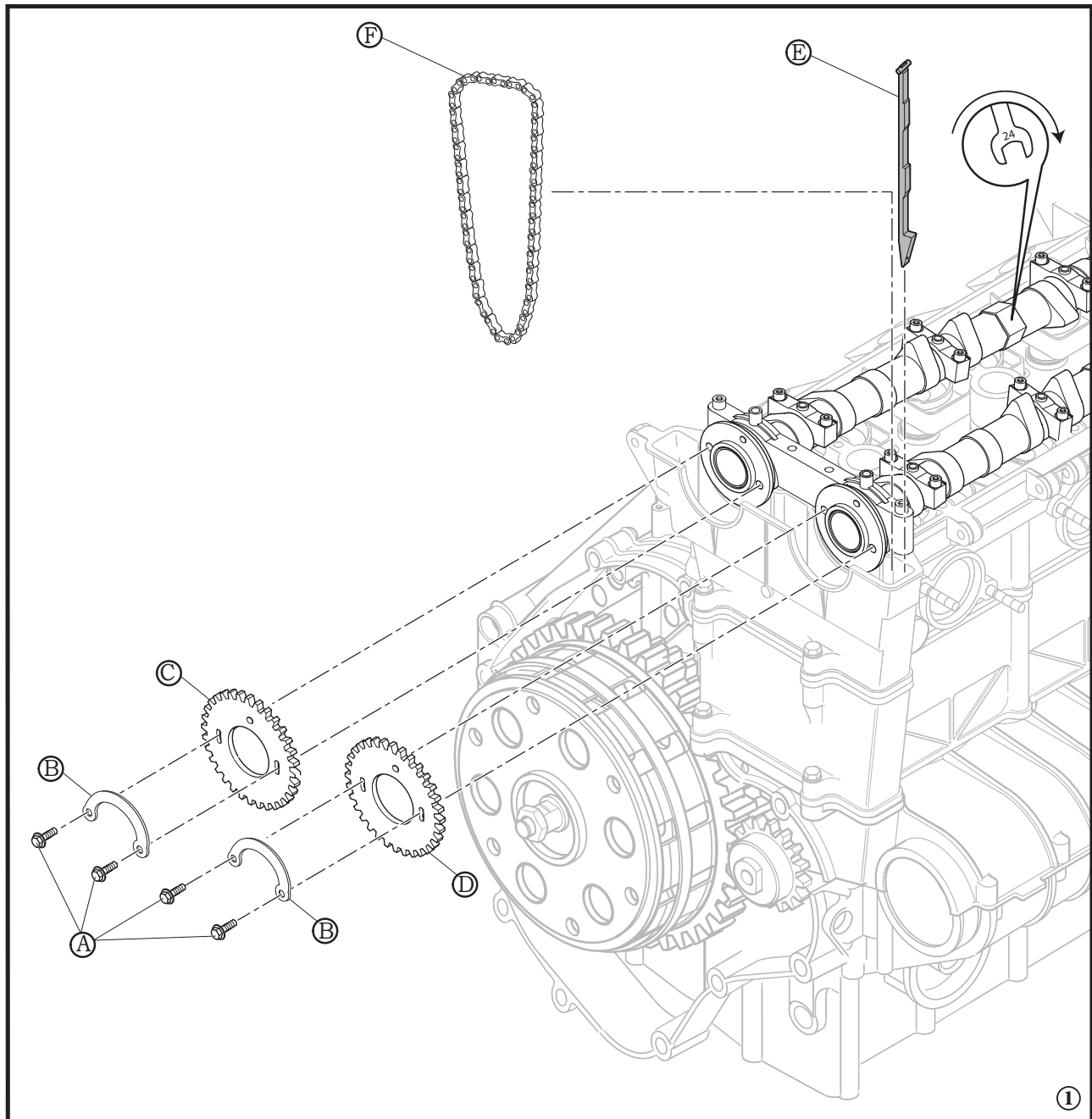
DISTRIBUTION CHAIN REMOVAL



SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1		Distribution Lid Removal Clutch Lid Removal Upper Chain Slide Removal Distribution Chain Tensioner Removal Phonic Wheel Removal Fixed Chain Slide Removal Inlet Z34 Gear Removal Drain Z34 Gear Removal Distribution Chain Removal Distribution Chain	1	Remove the pieces in the given order. See paragraph "5.1". See paragraph "5.69". See paragraph "5.8". See paragraph "5.5". See paragraph "5.18". See paragraph "5.15". See paragraph "5.8". See paragraph "5.10". NOTE: _____ Remove the chain from the engine. _____



DISTRIBUTION CHAIN REMOVAL



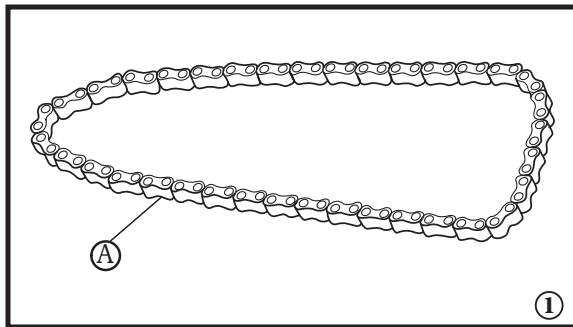
- ① Remove:
- the screws ①
 - the small plates ②
 - the Inlet Z34 gear ③
 - the Drain Z34 gear ④
 - the fixed slide ⑤
 - the distribution chain ⑥

NOTE: To remove the screws ① rotate the inlet cam clockwise using a 24 spanner.



DISTRIBUTION CHAIN CONTROL

The following procedure is applied to all cogwheels of the cam shafts and to all distribution chain guides.

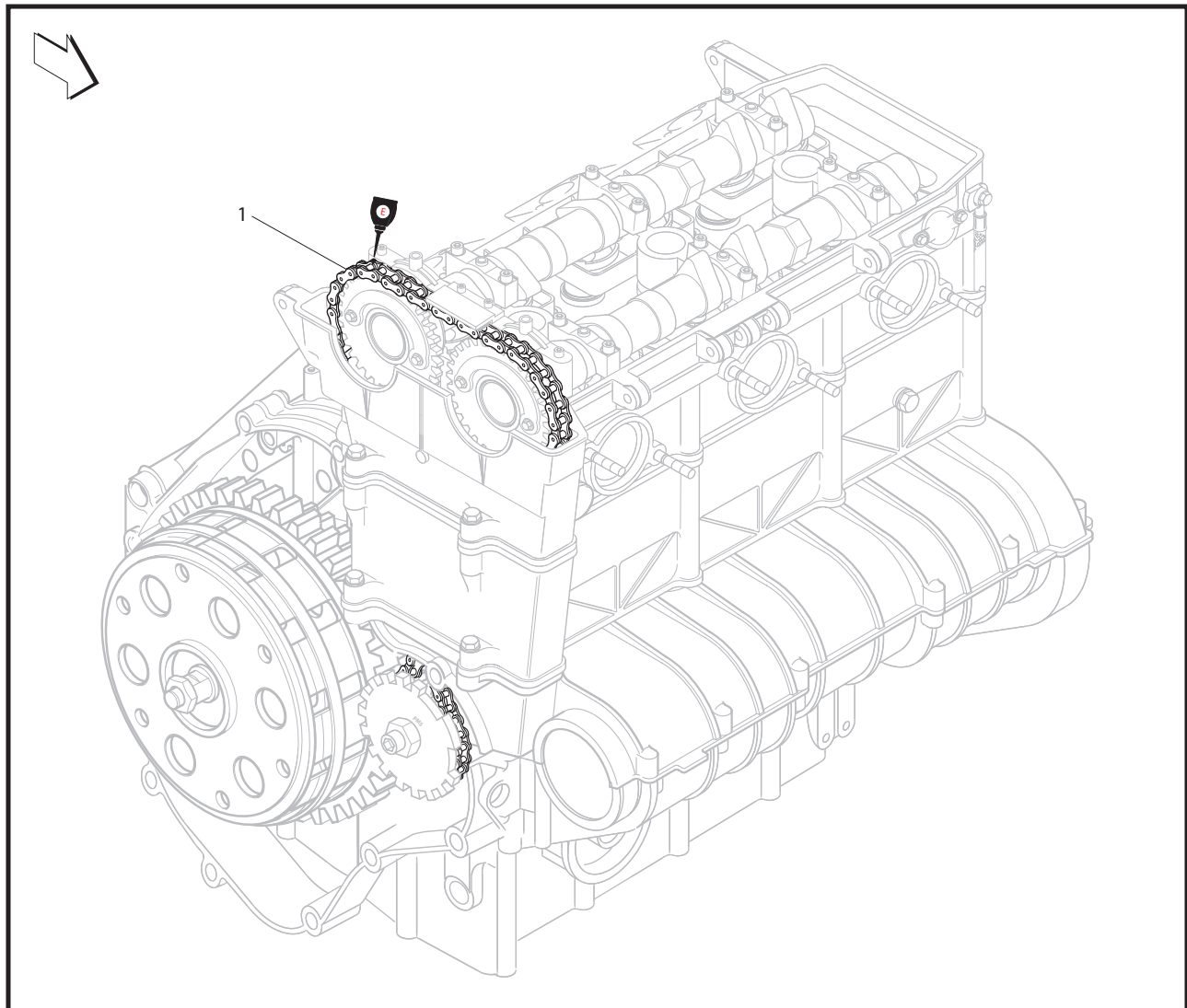


- ① Check:
- **the distribution chain** ①
- In the presence of damages/no flexibility/locked links
→ Replace the distribution chain together with the cam shaft gears.

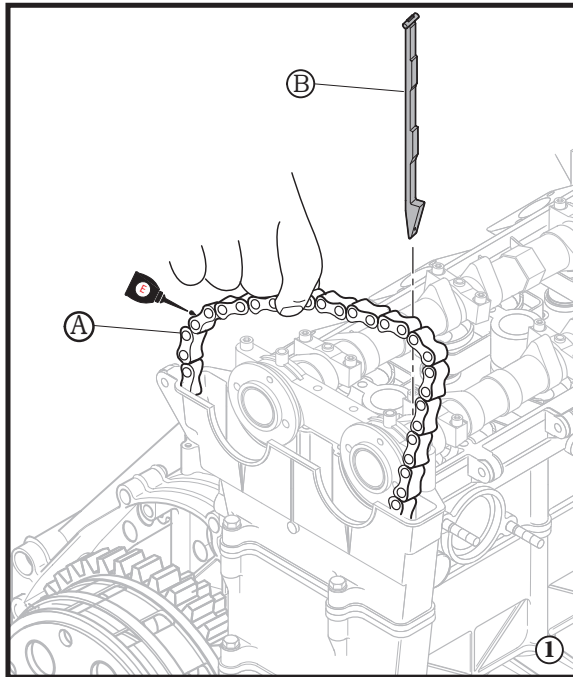
NOTE: _____
However, the distribution chain must be replaced when it exceeds 40.000 km. _____



DISTRIBUTION CHAIN INSTALLATION



SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1		Distribution Chain Installation Distribution Chain	1	Install the pieces in the given order. Operations to be carried out with the engine in PMS.



DISTRIBUTION CHAIN INSTALLATION AND ENGINE PHASING

ATTENTION

Carefully follow the instructions given in the various assembly phases.

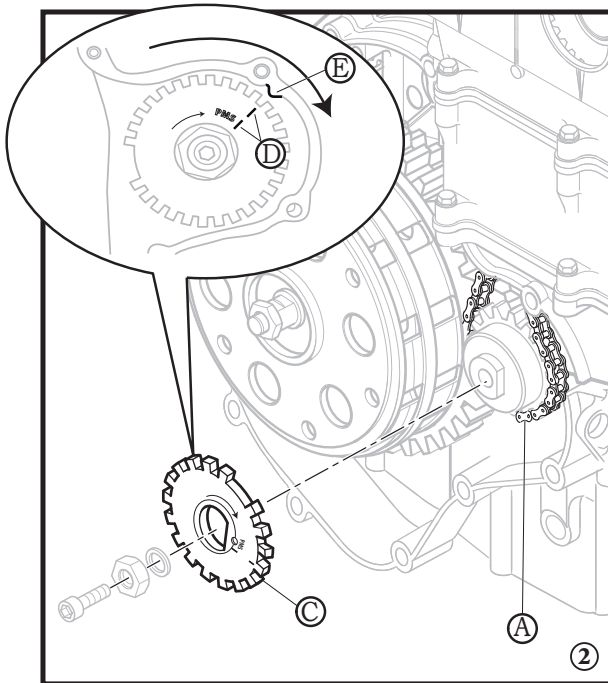
- ① Install:
- the distribution chain (A)
 - the fixed slide (B)

NOTE:

Lubricate the chain using engine oil.



Recommended lubricant
ENGINE OIL



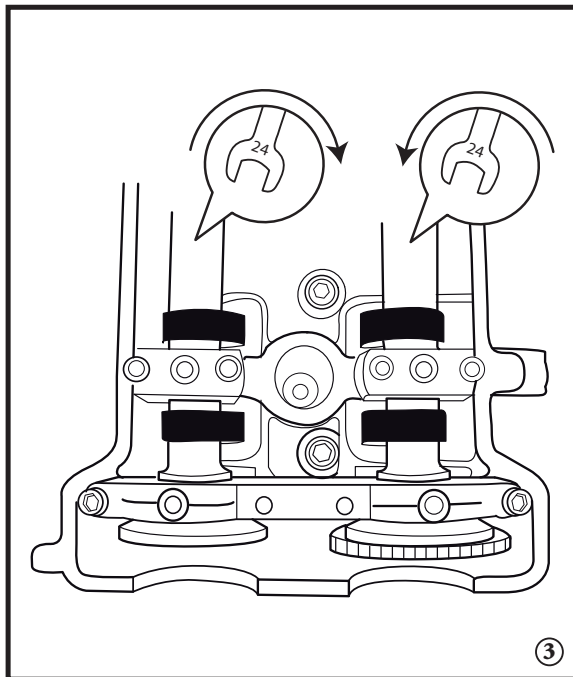
- ② Position:
- the distribution chain (A)
 - on the engine shaft gear.
 - the phonic wheel (C)
- See paragraph "5.20".

NOTE:

Rotate the phonic wheel clockwise by acting on the nut, bringing the PMS (D) aligned with the carter reference (E).

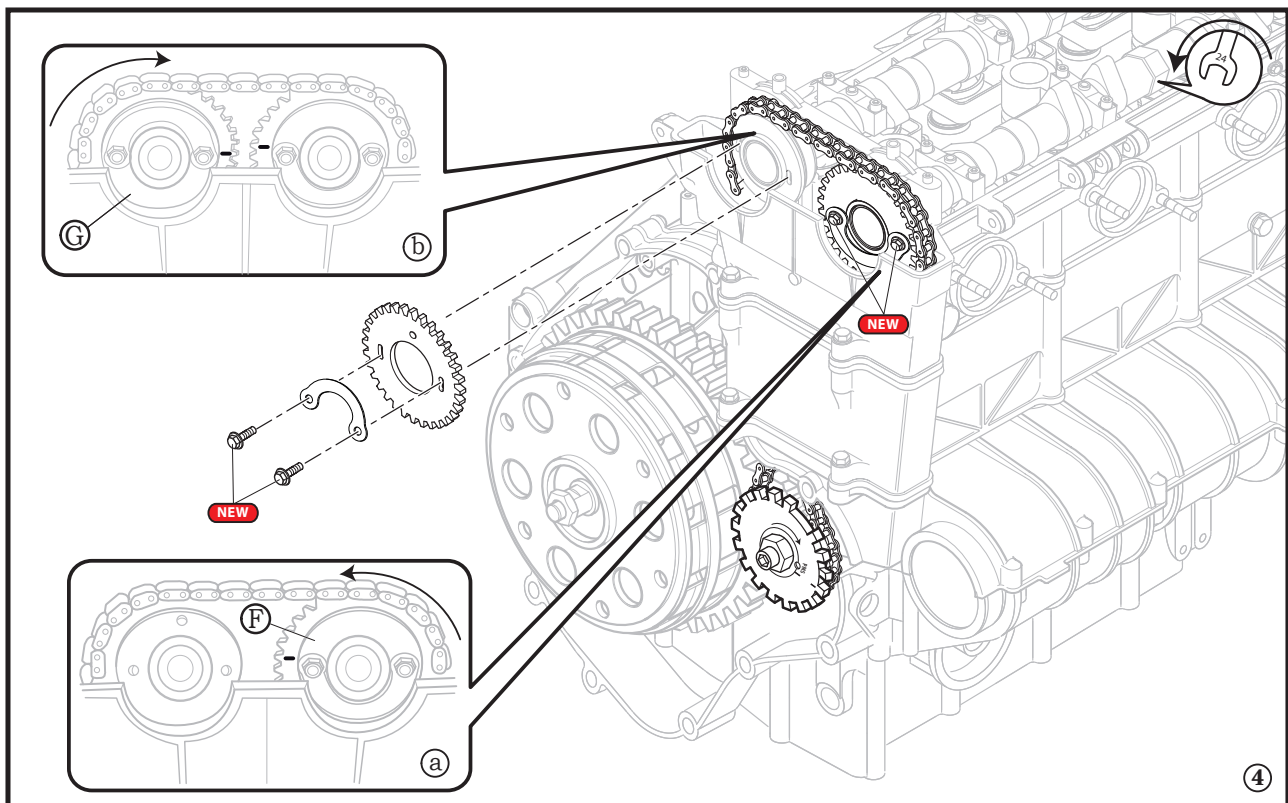
ATTENTION

This operation must be carried out with the distribution chain tensioned.



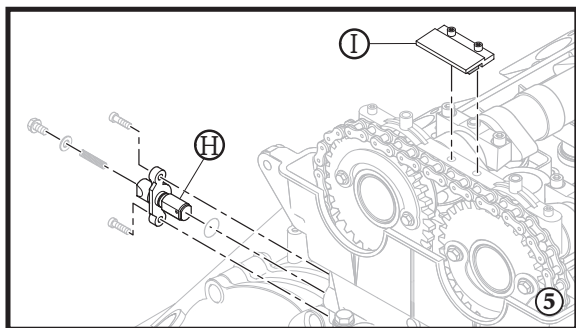
- ③ Rotate:
- **the drain and inlet cam shaft** in phase anti-clockwise using a 24 spanner, bringing the olives in cylinder 1, facing each other.

NOTE: _____
Engine phasing tolerance: 3°. _____



- ④ Install:
- **the Z34 gear** **(F)** (see paragraph "5.13"). Partially rotate the cam anti-clockwise using a 24 spanner in order to hook and tension the distribution chain, positioning the reference as shown in figure **(a)**.

- **the Z34 gear** **(G)** (see paragraph "5.14"). on the inlet shaft hooking the chain on to the already positioned gear as shown in figure **(b)**; therefore rotate the inlet cam reaching the stop point and relative insertion in the seat.

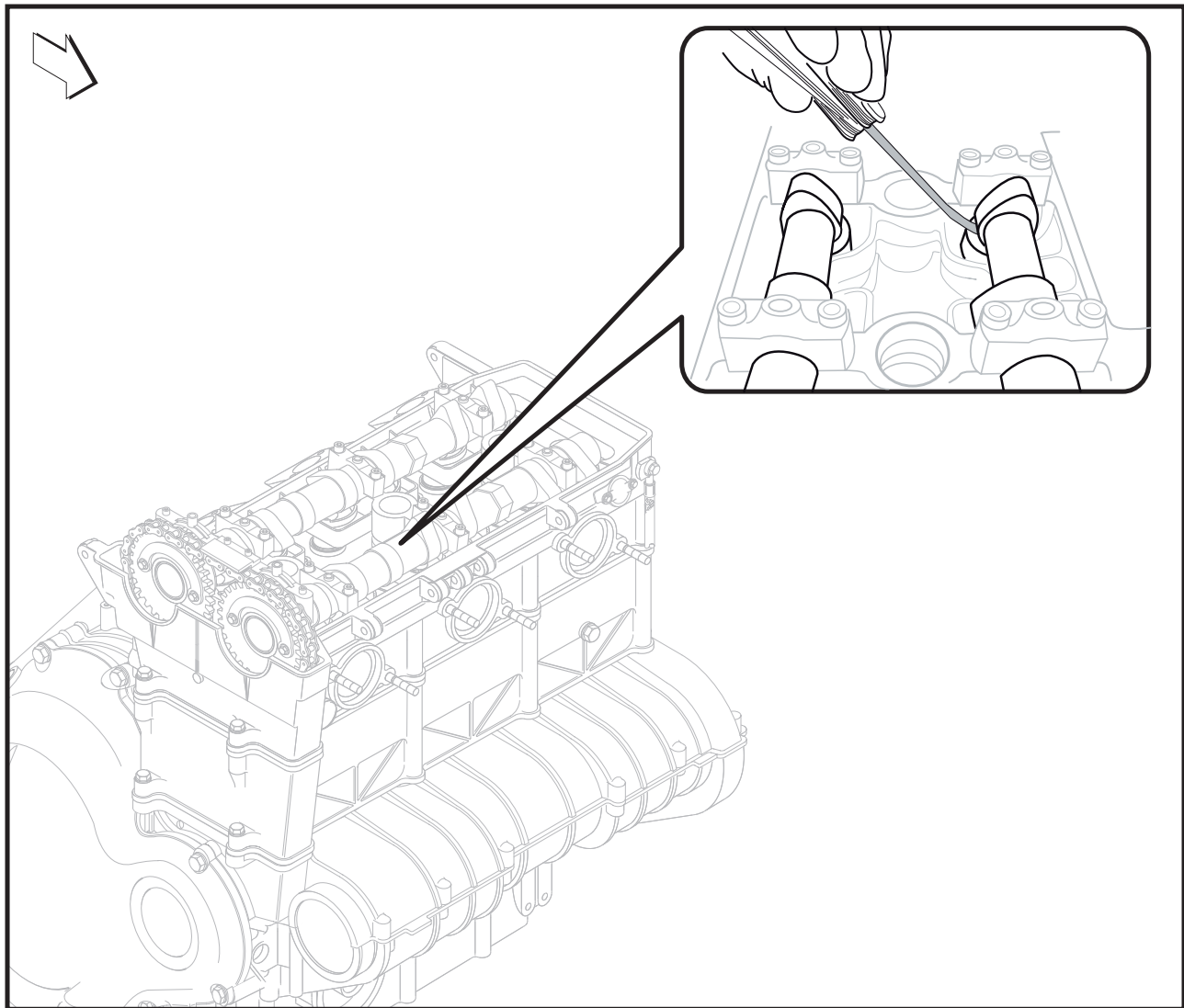


- ⑤ Install:
- **the chain tensioner** ⑧
See paragraph "5.7".
 - **the upper chain slide** ①
See paragraph "5.14".

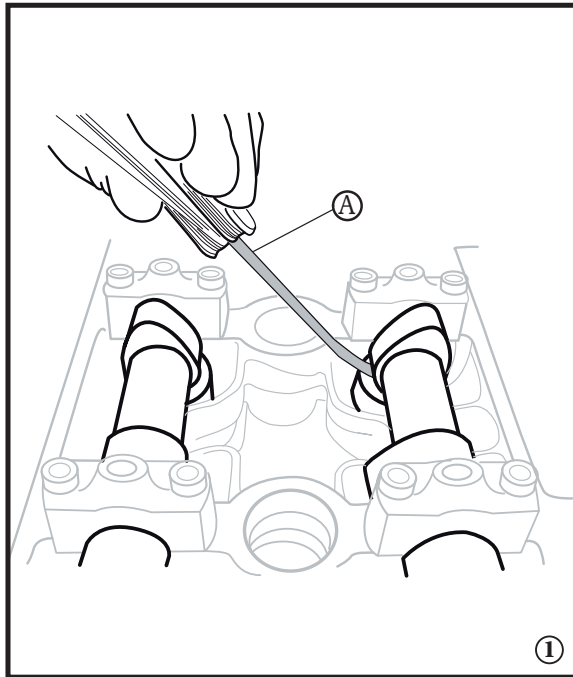
NOTE: Rotate the cam shafts using a spanner performing a full turn and bringing the engine in PMS.



VALVES CLEARANCE ADJUSTMENT



SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
		Distribution Lid Removal Valves Clearance Adjustment		Remove the pieces in the given order. Operations to be carried out with the engine in PMS. See paragraph "5.1"



VALVES CLEARANCE CONTROL AND ADJUSTMENT

- ① Measure:
- **the clearance between cams and cup** using a feeler ①.
- Position the cam as shown in the figure.
If out of specification → Replace the pad.
See paragraph "5.30".

NOTE: Measurement must be carried out on all shafts and cups.



Clearance between cup and shafts

Inlet

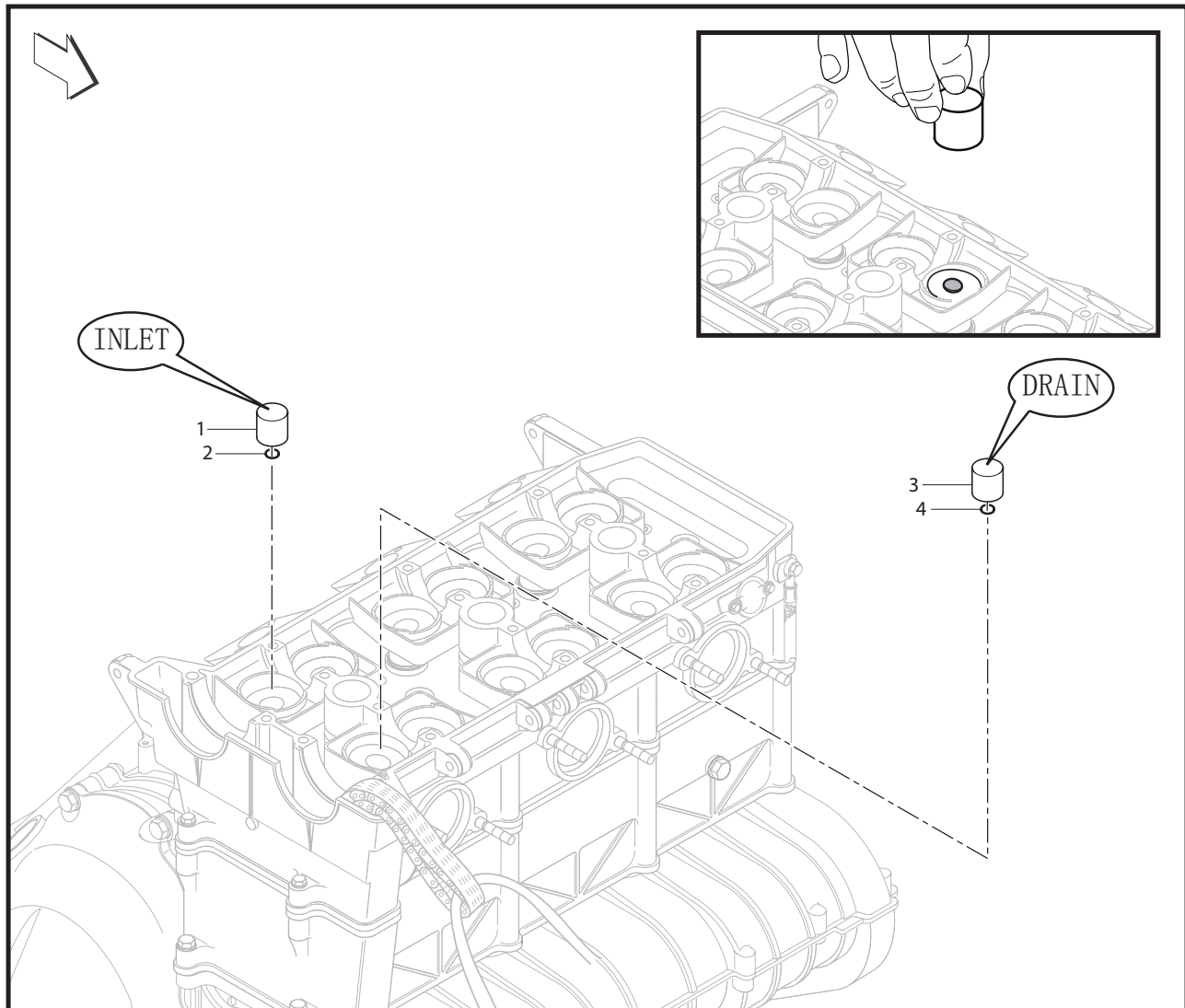
0.28 ~ 0.32 mm (0.028 ~ 0.032 in)

Drain

0.34 ~ 0.38 mm (0.034 ~ 0.038 in)



VALVES LIFTERS AND CALIBRATED PADS REMOVAL



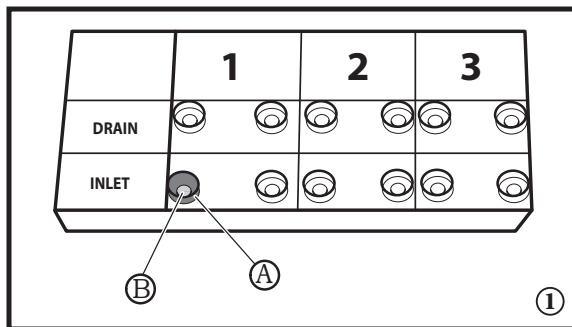
SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1 2 3 4		Distribution Lid Removal Distribution Chain Tensioner Removal Inlet Cam Shaft Removal Drain Cam Shaft Removal Valves Lifters And Calibrated Pads Removal Inlet Valve Lifter Inlet Valve Calibrated Pad Drain Valve Lifter Drain Valve Calibrated Pad	6 6 6 6	Remove the pieces in the given order. See paragraph "5.1". See paragraph "5.5". See paragraph "5.8". See paragraph "5.10".



VALVES LIFTERS AND CALIBRATED PADS REMOVAL

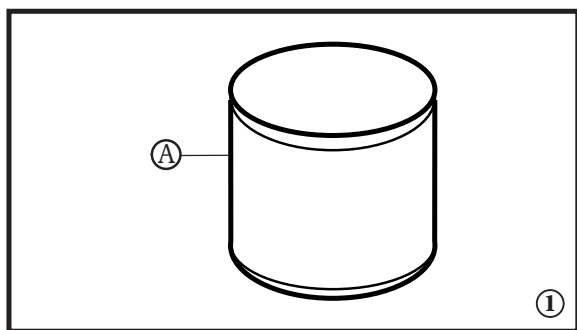
The following procedure is applied to all valve lifters and calibrated pads.

NOTE: Before removing the internal parts of the head (for example: valves, valves springs, valves seats), check that the valves are adequately sealed.



- ① Remove:
- the valves lifters (A)
 - the calibrated pad (B)

NOTE: Take note of the position of each valve lifter and of each pad in order to be able to re-assemble them in the correct position.



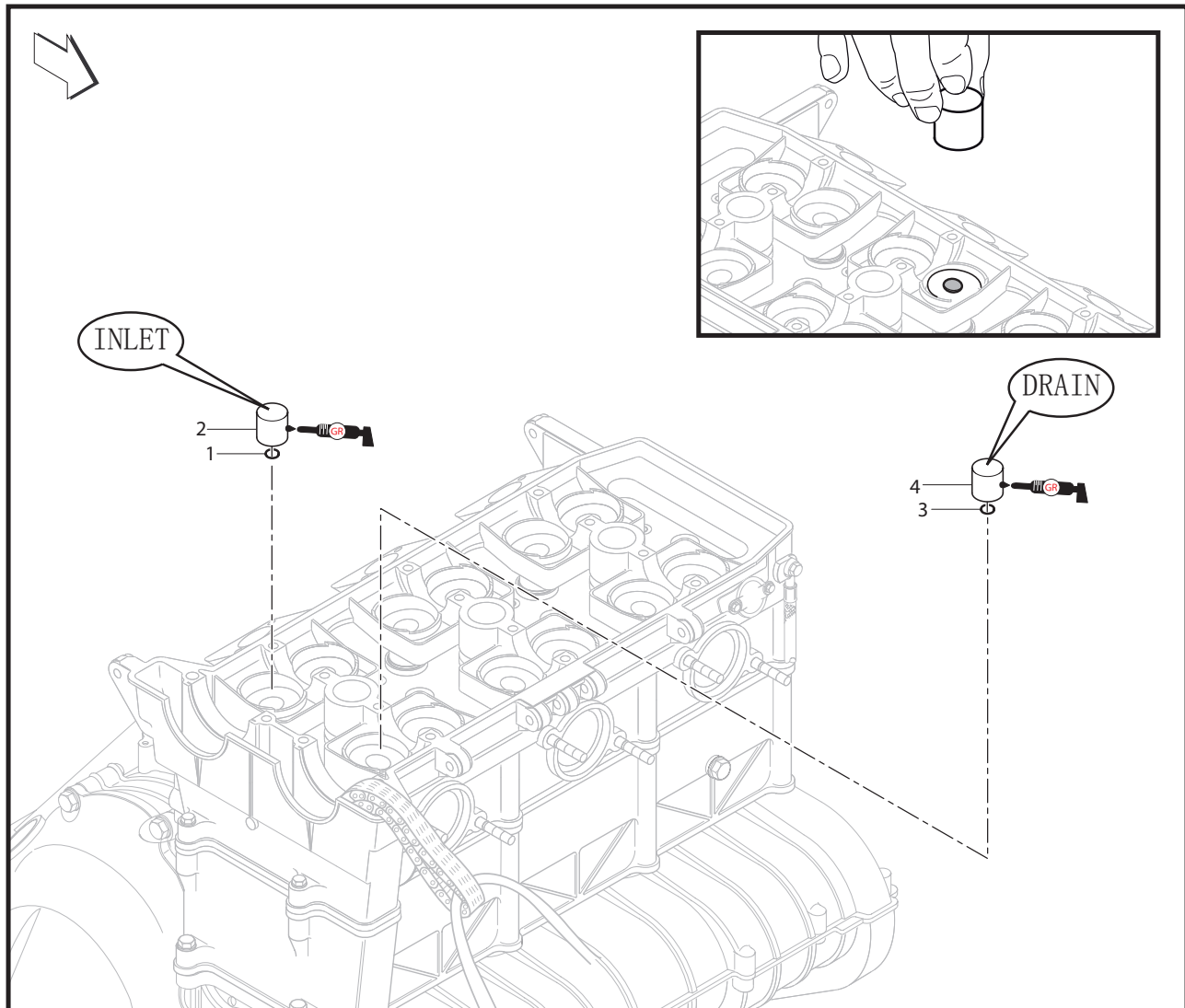
VALVES LIFTERS CONTROL

The following procedure is applied to all valves lifters.

- ① Check:
 - **the valves lifters** ①In the presence of damages/scratches → Replace the valves lifters.



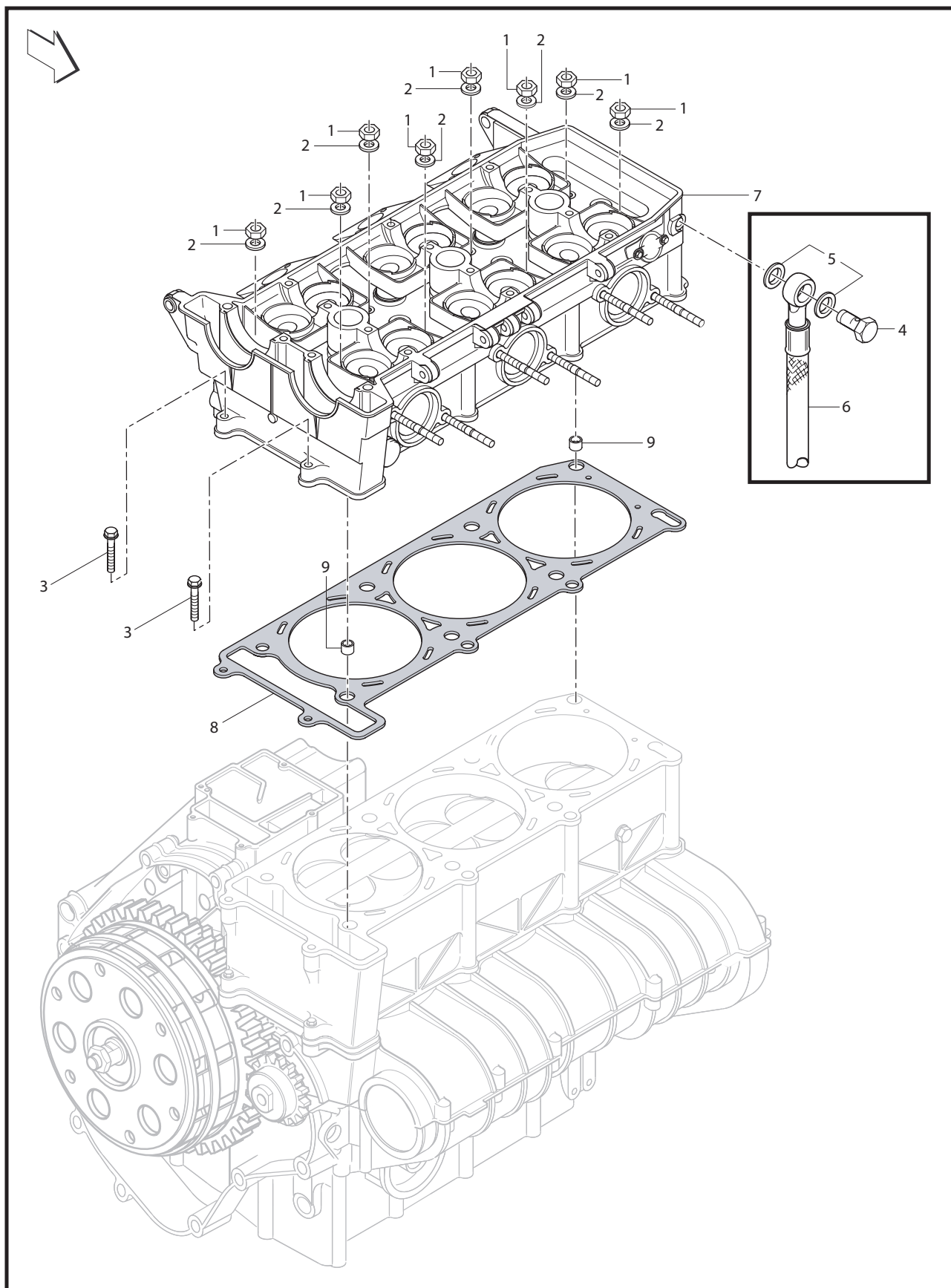
VALVES LIFTERS AND CALIBRATED PADS INSTALLATION



SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1		Valves Lifters And Calibrated Pads Installation Inlet Valve Calibrated Pad Inlet Valve Lifter Drain Valve Calibrated Pad	6	Install the pieces in the given order. NOTE: _____ Always check the valves clearance. See paragraph "5.29". _____
2			6	
3			6	
4			6	



HEAD REMOVAL



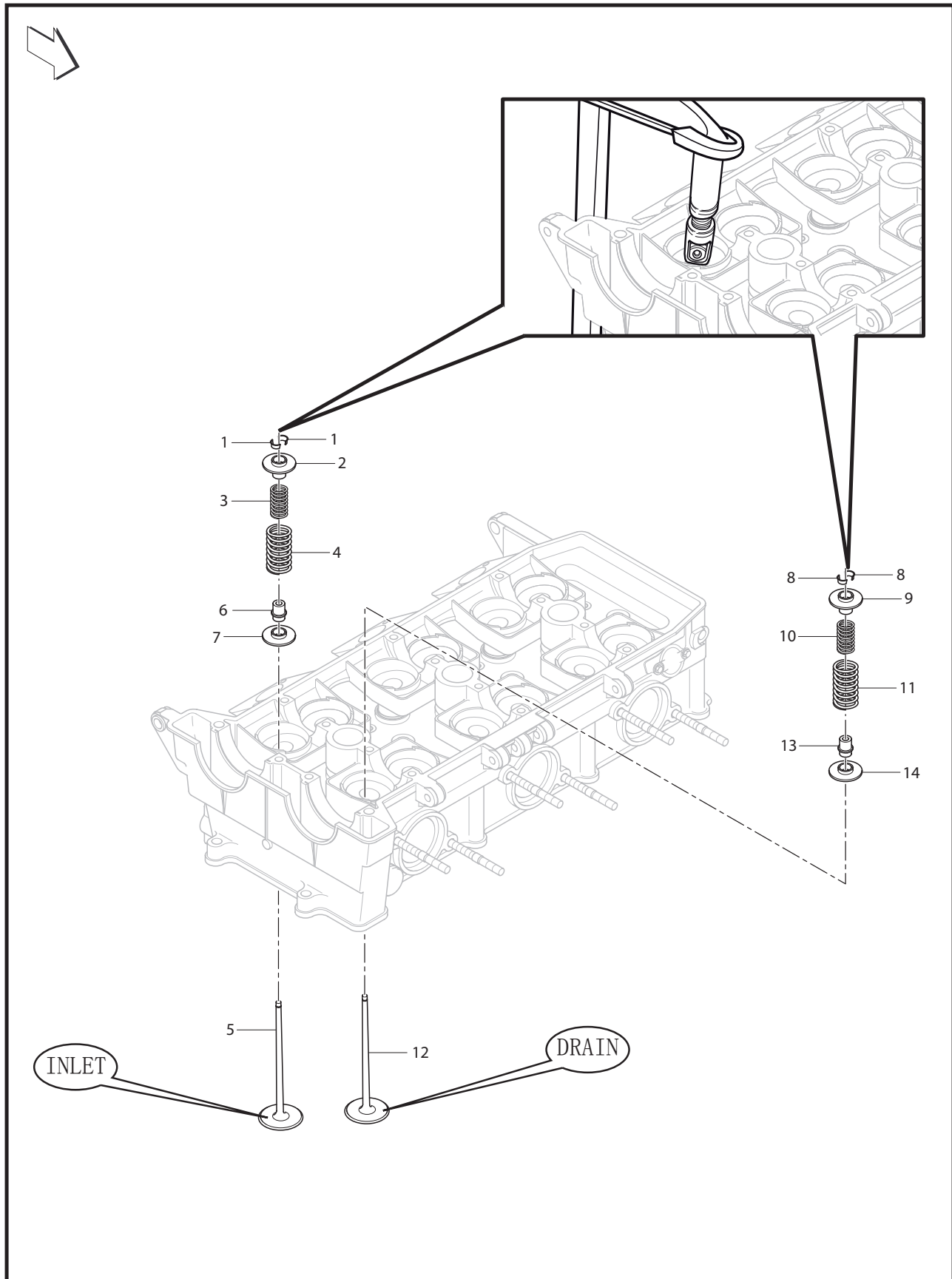


HEAD REMOVAL

SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1		Engine Removal Distribution Lid Removal Distribution Chain Tensioner Removal Inlet Cam Shaft Removal Drain Cam Shaft Removal Clutch Lid Removal Chain Slides Removal Phonic Wheel Removal Distribution Chain Removal Head Removal Nut	8	Remove the pieces in the given order. See "FRAME 4.107" paragraph. See paragraph "5.1". See paragraph "5.5". See paragraph "5.8". See paragraph "5.10". See paragraph "5.69". See paragraph "5.15". See paragraph "5.18". See paragraph "5.21". NOTE: _____ Loosen each nut by ½ a turn at a time. After having completely loosened all nuts, remove them. _____
2		Washer	8	
3		Screw	2	
4		Special Screw	1	
5		Seal Washer	2	
6		Tube	1	
7		Head	1	
8		Head Gasket	1	
9		Reference Plug	2	



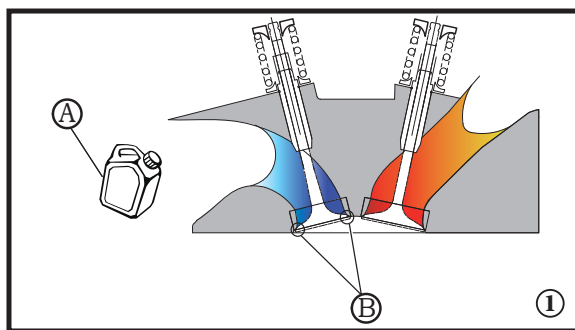
VALVES AND VALVES SPRINGS REMOVAL





VALVES AND VALVES SPRINGS REMOVAL

SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
		Engine Removal Distribution Lid Removal Distribution Chain Tensioner Removal Inlet Cam Shaft Removal Drain Cam Shaft Removal Clutch Lid Removal Chain Slides Removal Phonic Wheel Removal Distribution Chain Removal Valves Lifters And Calibrated Pads Removal Head Removal Valves And Valves Springs Removal		Remove the pieces in the given order. See "FRAME 4.107" paragraph. See paragraph "5.1". See paragraph "5.5". See paragraph "5.8". See paragraph "5.10". See paragraph "5.69". See paragraph "5.15". See paragraph "5.18". See paragraph "5.21". See paragraph "5.30". See paragraph "5.34".
1		Inlet Valve Split Pin	12	NOTE: _____ Carefully identify the position of each part in order to be able to re-assemble it correctly. _____ NOTE: _____ The valves removal initial procedure is irrelevant. _____
2		Inlet Valve Upper Spring Plate	6	
3		Inlet Valve Internal Spring	6	
4		Inlet Valve External Spring	6	
5		Inlet Valve	6	
6		Inlet Valve Oil Retainer	6	
7		Inlet Valve Lower Spring Plate	6	
8		Drain Valve Split Pin	12	
9		Drain Valve Upper Spring Plate	6	
10		Drain Valve Internal Spring	6	
11		Drain Valve External Spring	6	
12		Drain Valve	6	
13		Drain Valve Oil Retainer	6	
14		Drain Valve Lower Spring Plate	6	

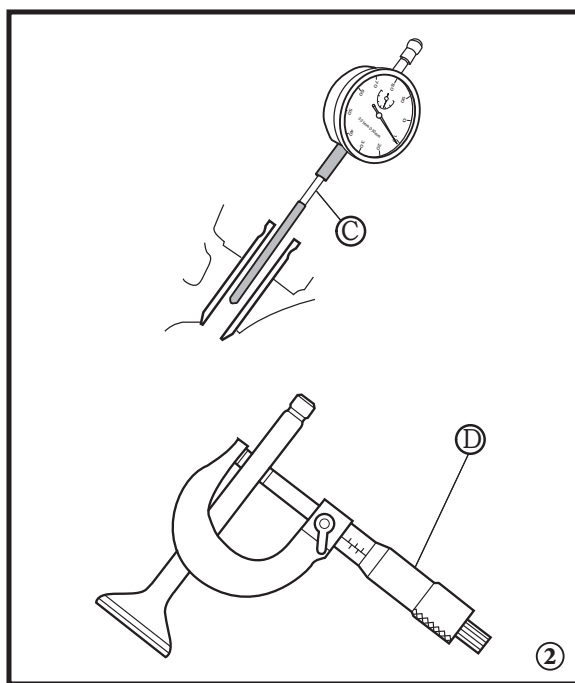


VALVES AND RELATIVE GUIDES CONTROL

The following procedure is applied to all valves and valves guides.

- ① Check:
 - **the valves seal**
In the presence of leaks of the valves seats →
Check the contact surface, the seat and the width of the valve seat.
See paragraph "5.41".
 - a) Pour clean solvent ① inside the inlet doors.
 - b) Check that the valves are adequately sealed.

NOTE:
There must be no leaks from the valve seat ②.



- ② Measure:
 - **the clearance between stem and valve guide**

Clearance between stem and valve guide =
C valve guide internal diameter
- D valve stem diameter

If out of specification → Replace the valve guide.



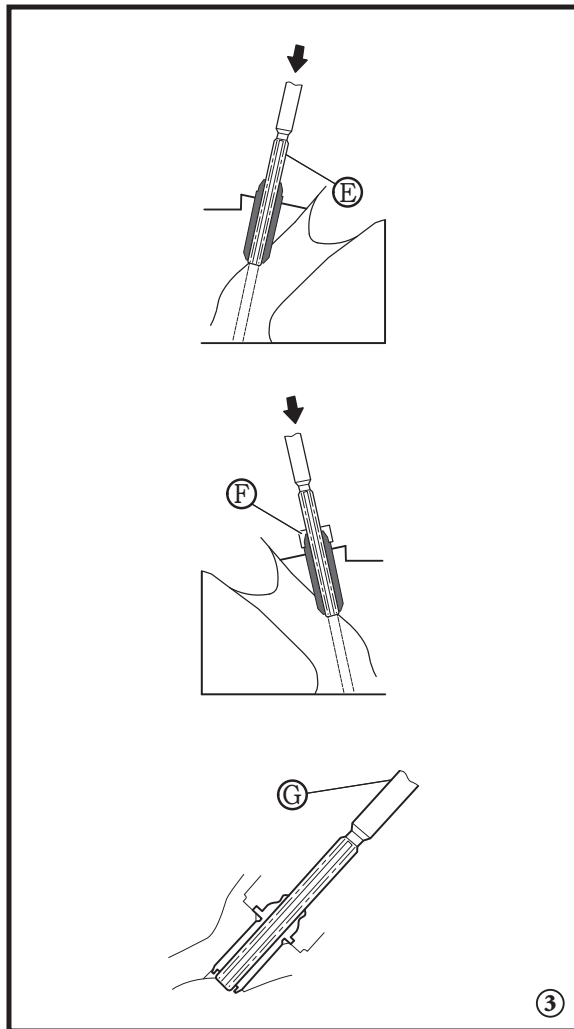
Clearance between valve stem and valve guide

Inlet

0.0010 ~ 0.0037 mm
(0.000039 ~ 0.00014 in)

Drain

0.025 ~ 0.052 mm
(0.00098 ~ 0.0020 in)



- ③ Replace:
• **the valve guide**

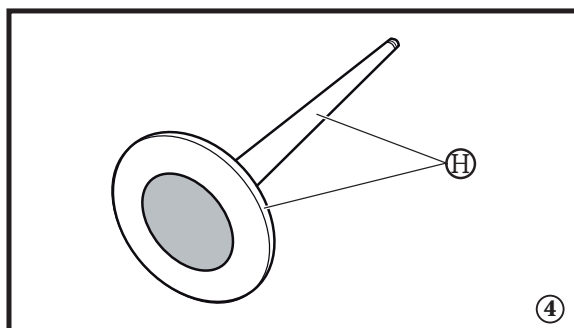
NOTE:

To facilitate the removal and installation of the valve guide operations and to maintain assembly correct, heat the head in an oven bringing it to 100° C (212° F).

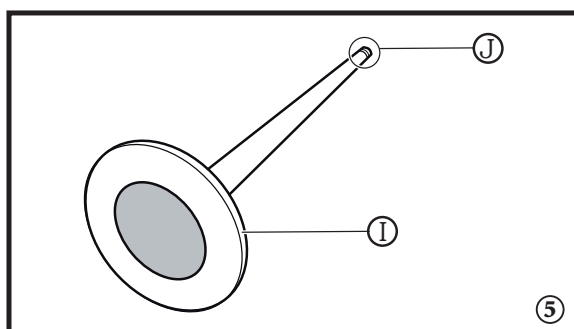
- (a) Remove the valve guide using an appropriate extractor (E).
- (b) Install the new valve guide using an appropriate installer (F) and extractor (E).
- (c) After having installed the valve guide, bore it using a borer (G) to obtain the correct clearance between the stem and valve guide.

NOTE:

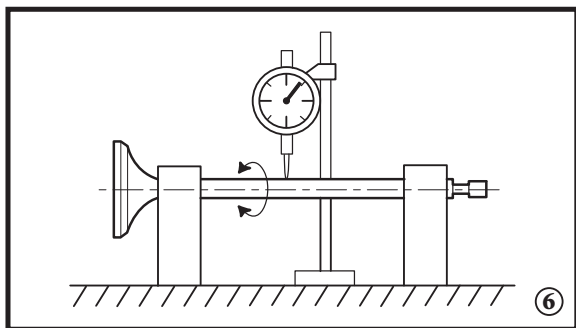
After having re-assembled the valve guide, trim the seat.



- ④ Eliminate:
• **the carbonaceous deposits (H)**
(from the contact surface and from the valve seat)



- ⑤ Check:
• **the contact surface of the valve (I)**
In the presence of pittings/wear → Rectify the contact surface of the valve.
• **the end of the valve stem (J)**
In the presence of a template or diameter of the head greater than the body of the valve stem → Replace the valve.



- ⑥ Measure:
- **the eccentricity of the valve stem**
If out of specification → Replace the valve.

NOTE:

- If a new valve is installed, always replace the relative guide.
- If the valve is disconnected or re-assembled, always replace the oil retainer.



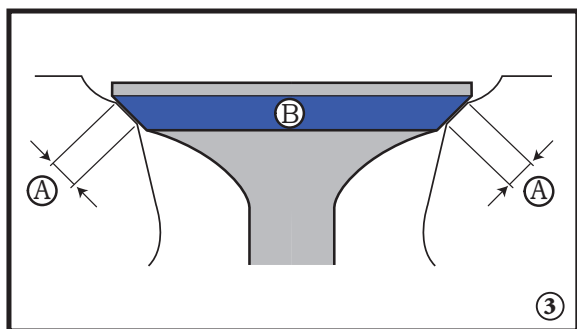
Valve stem eccentricity
0.015 mm (0.0005 in)



VALVES SEATS CONTROL

The following procedure is applied to all valves and valves seats.

- ① Eliminate:
 - **the carbonaceous deposits**
(from the contact surface and from the valve seat ①)
- ② Check:
 - **the valve seat ①**
In the presence of pittings/wear → Replace the head.
- ③ Measure:
 - **the width of the valve seat ①**
If out of specification → Replace the head.



Valve seat width

Inlet

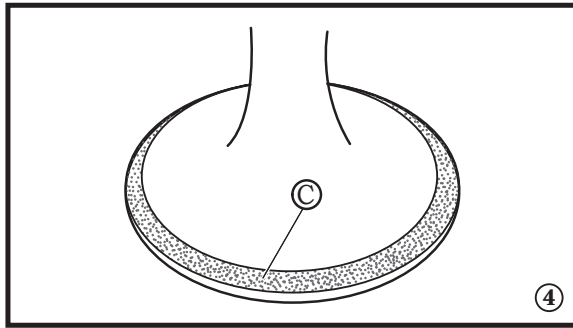
0.9 ~ 1.1 mm (0.035 ~ 0.043 in)

Drain

0.9 ~ 1.1 mm (0.035 ~ 0.043 in)

- ① Apply some blue colouring (Dykem) for mechanics ① on the contact surface of the valve.
- ② Install the valve in the head.
- ③ Push the valve inside the guide and against its seat to leave a well-defined impression.
- ④ Measure the width of the valve seat.

NOTE: Where the valve seat and the valve face touch each other, the Prussian blue will result removed.



- ④ Lappa
- the contact surface of the valve
 - the valve seat

NOTE:

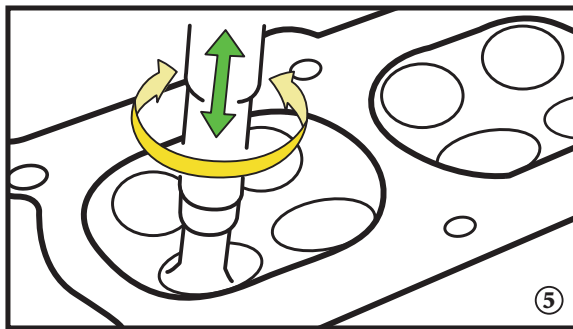
After having replaced the head or the valve and the relative guide, the seat and the contact surface of the valve must be lapped.

- Ⓐ Apply a rough lapping paste © on the contact surface of the valve.

ATTENTION

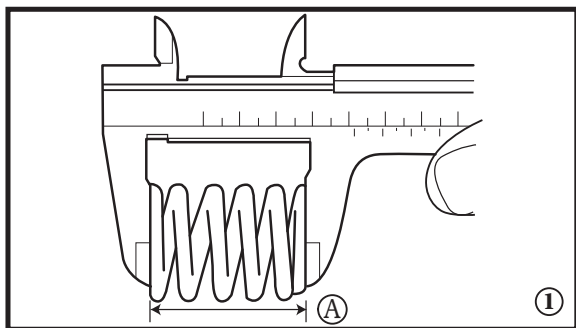
Avoid the lapping paste penetrating in the space between the valve stem and the guide.

- Ⓑ Apply molybdenum disulphide oil on the valve stem.
- Ⓒ Install the valve in the head.
- Ⓓ Rotate the valve until the contact surface and its seat are evenly polished, then remove all lapping paste.

**NOTA:**

To obtain the best lapping results, slightly spot the valve seat whilst manually rotating it forwards and backwards. Figure ⑤

- Ⓔ Apply a thin lapping paste on the surface contact of the valve and repeat the above procedure.
- Ⓕ After every lapping operation, it is important to remove every trace of lapping paste from the contact surface and from the valve seat.
- Ⓖ Apply blue colouring (Dykem) for mechanics on the contact surface of the valve.
- Ⓗ Install the valve in the head.
- Ⓘ Push the valve inside the guide and against its seat to leave a well-defined impression.



INTERNAL AND EXTERNAL VALVES SPRINGS CONTROL

The following procedure is applied to all valves springs.

- ① Measure:
 • **the free length of the valves springs** ①
 If out of specification → Replace the valve spring.



Valves springs free length

External spring

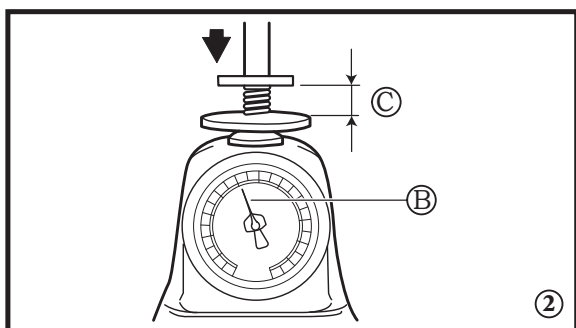
inlet: 38.5 mm (1.515 in)

drain: 36 mm (1.417 in)

Inside spring

inlet: 35 mm (1.377 in)

drain: 33 mm (1.299 in)



- ② Measure:
 • **the force of the compressed valve spring** ②
 If out of specification → Replace the valve spring.

© Installed length



Force of the compressed valve spring (installed)

External valve spring

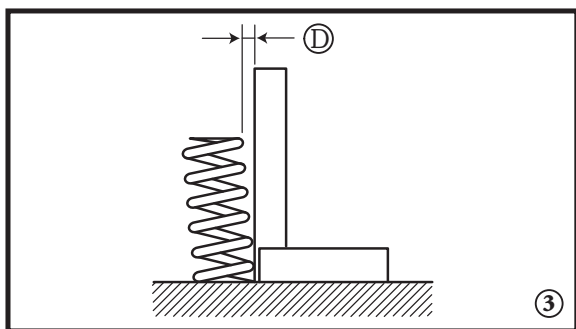
186 N m (18.96 Kg·m)

a 32.8 mm (1.29 in)

Drain valve spring

32.5 N m (3.31 Kg·m)

a 30.8 mm (1.21 in)



- ③ Measure:
 • **the inclination of the valves springs** ③
 If out of specification → Replace the valve spring.



Spring inclination limit

Inlet valve spring

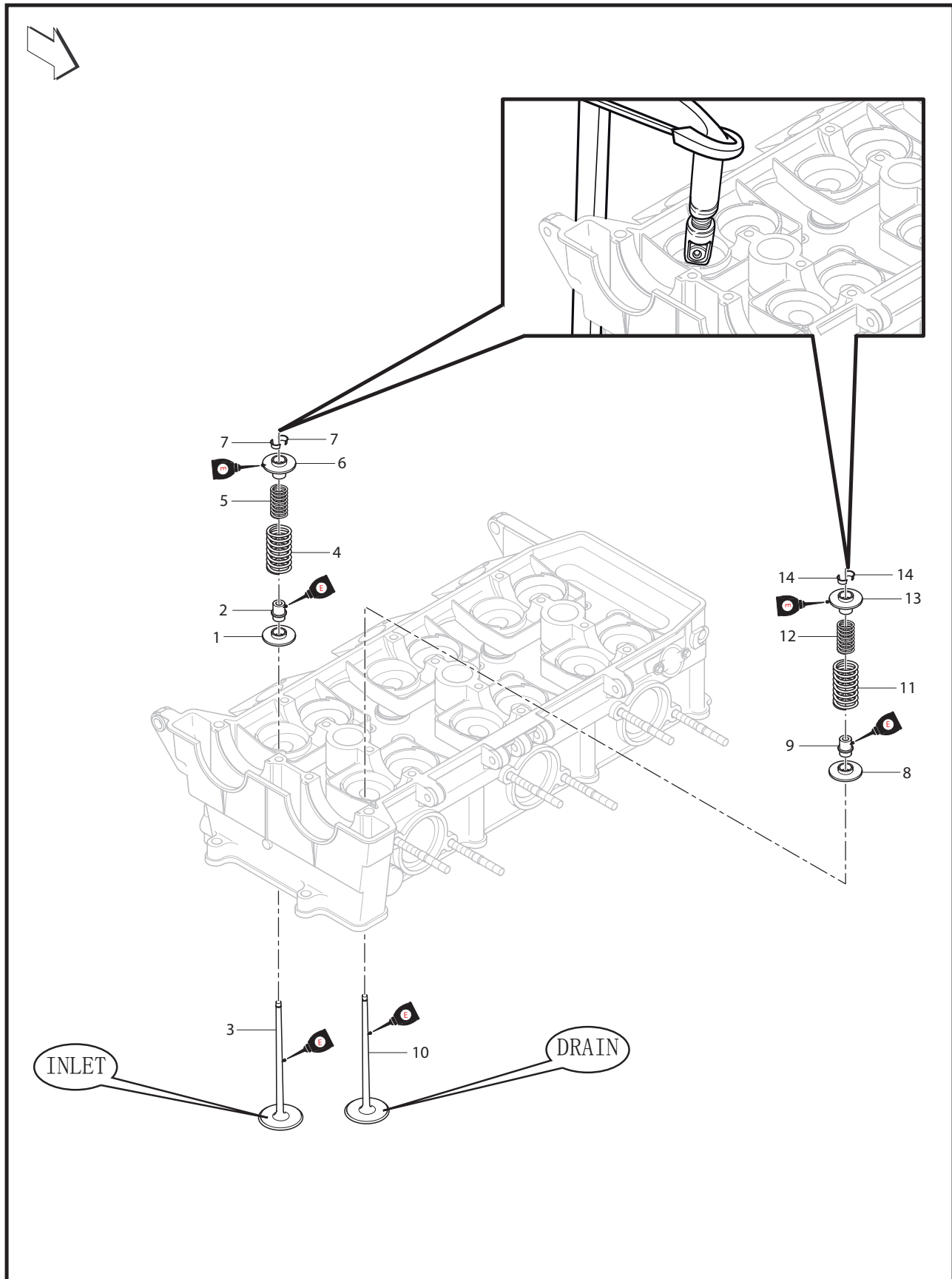
1.7 mm (0.06 in)

Drain valve spring

1.7 mm (0.06 in)



VALVES AND VALVES SPRINGS INSTALLATION



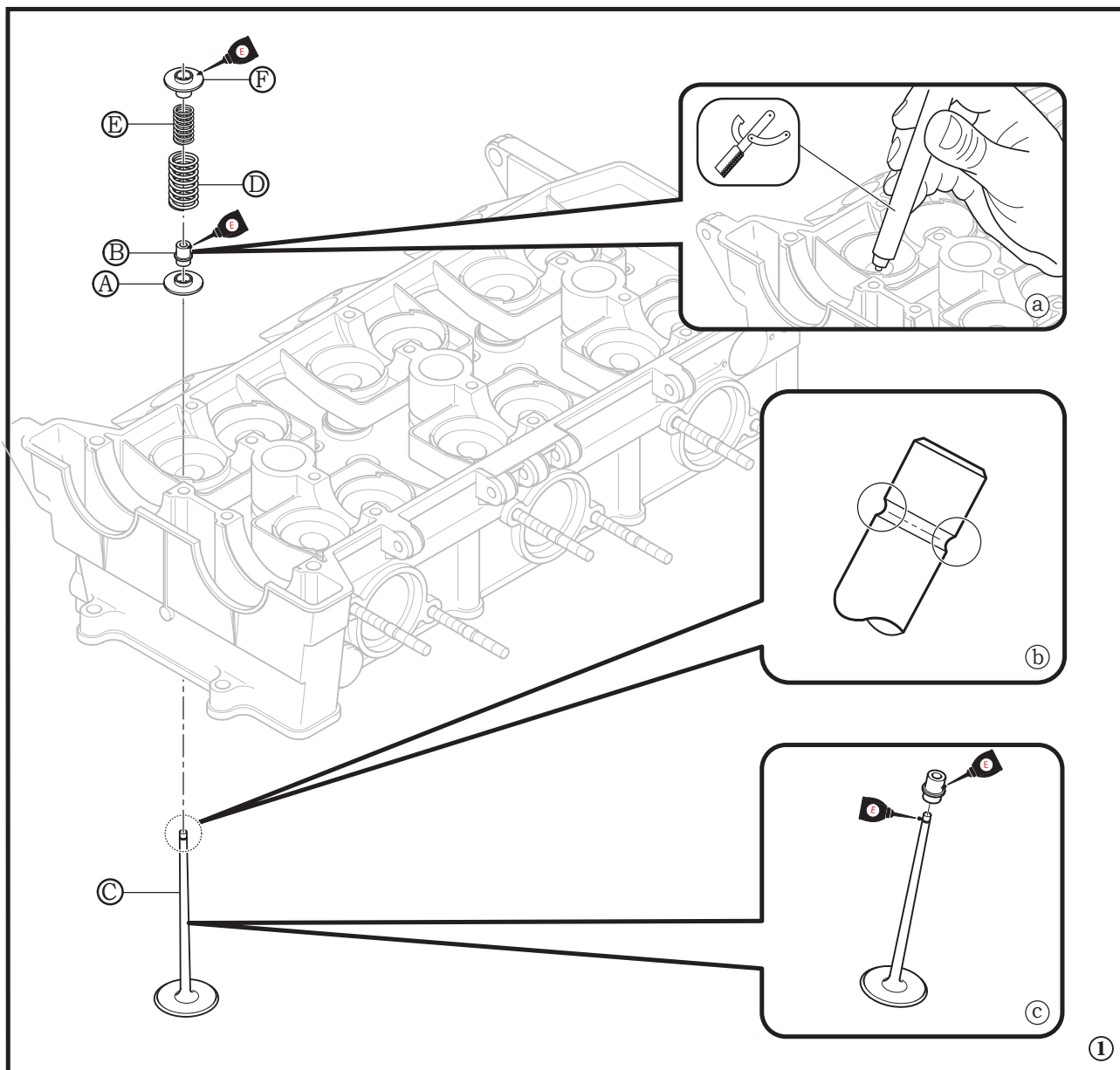


VALVES AND VALVES SPRINGS INSTALLATION

SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1		Valves And Valves Springs Installation	6	Install the pieces in the given order.
2		Inlet Valve Lower Spring Plate	6	
3		Inlet Valve Oil Retainer	6	
4		Inlet Valve	6	
5		Inlet Valve External Spring	6	
6		Inlet Valve Internal Spring	6	
7		Inlet Valve Upper Spring Plate	6	
8		Inlet Valve Split Pin	12	
9		Drain Valve Lower Spring Plate	6	
10		Drain Valve Oil Retainer	6	
11		Drain Valve	6	
12		Drain Valve External Spring	6	
13		Drain Valve Internal Spring	6	
14		Drain Valve Upper Spring Plate	6	
		Drain Valve Split Pin	12	



VALVES AND VALVES SPRINGS INSTALLATION



- ① Install in the head:
- the valve lower spring plate **A**
 - the valve oil retainer **B** (see figure **a**)
 - the valve **C**
 - the external valve spring **D**
 - the internal valve spring **E**
 - the upper spring plate **F**

NOTE: Trim the end of the valve stem using a stone to thinly sharpen (see figure **b**).

NOTE: Ensure that every valve has been re-assembled in its original position.

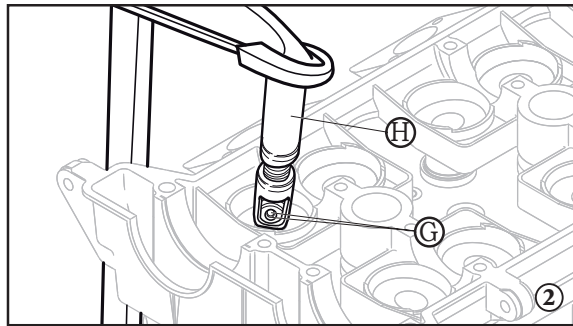
NOTE: Lubricate the valve stem and the valve oil retainer **C**.



Recommended lubricant
ENGINE OIL



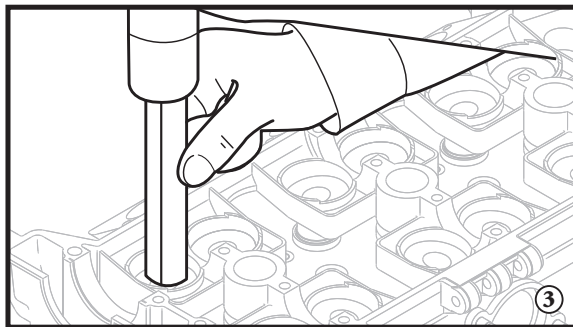
Special Tools: BUFFER FOR VALVES OIL RETAINER
Code: R180197025000



- ② Install:
• the valve pins ⑥

NOTE:

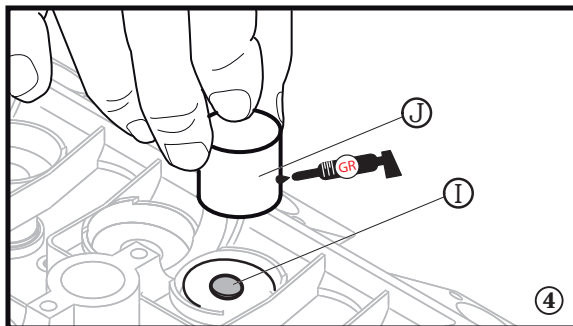
Re-assemble the valves' pins by compressing the spring of each valve using the appropriate compression tool ⑧.



- ③ Fix:
• the pins on to the valves stems
Delicately hit the point of the valve using a soft hammer.

ATTENTION

Hitting the point of the valve with excessive force may damage the same valve.



- ④ Install:
• the calibrated pad ①
• the valves lifters ②

NOTE:

- Lubricate the valve lifter using copper grease MOLYKOTE HSC PLUS.
- By manually rotating the valve lifter, it must move smoothly.
- Re-assemble each valve lifter and pad in the original position.

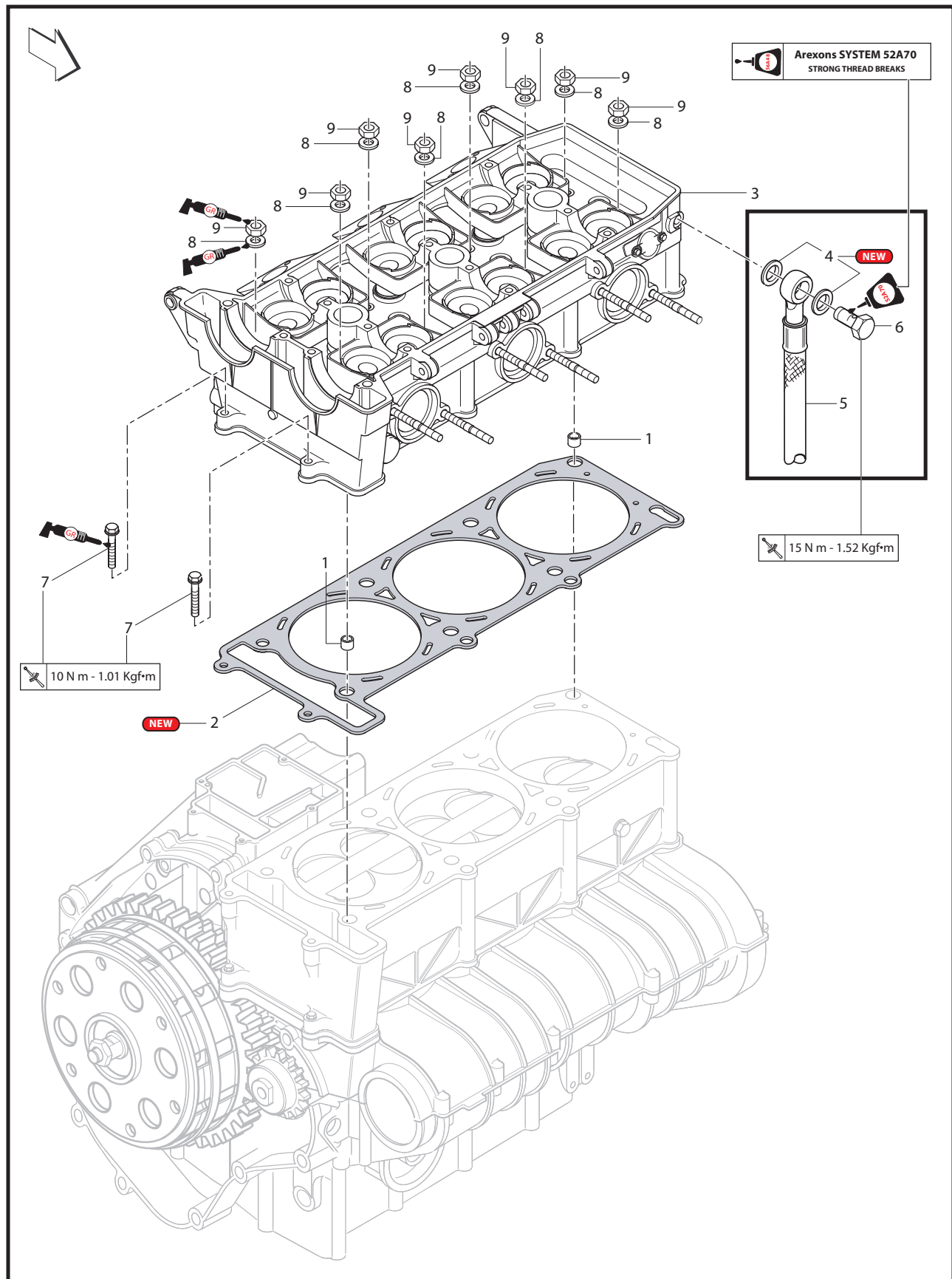
This procedure is applied to all valves and relative components.



Recommended lubricant
COPPER GREASE



HEAD INSTALLATION



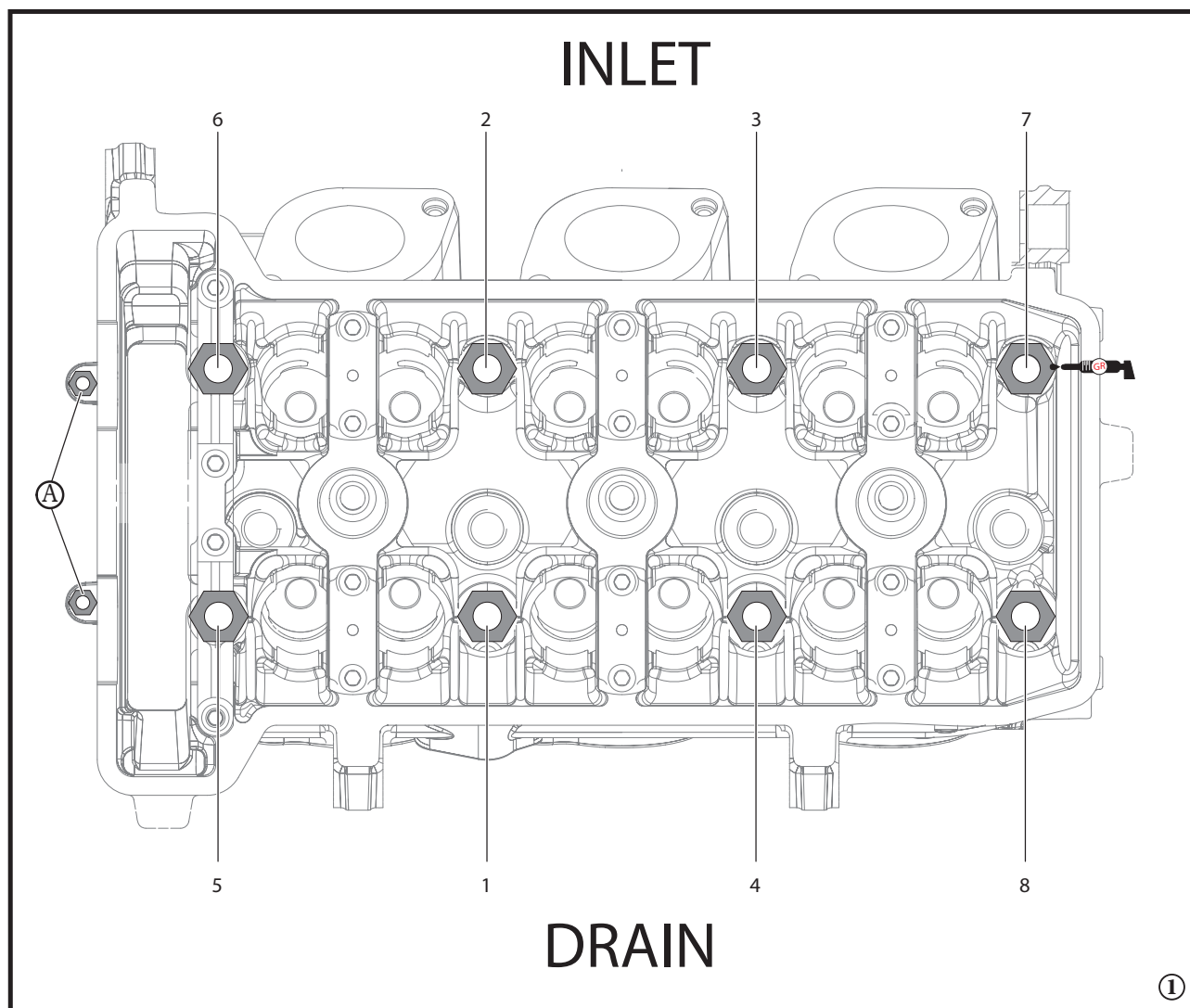


HEAD INSTALLATION

SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1		Head Installation	2	Install the pieces in the given order.
2		Reference Plug	1	
3		Head Gasket	1	
4		Head	1	
5		Seal Washer	2	
6		Tube	1	
7		Special Screw	1	
8		Screw	2	
9		Washer	8	
		Nut	8	



HEAD INSTALLATION



① Fasten the nuts (1 ~ 8) respecting the fastening sequence:

1st phase: 25 N m - 2.54 Kgf·m

2nd phase: 45 N m - 4.58 Kgf·m

3rd phase: 50° angle pair

4th phase: 50° angle pair

5th phase: fasten the screws ① 10 N m - 1.01 Kgf·m

NOTE:

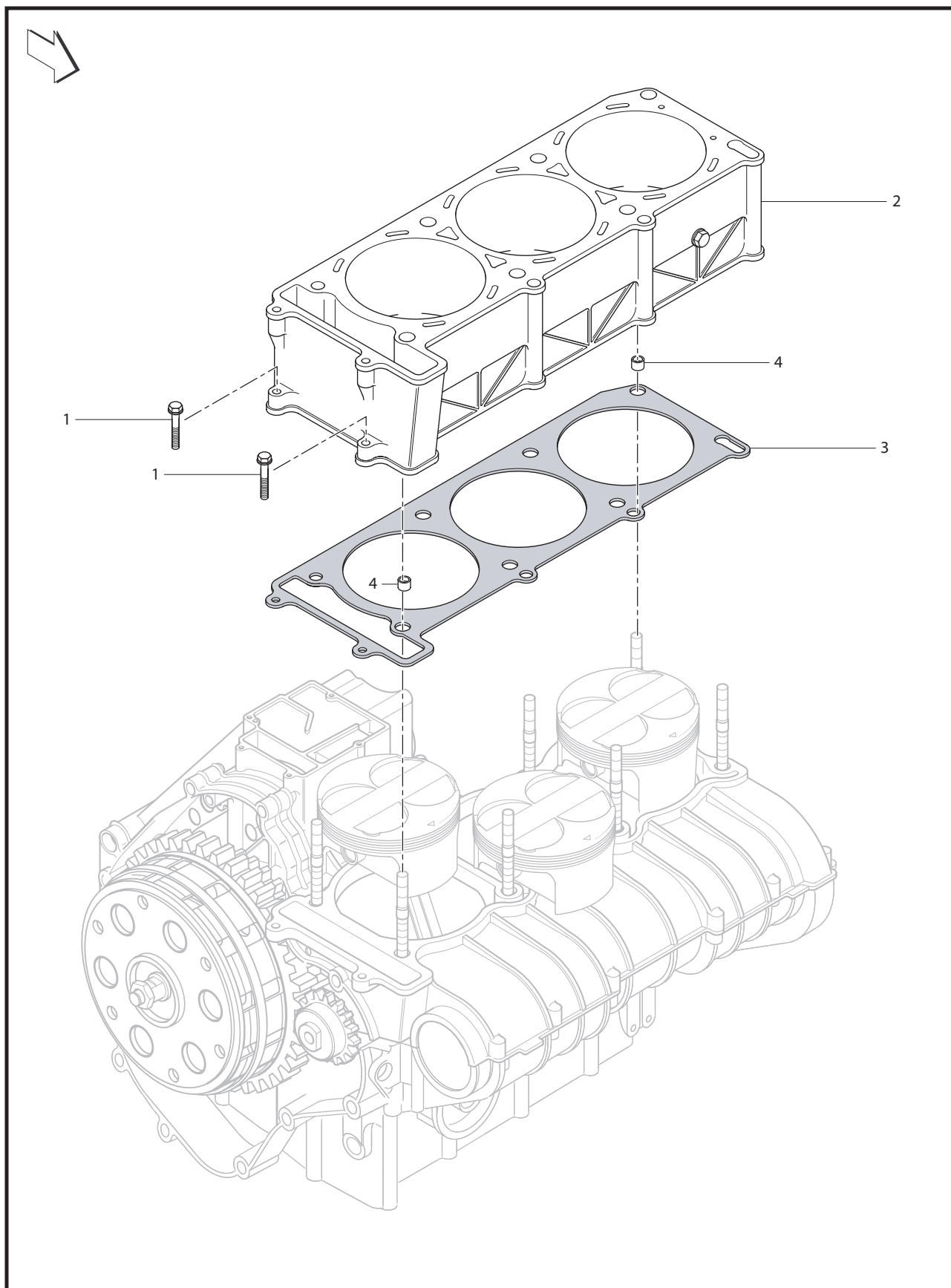
Using copper grease lubricate the threading of the head fixing nuts (1~8).



Recommended lubricant
COPPER GREASE



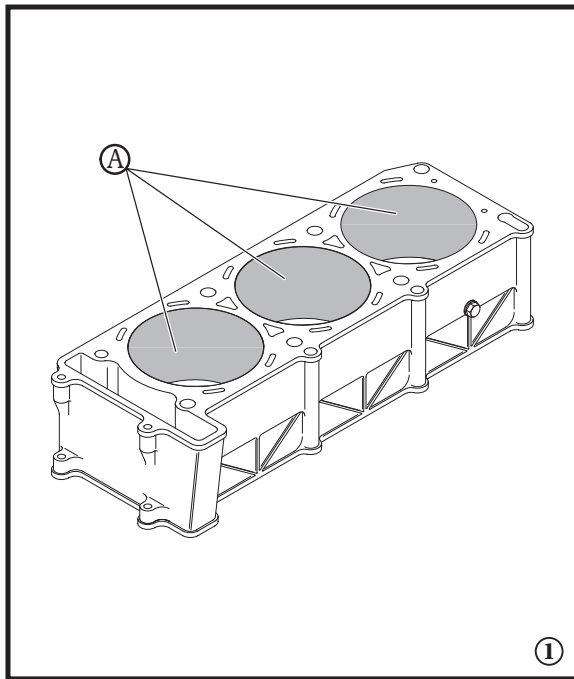
CYLINDERS REMOVAL





CYLINDERS REMOVAL

SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1		Engine Removal	2	Remove the pieces in the given order. See "FRAME 4.107" paragraph. See paragraph "5.1". See paragraph "5.5". See paragraph "5.8". See paragraph "5.10". See paragraph "5.69". See paragraph "5.15". See paragraph "5.18". See paragraph "5.21". See paragraph "5.34".
2		Distribution Lid Removal	1	
3		Distribution Chain Tensioner Removal	1	
4		Inlet Cam Shaft Removal	1	
		Drain Cam Shaft Removal	2	
		Clutch Lid Removal		
		Chain Slides Removal		
		Phonic Wheel Removal		
		Distribution Chain Removal		
		Head Removal		
		Cylinders Removal		
		Screw		
		Carter Cylinder		
		Carter Cylinder Gasket		
		Reference Plug		



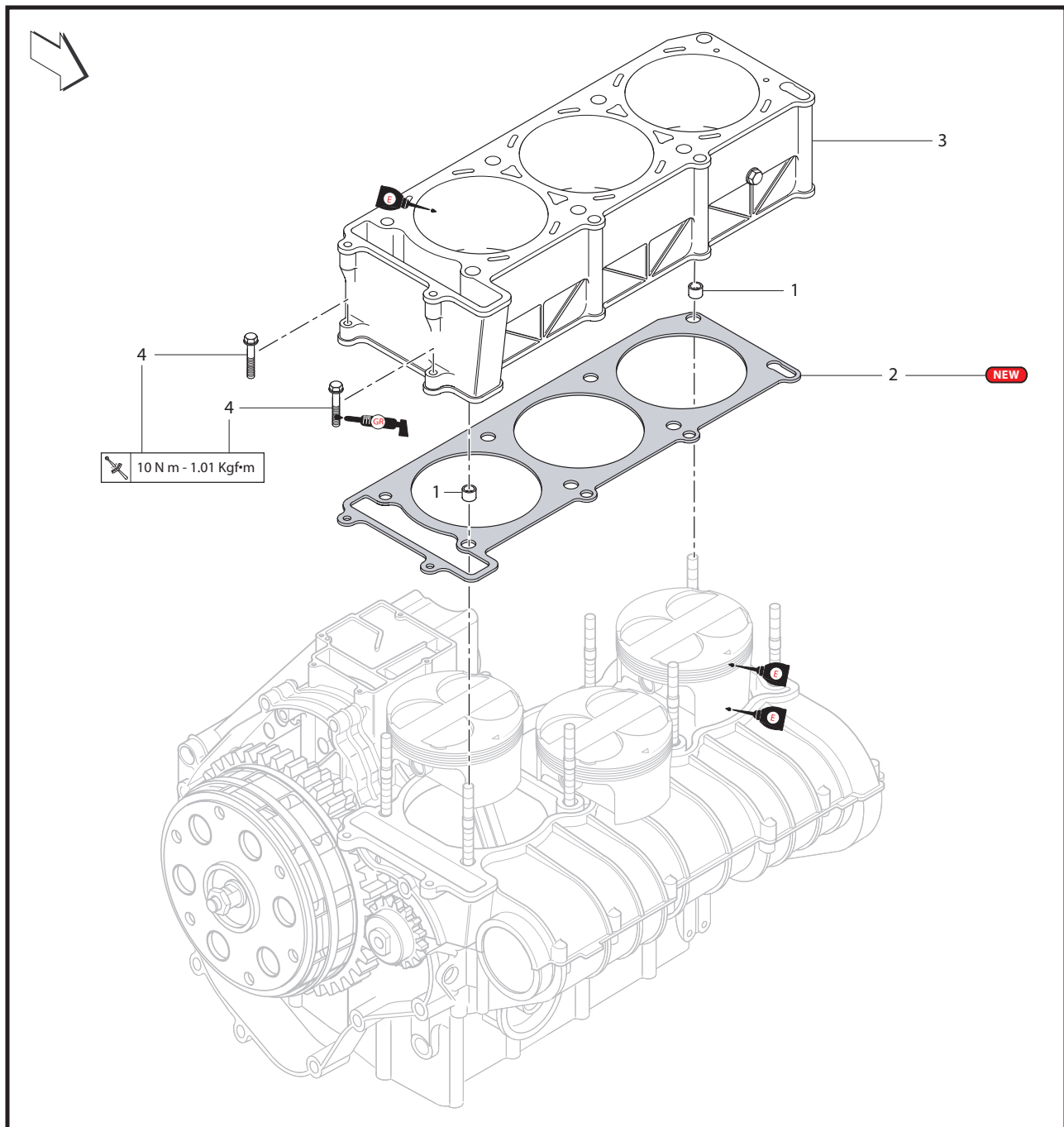
CYLINDERS CONTROL

The following procedure is applied to the entire cylinder unit.

- ① Check:
 - **the cylinder wall** ①
In the presence of vertical scratches → Replace the cylinder and the piston together with the relative bands.



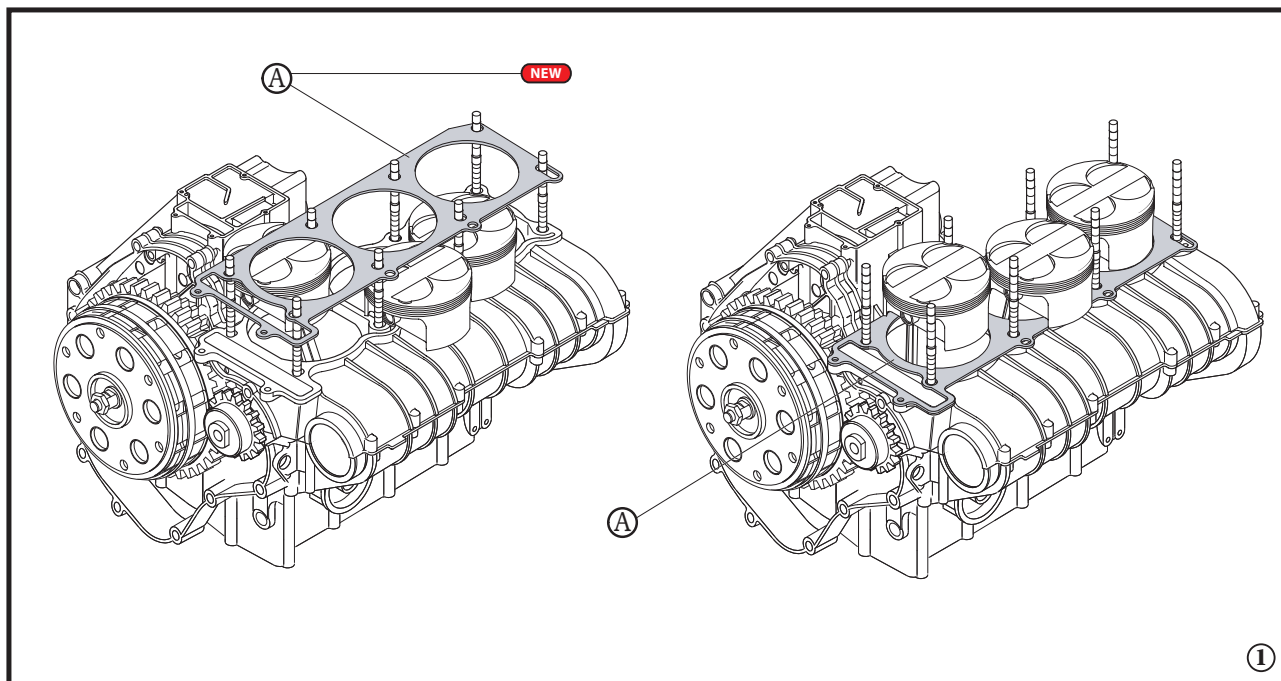
CYLINDERS INSTALLATION



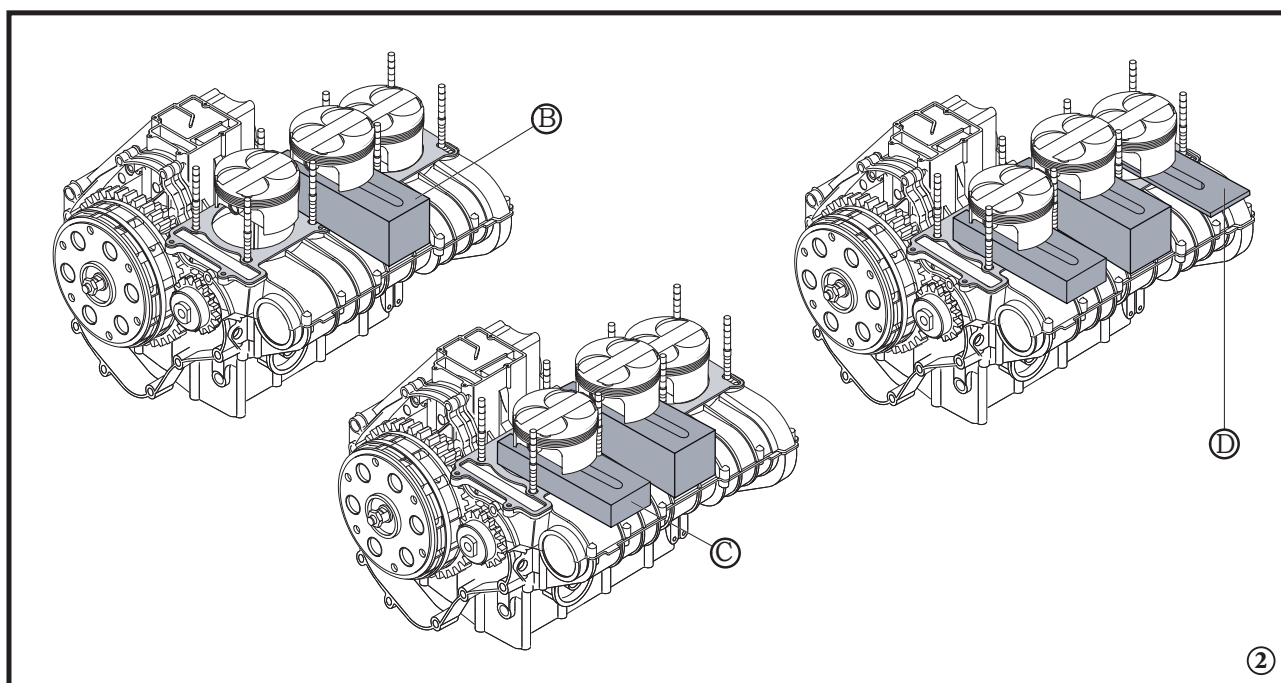
SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1		Reference Plug	2	Install the pieces in the given order. NOTE: _____ Apply engine oil on the bands and on the pistons' wall before installing the carter cylinder. Do not exceed with the engine oil. _____
2		Carter Cylinder Gasket	1	
3		Carter Cylinder	1	
4		Screw	2	



CYLINDERS INSTALLATION



- ① Install:
- the cylinder gasket ①

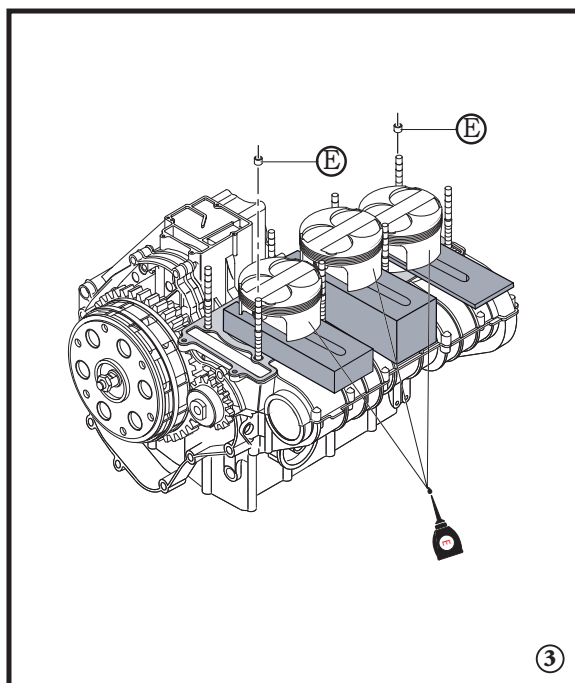


- ② Apply:
- the thickness ② in the central piston
 - the thickness ③ in the side piston
 - the thickness ④ in the side piston

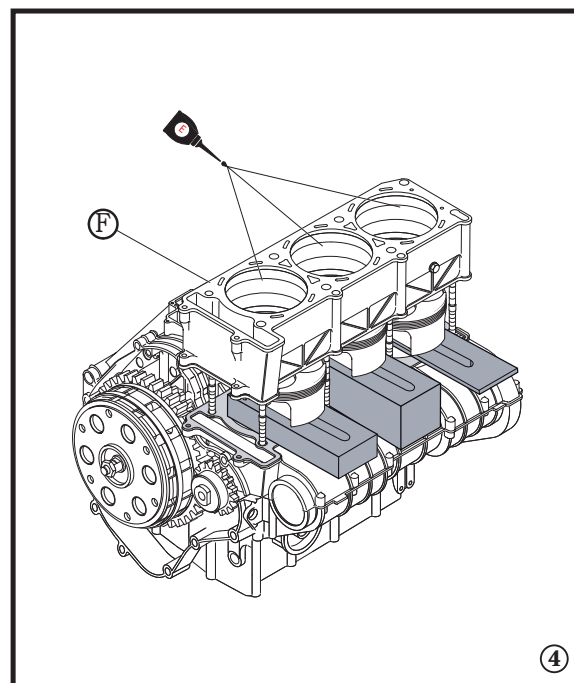


Special Tools: CYLINDER ASSEMBLY THICKNESSES

Code: R180197018000



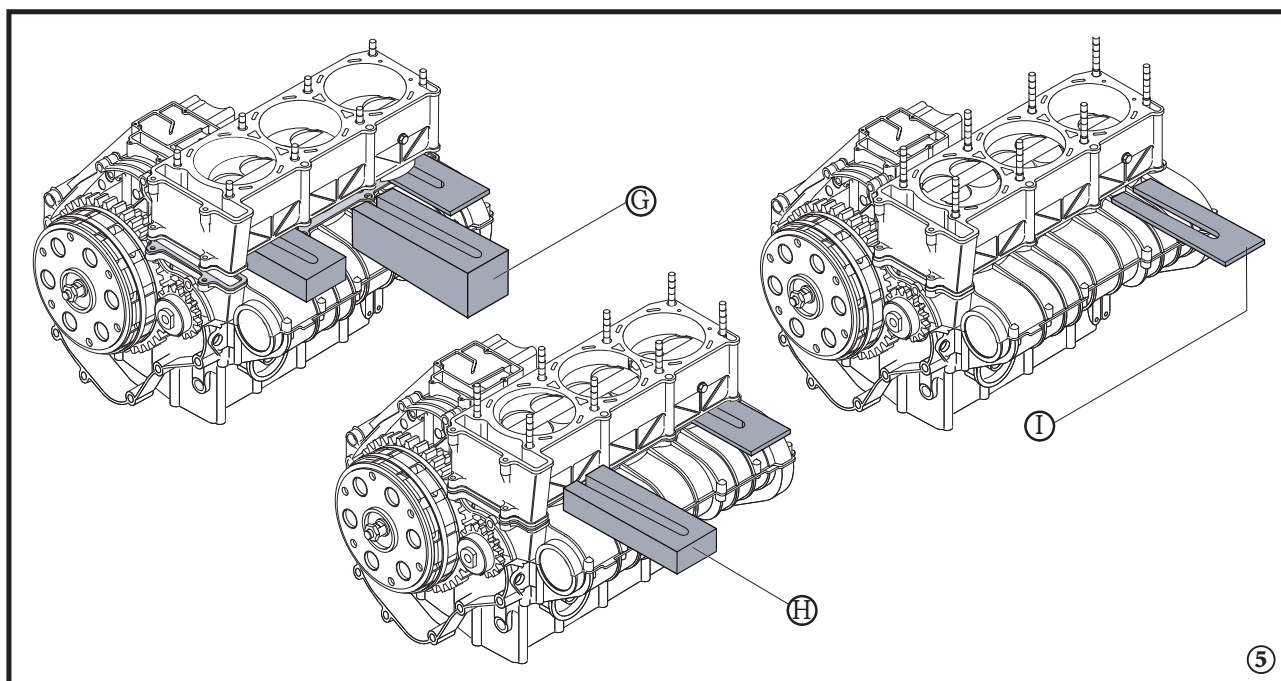
- ③ Install:
- the 2 reference plugs (E)



- ④ Position:
- the cylinder unit (F)

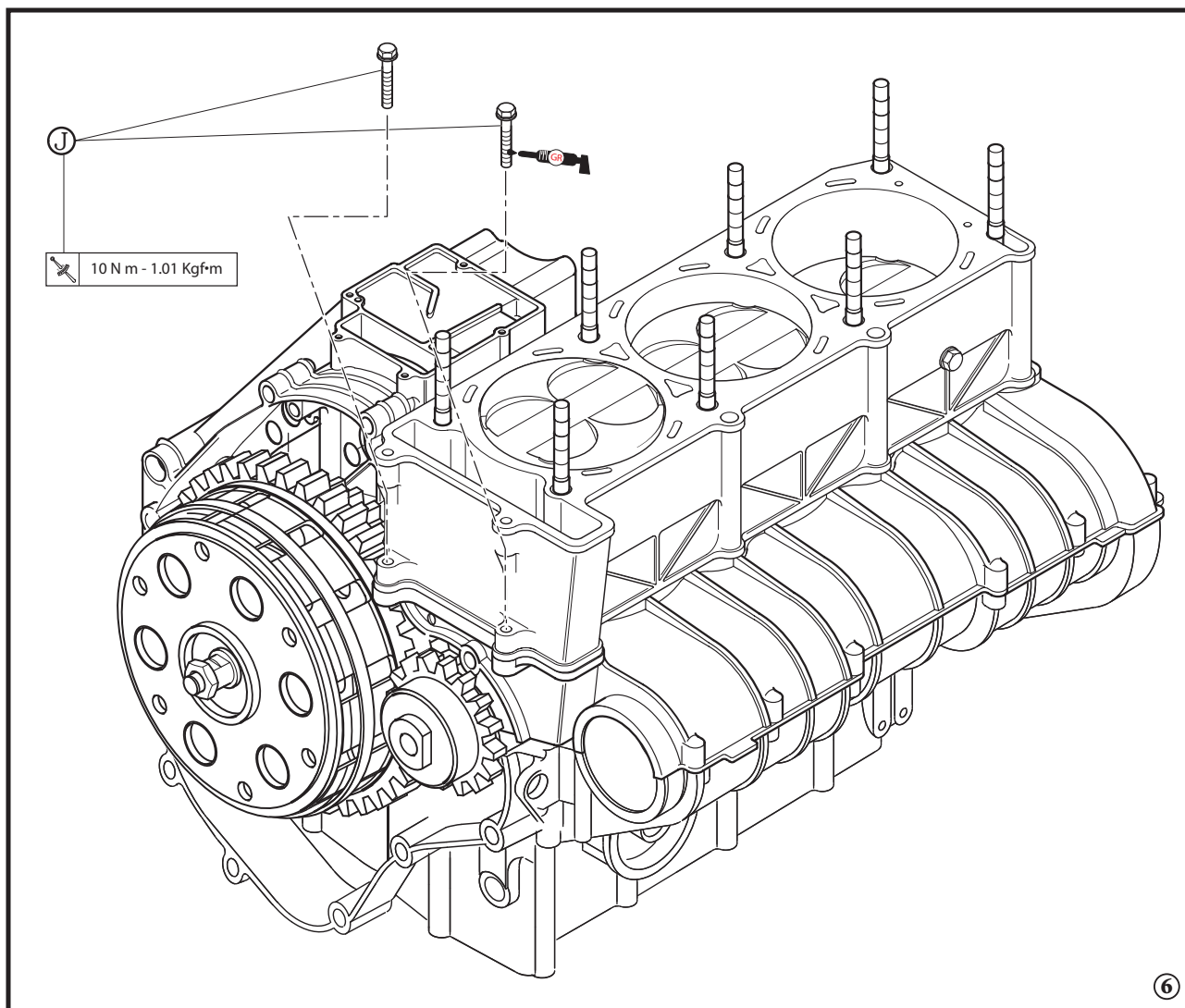


Recommended lubricant
ENGINE OIL



NOTE: _____
By compressing the piston bands using one hand,
with the other, install the cylinder set,
subsequently removing the thickness. _____

- ⑤ Sequentially remove:
- the thicknesses (G), (H) and (I) .



- ⑥ Install:
- the two cylinder fixing screws ①

ATTENTION

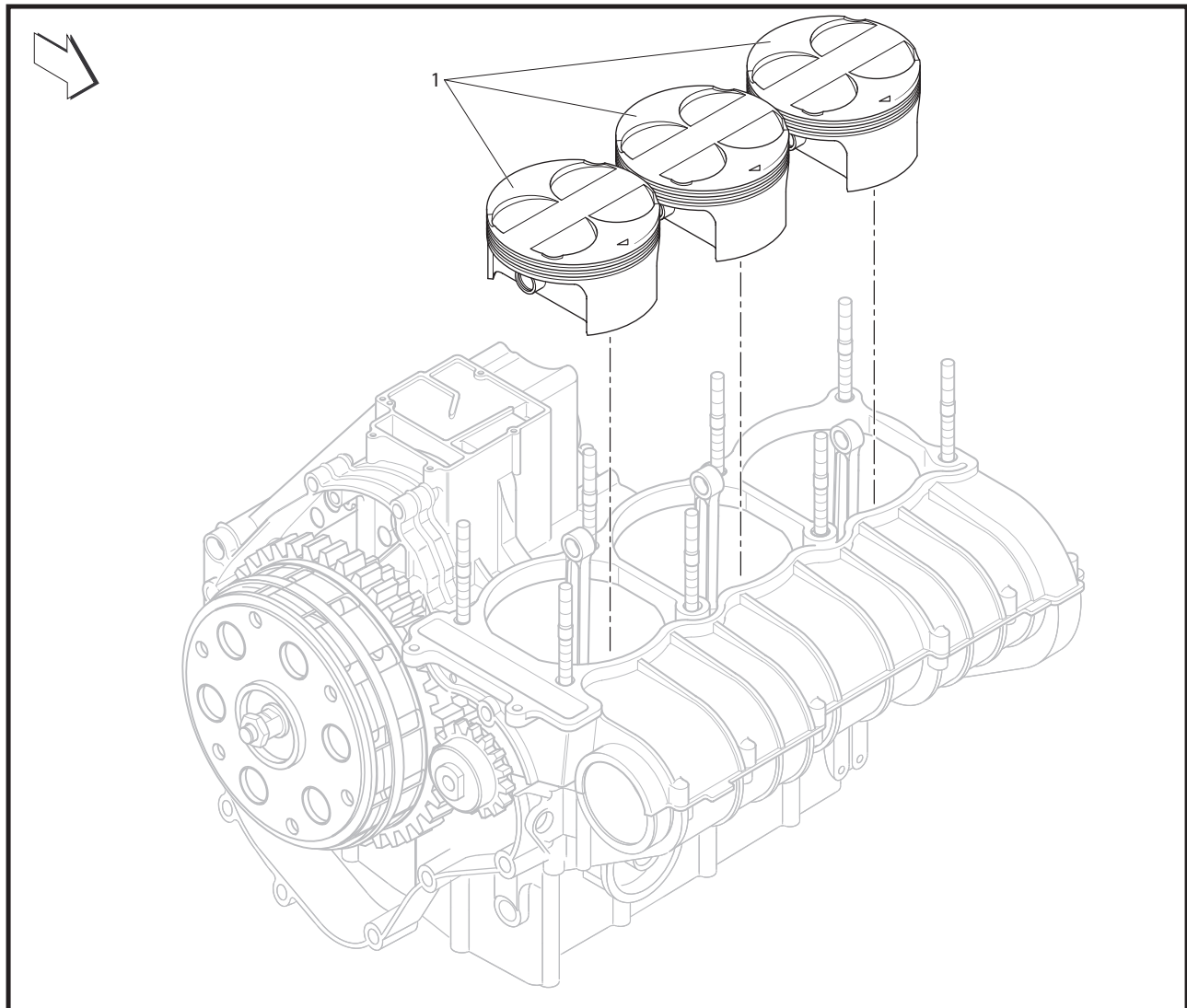
Completely fasten the cylinder fixing screws after having fixed the head.



Recommended lubricant
COPPER GREASE



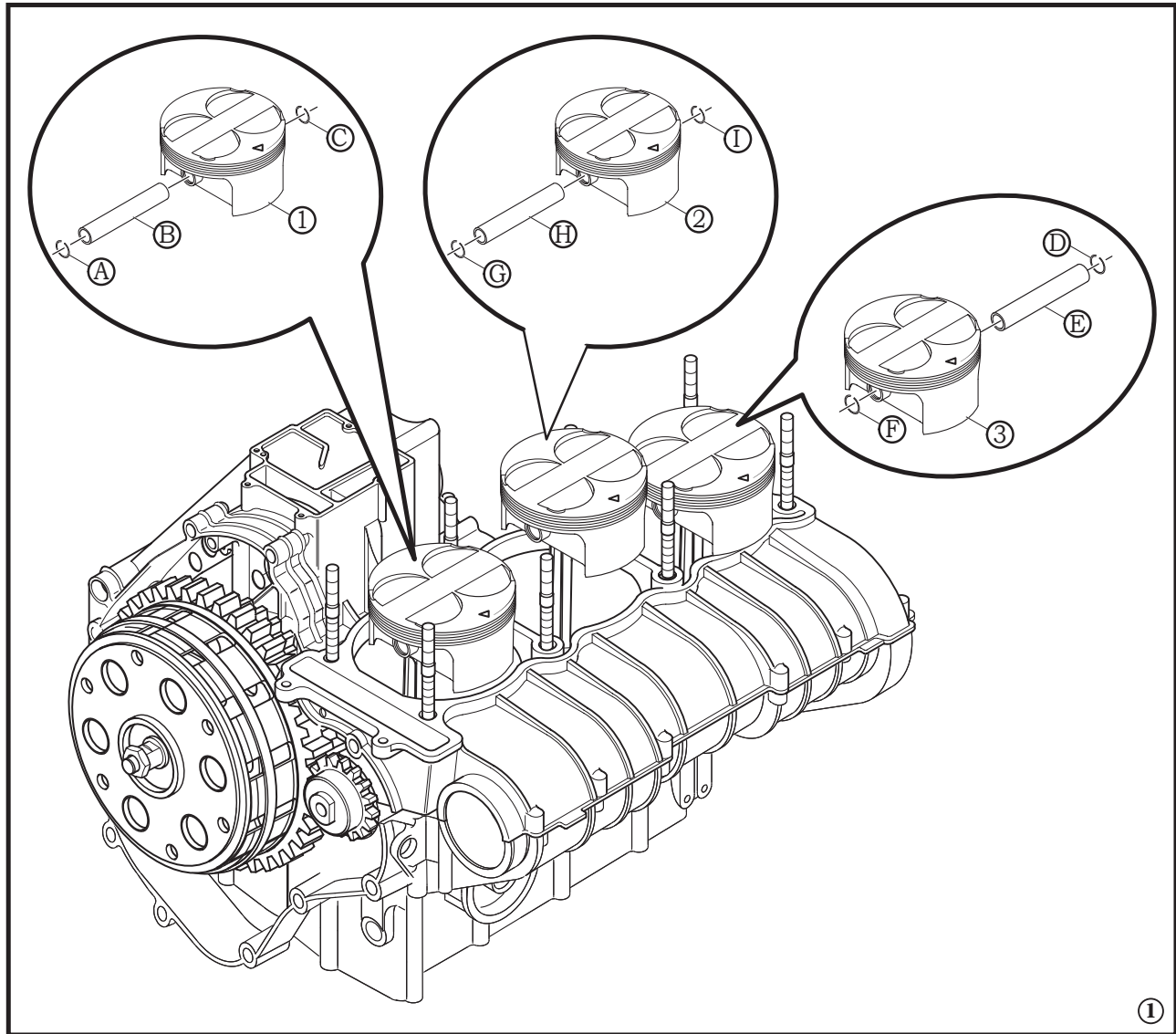
PISTONS REMOVAL



SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1		Engine Removal Distribution Lid Removal Distribution Chain Tensioner Removal Inlet Cam Shaft Removal Drain Cam Shaft Removal Clutch Lid Removal Chain Slides Removal Phonic Wheel Removal Distribution Chain Removal Head Removal Cylinders Removal Pistons Removal Pistons	3	Remove the pieces in the given order. See "FRAME 4.107" paragraph. See paragraph "5.1". See paragraph "5.5". See paragraph "5.8". See paragraph "5.10". See paragraph "5.69". See paragraph "5.15". See paragraph "5.18". See paragraph "5.21". See paragraph "5.34". See paragraph "5.51".

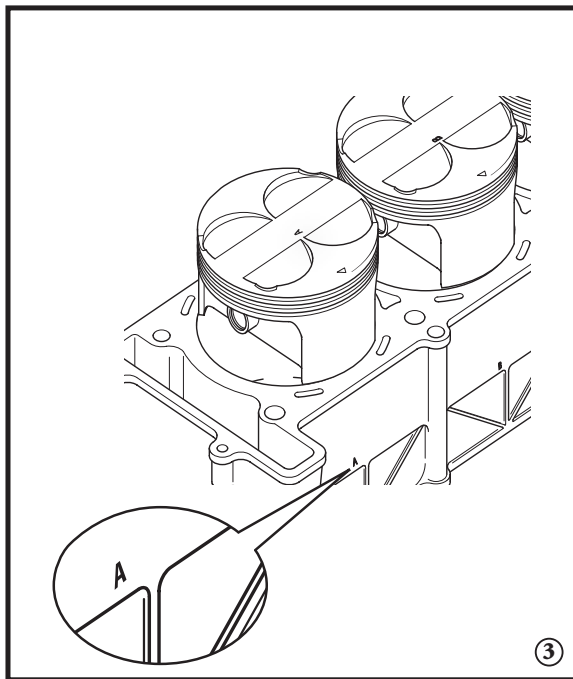
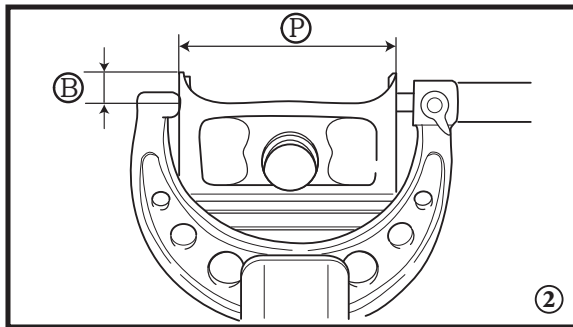
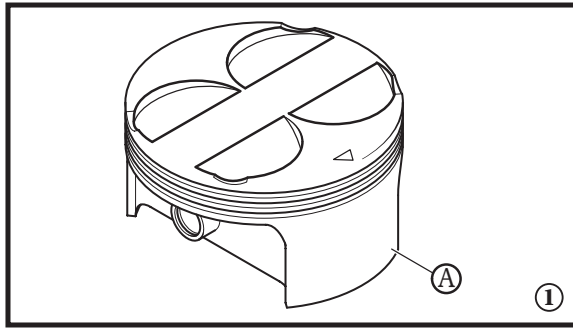


PISTONS REMOVAL



- ① Remove:
- the external elastic ring **A**
 - the pin **B**
 - the piston **①**
 - the internal elastic ring **C**
 - the external elastic ring **D**
 - the pin **E**
 - the piston **③**
 - the internal elastic ring **F**
 - the elastic ring **G**
 - the pin **H**
 - the piston **②**
 - the elastic ring **①**

NOTE: _____
Do not use hammers to remove the pins. _____



PISTONS CONTROL

The following procedure is applied to all three pistons.

- ① Check:
- **the piston wall** **A**
In the presence of vertical scratches → Replace the piston together with the relative bands and the cylinder.

- ② Measure:
- **the diameter of skirt of piston P** using the micrometer.

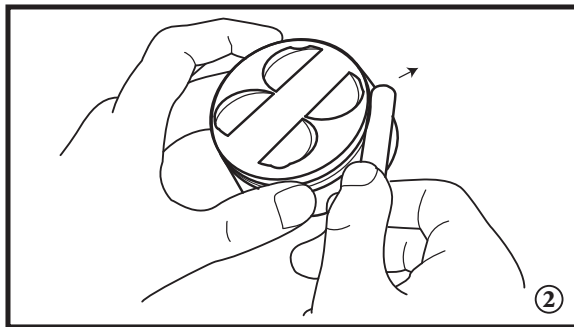
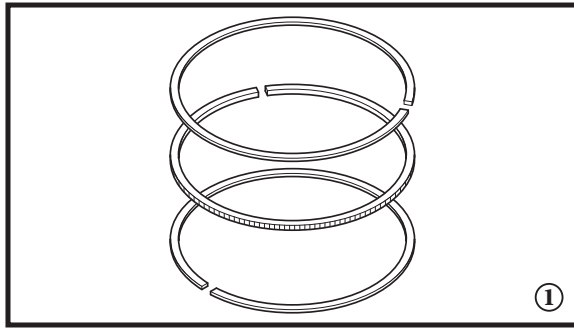
B 10.5 mm (0.413 in) from the lower edge of the piston.

CLASS	P P
A	87.950 ~ 87.960
B	87.961 ~ 87.971
C	87.972 ~ 87.982

If out of specification → Replace the piston and the relative bands together.

ATTENTION

The piston is distinguished by a letter indicating its class. The coupling cylinder piston must be carried out between equal classes. Figure ③.



ELASTIC BANDS CONTROL

The following procedure is applied to all elastic bands.

- ① Check:
- **there are no scratches and signs of forcing on every band**
- If out of specification → Replace the relative bands and the pistons.

- ② Measure:
- **the side clearance between one piston band and the other**
- If out of specification → Replace the piston and the relative bands together.

NOTE:
Before measuring the side clearance between the piston bands, eliminate any carbonaceous deposits from the piston bands and from the relative grooves.



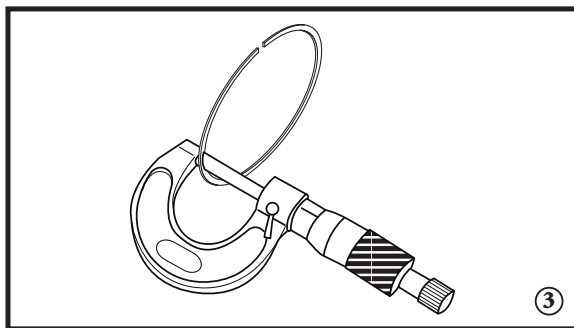
Side clearance between the piston bands

Upper band

<Limit> : 0.20 mm (0.0078 in)

Second band

<Limit> : 0.18 mm (0.0070 in)



- ③ Measure:
- **the upper band thickness**
 - **the second band thickness**



Elastic bands thicknesses

Upper band

0.97 ~ 0.99 mm
(0.0381 ~ 0.0389 in)

Second band

0.97 ~ 0.99 mm
(0.0381 ~ 0.0389 in)



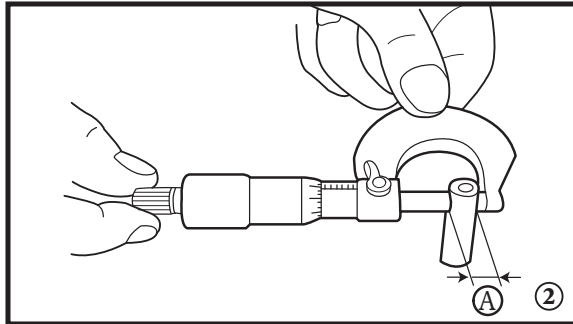
PINS CONTROL

The following procedure is applied to all pins.

① Check:

• **the piston pin**

In the presence of blue fading/grooves → Replace the piston pin and check the lubricating system.



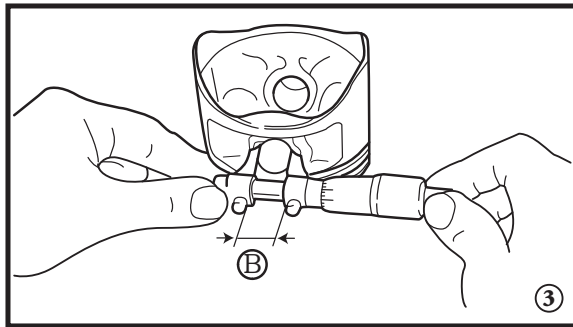
② Measure:

• **the external diameter of the piston pin** ①A

If out of specification → Replace the piston pin.



Piston pin external diameter
18.995 ~ 19.000 mm
(0.747 ~ 0.748 in)



③ Measure:

• **the internal diameter of the bore of the piston pin** ①B

If out of specification → Replace the piston.

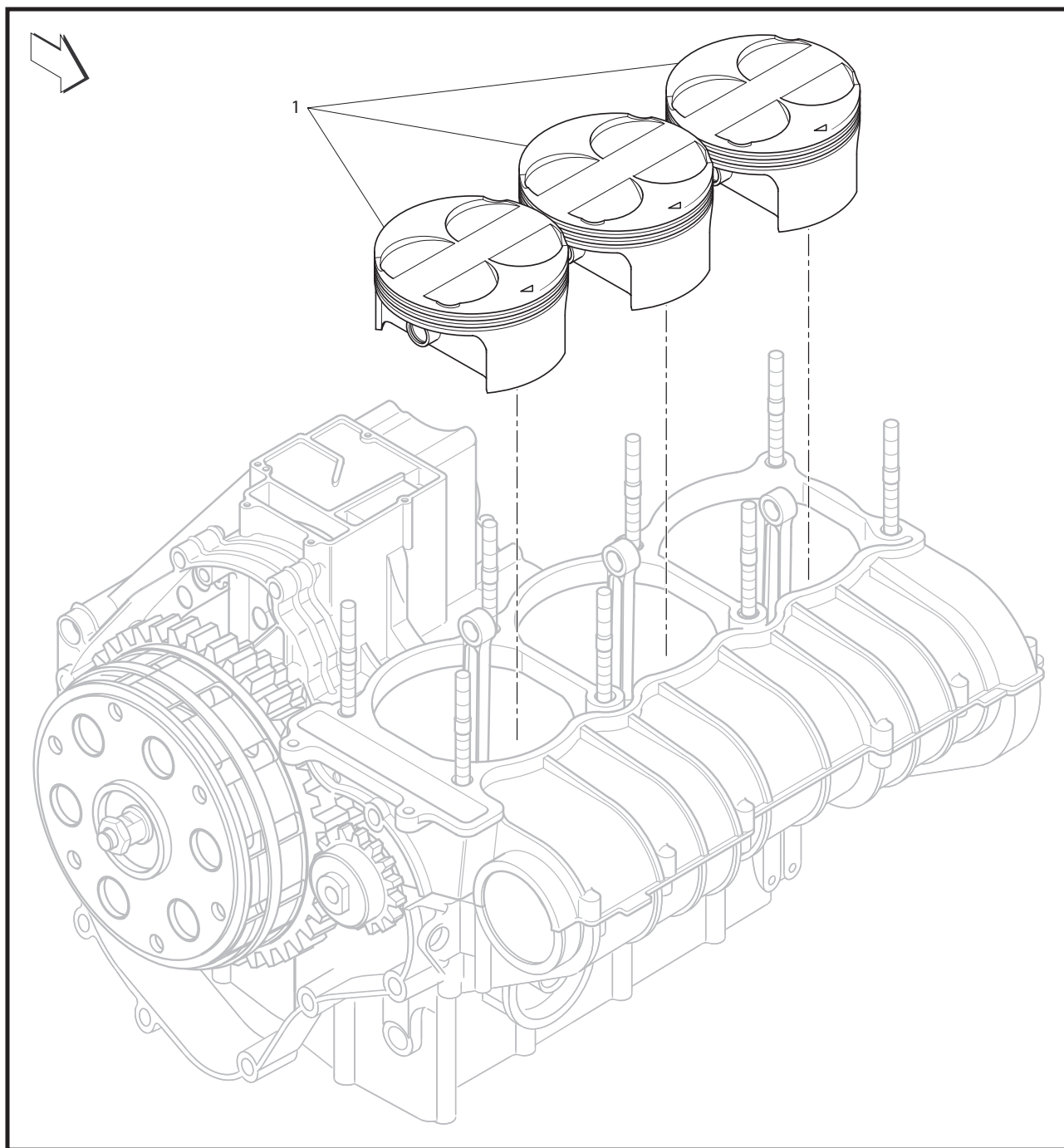


The internal diameter of the bore of the piston pin

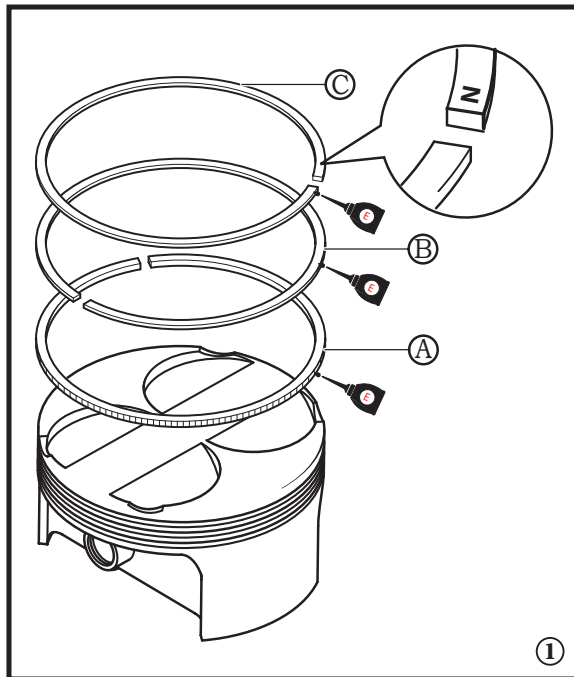
9.002 ~ 19.008 mm
(0.7481 ~ 0.7483 in)



PISTONS INSTALLATION



SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1		Pistons Installation Pistons	3	Install the pieces in the given order.



PISTONS INSTALLATION

The following procedure is applied to all pistons.

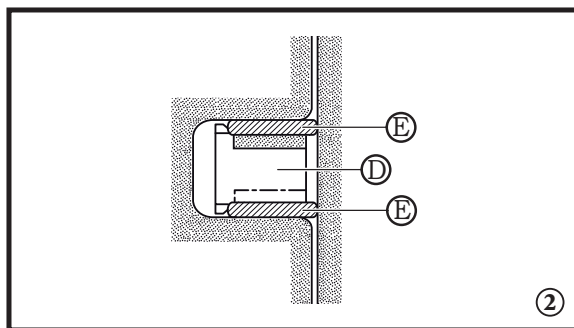
- ① Install:
- the oil scraper band **A**
 - the 2nd band **B**
 - the upper band **C**

NOTE:

The first and second rings have the letter N on the upper side. Remember to install the piston bands so that the letter N is facing upwards.



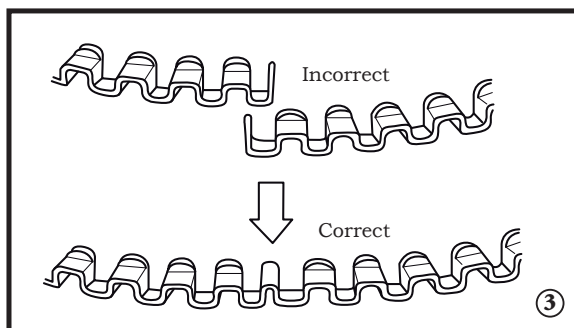
Recommended lubricant
ENGINE OIL



- ② The first element to insert in the oil scraper segment slot is the spacer **D**. After having positioned the spacer, insert its side rings **E**.

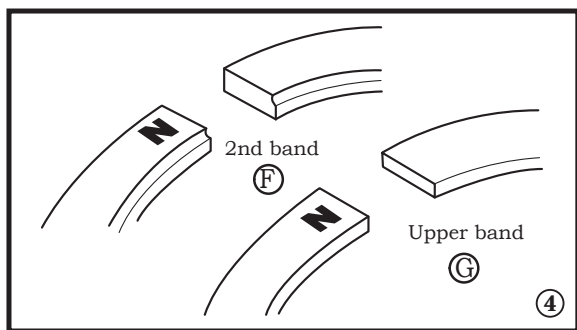
NOTE:

The spacer and the side rings do not have a particular upper or lower side: they can be inserted in any way.



ATTENTION

When installing the spacer, careful that its ends do not overlap inside the slot. Figure ③.



- ④ The two bands have a different thickness.
The upper band ③ has a lower thickness than the
2nd band ② .

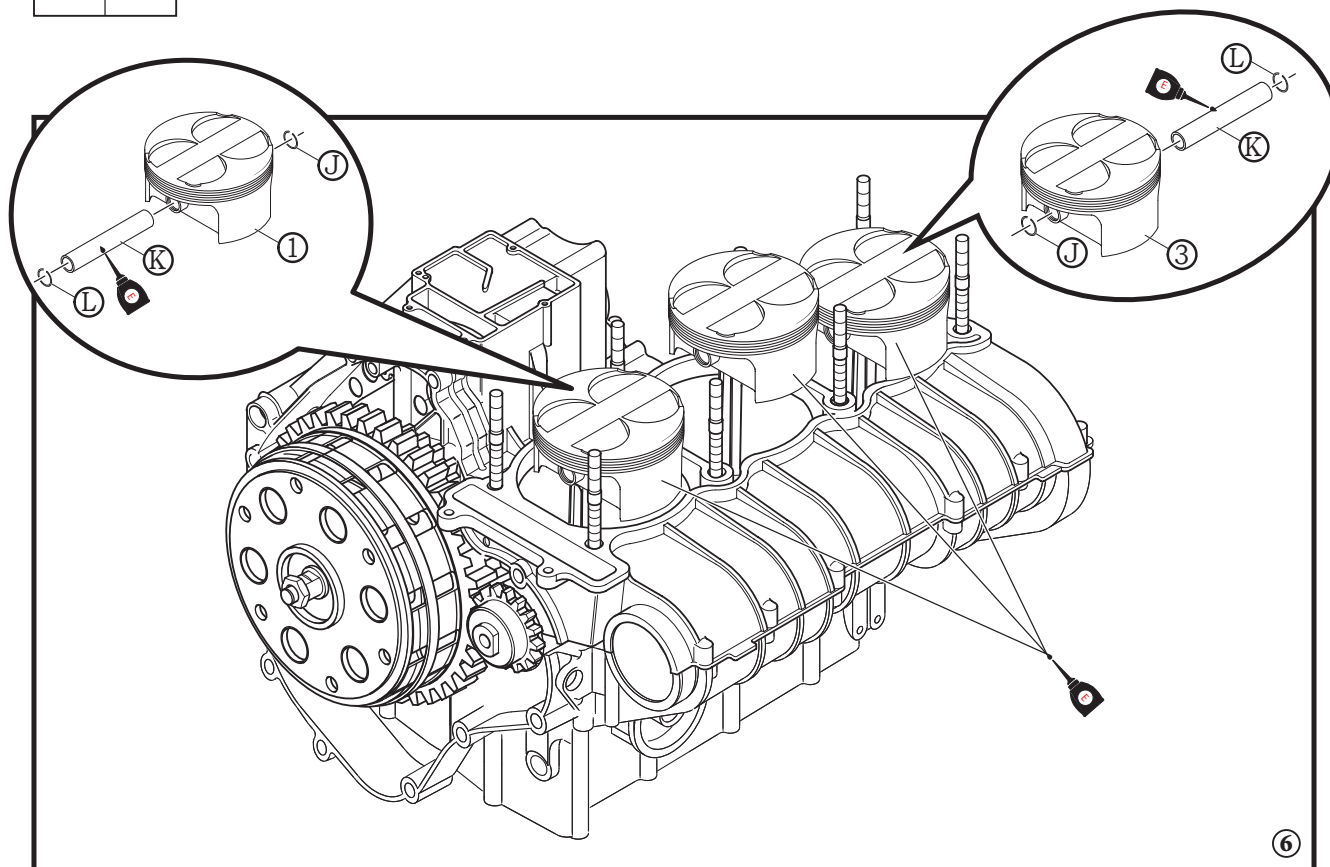
**Piston bands thickness**

Upper band
3.1 ~ 0.1 mm

Second band
3.7 ~ 0.1 mm

- 

5

**NOTE:**

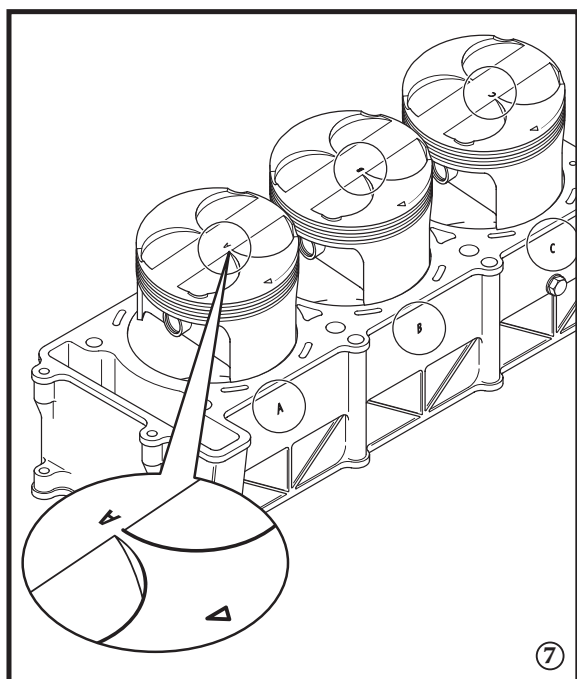
To assemble the two side pistons insert first the internal rings ①, then the piston pins ② and finally the external rings ③. Lubricate the pistons well before installing them...

⑥ Install:

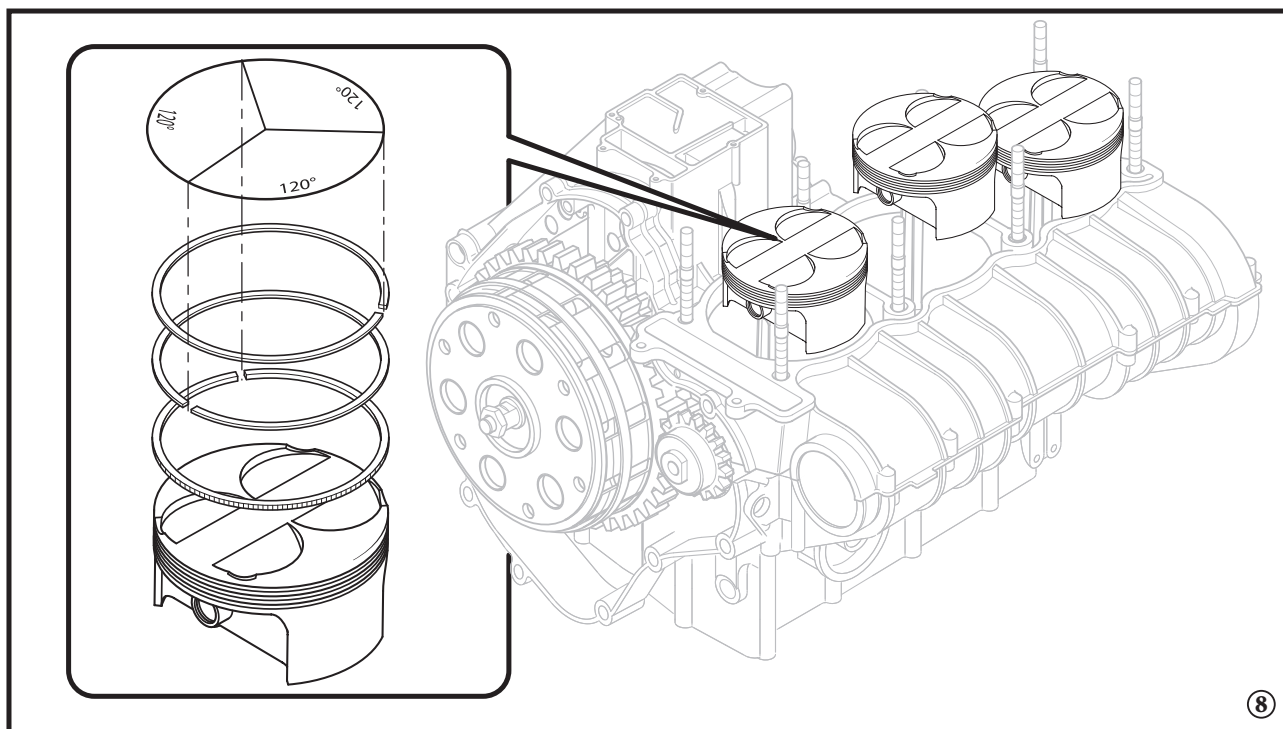
- the side piston ①
- the side piston ③



Recommended lubricant
ENGINE OIL

**ATTENTION**

Match the piston class to the letter on the cylinder (A, B, C). Face the arrow on the piston crown towards the drain. Figure ⑦.

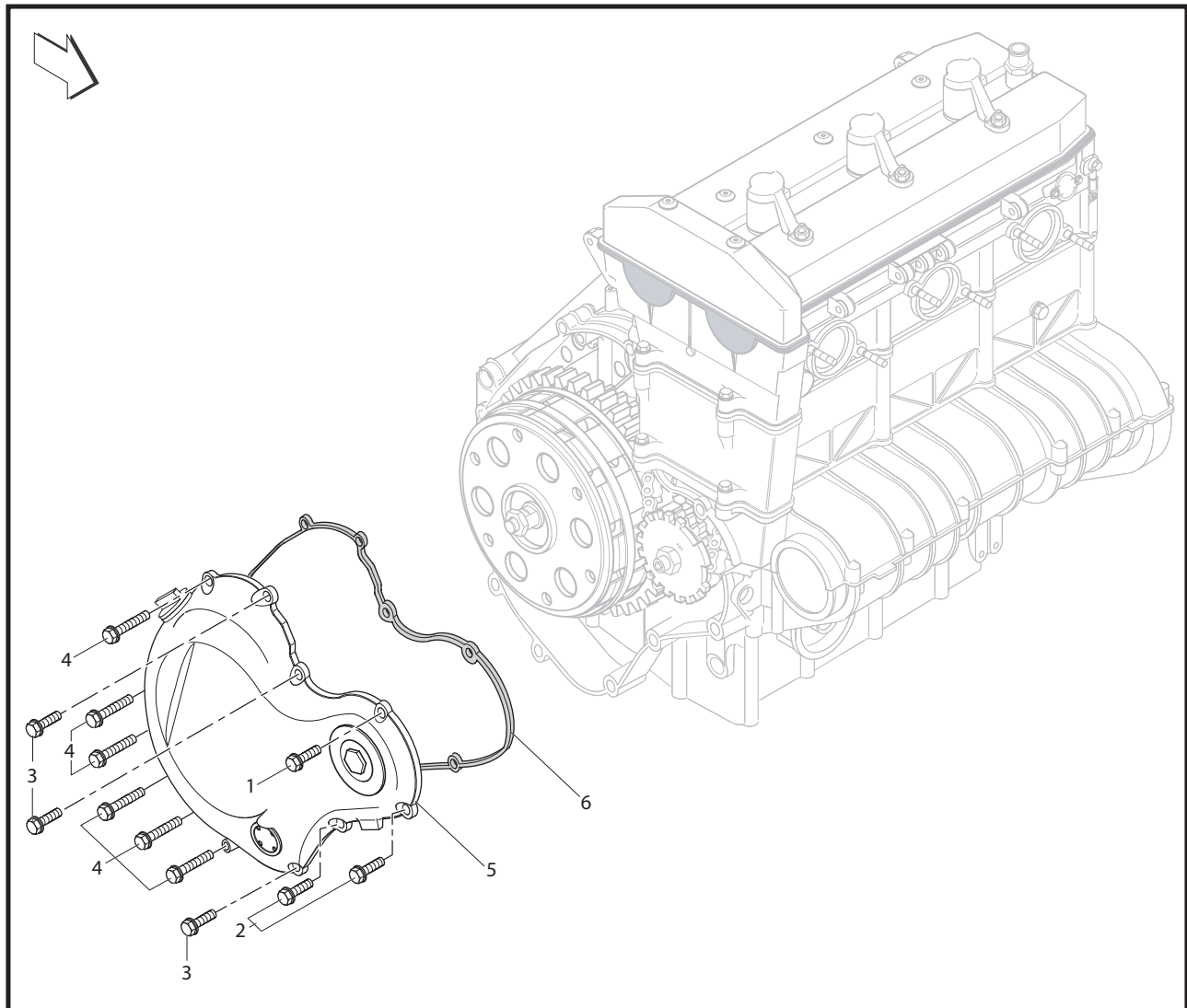


⑧ Position in an alternative manner:

- the light between the two ends of each piston band at 120° compared to the other.



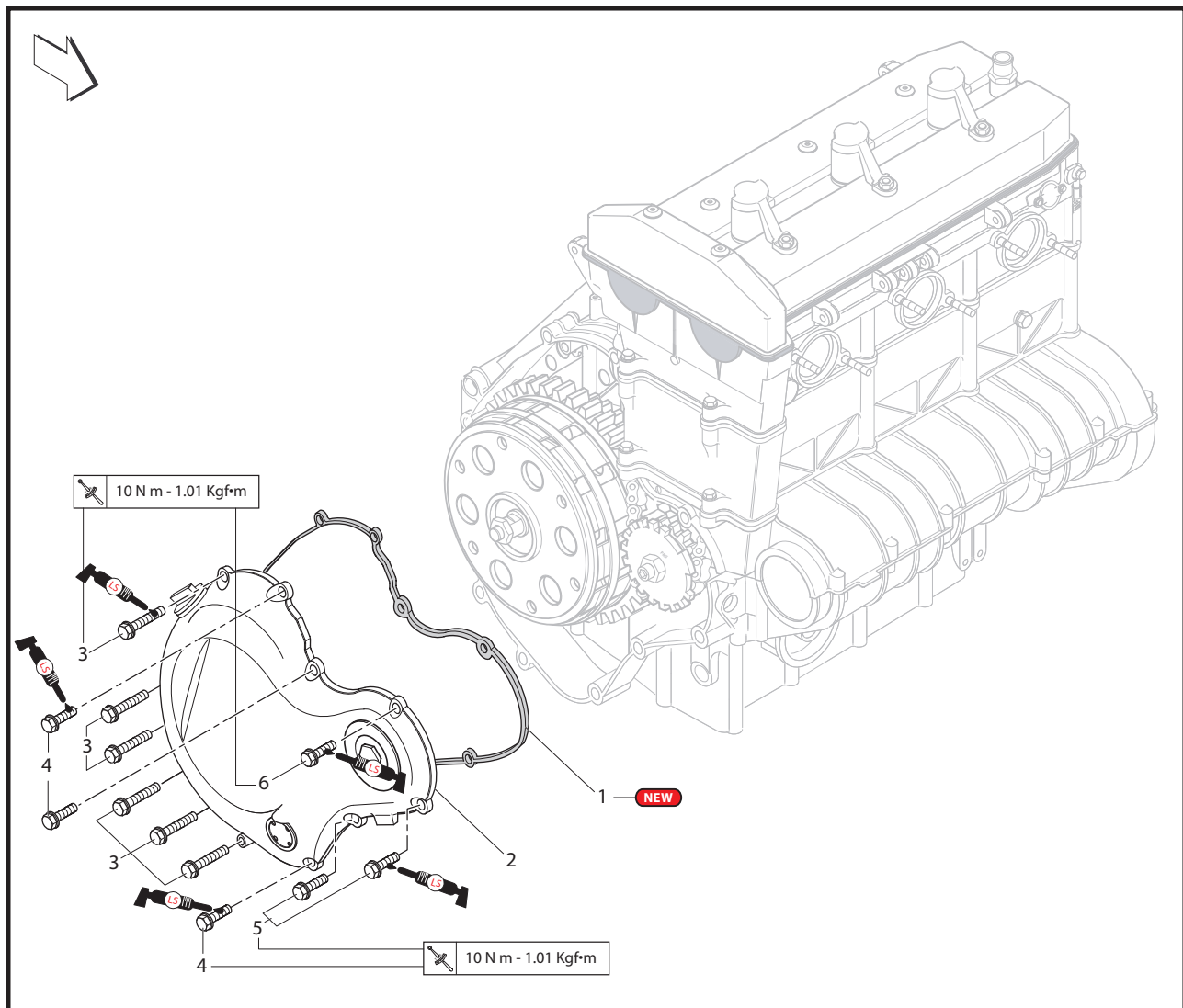
CLUTCH LID REMOVAL



SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1 2 3 4 5 6		Clutch Lid Removal Screw Screw Screw Screw Clutch Lid Clutch Lid Gasket	1 2 3 6 1 1	Remove the pieces in the given order. NOTE: <u>Loosen each screw by ¼ of a turn at a time, repeatedly and proceeding in a crossed sequence. After having completely loosened all the screws, remove them.</u>



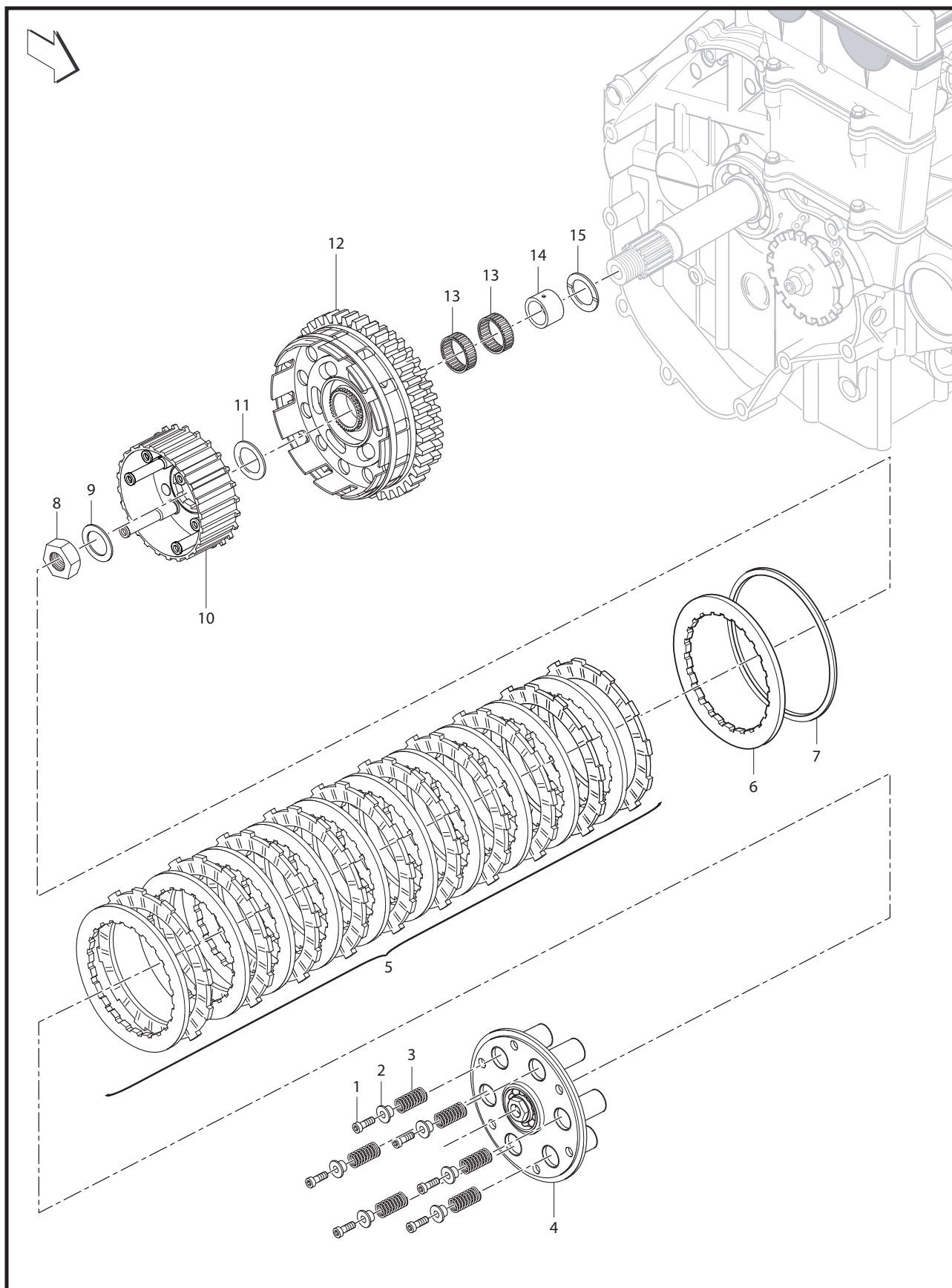
CLUTCH LID INSTALLATION



SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1		Clutch Lid Installation Clutch Lid Gasket	1	Install the pieces in the given order. NOTE: <u>Accurately clean the support surfaces of the gasket.</u>
2		Clutch Lid	1	
3		Screw	6	
4		Screw	3	
5		Screw	2	
6		Screw	1	



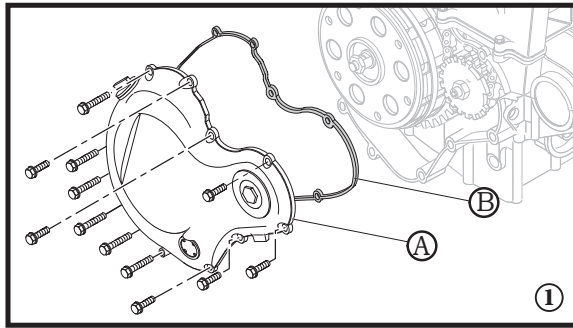
CLUTCH REMOVAL





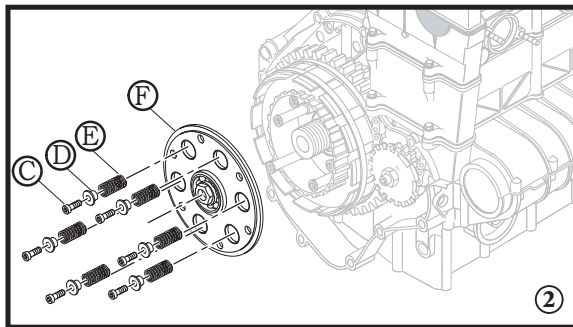
CLUTCH REMOVAL

SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1		Clutch Lid Removal	6	Remove the pieces in the given order. See paragraph "5.69"
2		Clutch Removal	6	
3		Screw	6	
4		Cup	1	
5		Compression Spring	1	
6		Clutch Pressure Plate	1	
7		Clutch Disks Series	1	
8		Friction Steel Disk	1	
9		Disk	1	
10		Hexagonal Nut	1	
11		Disk Spring	1	
12		Clutch Drum	1	
13		High Shim	1	
14		Clutch Bell	2	
15		Needle Cage	1	
		Spacer	1	
		Low Shim	1	

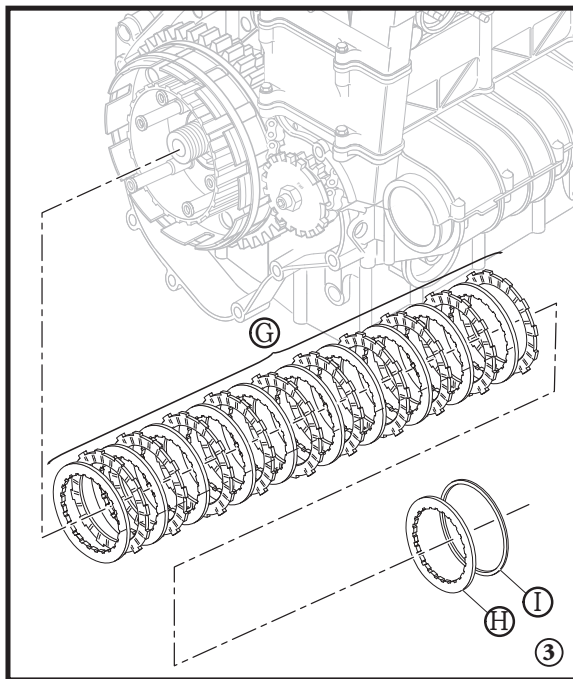


CLUTCH REMOVAL

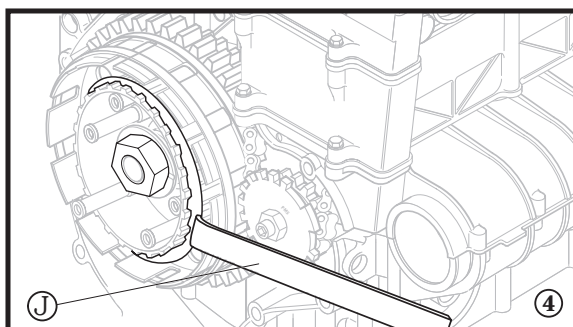
- ① Remove:
- the clutch lid (A)
 - the clutch lid gasket (B)
- See paragraph "5.69".



- ② Remove:
- the screws (C)
 - the cups (D)
 - the compression springs (E)
 - the clutch pressure plate (F)



- ③ Remove:
- the clutch disks series (G)
 - the friction steel disk (H)
 - the disk (I)



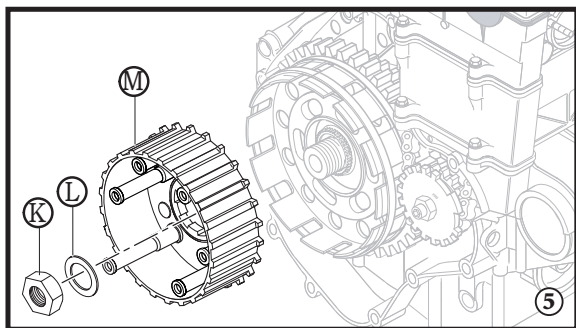
- ④ Loosen:
- the clutch drum nut

NOTE:
By keeping the clutch drum still using the retainer tool specific for the clutch (J), loosen the relative nut.

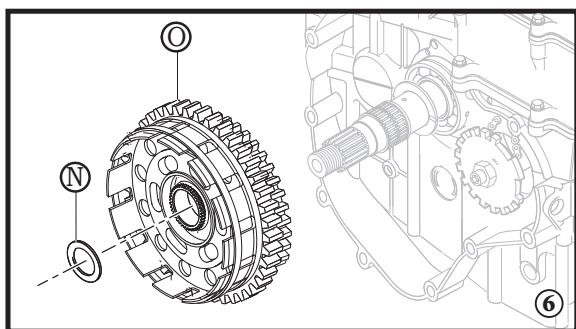


Special Tools: CLUTCH DISMANTLING SPANNER

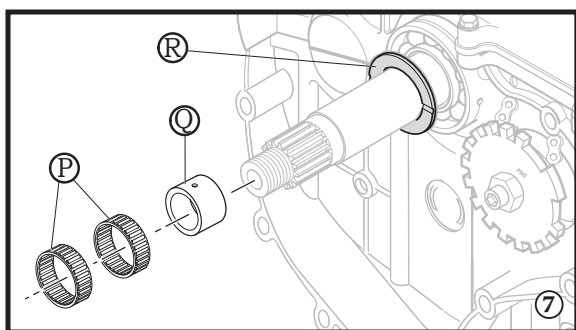
Code: R180297047000



- ⑤ Remove:
- the clutch drum nut (K)
 - the disk spring (L)
 - the clutch drum set (M)



- ⑥ Remove:
- the high shim (N)
 - the clutch bell (O)



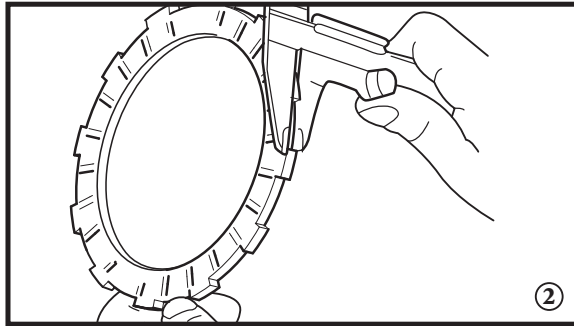
- ⑦ Remove:
- the needle cage (P)
 - the spacer (Q)
 - the low shim (R)



FRICITION DISKS CONTROL

The following procedure is applied to all friction disks.

- ① Check:
- **the friction disk**
In the presence of damages/wear → Replace all friction disks.



- ② Measure:
- **the thickness of the friction disks**
If out of specification → Replace all friction disks.

NOTE: _____
Measure the friction disk in four points. _____



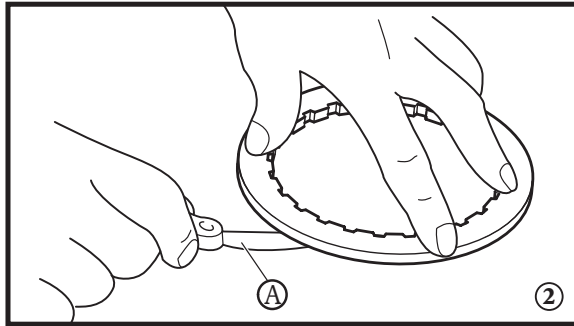
Friction disk thickness
<Limit> : 2.8 mm (0.110 in)



STEEL DISKS CONTROL

The following procedure is applied to all steel disks.

- ① Check:
- **the steel disk**
In the presence of damages/wear → Replace all steel disks.



- ② Measure:
- **the twisting of the steel disk**
(using a surface plate and a feeler (A)).
If out of specification → Replace all steel disks.



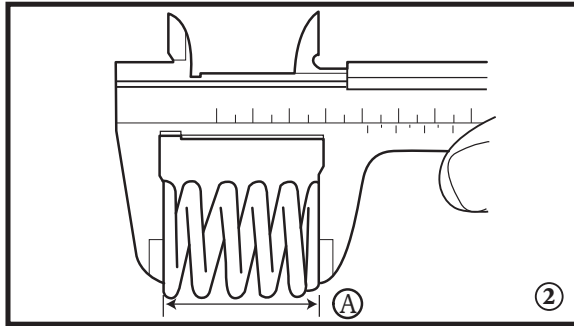
Steel disk twisting limit
0.1 mm (0.0039 in)



COMPRESSION SPRINGS CONTROL

The following procedure is applied to all compression springs.

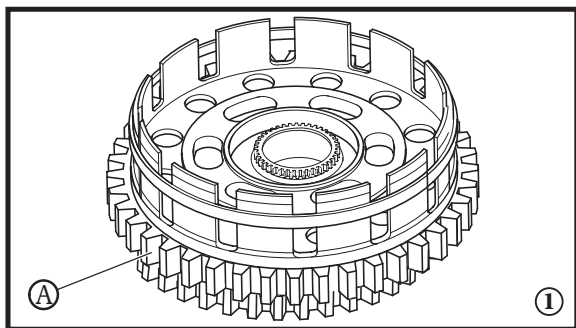
- ① Check:
 - **the compression springs**
In the presence of damages → Replace all compression springs.



- ② Measure:
 - **the free length of the compression springs** [Ⓐ]
If out of specification → Replace all compression springs.



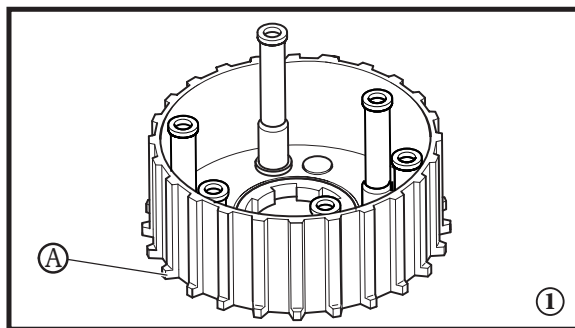
Compression spring free height
34.3 mm (1.35 in)



CLUTCH BELL CONTROL

- ① Check:
- **the clutch jaws of the clutch bell** ①
- In the presence of damages/pittings/wear lines →
Trim the clutch jaws of the clutch bell, or replace the clutch bell.

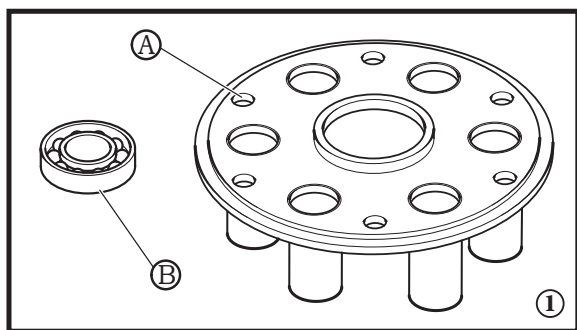
NOTE: _____
The presence of pittings on the clutch jaws of the clutch bell will make the clutch malfunction. _____



CLUTCH DRUM INSPECTION

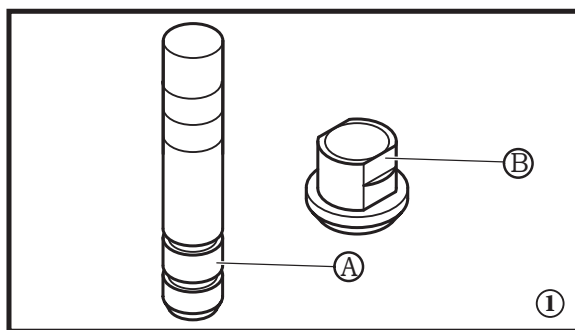
- ① Check:
- **the grooved part of the clutch drum** ①
- In the presence of damages/pittings/wear lines →
Replace the clutch drum.

NOTE: _____
The presence of pittings on the grooved part of the drum will make the clutch malfunction. _____



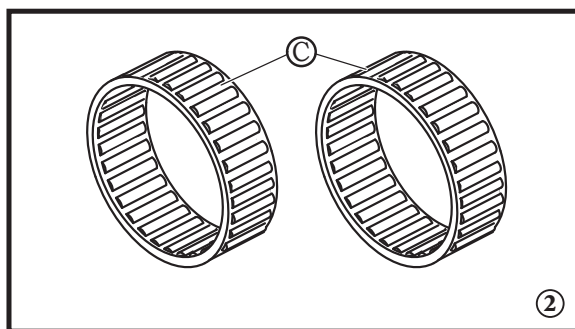
CLUTCH PRESSURE PLATE CONTROL

- ① Check:
- **the clutch pressure plate** ①
In the presence of cracks/damages → Replace.
 - **the bearing** ②
In the presence of damages/wear → Replace.



CLUTCH PRESSURE PLATE PIN CONTROL

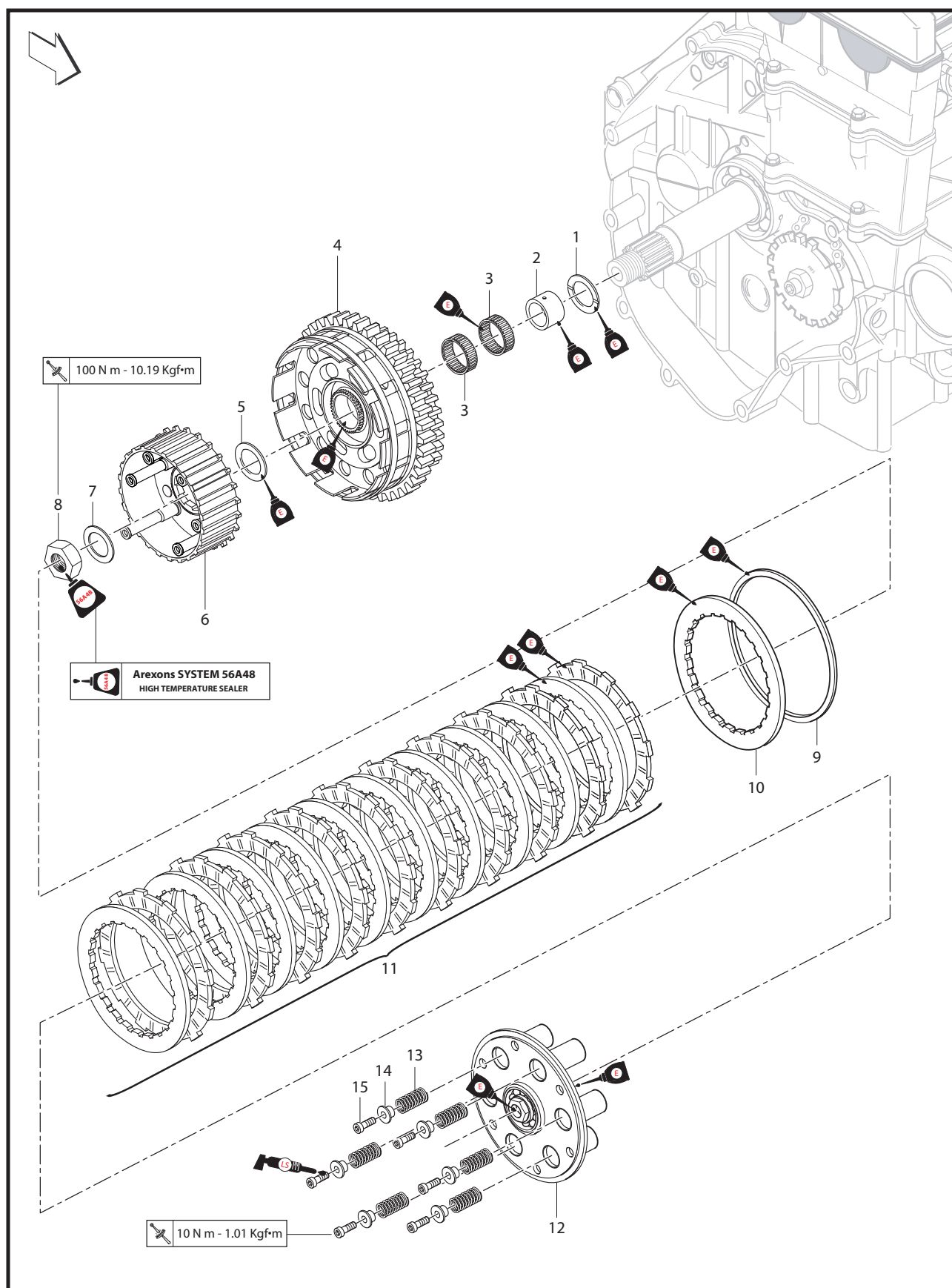
- ① Check:
- **the pressure plate pin** ①
 - **the bush** ②
- In the presence of damages/wear → Replace the clutch pressure plate pin together with the traction lever shaft pinion.



- ② Check:
- **the needle cage** ③
- In the presence of damages/wear → Replace.



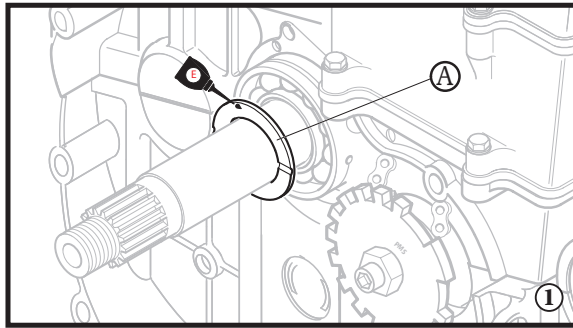
CLUTCH INSTALLATION





CLUTCH INSTALLATION

SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
		Clutch Installation		Install the pieces in the given order.
1		Low Shim	1	
2		Spacer	1	
3		Needle Cage	2	
4		Clutch Bell	1	
5		High Shim	1	
6		Clutch Drum	1	
7		Disk Spring	1	
8		Hexagonal Nut	1	
9		Disk	1	
10		Friction Steel Disk	1	
11		Clutch Disks Series	1	
12		Clutch Pressure Plate	1	
13		Compression Spring	6	
14		Cup	6	
15		Screw	6	
				NOTE: _____ To assemble the clutch unit, gather shims 1 and 5. Always check the relief thickness. _____



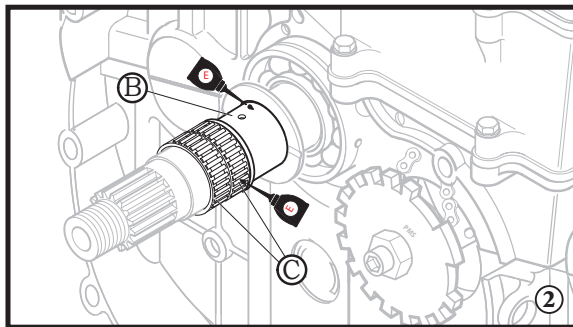
CLUTCH INSTALLATION

- ① Position:
 • **the low shim** (A)
 with the lowest relief towards the inside of the engine.

(A) Thickness 3.5 mm.



Recommended lubricant
ENGINE OIL

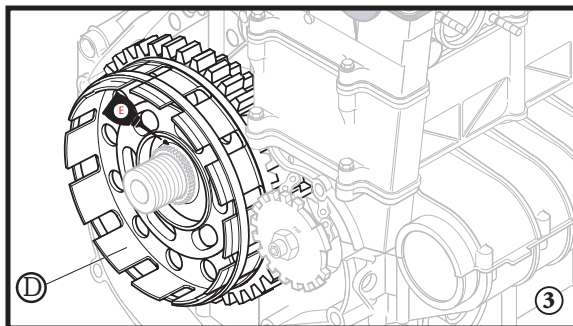


- ② Insert:
 • **the spacer** (B)
 • **the needle cage** (C)

NOTE:
Before inserting the needle cages, lubricate their sliding area well.



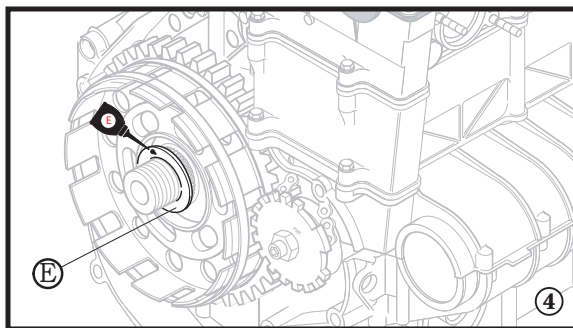
Recommended lubricant
ENGINE OIL



- ③ Insert:
 • **the clutch bell** (D)



Recommended lubricant
ENGINE OIL

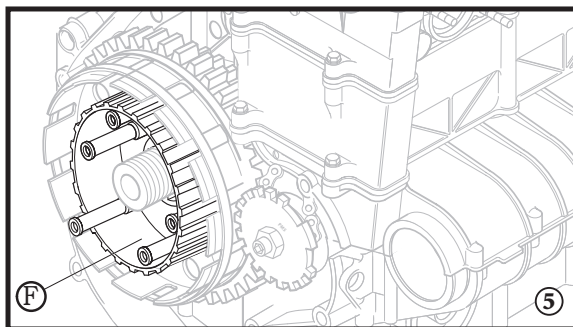


- ④ Position:
 • **the high shim** (E)
 with the lowest relief towards the outside of the engine.

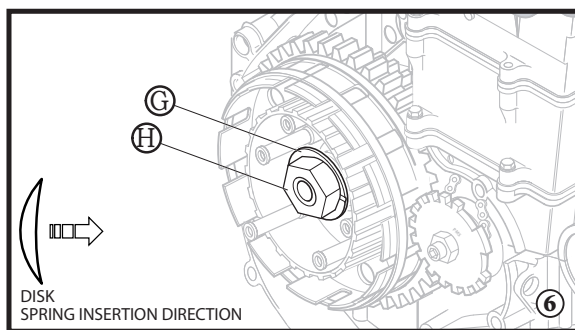
(E) Thickness 4.0 mm.



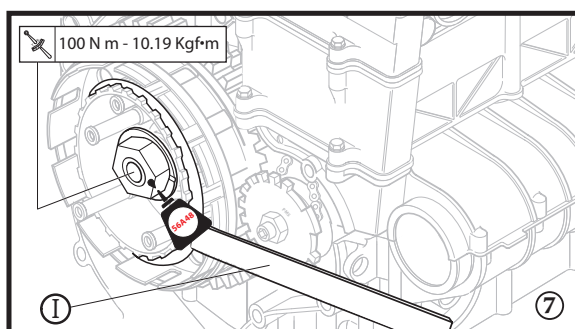
Recommended lubricant
ENGINE OIL



- ⑤ Insert:
 • **the clutch drum** (F)



- 6 Insert:
- the convex disk spring **G**
 - the fixing nut **H**



- 7 Tighten:
- the clutch drum nut

NOTE:
By keeping the clutch drum still using the retainer tool specific for the clutch **I**, tighten the relative nut.



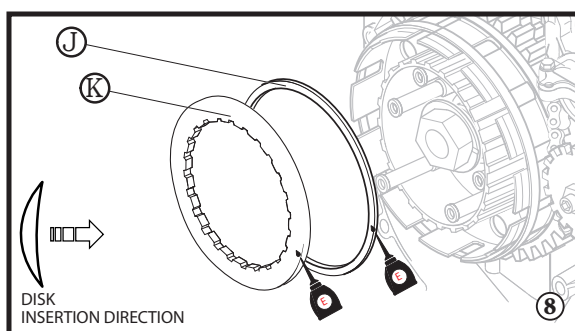
Special Tools: CLUTCH DISMANTLING SPANNER
Code: R180297047000

Torque fasten with:

100 N m - 10.9 Kgf·m



AREXONS SYSTEM 56A48
HIGH TEMPERATURE SEALER

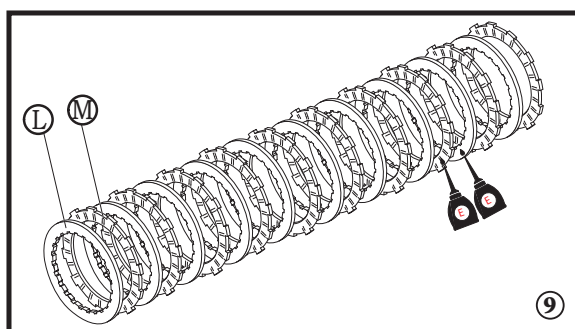


- 8 Insert:
- the disk with convex side **J**
 - the friction steel disk **K**

NOTE:
The friction steel disk **K** must be inserted with the friction band towards the inside of the engine.



Recommended lubricant
ENGINE OIL

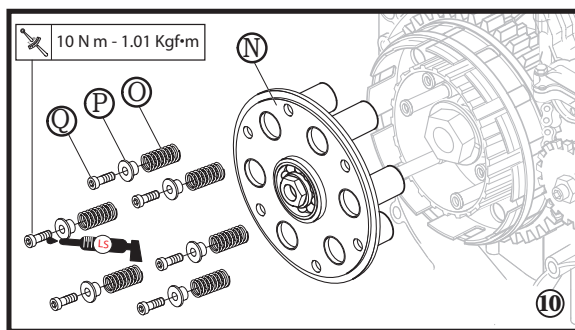


- 9 Insert sequentially and alternatively:
- the friction disks **L**
 - the steel disks **M**

NOTE:
Lubricate all disks, one by one, using engine oil, before inserting them in the clutch drum.



Recommended lubricant
ENGINE OIL



- ⑩ Insert:
- the pressure plate **N**
 - the compression springs **P**
 - the cups **P**
 - the screws **Q**

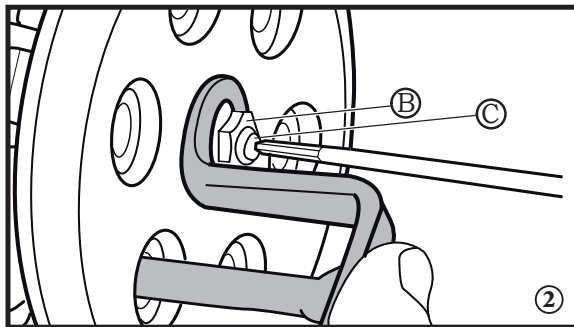
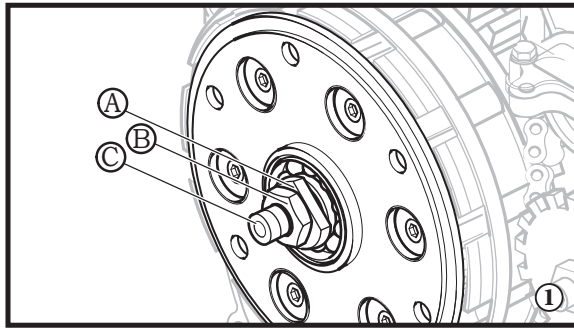
Torque fasten.

 10 N m - 1.01 Kgf·m

NOTE: _____
Lubricate the screws' threads. _____



Recommended lubricant
TUTELA MR2 GREASE



CLUTCH DISKS ADJUSTMENT

- ① Lock:
- **the flange ((IMG))**
- Loosen:
- **the lock nut ((IMG))**
- Tighten:
- **the regulator ((IMG))**
- until contact with the internal reaction rod is heard and loosen it by $\frac{1}{4}$ of a turn.

Check the clearance on the clutch command positioned on the opposite side of the engine.

- ② Fasten:
- **the lock nut (B)**
- using special tool keeping the regulator still (C)

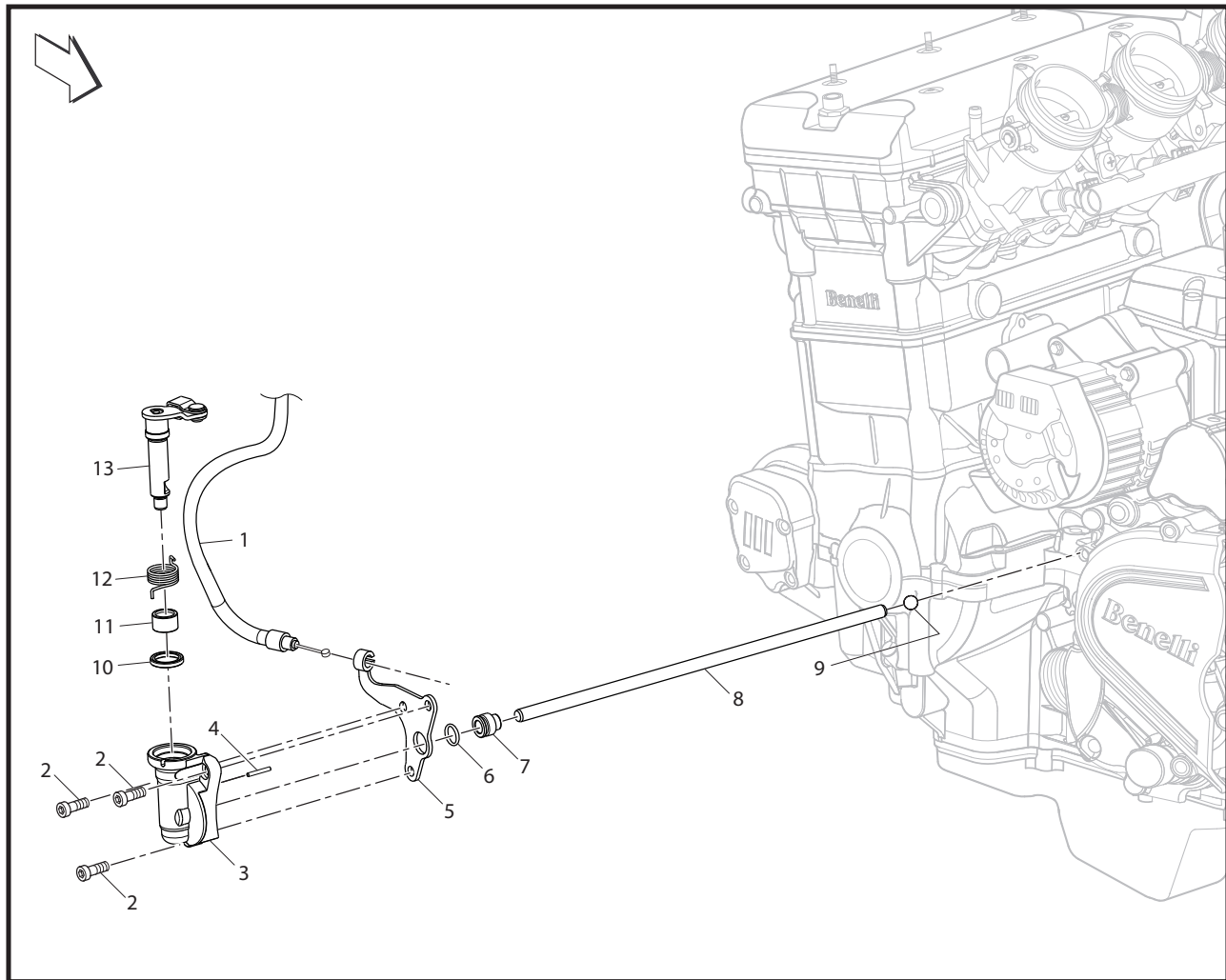


**Special Tools: CLUTCH PRESSURE PLATE
ADJUSTING SPANNER**
Code: R180297130000

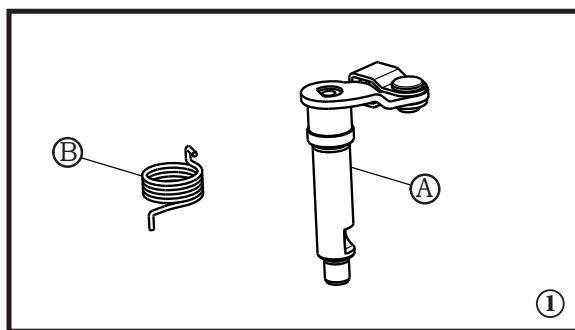
NOTE: _____
To use the special tool, remove one screw with
relative cup and spring. _____



CLUTCH COMMAND REMOVAL



SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1		Clutch Lid Removal	1	Remove the pieces in the given order. See paragraph "5.69" See paragraph "5.71"
2		Clutch Pressure Plate Removal	3	
3		Clutch Command Removal	1	
4		Clutch Cable	1	
5		Screw	1	
6		Clutch Command Body	1	
7		Plug	1	
8		Small Plate	1	
9		O-Ring Gasket	1	
10		Bush	1	
11		Clutch Command Rod	1	
12		Ball	1	
13		Needle Cage	1	
		Needle Cage	1	
		Spring	1	
		Clutch Command	1	

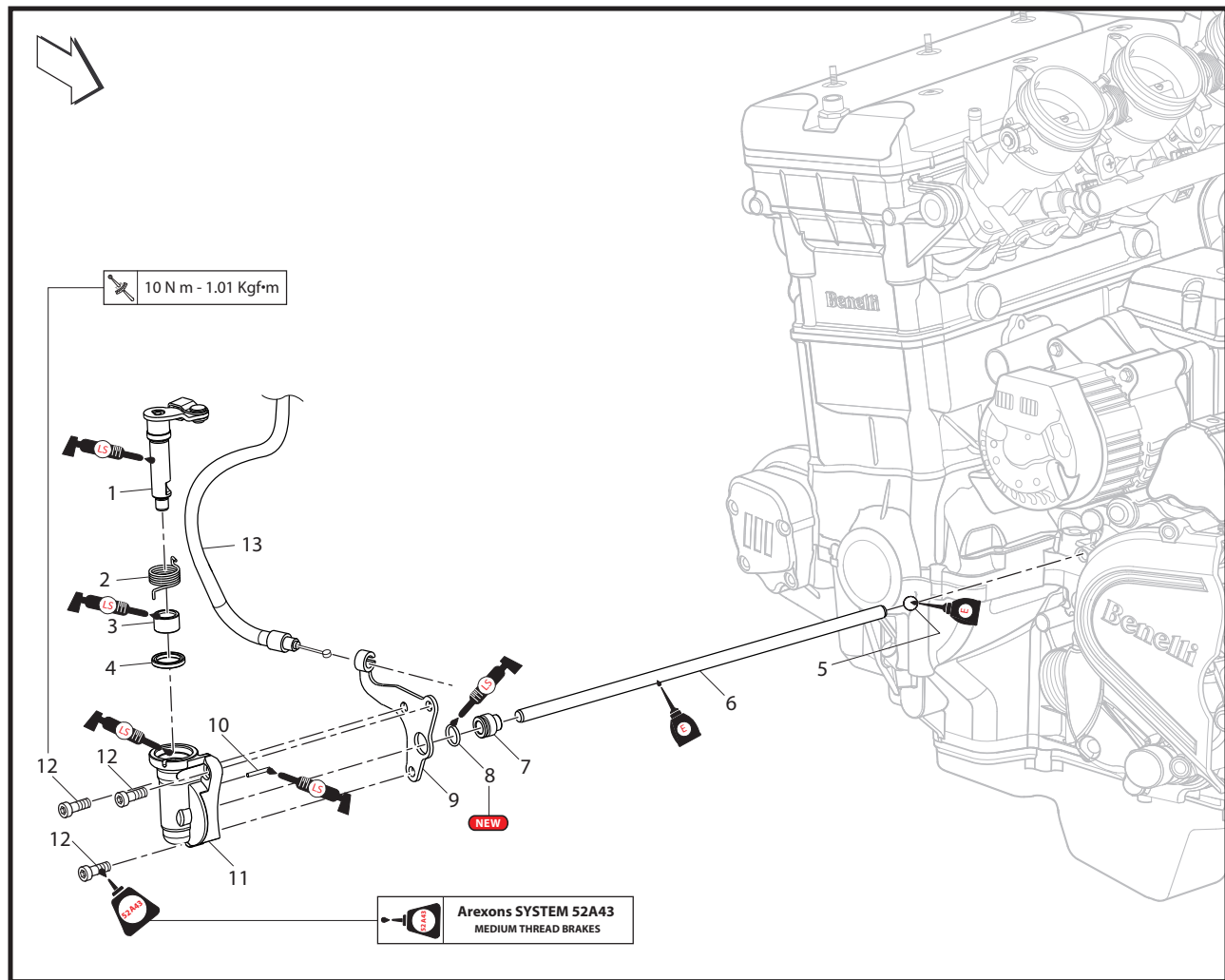


CLUTCH COMMAND CONTROL

- ① Check:
- **the clutch command** ①
In the presence of deformations/damages/wear lines → Replace.
 - **the clutch command spring** ②
In the presence of damages/wear → Replace.



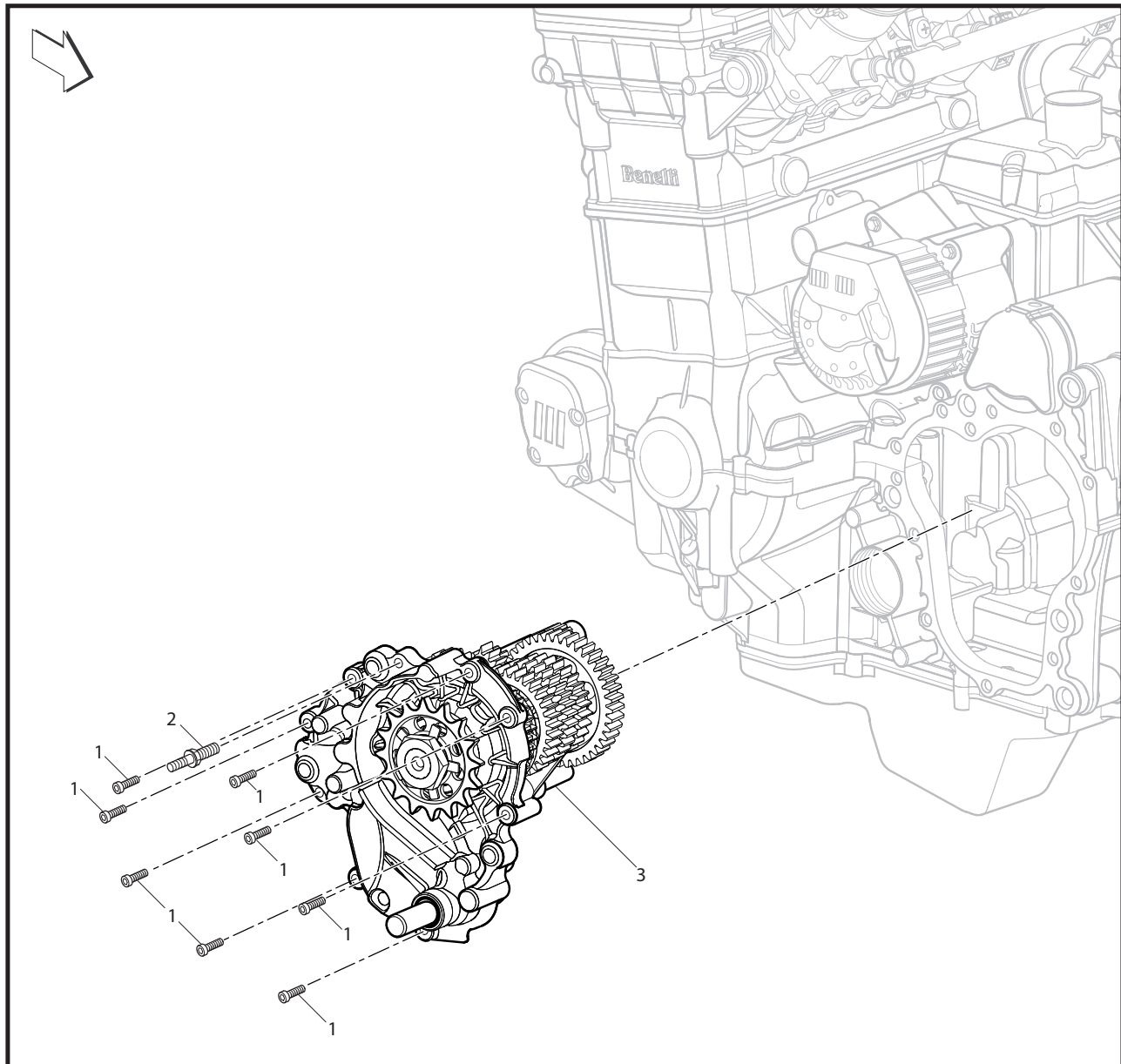
CLUTCH COMMAND INSTALLATION



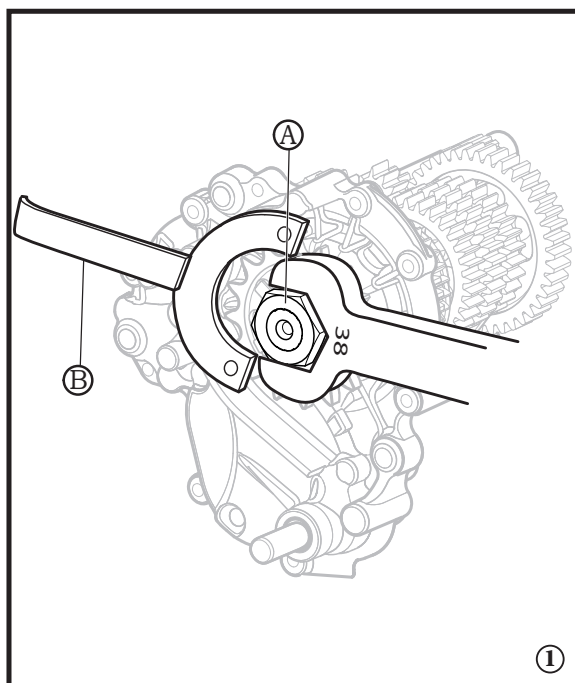
SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1		Clutch Command Installation	1	Install the pieces in the given order.
2		Clutch Command	1	
3		Spring	1	
4		Needle Cage	1	
5		Needle Cage	1	
6		Ball	1	
7		Clutch Command Rod	1	
8		Bush	1	
9	NEW	O-Ring Gasket	1	
10		Small Plate	1	
11		Plug	1	
12		Clutch Command Body	1	
13		Screw	3	
		Clutch Cable	1	



GEAR CHANGE REMOVAL



SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1 2 3		Clutch Lid Removal Clutch Removal Clutch Command Removal Water Pump Removal Gear Change Removal Screw Special Screw Gear change	8 1 1	Remove the pieces in the given order. NOTE: Remove the neutral sensor located in the rear part of the engine before removing the gear change. NOTE: Drain the engine oil before carrying out the operations. See paragraph "5.69". See paragraph "5.71". See paragraph "5.88". See "COOLING PLANT 6.15" paragraph.



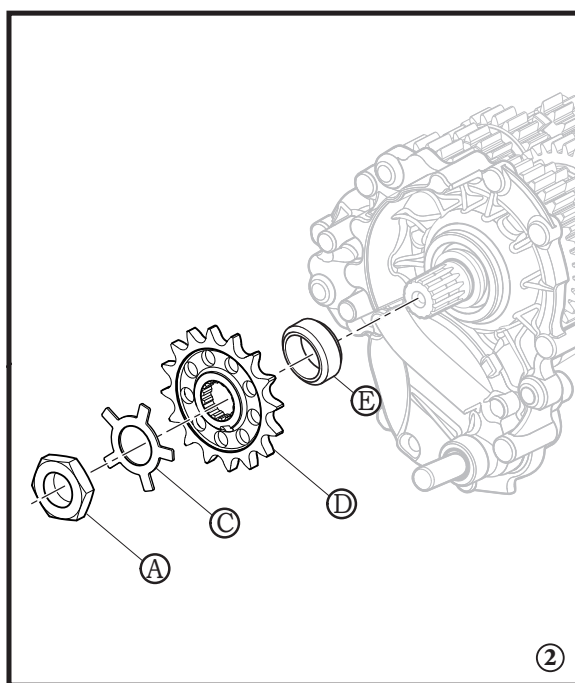
GEAR CHANGE REMOVAL

- ① Remove:
- the nut (A)
- keeping the pinion still with the special tool (B)

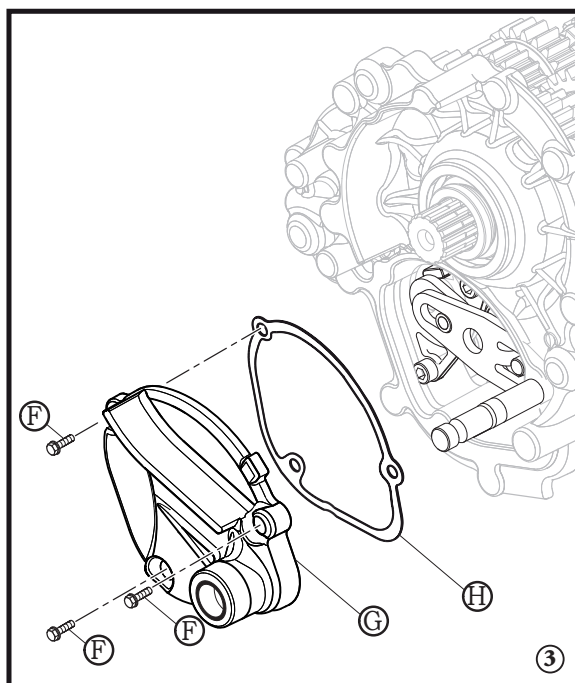


Special Tools: PINION DISMANTLING TOOL

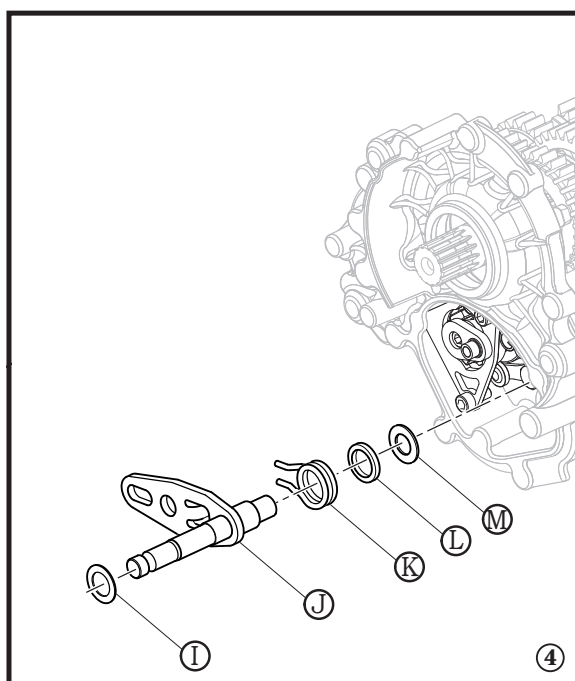
Code: R180297048000



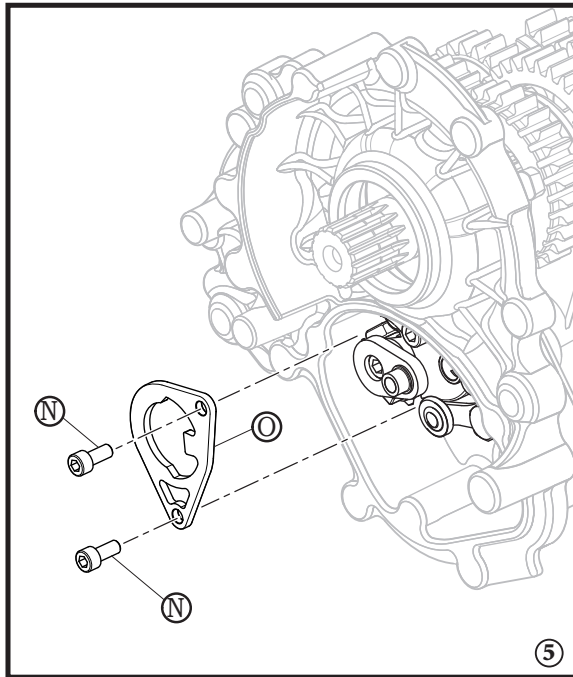
- ② Remove:
- the washer (C)
 - the pinion (E)
 - the spacer (D)



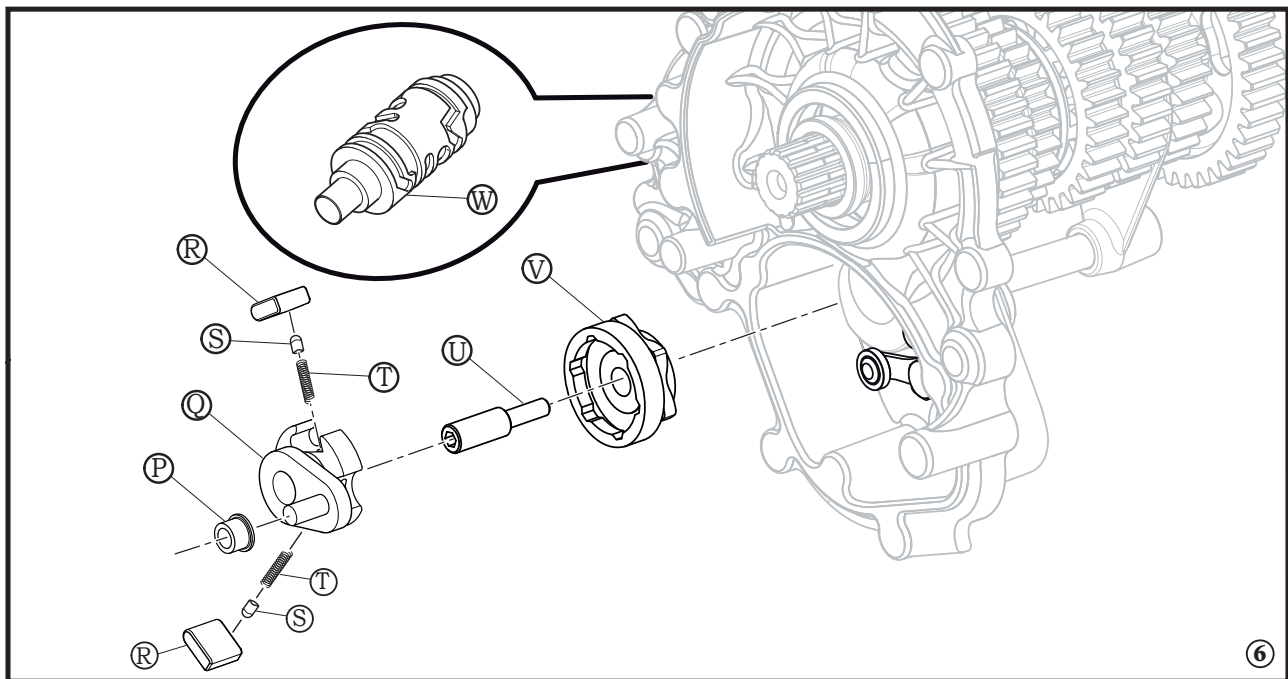
- ③ Remove:
- the screws ⑥
 - the selector lid ⑦
 - the selector lid gasket ⑧



- ④ Remove:
- the washer ①
 - the pin ②
 - the spring ③
 - the spacer ④
 - the washer ⑤



- ⑤ Remove:
- the screws **N**
 - the flange **O**



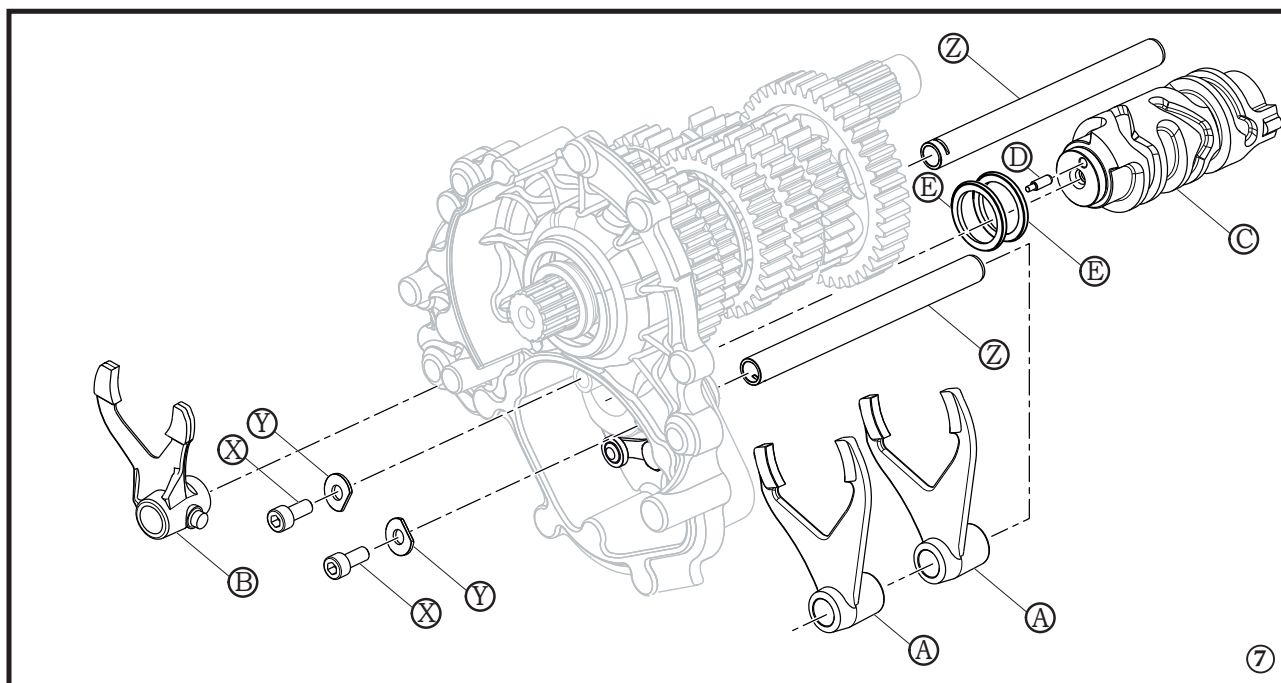
ATTENTION

During removal of the peg **U** support the desmodromic **W** positioned behind the gear change flange to avoid it falling.

NOTE:

During removal of the desmodromic sprocket **Q** contrast the reaction of the springs **T** located underneath the jumpers **R**.

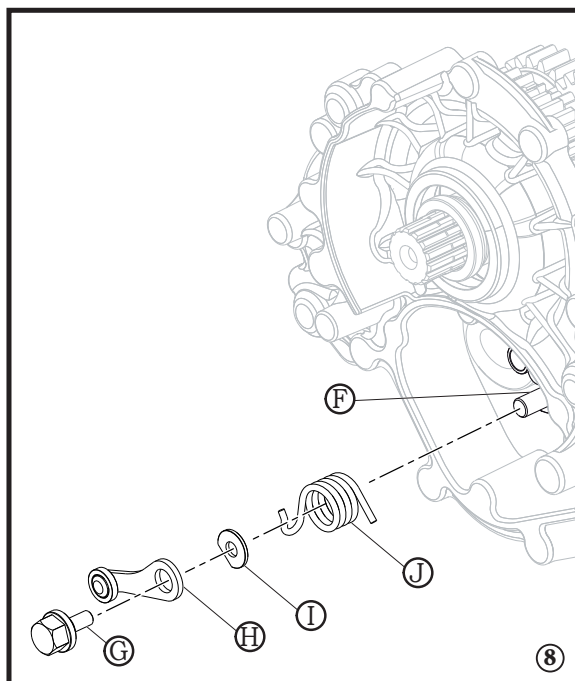
- ⑥ Remove:
- the bush **P**
 - the desmodromic sprocket **Q**
 - the jumpers **R**
 - the pegs **S**
 - the springs **T**
 - the peg **U**
 - the complete gear change drum **V**



NOTE: During removal of the pins **Z** pay attention to the desmodromic **C** and to the forks **A** and **B**.

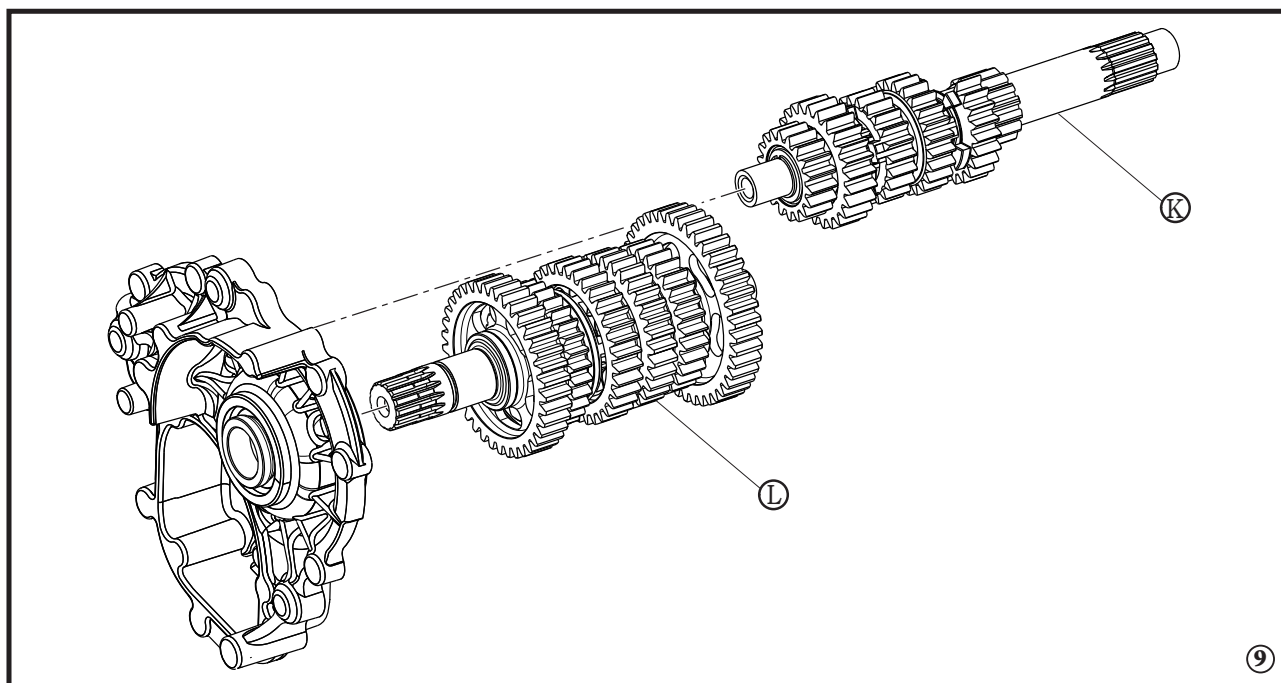
NOTE: Take note of the position of the forks before removing them for a correct re-assembly.

- ⑦ Remove:
- the screws **X**
 - the washers **Y**
 - the pins **Z**
 - the clutch forks 1st/4th - 2nd/3rd **A**
 - the clutch fork 5th/6th **B**
 - the desmodromic **C**
 - the plug **D**
 - the shims **E**



ATTENTION Ensure that the peg **F** is correctly inserted in its seat.

- ⑧ Remove:
- the threaded pin **G**
 - the gears fixing jumper **H**
 - the washer **I**
 - the spring **J**

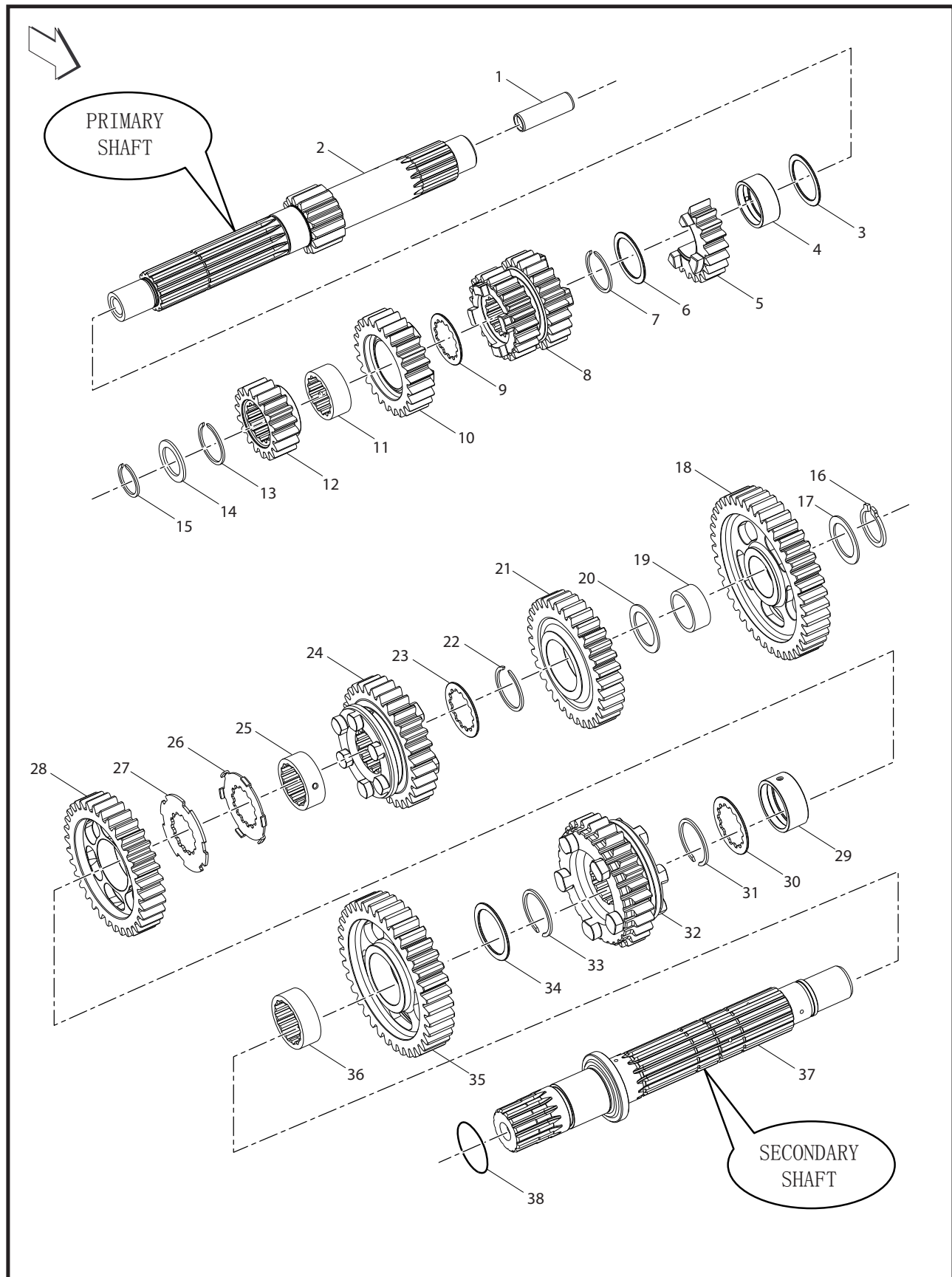
**ATTENTION**

The gears are free.
Remove the shafts (K) and (L) simultaneously.

- 9 Remove:
- the primary shaft (K)
 - the secondary shaft (L)



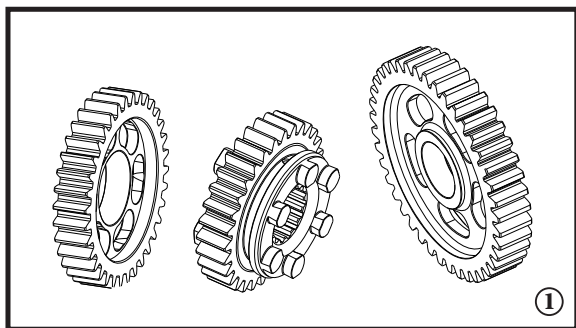
PRIMARY AND SECONDARY SHAFT GEARS REMOVAL





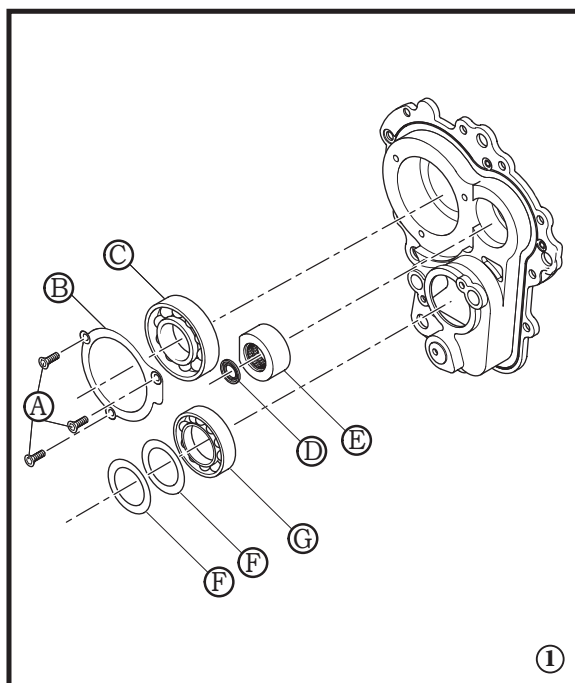
PRIMARY AND SECONDARY SHAFT GEARS REMOVAL

SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
		Engine Removal Clutch Lid Removal Clutch Removal Oil Tank Removal Oil Pump Removal Clutch Command Removal Water Pump Removal Distribution Lid Removal Phonic Wheel Removal Alternator Removal Female Collar Joint Removal Z25 Gear/Splined Shaft Removal Start-Up Motor Removal Gear Change Removal Shower Tube Removal Intermediate Gear Small Shaft Removal Satellite Gear Removal Complete Free Wheel Removal Primary Shaft Gears Removal		Remove the pieces in the given order. NOTE: Drain the engine oil and the cooling liquid before carrying out the operations. See "FRAME 4.107" paragraph. See paragraph "5.69". See paragraph "5.71". See paragraph "5.113". See paragraph "5.116". See paragraph "5.88". See "COOLING PLANT 6.15" paragraph. See paragraph "5.1". See paragraph "5.18". See paragraph "5.122". See paragraph "5.128". See paragraph "5.128". See paragraph "5.125". See paragraph "5.91". See paragraph "5.131". See paragraph "5.131". See paragraph "5.131". See paragraph "5.131".
1		Bush	1	
2		Primary Shaft	1	
3		Shim	1	
4		Needle Cage	1	
5		Z24 5th Conductor Gear	1	
6		Shim	1	
7		Elastic Ring	1	
8		3rd/4th Conductor Gear	1	
9		Shim	1	
10		Z25 6th Conductor Gear	1	
11		Needle Cage	1	
12		Z18 2nd Conductor Gear	1	
13		Seeger	1	
14		Shim	1	
15		Seeger	1	
		Secondary Shaft Gears Removal		
16		Elastic Ring	1	
17		Shim	1	
18		Z39 1st Conduct Gear	1	
19		Needle Cage	1	
20		Shim	1	
21		Z28 5th Conduct Gear	1	
22		Elastic Ring	1	
23		Splined Shim	1	
24		Z30 4th Conduct Gear	1	
25		Broached Bush	1	
26		Stop Ring	1	
27		Splined Shim	1	
28		Z32 3rd Conduct Gear	1	
29		Broached Bush	1	
30		Splined Shim	1	
31		Elastic Ring	1	
32		Z27 6th Conduct Gear	1	
33		Elastic Ring	1	
34		Shim	1	
35		Z39 2nd Conduct Gear	1	
36		Needle Cage	1	
37		Secondary Shaft	1	
38		O-Ring Gasket	1	



GEARS CONTROL

- ① Check:
- **the gears of the two shafts**
In the presence of blue fading/pittings/wear lines
→ Replace the faulty gears.
 - **the gears clutch jaws**
In the presence of cracks/damages/round edges
→ Replace the faulty gears.

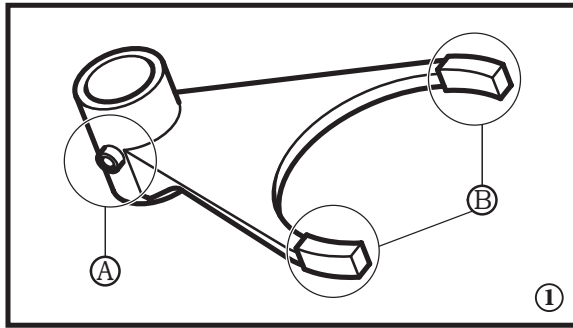


GEAR CHANGE FLANGE BEARINGS CONTROL

- ① Check:
- **the free rotation of the bearings** ③ ⑤ ⑦
- If out of specification → Replace.

To replace the bearings remove:

- **the screws** ①
- **the small plate** ②
- **the bearing** ③
- **the seal ring** ④
- **the bearing** ⑤
- **the shims** ⑥
- **the bearing** ⑦



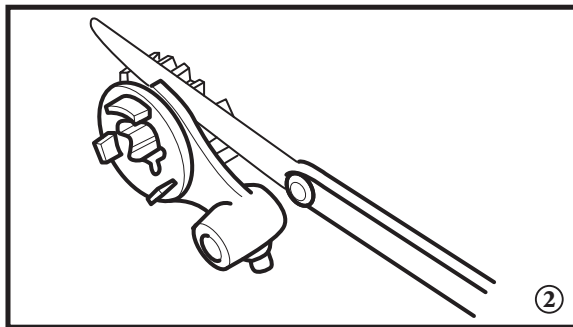
GEARS COMMAND FORKS CONTROL

- ① The following procedure is applied to all gears command forks.

Check:

- the gears command fork cam follower **A**
- the gears command fork jaw **B**

In the presence of deformations/damages/scratches /wear lines → Replace the gears command fork.

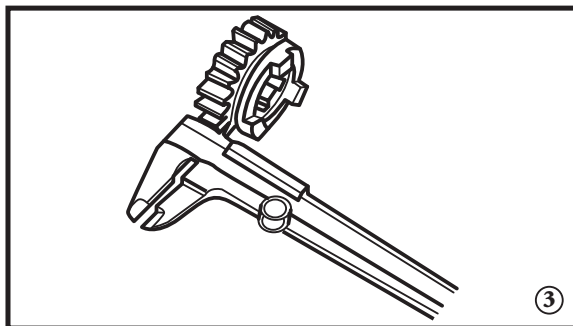


- ② Check:
- the clearance of the gear change fork inside the slot of its gear using a feeler.
- If the clearance is out of specification → Replace the fork or the relative gear or both.

The clearance of each fork is important for the smoothness and precision of the speed gear change.



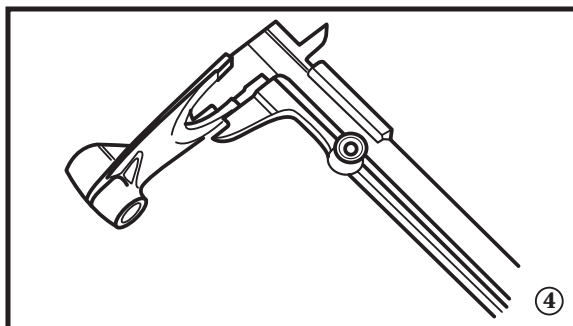
Fork-slot clearance
<Limit> : 0.50 mm (0.019 in)



- ③ Measure:
- the width of the slot of the gear change fork using a cursor gauge



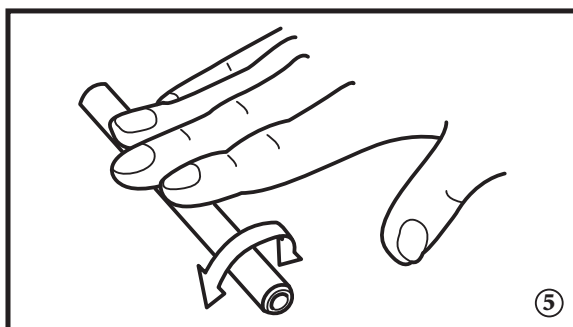
Slot-fork width
Standard value: 5.0 - 5.1 mm
(0.19 - 0.20 in)



- ④ Measure:
- the thickness of the gear change fork using a cursor gauge

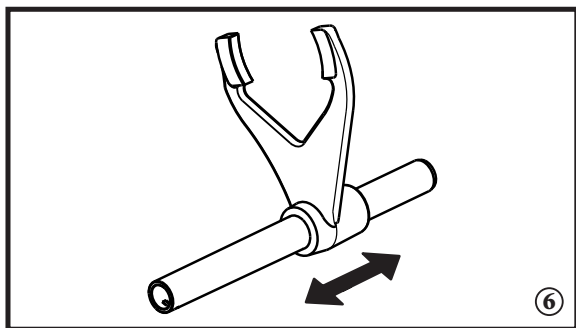


Fork-gear change thickness
Standard value: 4.8 - 4.9 mm
(0.18 - 0.19 in)

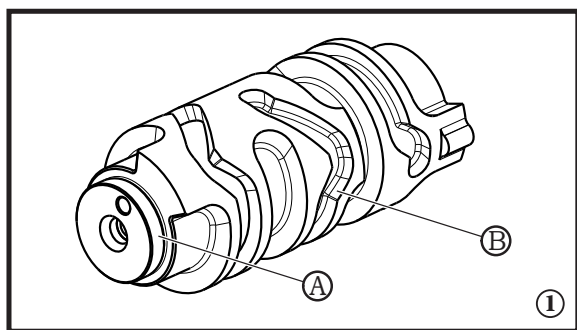


- ⑤ Check:
- the gears command fork guide pin
- Roll the guide pin of the gears command fork on a flat surface
In the presence of deformations → Replace.

NOTE:
Do not attempt to straighten the fork guide bar if it is deformed.



- ⑥ Check:
- **the movement of the gears command fork on the relative guide bar**
- If the movement is not smooth → Replace the gears command forks together with the relative bar guide.

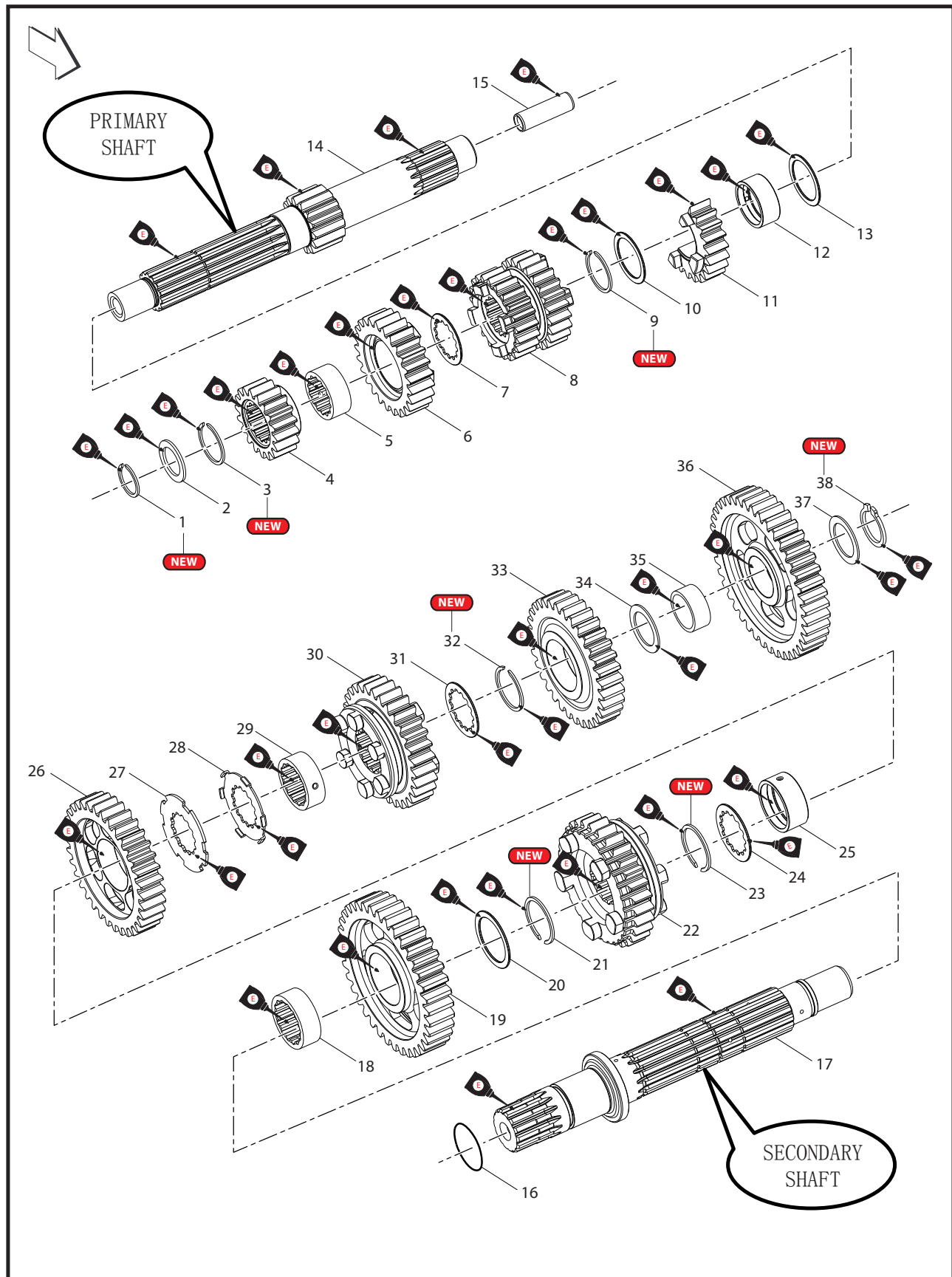


DESMODROMIC SHAFT CONTROL

- ① Check:
- **the grooves of the desmodromic shaft** ①
In the presence of damages/scratches/wear lines
→ Replace the desmodromic shaft set
 - **the segment of the desmodromic shaft** ②
In the presence of damages/wear → Replace the desmodromic shaft set



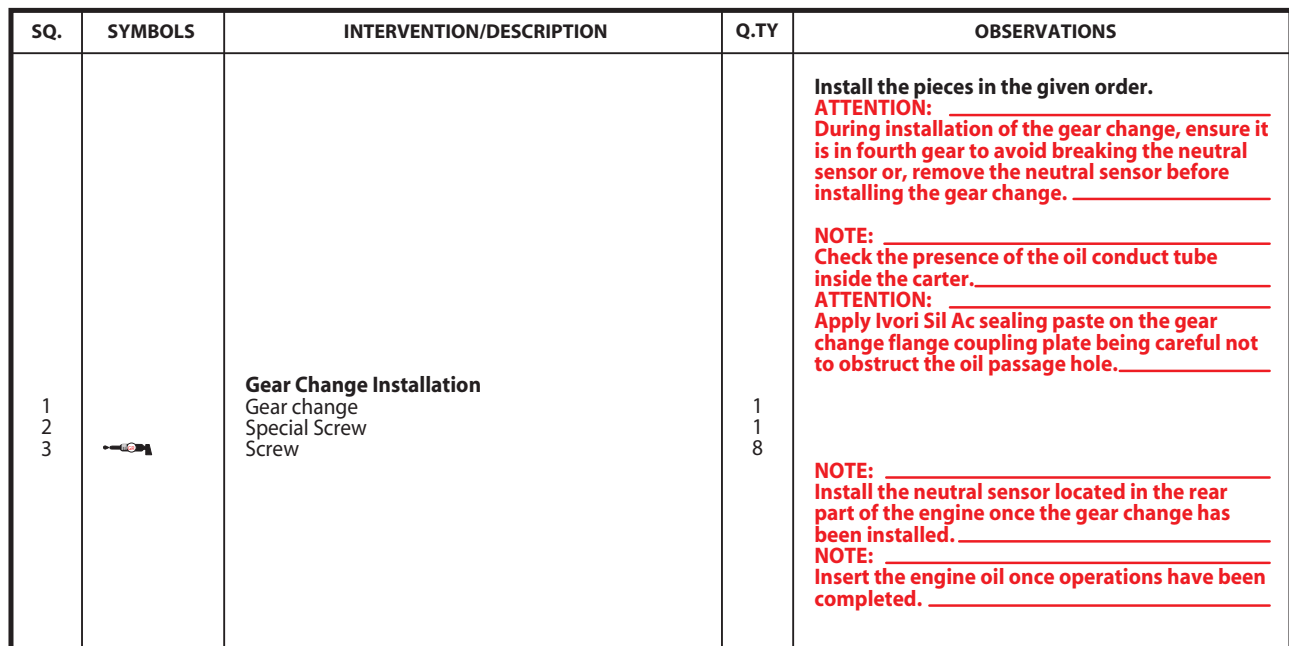
PRIMARY AND SECONDARY SHAFT GEARS INSTALLATION





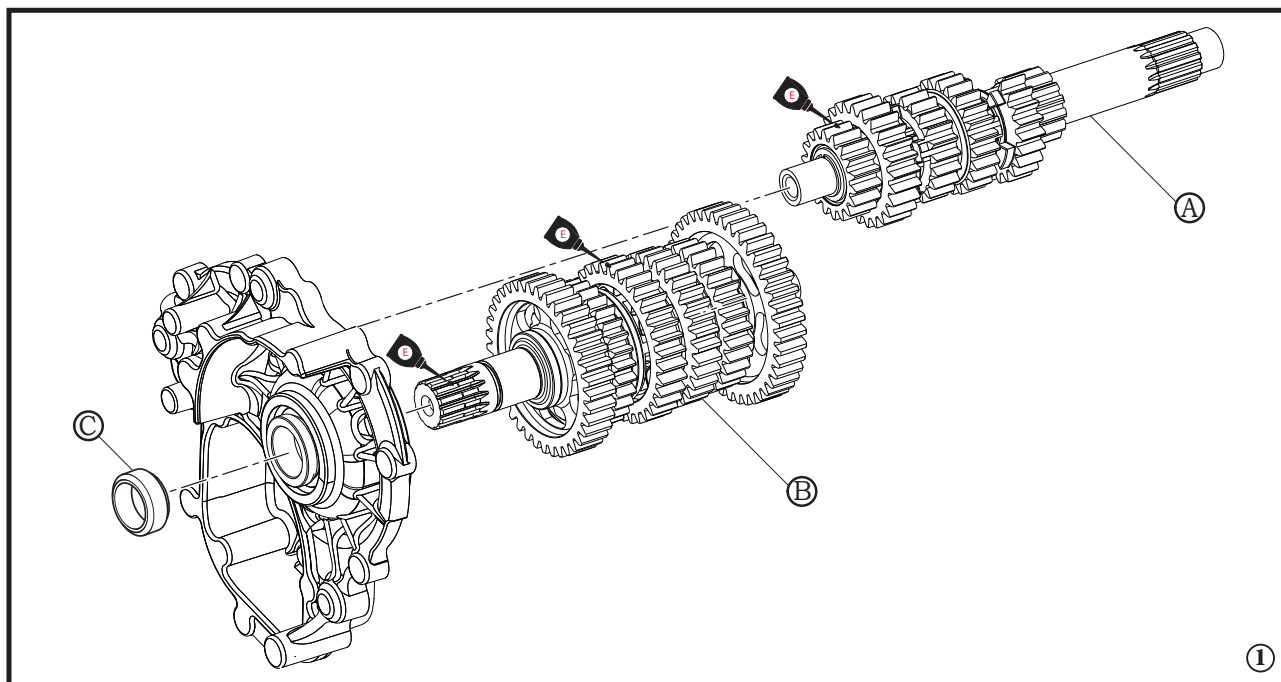
PRIMARY AND SECONDARY SHAFT GEARS INSTALLATION

SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
				Install the pieces in the given order. NOTE: _____ Never use a used elastic ring. When installing a new elastic ring careful not to stretch its ends more than necessary for it to be inserted on the shaft. Once the elastic ring has been installed, always ensure it is completely and firmly inserted in its slot. NOTE: _____ Accurately oil each gear, shaft and bearing but not excessively in order to avoid jeopardising the sealing paste hold with oil leaks.
		Primary Shaft Gears Installation		
1		Seeger	1	
2		Shim	1	
3		Seeger	1	
4		Z18 2nd Conductor Gear	1	
5		Needle Cage	1	
6		Z25 6th Conductor Gear	1	
7		Shim	1	
8		3rd/4th Conductor Gear	1	
9		Elastic Ring	1	
10		Shim	1	
11		Z24 5th Conductor Gear	1	
12		Needle Cage	1	
13		Shim	1	
14		Primary Shaft	1	
15		Bush	1	
		Secondary Shaft Gears Installation		
16		O-Ring Gasket	1	
17		Secondary Shaft	1	
18		Needle Cage	1	
19		Z39 2nd Conduct Gear	1	
20		Shim	1	
21		Elastic Ring	1	
22		Z27 6th Conduct Gear	1	
23		Elastic Ring	1	
24		Splined Shim	1	
25		Broached Bush	1	
26		Z32 3rd Conduct Gear	1	
27		Splined Shim	1	
28		Stop Ring	1	
29		Broached Bush	1	
30		Z30 4th Conduct Gear	1	
31		Splined Shim	1	
32		Elastic Ring	1	
33		Z28 5th Conduct Gear	1	
34		Shim	1	
35		Needle Cage	1	
36		Z39 1st Conduct Gear	1	
37		Shim	1	
38		Elastic Ring	1	NOTE: _____ Insert the engine oil and the cooling liquid once the operations have been completed. NOTE: _____ Check that the seegers are in their seats.





GEAR CHANGE INSTALLATION



ATTENTION

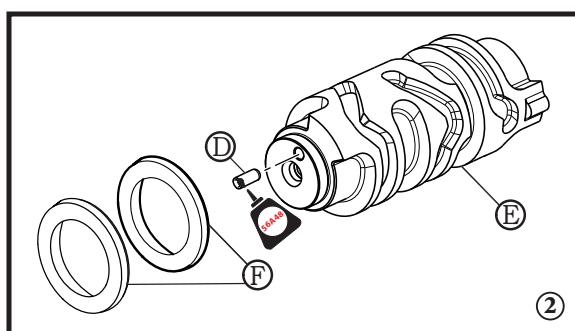
The gears are free.

Remove the shafts (A) and (B) simultaneously.

- ① Install:
- the primary shaft (A)
 - the secondary shaft (B)
 - the spacer (C)



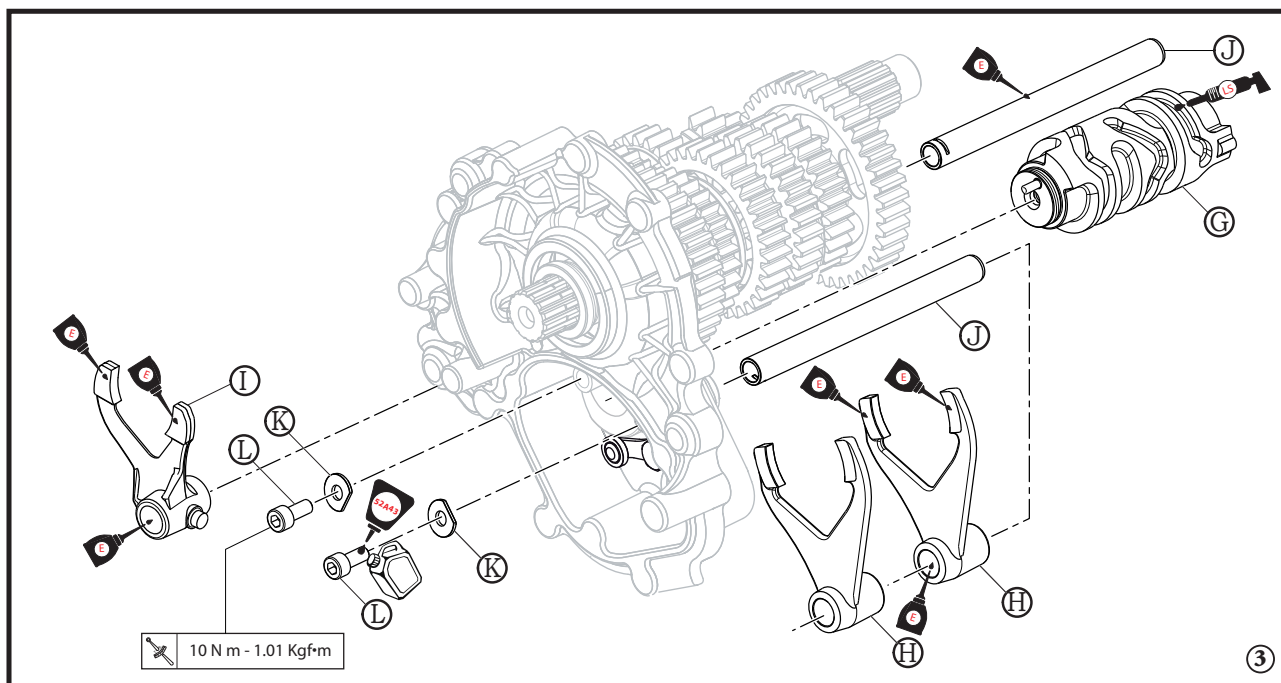
Recommended lubricant
ENGINE OIL



- ② Install:
- the plug (D) on the desmodromic shaft (E)
 - the two thicknesses (F) (of 0.2 mm each)



AREXONS SYSTEM 56A48
HIGH TEMPERATURE THREAD BRAKES



- ③ Install:
- the desmodromic Ⓒ
 - the clutch forks 1st/4th - 2nd/3rd Ⓓ
 - the clutch fork 5th/6th Ⓔ
 - the pins Ⓙ
 - the washers Ⓚ
 - the screws Ⓛ

Torque fasten with:

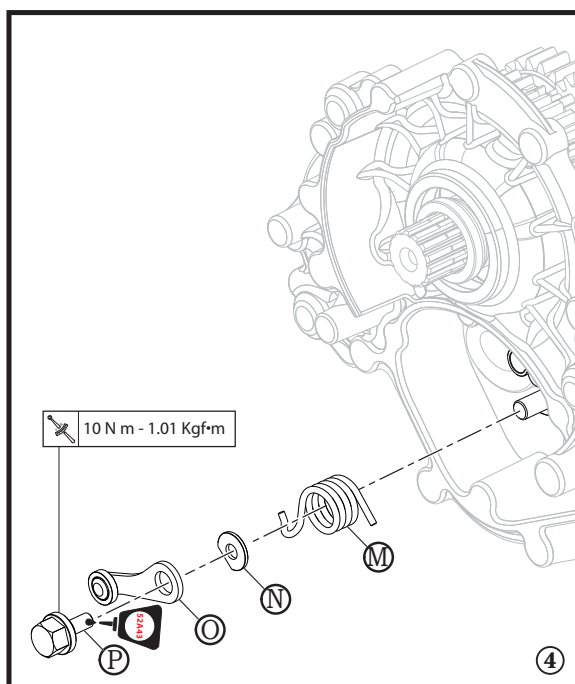
10 N m - 1.01 Kg f m



AREXONS SYSTEM 52A43
MEDIUM THREAD BRAKES



Recommended lubricant
ENGINE OIL



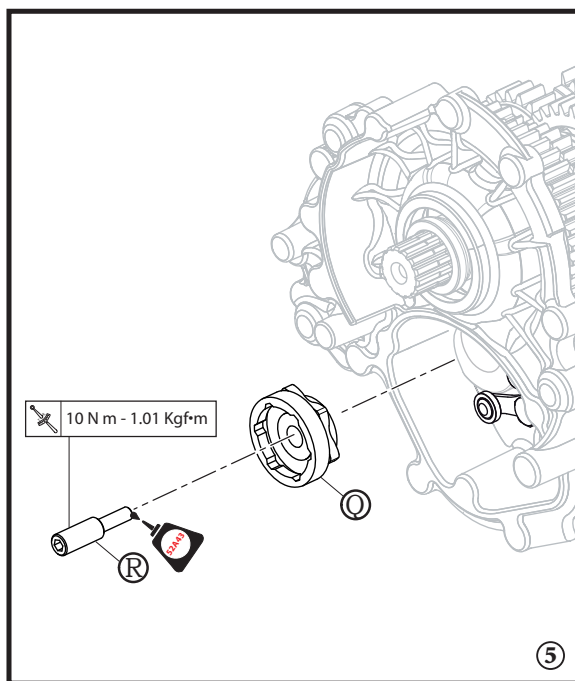
- ④ Install:
- the spring Ⓜ
 - the washer Ⓝ
 - the gears fixing jumper Ⓞ
 - the threaded pin Ⓟ

Torque fasten with:

10 N m - 1.01 Kg f m



AREXONS SYSTEM 52A43
MEDIUM THREAD BRAKES



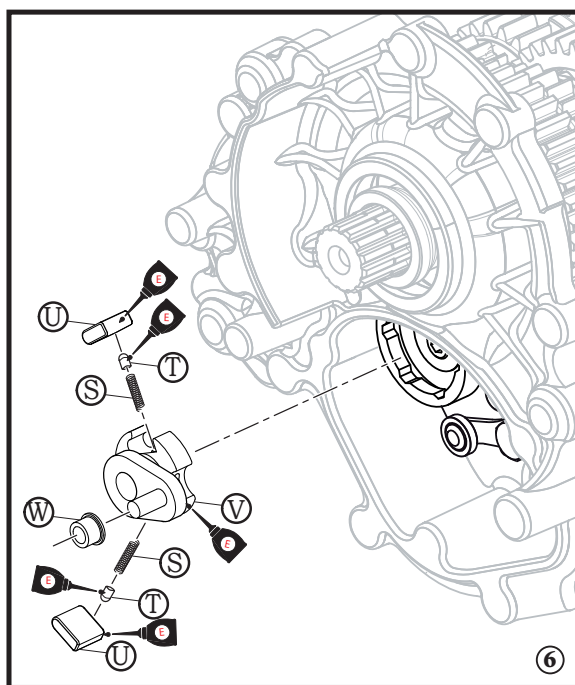
- ⑤ Install:
- the complete gear change drum ①
 - the peg ②

Torque fasten with:

10 N m - 1.01 Kg f m



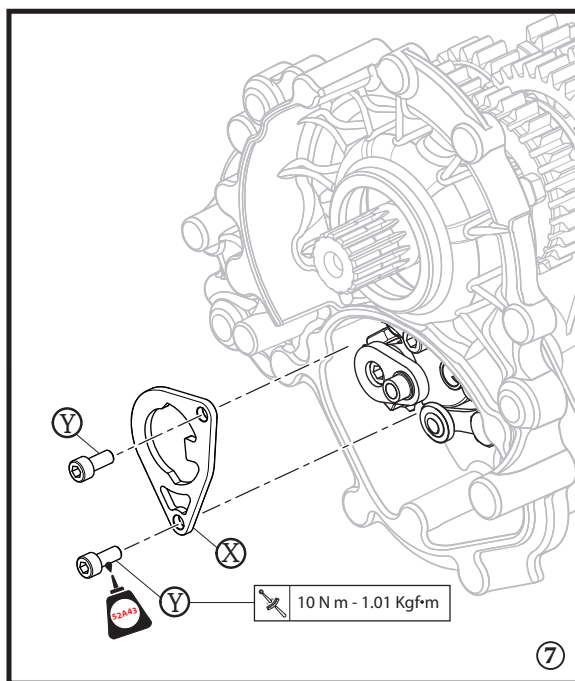
AREXONS SYSTEM 52A43
MEDIUM THREAD BRAKES



- ⑥ Install:
- the springs ③
 - the pegs ④
 - the jumpers ⑤
 - the desmodromic sprocket ⑥
 - the bush ⑦



Recommended lubricant
ENGINE OIL



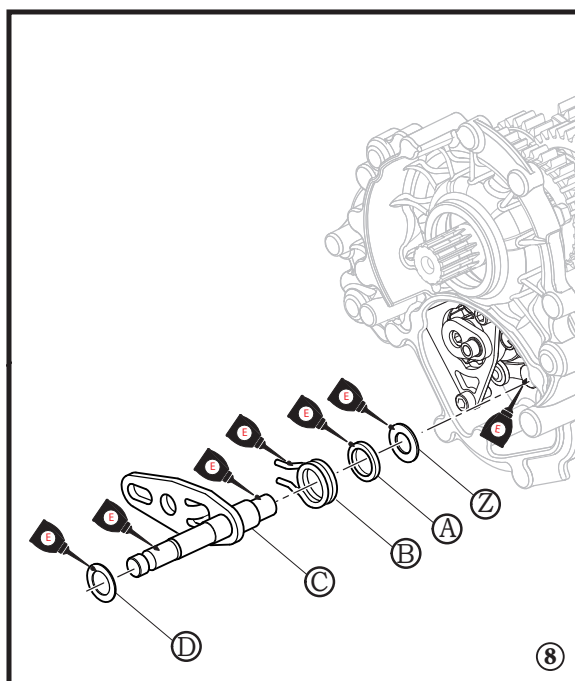
- ⑦ Install:
- the flange (X)
 - the screws (Y)

Torque fasten with:

10 N m - 1.01 Kg f.m



AREXONS SYSTEM 52A43
MEDIUM THREAD BRAKES



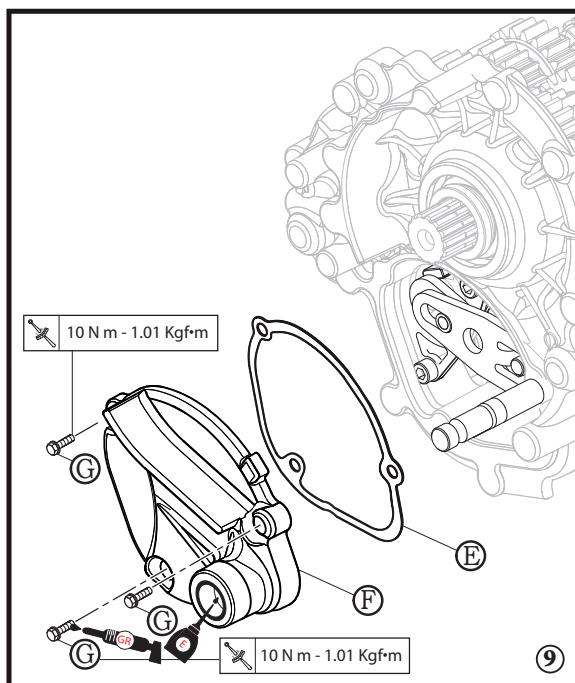
- ⑧ Install:
- the washer (Z)
 - the spacer (A)
 - the spring (B)
 - the pin (C)
 - the washer (D)

NOTE: Do not force the spring cap too much (B) during installation on the command shaft.

NOTE: Ensure that the washers (Z) and (D) remain in position.



Recommended lubricant
ENGINE OIL



- ⑨ Install:
- the selector lid gasket (E)
 - the selector lid (F)
 - the screws (G)

Torque fasten.

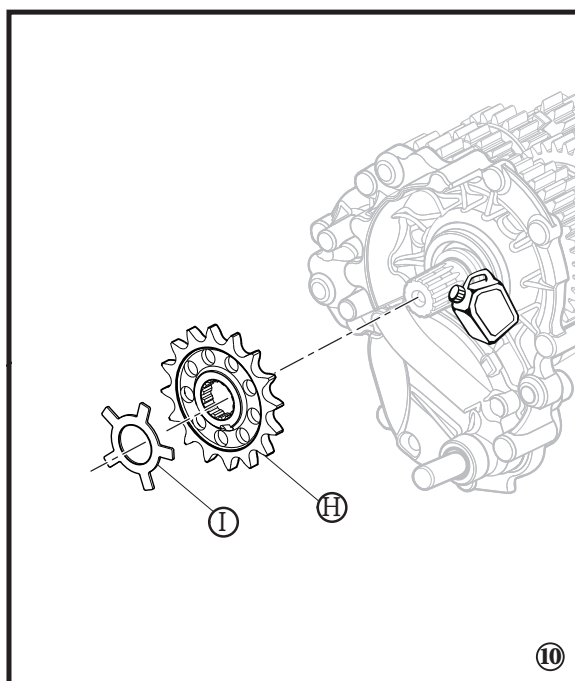
10 N m - 1.01 Kg f·m



Recommended lubricant
ENGINE OIL



Recommended lubricant
COPPER GREASE

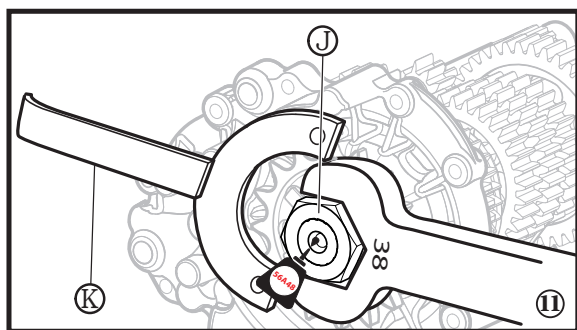


- ⑩ Install:
- the pinion (H)
 - the washer (I)

NOTE: Before installing remove the grease from the broached using solvent.



Recommended solvent
TUTELA MOTOR CLEAN



- 11 Install:
• the nut J
keeping the pinion still with the special tool K



Special Tools: PINION DISMANTLING TOOL

Code: R180297048000

Torque fasten with:



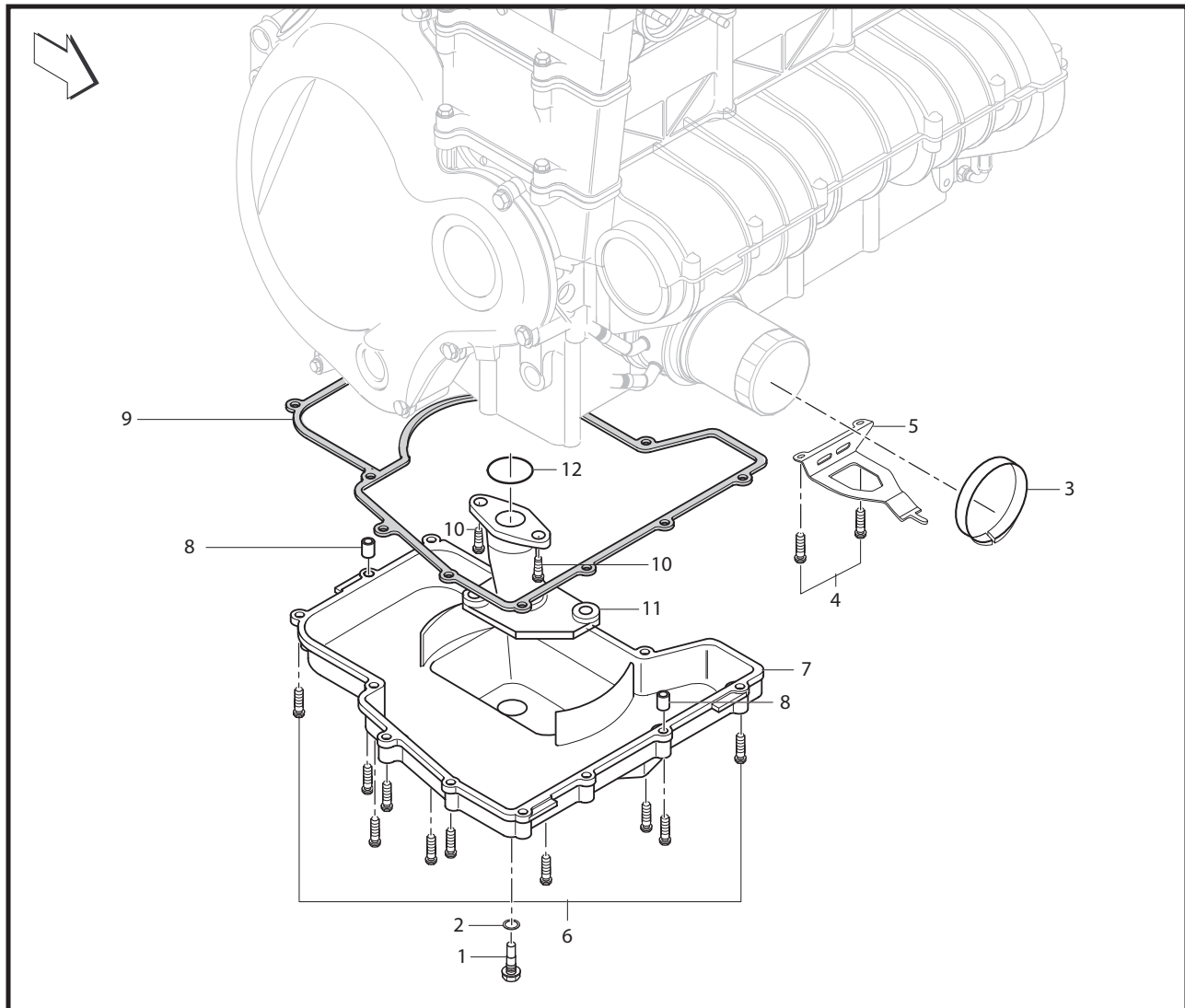
140 N m - 14.2 Kgf·m



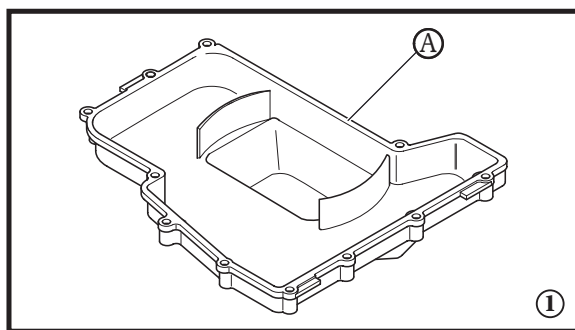
AREXONS SYSTEM 56A48
HIGH TEMPERATURE THREAD BRAKES



OIL TANK AND INLET FILTER REMOVAL

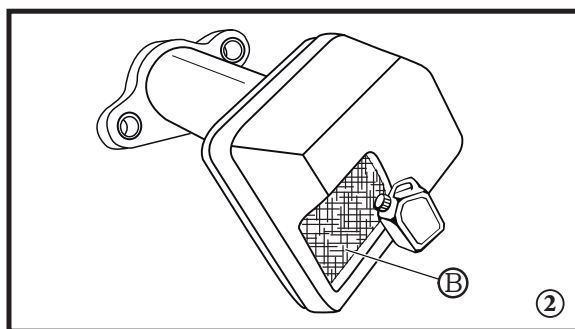


SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1		Oil Tank Removal Magnet Cap	1	Remove the pieces in the given order. NOTE: <u>Drain the engine oil before carrying out the operations.</u>
2		Washer	1	
3		Strip	1	
4		Screw	2	
5		Plate	1	
6		Screw	10	
7		Oil Tank	1	
8		Bush	2	
9		Oil Tank Gasket	1	
10		Inlet Filter Removal Screw	2	
11		Inlet Filter	1	
12		O-Ring Gasket	1	



OIL TANK AND INLET FILTER CONTROL

- ① Check:
- **the oil tank** ①
- In the presence of clinks/damages → Replace.



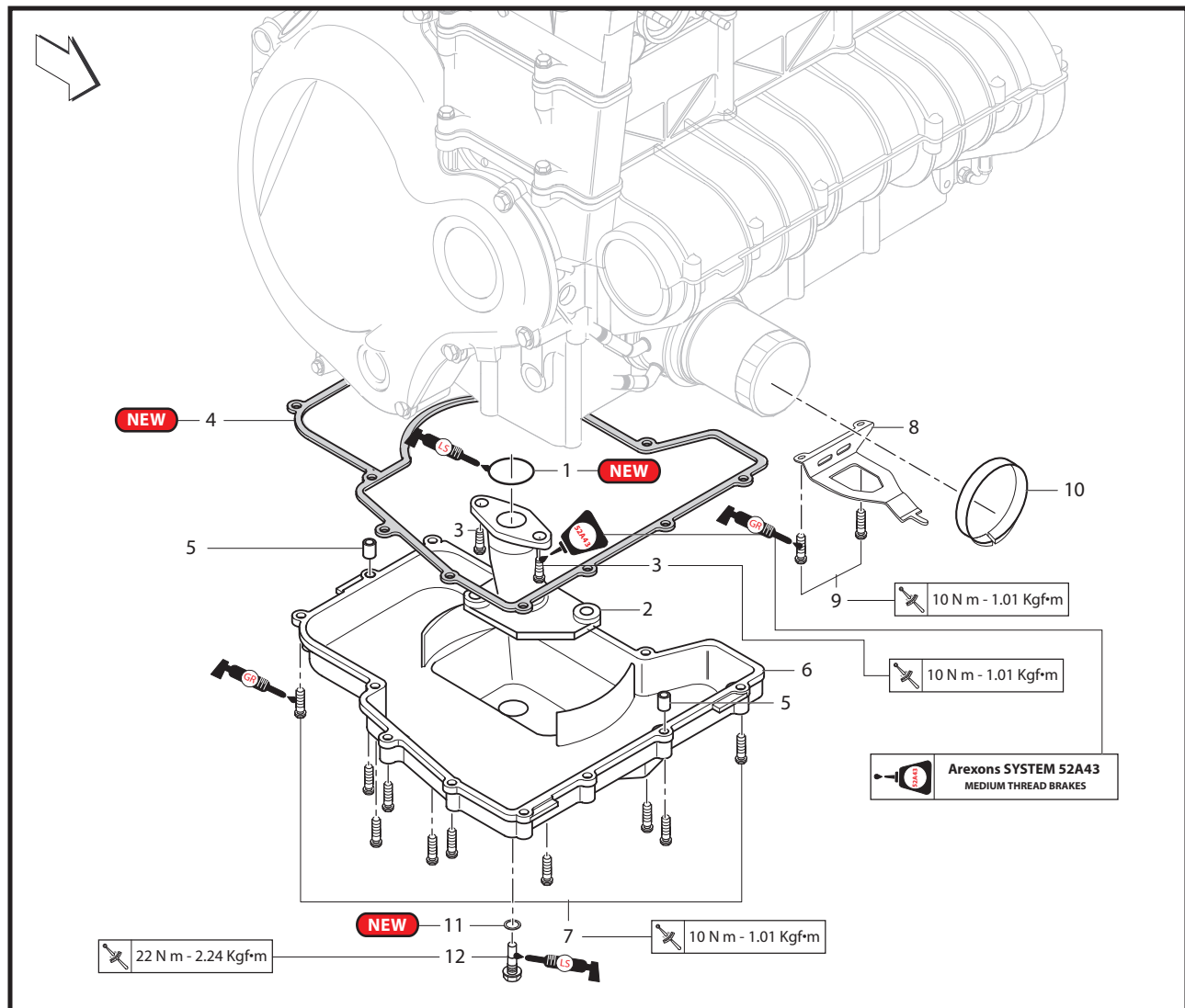
- ② Check:
- **the inlet filter** ②
- In the presence of clinks/damages → Replace.
In the presence of deposits/residues → Accurately clean the filtering area using solvent.



Recommended solvent
TUTELA MOTOR CLEAN



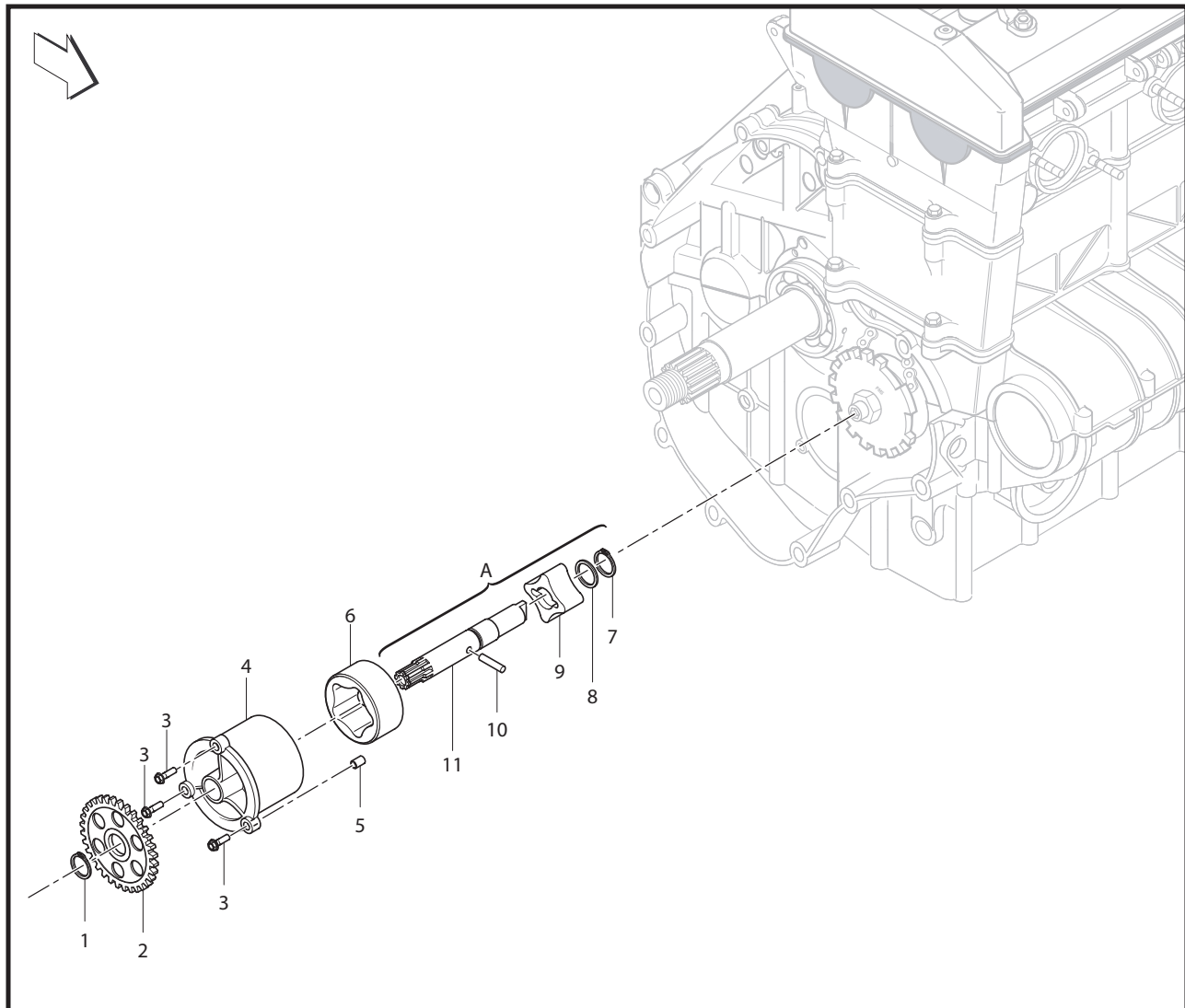
OIL TANK AND INLET FILTER INSTALLATION



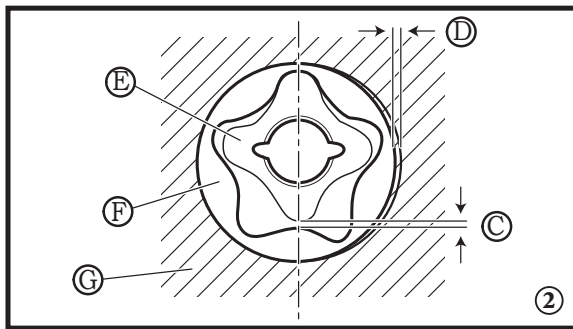
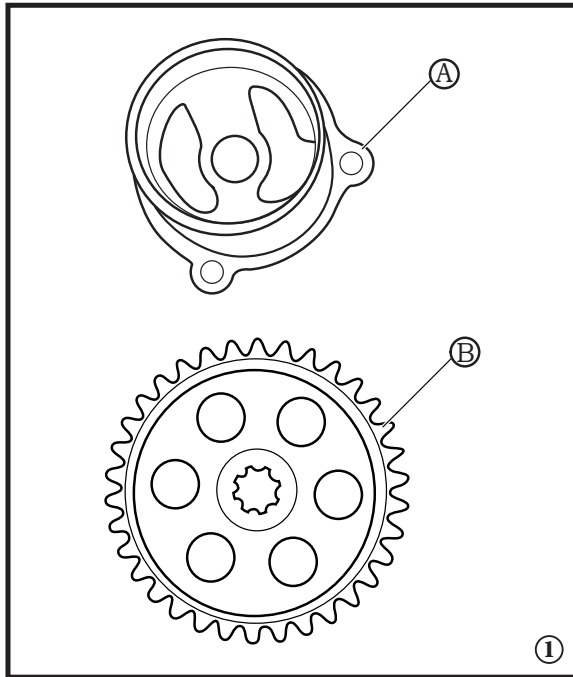
SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1		Inlet Filter Installation	1	Install the pieces in the given order. NOTE: <u>Insert the engine oil once operations have been completed.</u>
2		O-Ring Gasket	1	
3		Inlet Filter	2	
4		Oil Tank Installation	1	
5		Oil Tank Gasket	2	
6		Bush	1	
7		Oil Tank	10	
8		Screw	1	
9		Plate	2	
10		Screw	1	
11		Strip	1	
12		Washer	1	
		Magnet Cap	1	



OIL PUMP REMOVAL



SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
		Clutch Lid Removal Clutch Removal Water Pump Removal Oil Pump Removal		Remove the pieces in the given order. NOTE: _____ Drain the engine oil before carrying out the operations. _____ See paragraph "5.69" See paragraph "5.71" See paragraph "COOLING PLANT 6.15" NOTE: _____ To remove the pump, hit the oil pump shaft on the water pump side with a rubber hammer. _____
1		Seeger	1	
2		Z34 Command Gear	1	
3		Screw	3	
4		Oil Pump	1	
5		Bush	1	
6		External Rotor	1	
A		Rotor Set	1	
7		Seeger	1	
8		Shim	1	
9		Internal Rotor	1	
10		Roller	1	
11		Oil Pump Shaft	1	



OIL PUMP CONTROL

- ① Check:
- **the pump body** (A)
In the presence of scratches/damages/wear → Replace.
 - **the cogwheel** (B)
In the presence of gear damages/wear → Replace.

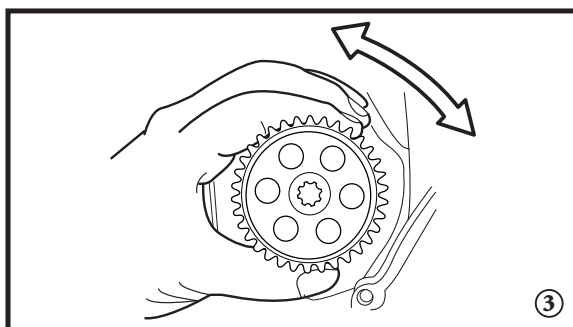
- ② Measure:
- **the tolerance between the internal rotor and the external rotor** (C)
 - **the tolerance between the external rotor and the oil pump slot** (D)

- (E) Internal rotor
(F) External rotor
(G) Oil pump slot



Clearance between the internal rotor point and the rotor point
0.25 mm (0.0098 in)

Clearance between the external rotor and the oil pump slot
0.2 mm (0.0078 in)



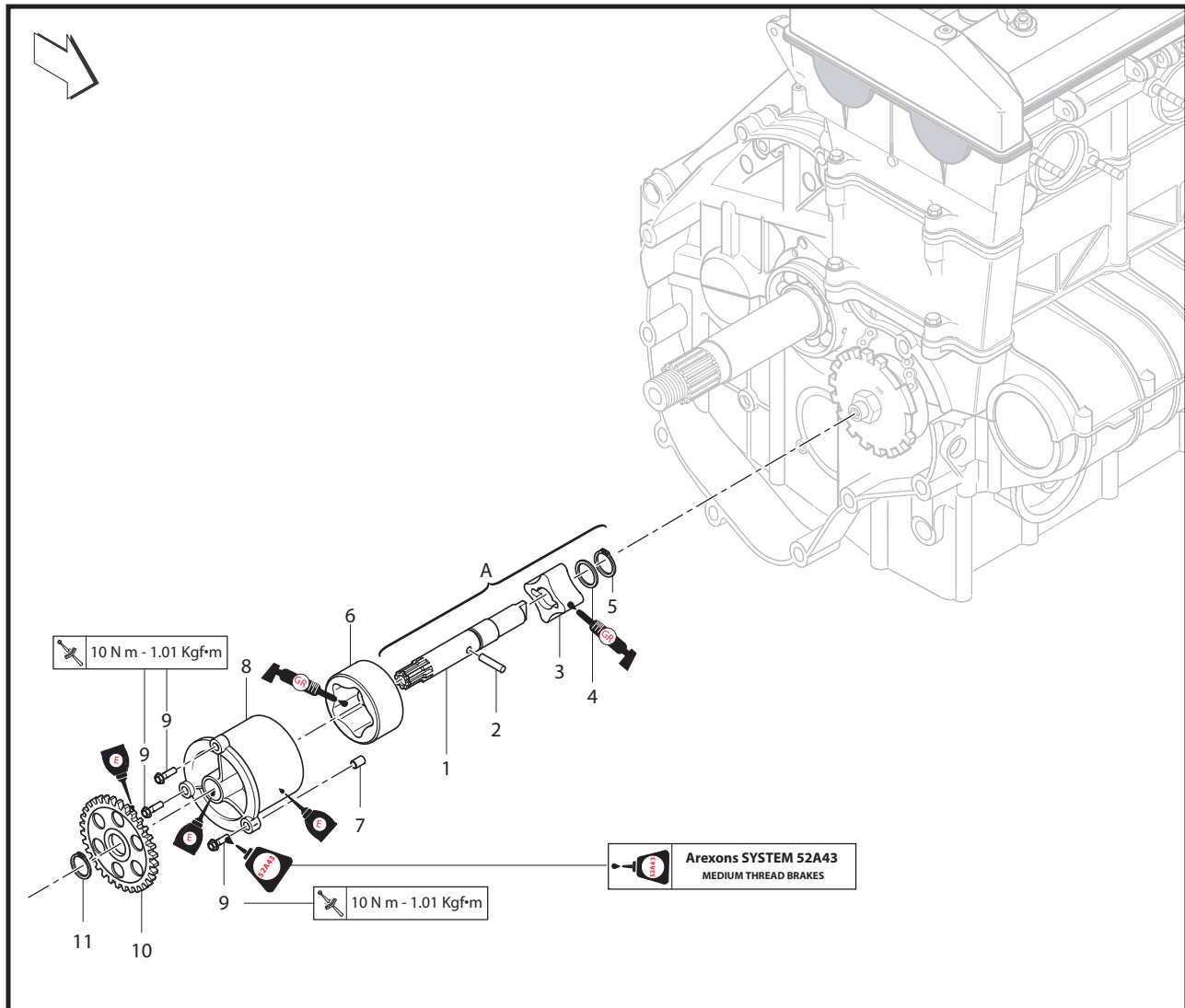
- ③ Check:
- **the oil pump functioning**
Rotate gear Z34 as shown in the figure.
If the movement is not smooth → Check the internal/external rotor seat again.
In the presence of scratches/damages → Replace the faulty part(s).

NOTE:

This control is carried out after having fixed the oil pump in the engine body and having inserted gear Z34 in its seat.

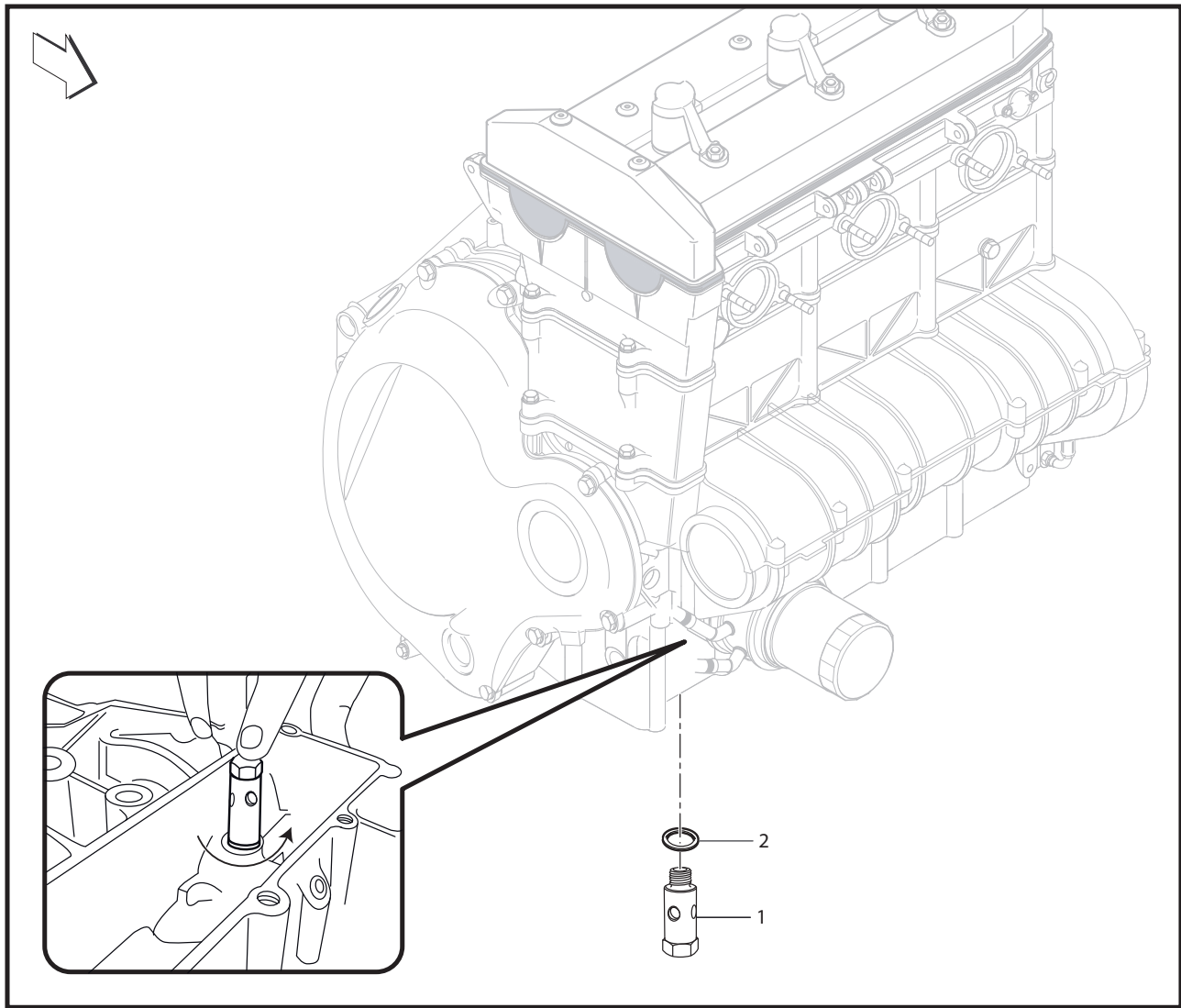


OIL PUMP INSTALLATION

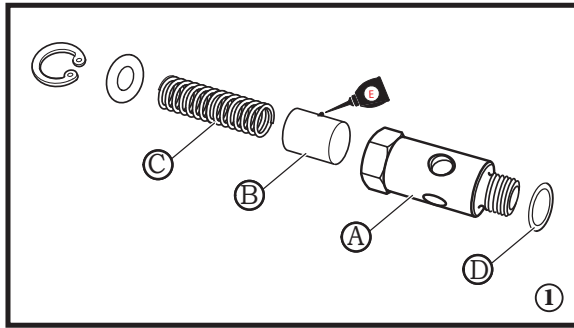


SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1		Oil Pump Installation	1	Install the pieces in the given order. NOTE: <u>Insert the engine oil once having completed the operations.</u>
2		Oil Pump Shaft	1	
3		Roller	1	
4		Internal Rotor	1	
5		Shim	1	
6		Seeger	1	
A		Rotor Set	1	
7		External Rotor	1	
8		Bush	1	
9		Oil Pump	1	
10		Screw	3	
11		Z34 Command Gear	1	
		Seeger	1	

OVER PRESSURE VALVE REMOVAL



SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1		Oil Tank Removal		Remove the pieces in the given order. See paragraph "5,113" NOTE: <u>Drain the engine oil before carrying out the operations.</u>
2		Over Pressure Valve Removal Over Pressure Valve Washer	1 1	



OVERPRESSURE VALVE CONTROL

- ① Check:
- the pressure valve body ①
 - the pressure valve ②
 - the spring ③
 - the washer ④

In the presence of damages/wear → Replace the fault parts.

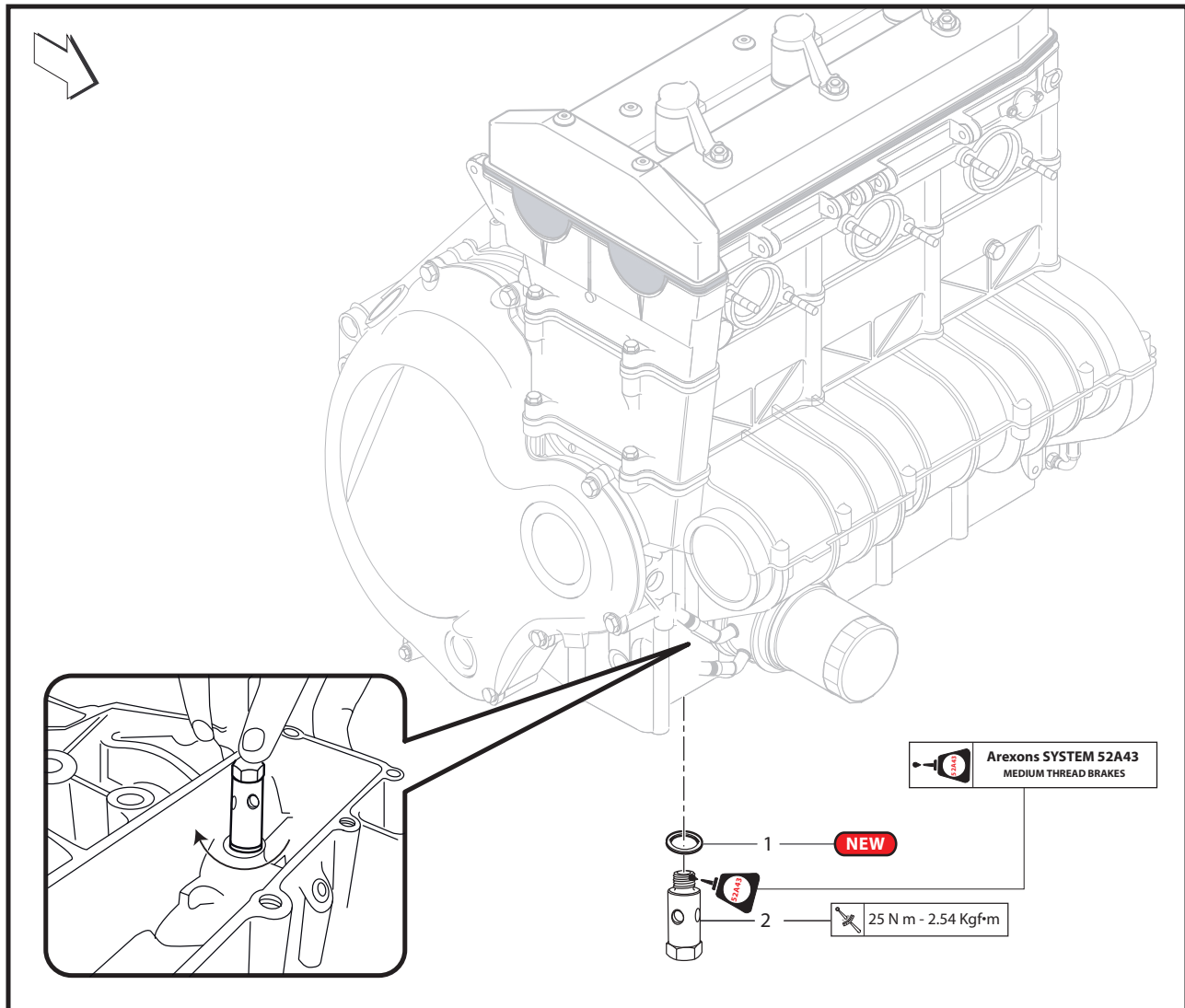
NOTE: Abundantly and accurately lubricate the pressure valve.



Recommended lubricant
ENGINE OIL



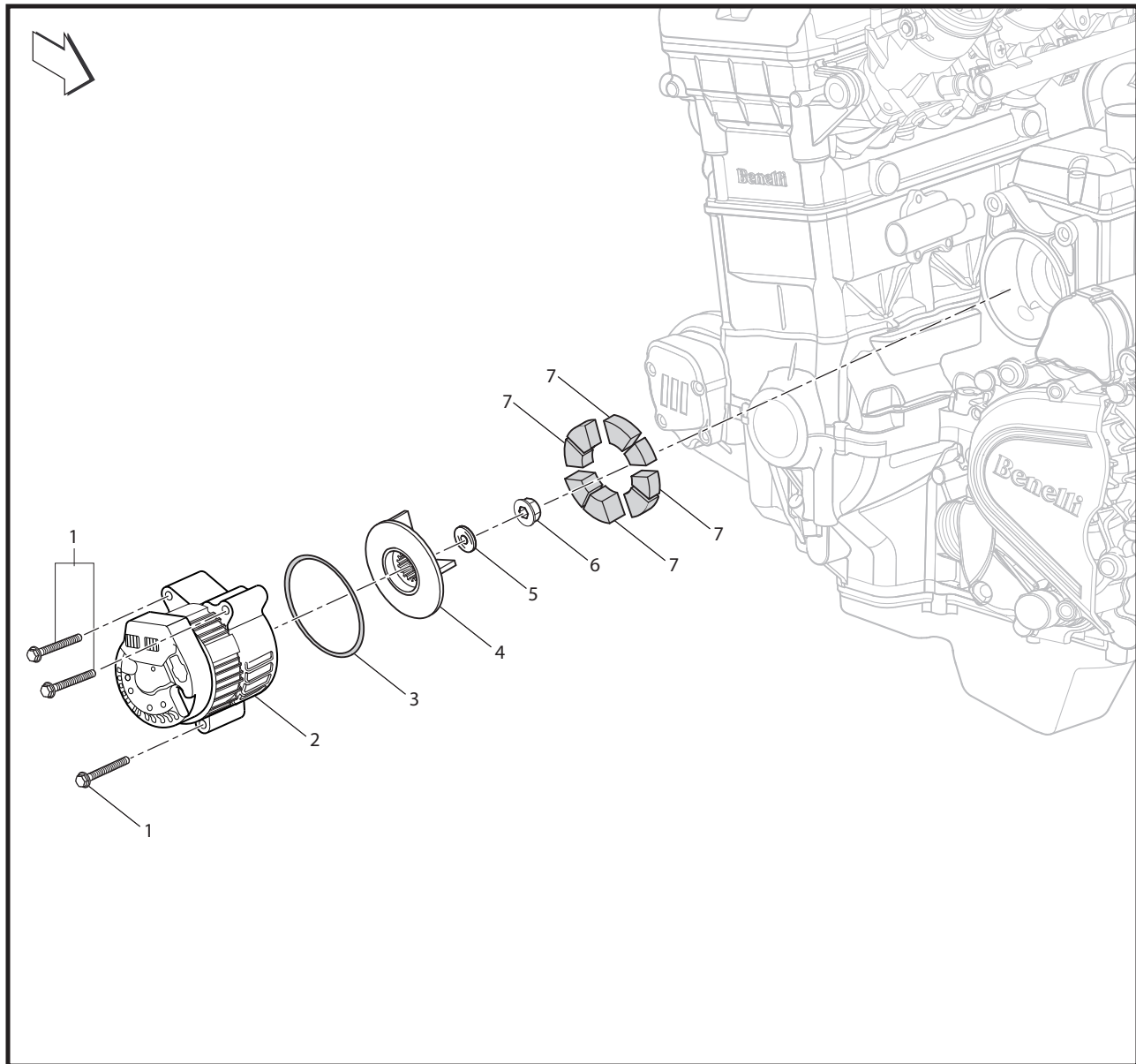
OVERPRESSURE VALVE INSTALLATION



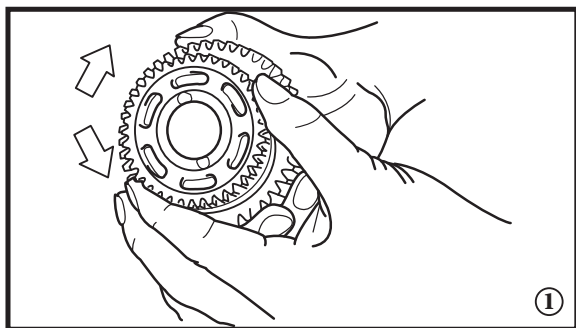
SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1		Over Pressure Valve Installation	1	Install the pieces in the given order.
2		Washer Over Pressure Valve	1	NOTE: <u>Insert the engine oil once operations have been completed.</u>



ALTERNATOR REMOVAL

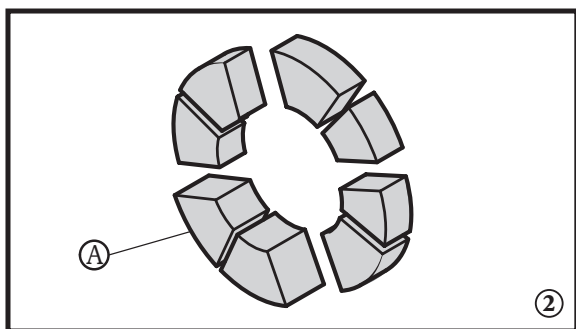


SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1		Clutch Lid Removal	3	Remove the pieces in the given order. NOTE: Drain the engine oil before carrying out the operations. See paragraph "5.69" See paragraph "5.71" See paragraph "5.88" See paragraph "COOLING PLANT 6.15"
2		Clutch Removal	1	
3		Clutch Command Removal	1	
4		Water Pump Removal	1	
5		Alternator Removal	1	
6		Screw	1	
7		Alternator	4	
		O-Ring Gasket		
		Male Joint		
		Washer		
		Nut		
		Collar Rubber		



ALTERNATOR CONTROL

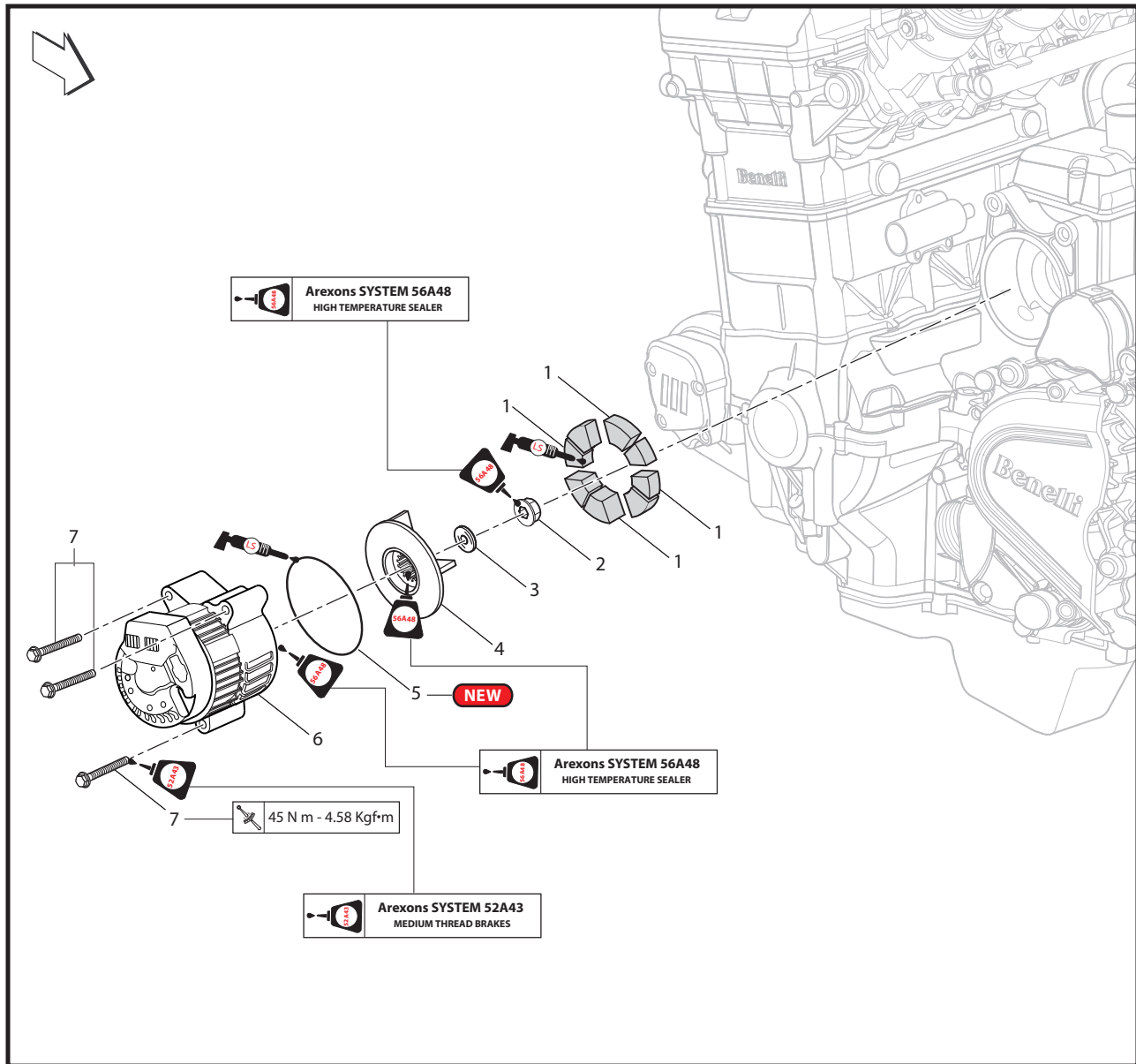
- ① Check:
- **the clearance between the male joint and the alternator**
- If out of specification → Replace the part.



- ② Check:
- **the collar rubber ①A**
- In the presence of damages/wear → Replace.



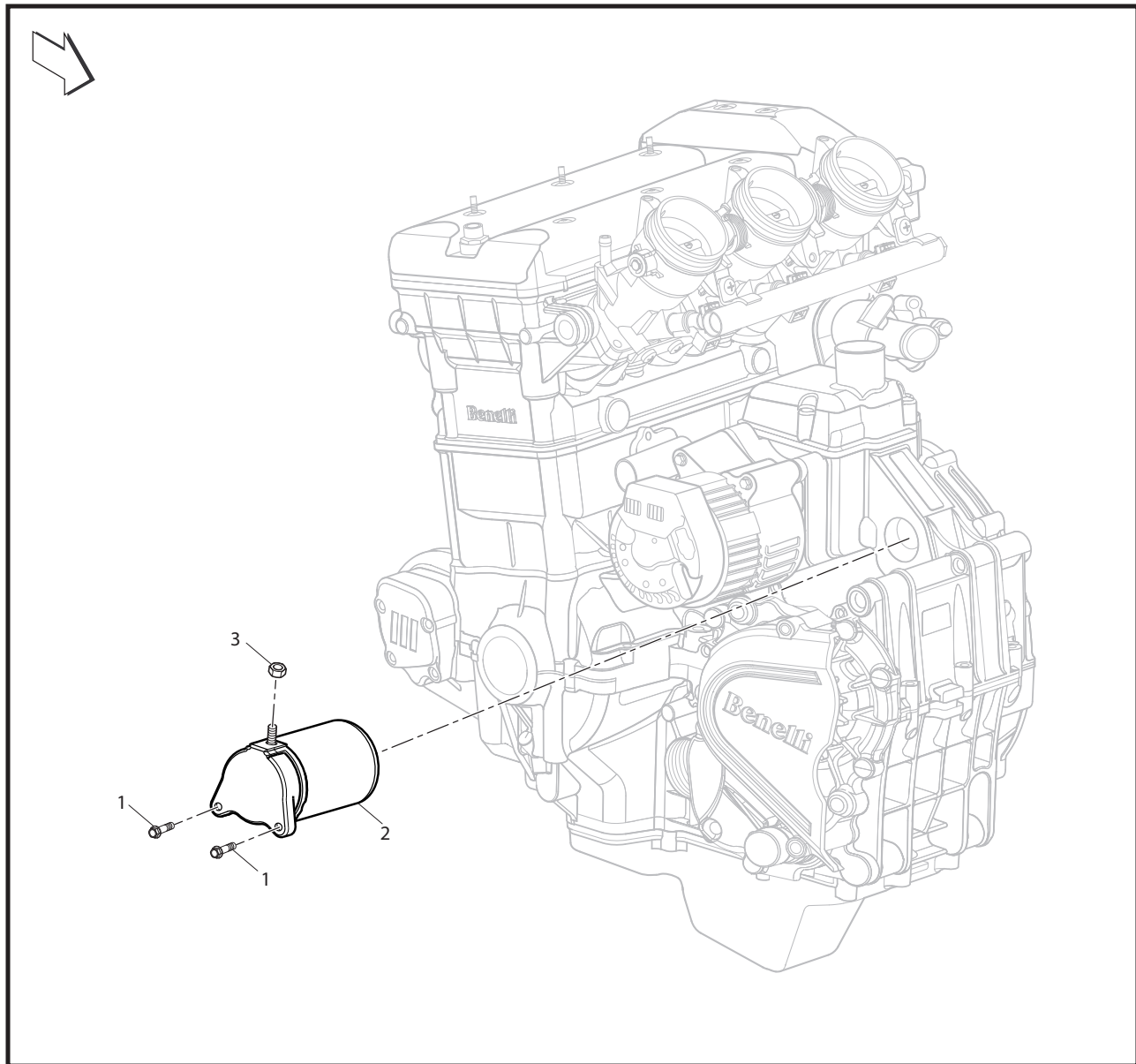
ALTERNATOR INSTALLATION



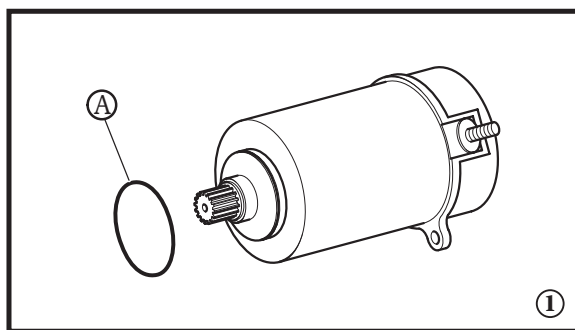
SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1		Alternator Installation	4	Install the pieces in the given order.
2		Collar Rubber	1	
3		Nut	1	
4		Washer	1	
5		Male Joint	1	
6		O-Ring Gasket	1	
7		Alternator	1	
		Screw	3	



START-UP MOTOR REMOVAL



SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1 2 3		Clutch Lid Removal Clutch Removal Clutch Command Removal Water Pump Removal Alternator Removal Start-Up Motor Removal Screw Complete Start-up Motor Nut	2 1 1	Remove the pieces in the given order. NOTE: <u>Drain the engine oil before carrying out the operations.</u> See paragraph "5.69" See paragraph "5.71" See paragraph "5.88" See paragraph "COOLING PLANT 6.15" See paragraph "5.122"

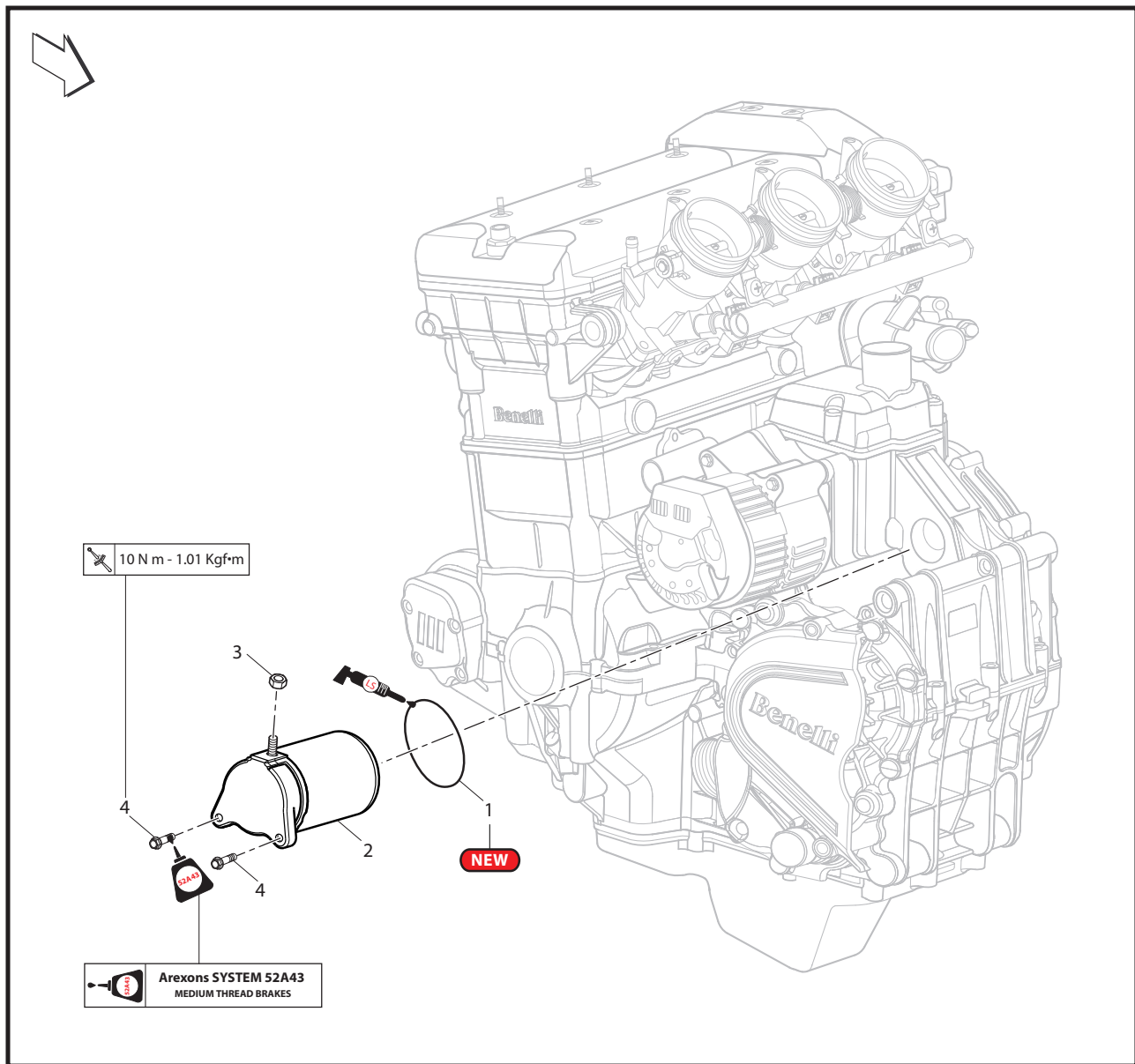


START-UP MOTOR CONTROL

- ① Check:
- **the start-up motor functioning**
If the start-up motor turns with force → Replace the part.
 - **the O-Ring gasket ①**
In the presence of damages/pittings/wear lines
→ Replace the O-Ring gasket.



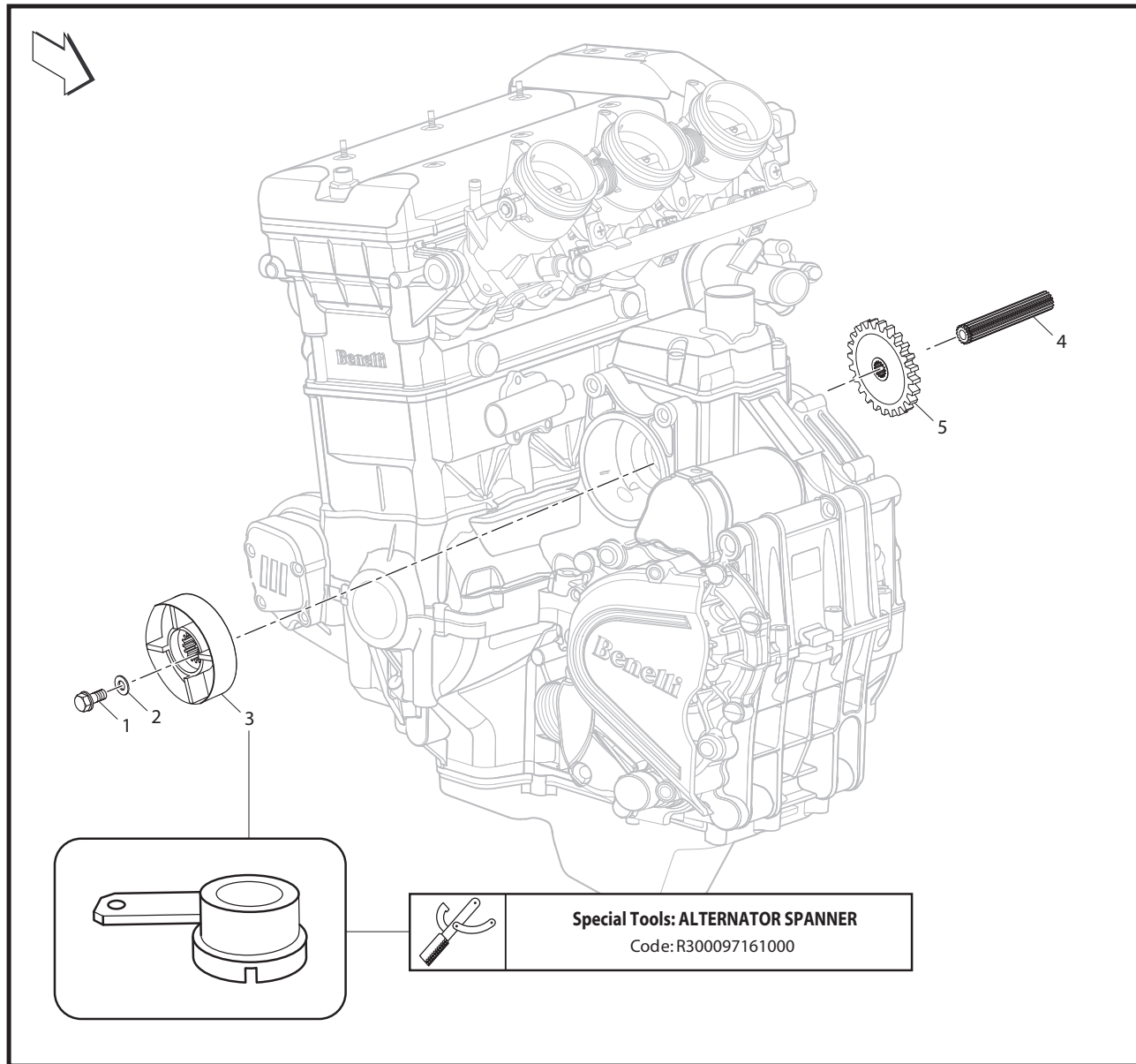
START-UP MOTOR INSTALLATION



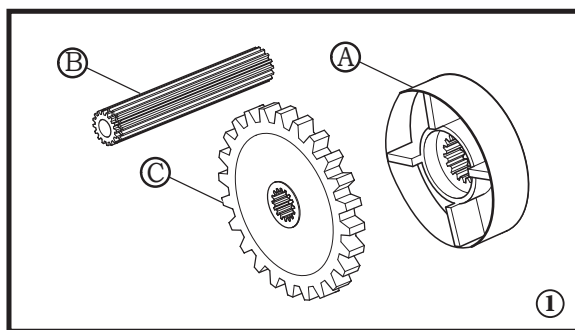
SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1	 	Start-Up Motor Installation O-Ring Gasket	1	Install the pieces in the given order. NOTE: _____ Lubricate the O-Ring being careful not to damage it. _____
2		Complete Start-up Motor	1	
3		Nut	1	
4		Screw	2	NOTE: _____ Insert the engine oil once operations have been completed. _____



Z25 GEAR/SPLINED SHAFT, FEMALE COLLAR JOINT REMOVAL



SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1		Clutch Lid Removal	1	Remove the pieces in the given order. NOTE: _____ Drain the engine oil before carrying out the operations. _____ See paragraph "5.69" See paragraph "5.71" See paragraph "5.88" See paragraph "COOLING PLANT 6.15" See paragraph "5.122" NOTE: _____ Remove it using the special tool. _____
2		Clutch Removal	1	
3		Clutch Command Removal	1	
		Water Pump Removal		
		Alternator Removal		
4		Female Collar Joint Removal		
5		Z25 Gear/Splined Shaft Removal		
		Screw	1	
		Washer	1	
		Female joint	1	
		Splined Shaft	1	
		Z25 Gear	1	

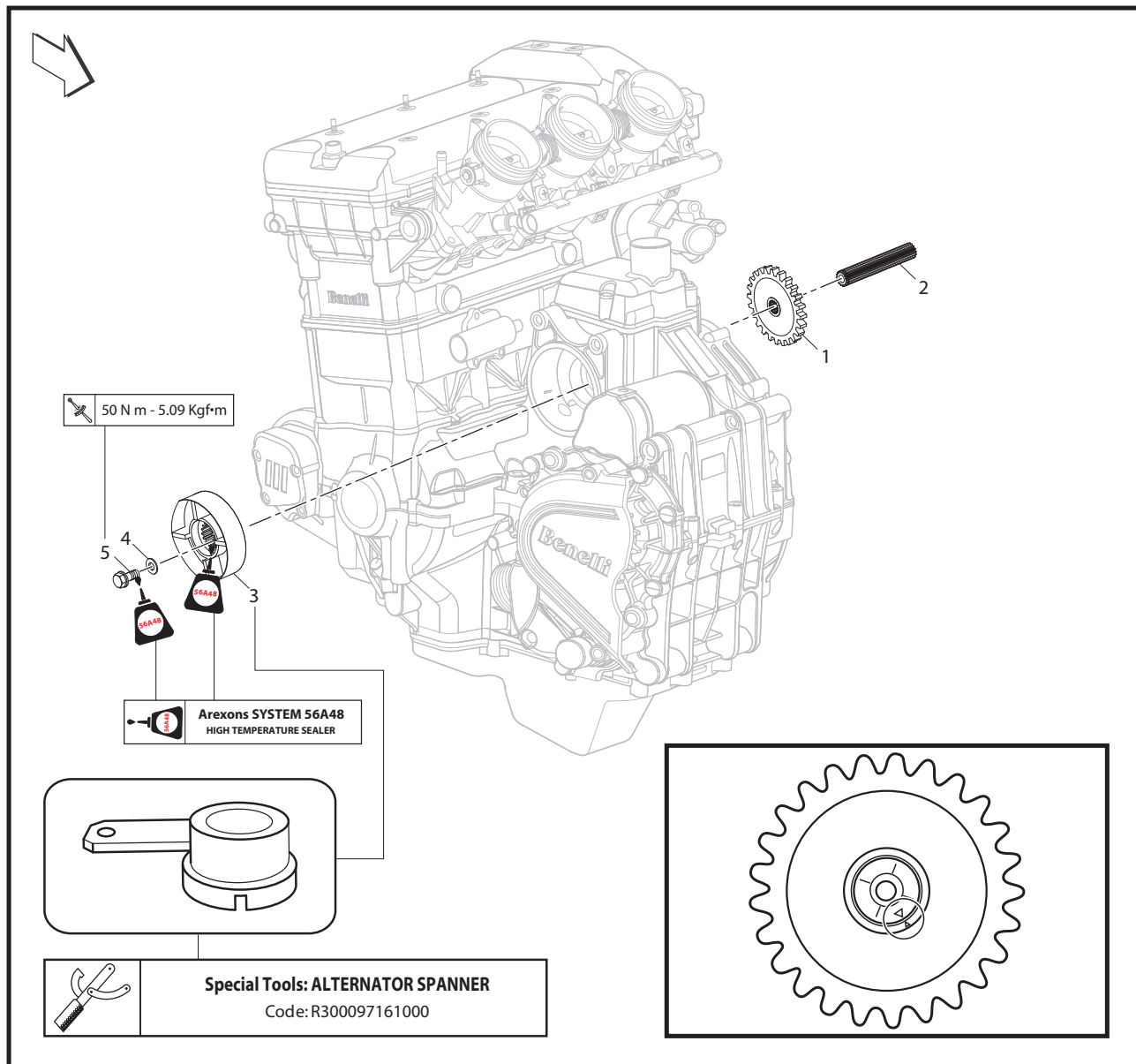


Z25 GEAR/SPLINED SHAFT, FEMALE COLLAR JOINT CONTROL

- ① Check:
- **the female collar joint** ①
In the presence of damages/wear → Replace.
 - **the splined shaft** ②
In the presence of torsions/clinks/wear lines → Replace.
 - **the Z25 gear** ③
In the presence of cracks/damages/round edges → Replace the faulty gear.



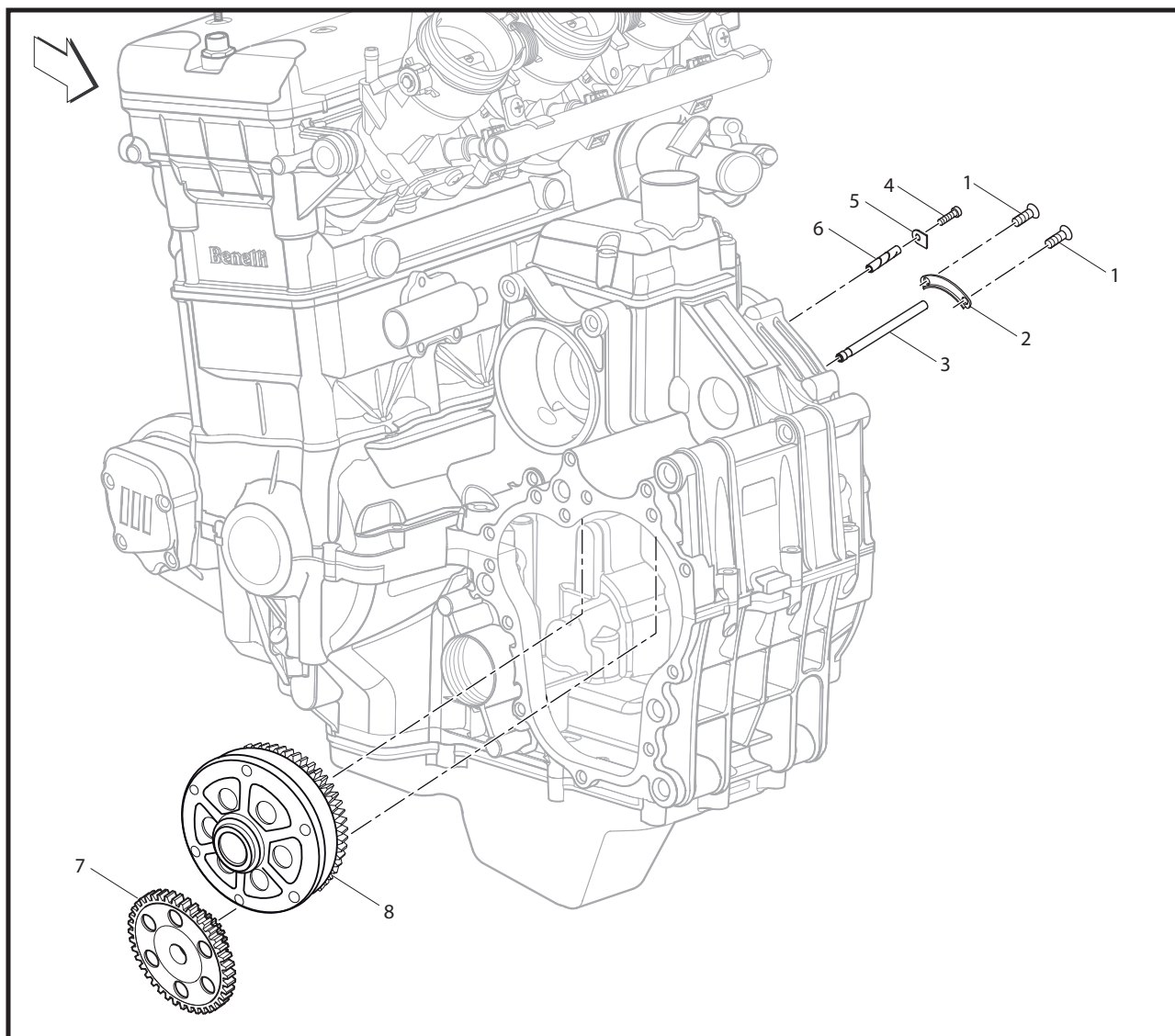
Z25 GEAR/SPLINED SHAFT, FEMALE COLLAR JOINT INSTALLATION



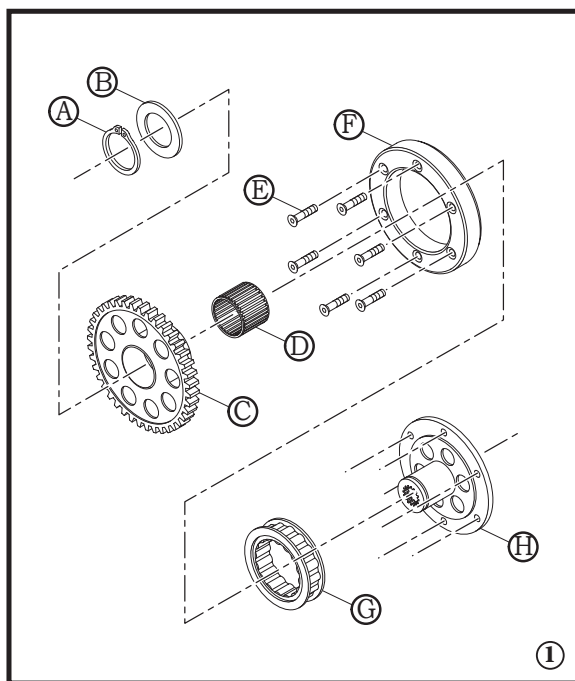
SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1		Z25 Gear/Splined Shaft Installation Z25 Gear	1	Install the pieces in the given order. NOTE: _____ Insert the splined shaft respecting the phasing on the relative Z25 gear, as shown in the figure.---
2		Splined Shaft	1	
3		Female Collar Joint Installation Female Joint	1	NOTE: _____ Install it using the special tool. _____
4		Washer	1	
5		Screw	1	NOTE: _____ Insert the engine oil once operations have been carried out. _____



SATELLITE GEAR AND FREE WHEEL UNIT REMOVAL

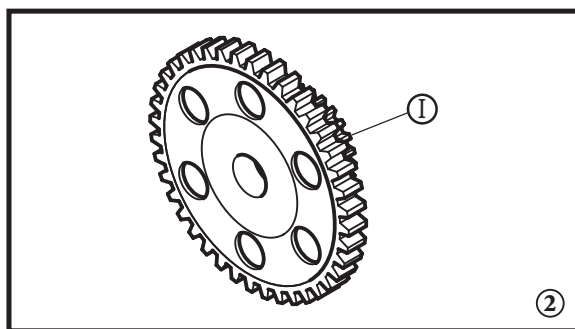


SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1		Clutch Lid Removal	2	Remove the pieces in the given order. NOTE: Drain the engine oil before carrying out the operations. See paragraph "5.69". See paragraph "5.71". See paragraph "5.88". See "COOLING PLANT 6.15" paragraph. See paragraph "5.91". See paragraph "5.122".
2		Clutch Removal	1	
3		Clutch Command Removal	1	
4		Water Pump Removal	1	
5		Gear Change Removal	1	
6		Alternator Removal	1	
7		Satellite Gear Removal	1	
8		Female Collar Joint Removal	1	
		Z25 Gear/Splined Shaft Removal		See paragraph "5.128".
		Free Wheel Unit Removal		See paragraph "5.128".
		Complete Free Wheel	1	



SATELLITE GEAR AND FREE WHEEL CONTROL

- ① Remove:
- the seeger ①
 - the washer ②
 - the Z60 free wheel gear ③
 - the needle cage ④
 - the screws ⑤
 - the flange ⑥
 - the free wheel ⑦
 - the free wheel hub ⑧

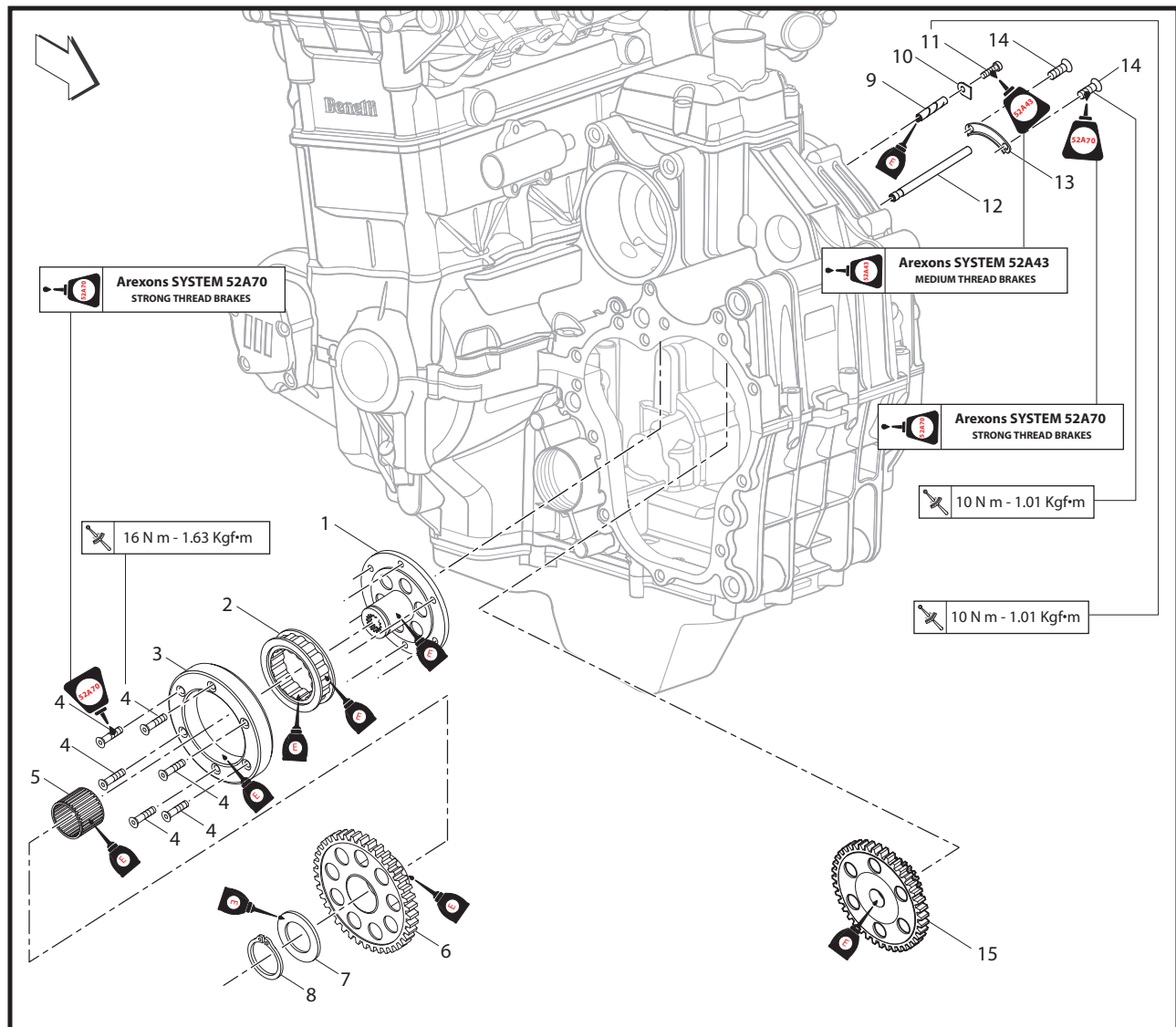


- ② Check:
- the satellite gear ①
- In the presence of damages, lines, wear → Replace.

- ③ Check:
- any breakages, wear and slidings of the components of the free wheel
- If out of specification → Replace the part.



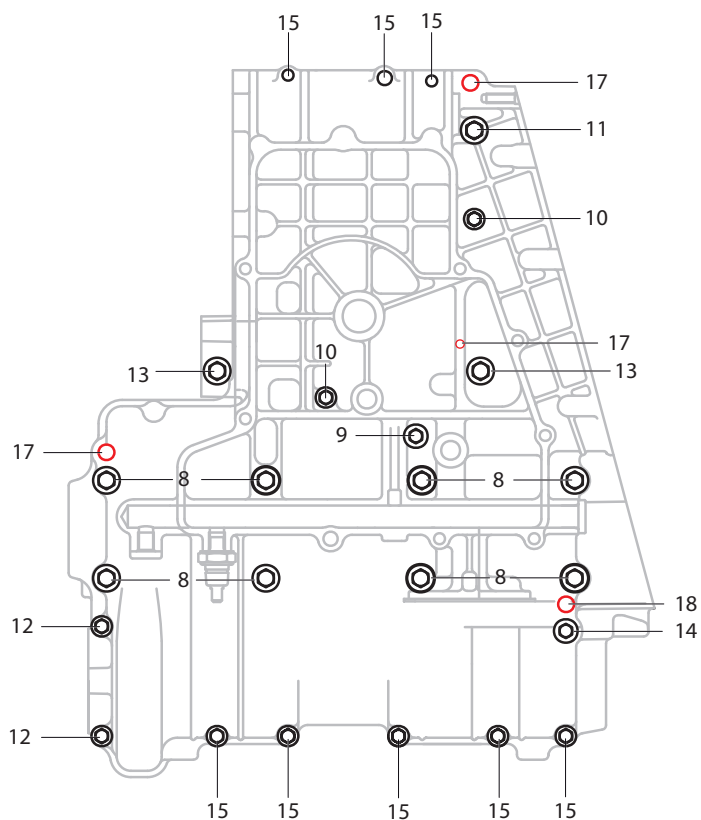
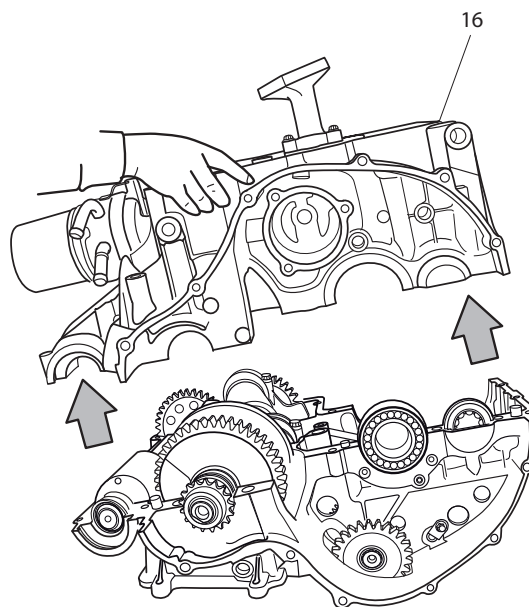
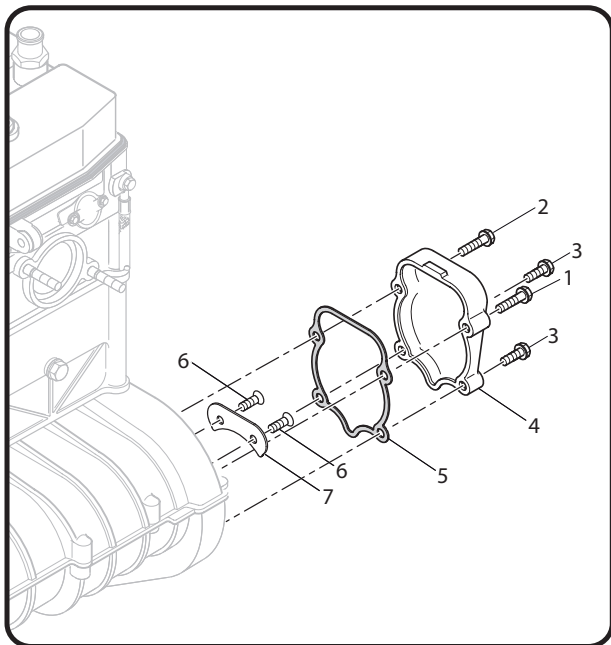
SATELLITE GEAR AND FREE WHEEL UNIT INSTALLATION



SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1		Free Wheel Unit Installation Free Wheel Hub	1	Install the pieces in the given order. NOTE: Insert the engine oil once operations have been completed.
2		Free Wheel Flange	1	
3		Needle Cage	1	
4		Screw	6	
5		Z60 Free Wheel Gear	1	
6		Washer	1	
7		Seeger	1	
8		Intermediate Gear Small Shaft	1	
9		Small Plate	1	
10		Screw	1	
11		Shower Tube	1	
12		Bearing Retainer Small Plate	1	
13		Screw	1	
14		Satellite Gear Installation Satellite Gear	2	
15			1	



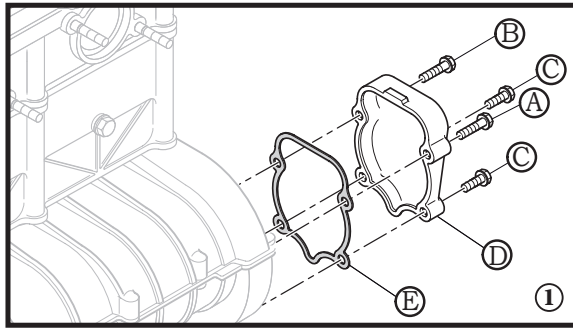
LOWER BASE REMOVAL





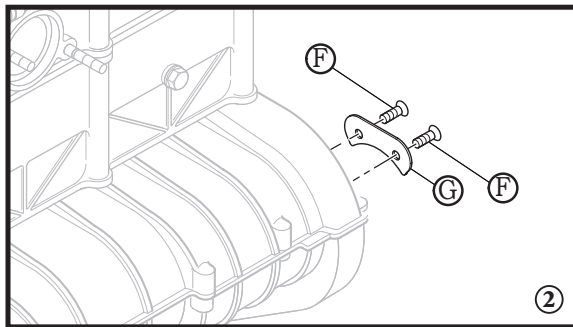
LOWER BASE REMOVAL

SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
		Engine Removal Clutch Lid Removal Clutch Removal Oil Tank Removal Oil Pump Removal Water Pump Removal Gear Change Removal Lower Base Removal		Remove the pieces in the given order. NOTE: _____ Drain the engine oil and the cooling liquid before carrying out the operations. _____ NOTE: _____ Operations to be carried out with the engine overturned. _____ See "FRAME 4.107" paragraph. See paragraph "5.69". See paragraph "5.71". See paragraph "5.113". See paragraph "5.116". See "COOLING PLANT 6.15" paragraph. See paragraph "5.91".
1		Screw	1	
2		Screw	1	
3		Screw	2	
4		Counter-shaft Lid	1	
5		Counter-Shaft Lid Gasket	1	
6		Screw	2	
7		Plate	1	
8		Screw	8	NOTE: _____ Remove the respective washers. _____
9		Screw	1	
10		Screw	2	
11		Screw	1	NOTE: _____ Remove the respective washer. _____
12		Screw	2	
13		Screw	2	
14		Screw	1	
15		Screw	8	
16		Lower Base	1	
17		Bush	3	
18		Bush	1	



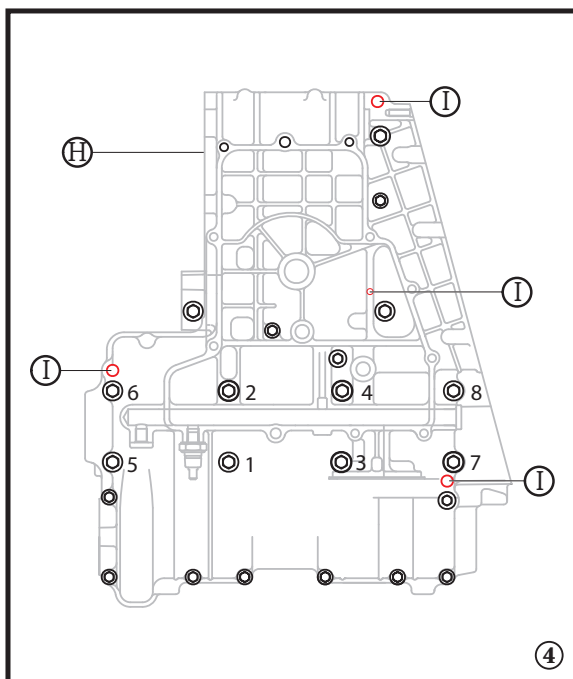
LOWER BASE REMOVAL

- ① Remove:
- the screw **A**
 - the screw **B**
 - the screws **C**
 - the counter-shaft lid **D**
 - the counter-shaft lid gasket **E**



- ② Remove:
- the screws **F**
 - the plate **G**

- ③ Overturn:
- the engine

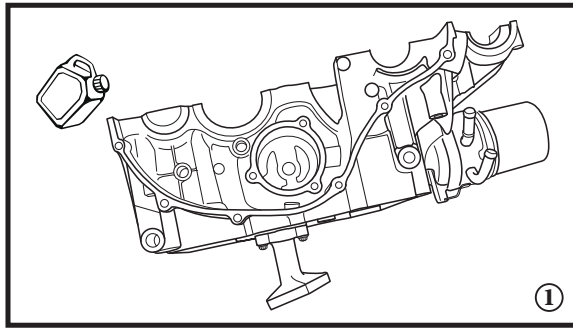


- ④ Remove:
- the screws
Loosen each screw by $\frac{1}{4}$ of a turn at a time, repeatedly following, in decreasing numerical order, the sequence shown in the figure. After having completely loosened all screws, remove them.
 - the lower base **H**

ATTENTION

Hit one side of the base with a rubber hammer. Only hit the reinforced parts of the base, not the coupling surfaces. Work slowly and carefully to ensure that the two halves of the base evenly separate.

- the centring bushes **I**



LOWER BASE CONTROL

- ① Scrupulously wash:
- **the lower base**
by dipping it in a neutral solvent.

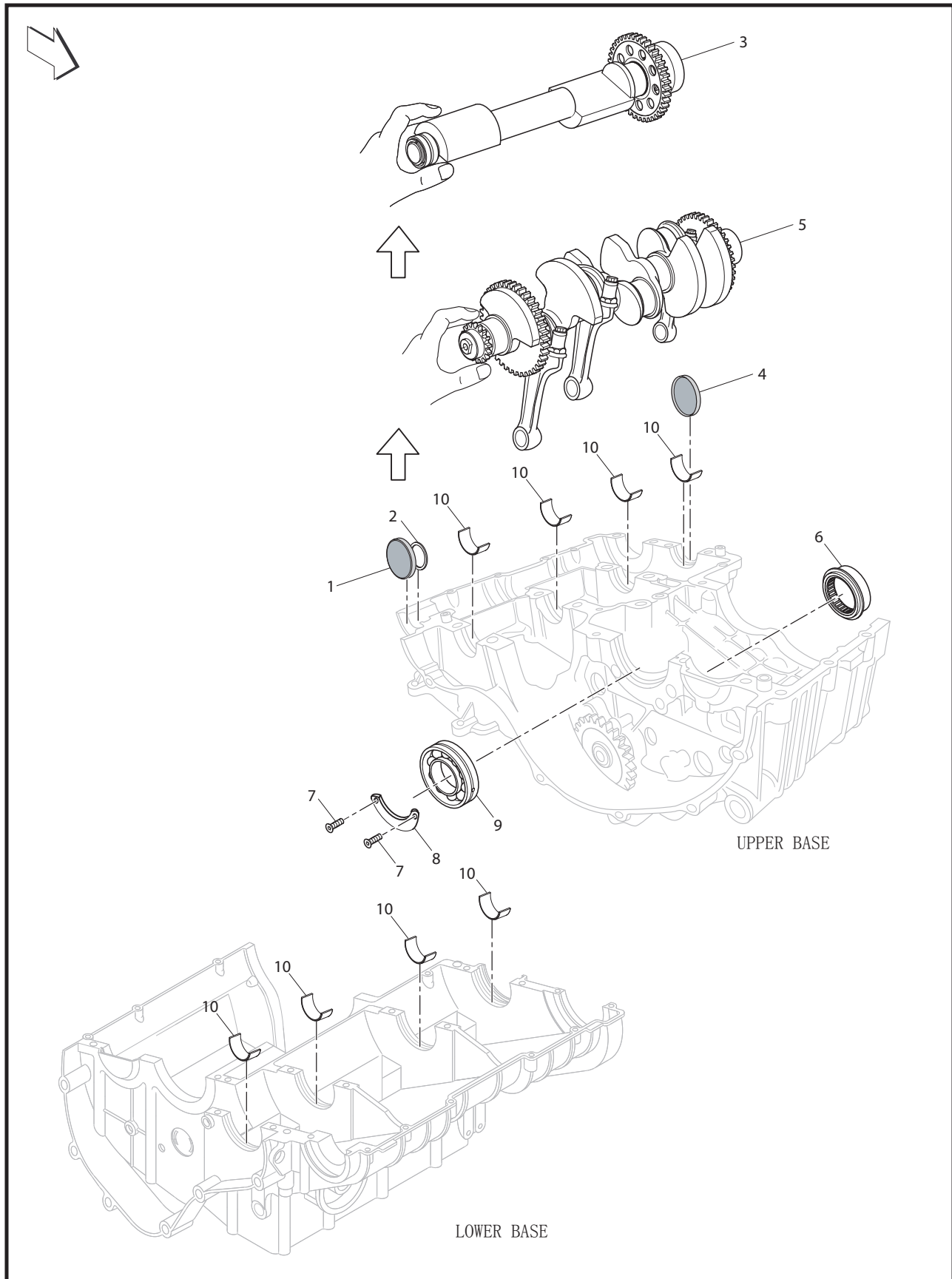


Recommended solvent
TUTELA MOTOR CLEAN

- ② Scrupulously clean:
- **all coupling surfaces**
destined to welcome the sealing paste and the coupling surfaces of the base.
- ③ Check:
- **the lower base**
In the presence of cracks/damages → Replace.
 - **the oil flow passages**
In the presence of obstructions → Clean with a jet of compressed air.



BENCH HALF-BEARINGS, ENGINE SHAFT AND BALANCING COUNTER-SHAFT REMOVAL



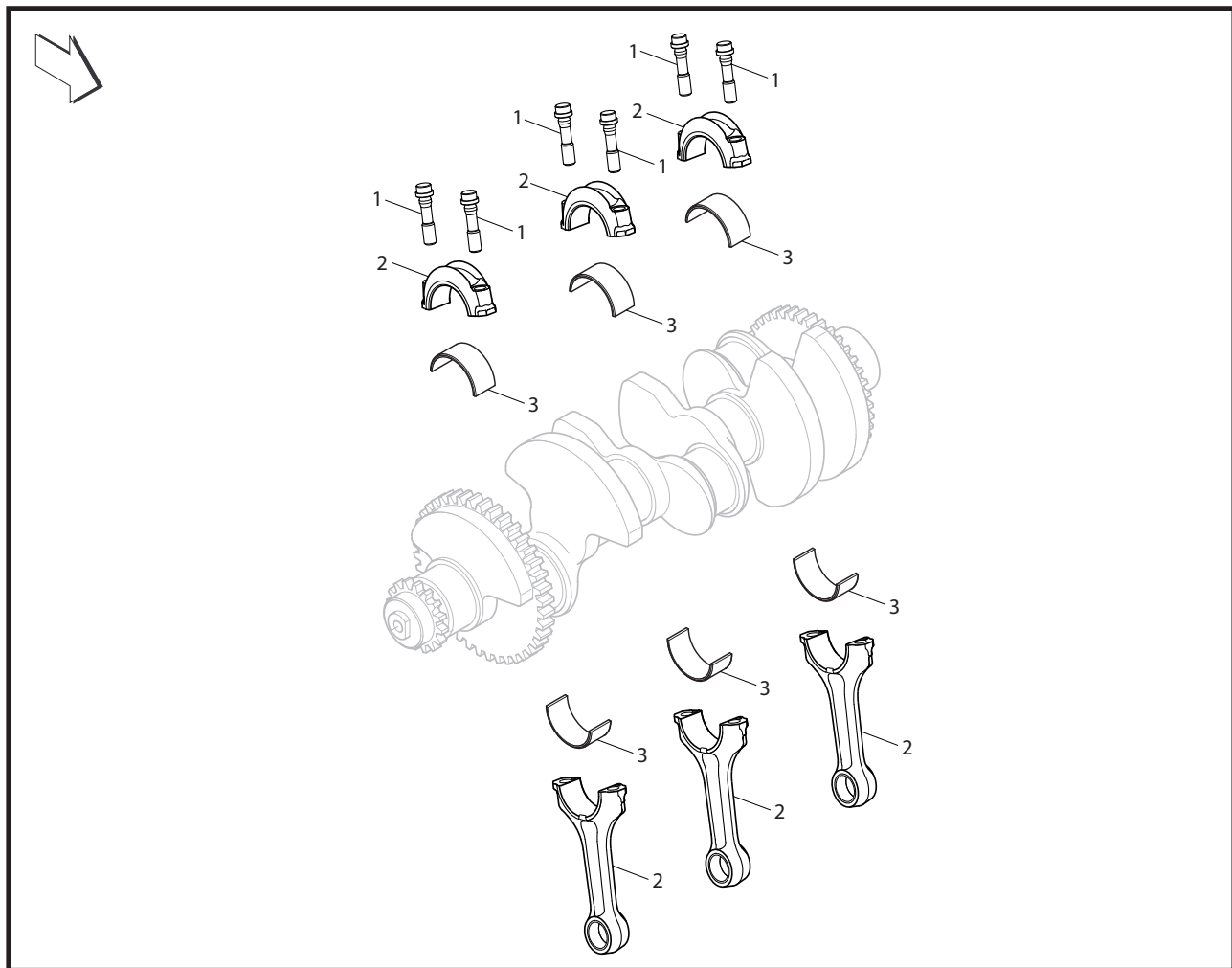


BENCH HALF-BEARINGS, ENGINE SHAFT AND BALANCING COUNTER-SHAFT REMOVAL

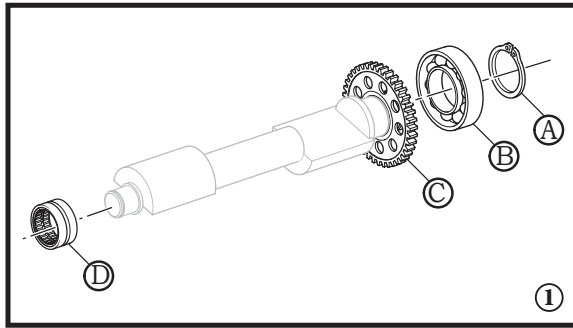
SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
		Engine Removal Clutch Lid Removal Clutch Removal Oil Tank Removal Oil Pump Removal Water Pump Removal Gear Change Removal Distribution Lid Removal Distribution Chain Tensioner Removal Inlet Cam Shaft Removal Drain Cam Shaft Removal Chain Slides Removal Phonic Wheel Removal Distribution Chain Removal Head Removal Cylinders Removal Pistons Removal Lower Base Removal Balancing Counter-Shaft Removal		Remove the pieces in the given order. NOTE: Drain the engine oil and the cooling liquid before carrying out the operations. See "FRAME 4.107" paragraph. See paragraph "5.69". See paragraph "5.71". See paragraph "5.113". See paragraph "5.116". See "COOLING PLANT 6.15" paragraph. See paragraph "5.91". See paragraph "5.1". See paragraph "5.5". See paragraph "5.8". See paragraph "5.10". See paragraph "5.15". See paragraph "5.18". See paragraph "5.21". See paragraph "5.34". See paragraph "5.51". See paragraph "5.58". NOTE: Operations to be carried out with the engine overturned. See paragraph "5.134".
1		Cap	1	
2		Seal Ring	1	
3		Balancing Counter-Shaft	1	
		Engine Shaft Removal		
4		Cap	1	
5		Engine Shaft	1	
6		Rollers Bearing	1	
7		Screw	2	
8		Plate	1	
9		Bearing	1	
		Bench Half-Bearings Removal		
10		Bench Half-Bearing	8	



CONNECTING ROD HALF-BEARINGS AND CONNECTING RODS REMOVAL



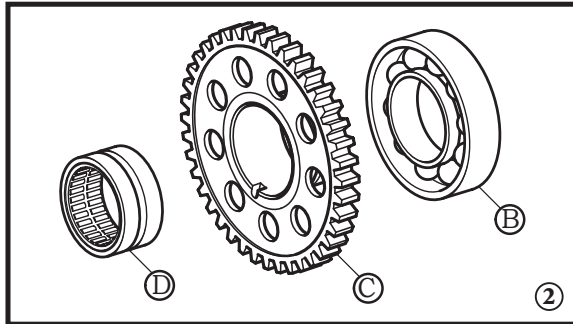
SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
		Engine Removal Clutch Lid Removal Clutch Removal Oil Tank Removal Oil Pump Removal Water Pump Removal Gear Change Removal Distribution Lid Removal Distribution Chain Tensioner Removal Inlet Cam Shaft Removal Drain Cam Shaft Removal Chain Slides Removal Phonic Wheel Removal Distribution Chain Removal Head Removal Cylinders Removal Pistons Removal Lower Base Removal Balancing Counter-Shaft Removal Engine Shaft Removal Bench Half-Bearings Removal Connecting Rods Removal		Remove the pieces in the given order. See "FRAME 4.107" paragraph. See paragraph "5.69". See paragraph "5.71". See paragraph "5.113". See paragraph "5.116". See "COOLING PLANT 6.15" paragraph. See paragraph "5.91". See paragraph "5.1". See paragraph "5.5". See paragraph "5.8". See paragraph "5.10". See paragraph "5.15". See paragraph "5.18". See paragraph "5.21". See paragraph "5.34". See paragraph "5.51". See paragraph "5.58". See paragraph "5.134". See paragraph "5.138". See paragraph "5.138". See paragraph "5.138".
1		Screw	6	
2		Connecting Rod	3	
3		Connecting Rod Half-Bearings Removal Connecting Rod Half-Bearing	6	



BALANCING COUNTER-SHAFT CONTROL AND ENGINE SHAFT

① Remove from the balancing counter-shaft:

- the seeger **A**
- the bearing **B**
- the Z34 command gear **C**
- the bearing **D**



② Check:

- the bearings **B** **D**

Clean the bearings, therefore rotate the internal track with a finger.

If the movement is not correct → Replace.

- the Z34 command gear **C**

In the presence of damages/wear lines → Replace.

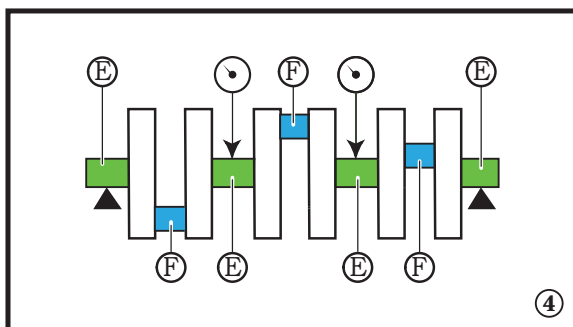
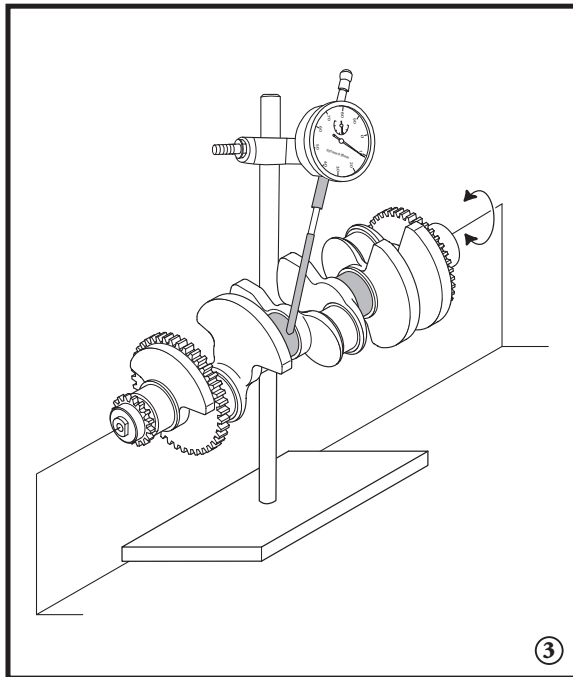
③ Measure:

- the engine shaft eccentricity

If out of specification Replace → the engine shaft.



Engine shaft eccentricity
Lower than: 0.03 mm (0.0011 in)

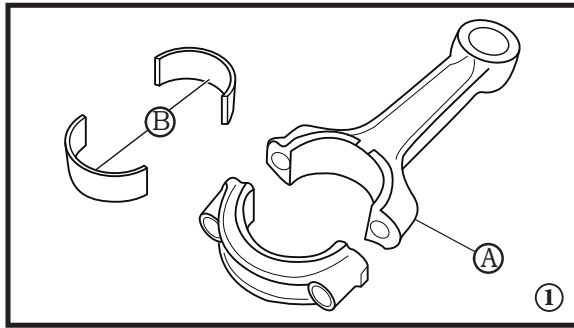


④ Check:

- the bench supports surfaces **E**

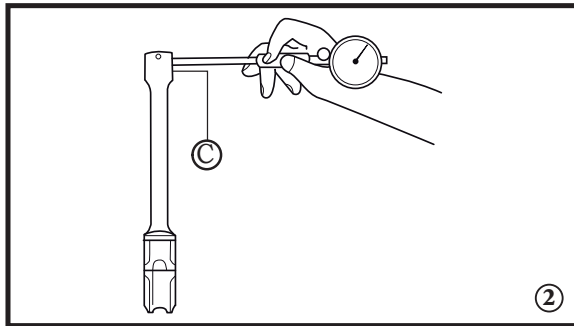
- the connecting rod supports surfaces **F**

In the presence of scratches/wear lines → Replace the engine shaft.



CONNECTING ROD HALF-BEARINGS AND CONNECTING RODS CONTROL

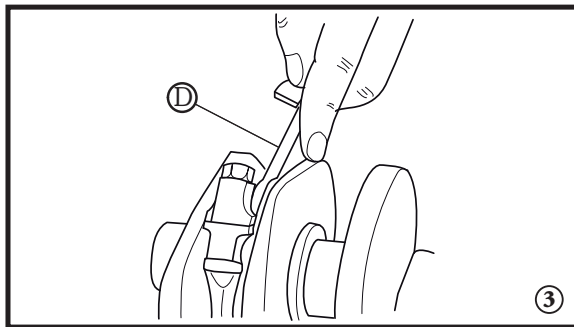
- ① Check:
- **any breakages or excessive clearance on the connecting rod (A) and on the connecting rod half-bearings (B)**
- In case of replacing the connecting rod, check the class marked on the connecting rod head.



- ② Check:
- **the internal diameter of the connecting rod foot (C)**
- If out of specification → Replace the connecting rod.



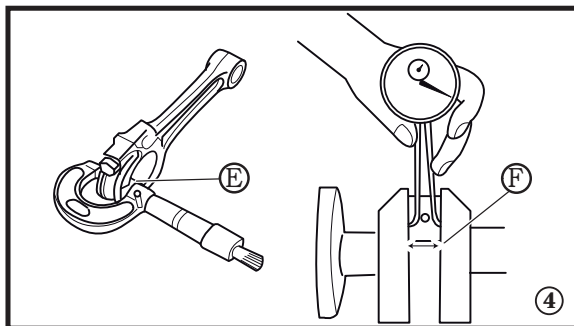
Connecting rod foot internal diameter
Limit > : 19.040 mm (0.749 in)



- ③ Check:
- **the side clearance of the connecting rod using a feeler (D)**
- If out of specification → Replace the connecting rod.



Connecting rod head side clearance
Limit > : 0.40 mm (0.015 in)



- ④ Check:
- **the connecting rod head width (E)**
 - **the connecting rod pin width (F)**
- If out of specification → Replace the connecting rod or the shaft engine.



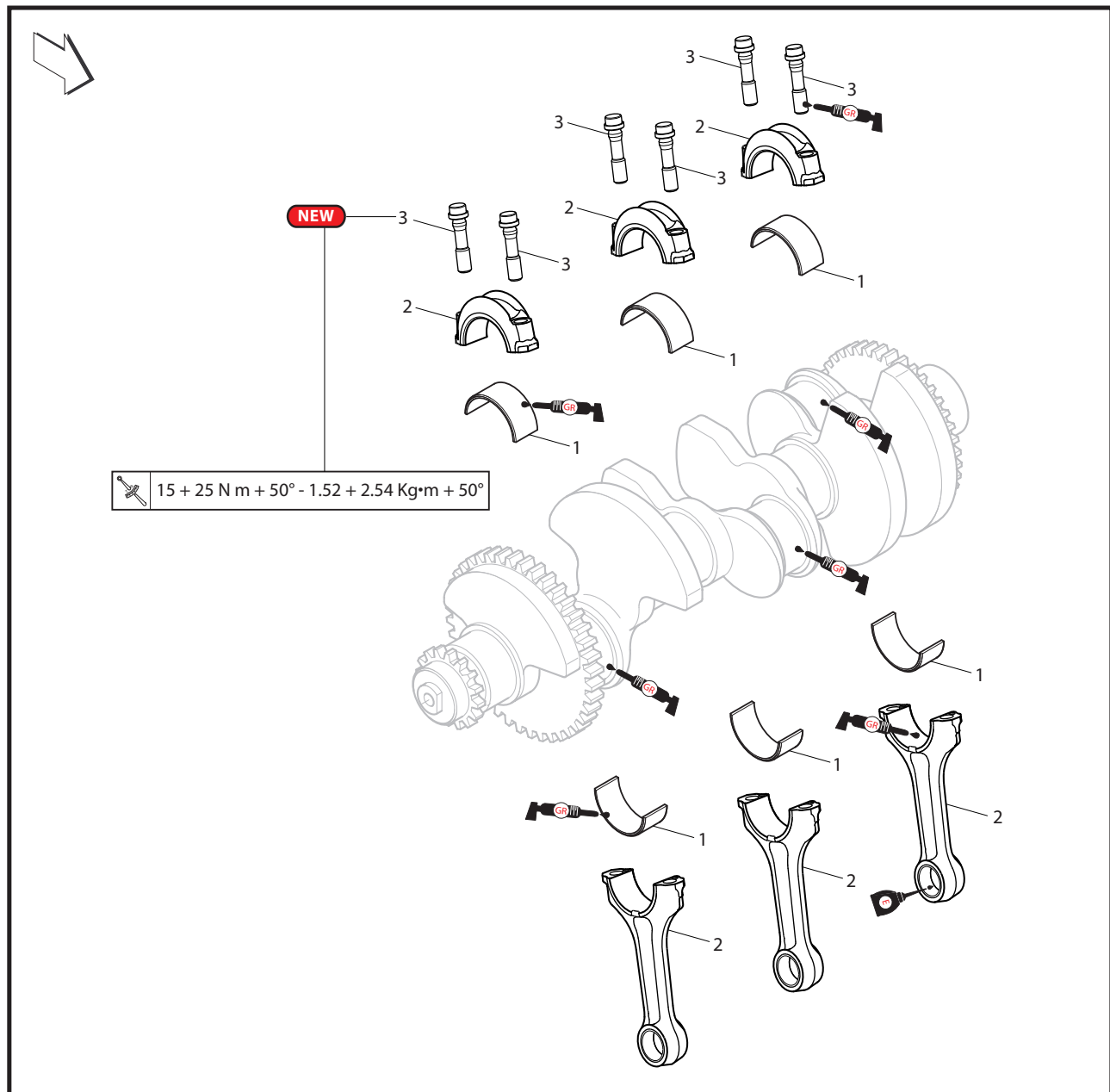
Connecting rod head width
Standard: 21.8 mm ~ 21.9 mm
(0.85 ~ 0.86 in)



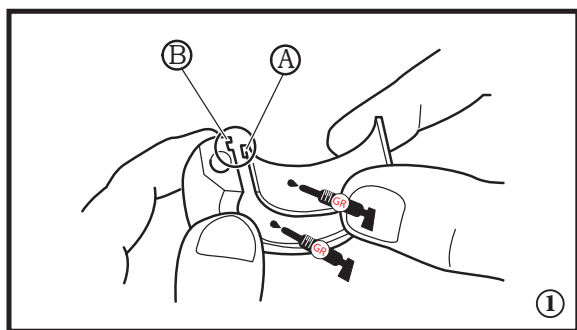
Connecting rod pin width
Standard: 22.0 mm ~ 22.05 mm
(0.866 ~ 0.868 in)



CONNECTING ROD HALF-BEARINGS AND CONNECTING RODS INSTALLATION



SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1		Connecting Rod Half-Bearings Installation	6	Install the pieces in the given order. NOTE: _____ Do not exceed with the copper grease. _____
2		Connecting Rod Half-Bearing	3	
3	NEW	Connecting Rods Installation Connecting Rod	6	



CONNECTING ROD HALF-BEARINGS AND CONNECTING RODS INSTALLATION

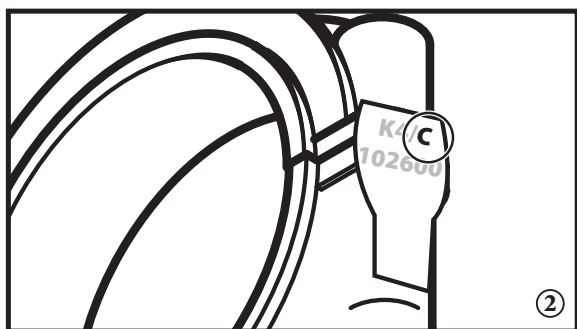
- ① Install:
- the connecting rod half-bearings
- ②
- a) Clean the bearings of the connecting rod heads, the connecting rod supports and the internal part of half of each connecting rod.
 - b) Install the upper bearing of the connecting rod head inside the connecting rod, and the lower bearing of the connecting rod head inside the connecting rod cap.

NOTE:

Align the protrusions **A** of the head half-bearings with the notches **B** inside the connecting rod and in the relative cap.

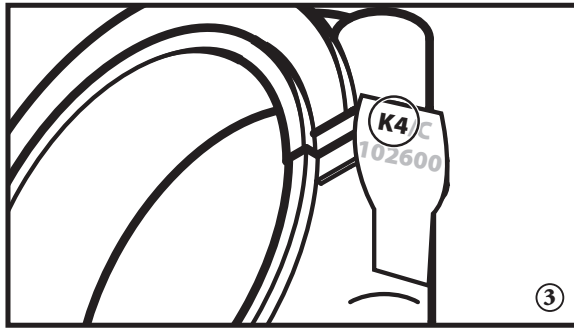
ATTENTION

Do not swap the half-bearings of the connecting rod heads and the connecting rods. To obtain the correct clearance between connecting rod support and connecting rod head half-bearing, and to prevent damages to the engine, the half-bearings of the connecting rod heads must be re-assembled in the original position.



- ② Select:
- the connecting rod half-bearings as shown in the table

CONNECTING ROD HALF-BEARING		
STD	COLOUR	THICKNESS
A	Red	1.680 ~ 1.684
B	Blue	1.684 ~ 1.688
C	Yellow	1.688 ~ 1.692
Ø std A seat red		40.395 - 40.401
Ø std B seat blue		40.401 - 40.407
Ø std C seat yellow		40.407 - 40.413
Ø std single seat		36.976 - 36.986

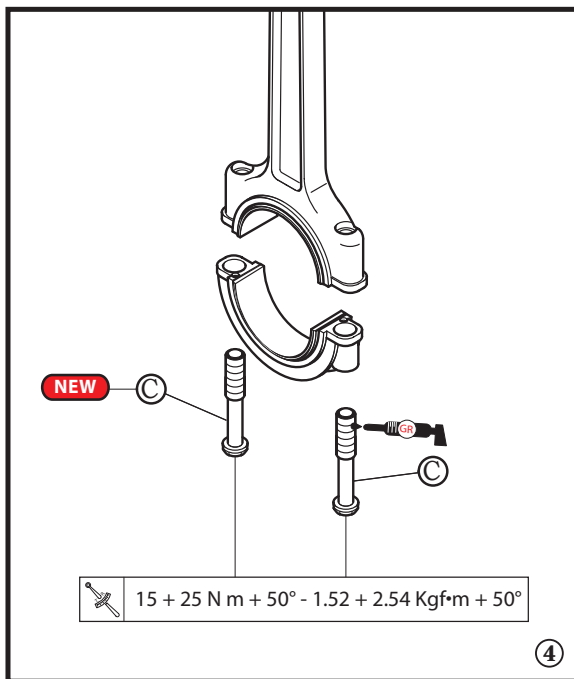


- ③ Select:
- the class marked on the connecting rod head

SELECTION TABLE		
TYPE	COLOUR	WEIGHT (g)
K1	Black	412/416
K2	Green	396/400
K3	White	400/404
K4	Brown	404/408
K5	Orange	408/412

ATTENTION

Associate the connecting rod types following the class marked on the connecting rod head.



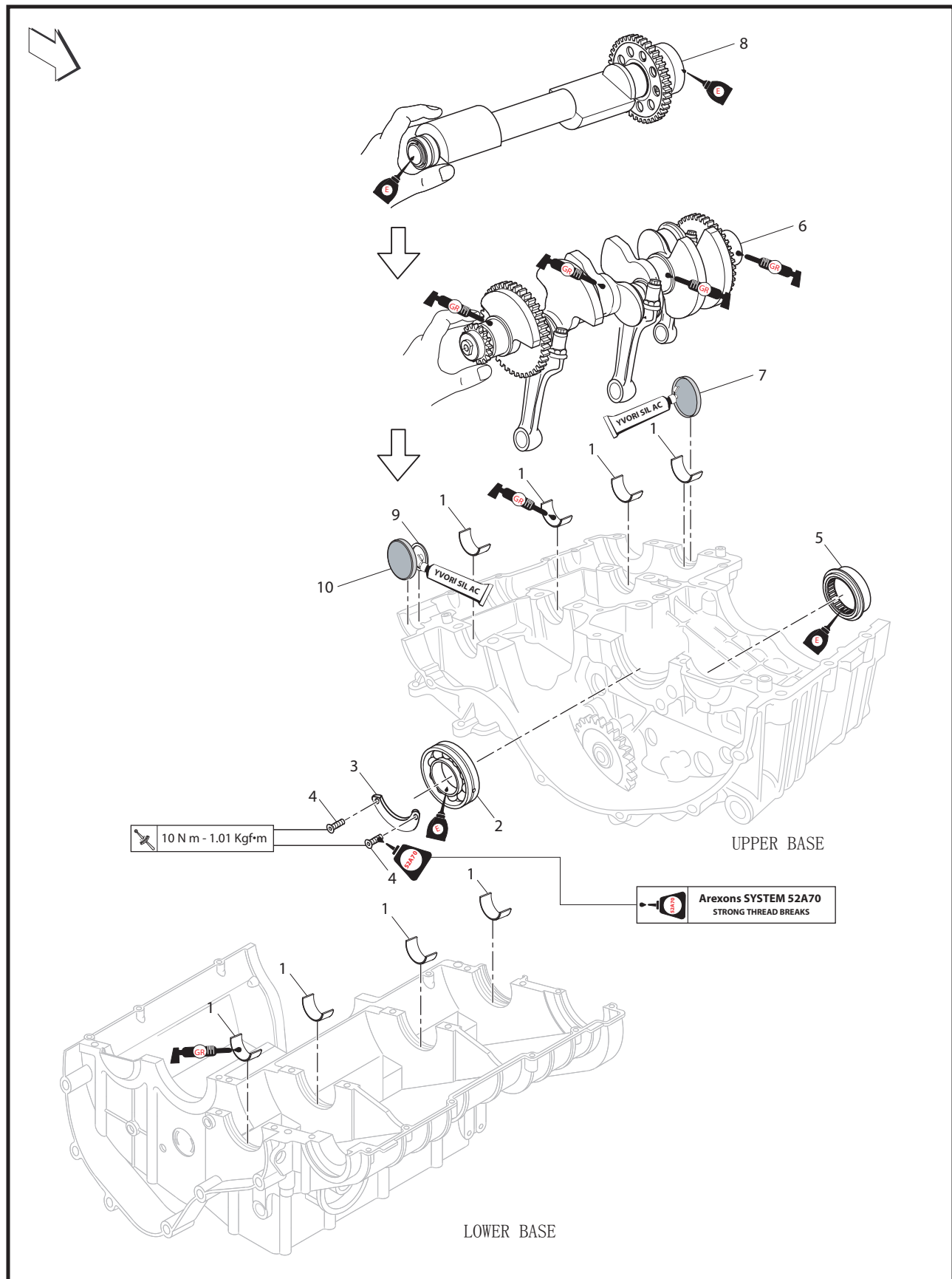
- ④ Install:
- the screws ③

Torque fasten:

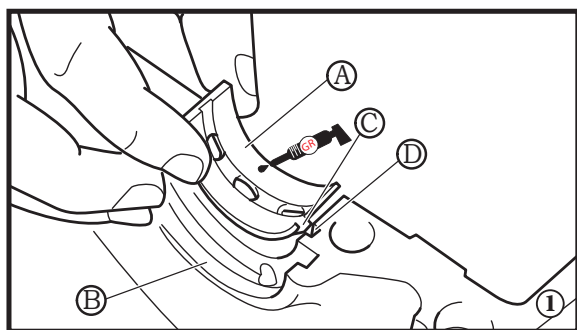
15 + 25 N m + 50° - 1.52 + 2.54 Kgfm + 50°



BALANCING COUNTER-SHAFT, ENGINE SHAFT AND BENCH HALF-BEARINGS INSTALLATION



NOTE: _____
Insert the engine oil and the cooling liquid once
the operations have been completed. _____



BALANCING COUNTER-SHAFT, ENGINE SHAFT AND BENCH HALF-BEARINGS INSTALLATION

- ① Install:
 - the bench half-bearings ①
- ② Clean the bench half-bearings, the bench supports and the base parts in contact with the half-bearings.
- ③ Rest the upper base overturned on to the work bench.
- ④ Install the bench half-bearings ① in the bench support seats ② and the engine shaft in the upper base.

NOTE:

Align the protrusions ③ of the bench half-bearings with the notches ④ of the upper base.

- ⑤ Install the lower half-bearings of the bench supports ① in the lower base.

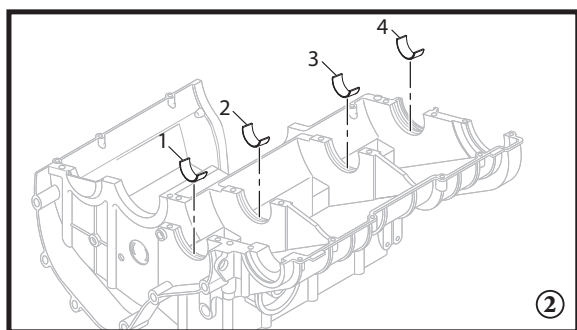
NOTE:

Align the protrusions ③ of the bench supports lower half-bearings with the notches ④ of the lower base.

Do not move the engine shaft until the clearance measuring operations have been completed.



Recommended lubricant
COPPER GREASE

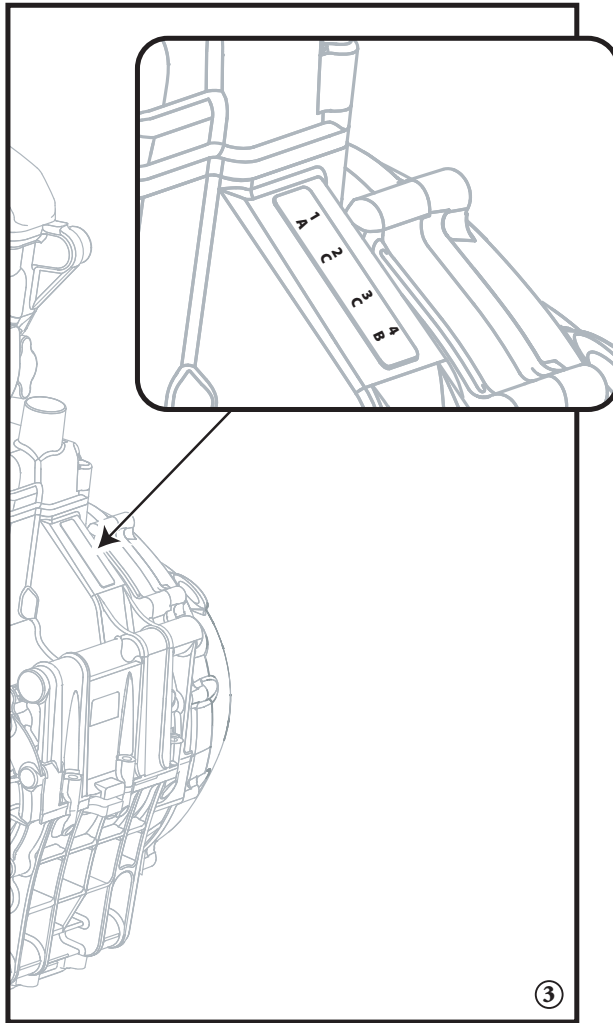


- ② Number 1 refers to the bench half-bearing seat on the distribution side.

ATTENTION

Do not exchange the bench half-bearings between them.

To obtain the correct clearance between the bench support surface and the bench half-bearing, and to prevent damages to the engine, the bench half-bearings must be re-assembled in the original position.

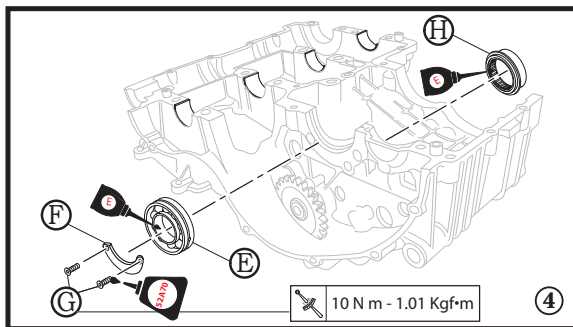


- ③ The bench half-bearings have various thicknesses distinguished by different letters and colours as shown in the table.

BENCH HALF-BEARING		
ST	COLOUR	THICKNESS
A	Red	1.918 ~ 1.922
B	Blue	1.922 ~ 1.926
C	Yellow	1.926 ~ 1.930
Ø std A seat red		41.830 - 41.836
Ø std B seat blue		41.836 - 41.843
Ø std C seat yellow		41.843 - 41.849
Ø std single seat		37.960 - 37.970

NOTE:

If replacing the engine shaft, always replace the bench half-bearings.



- ④ Install:
- the bearing **E**
 - the small plate **F**
 - the screws **G**
 - the roller bearings **H**

Torque fasten with:

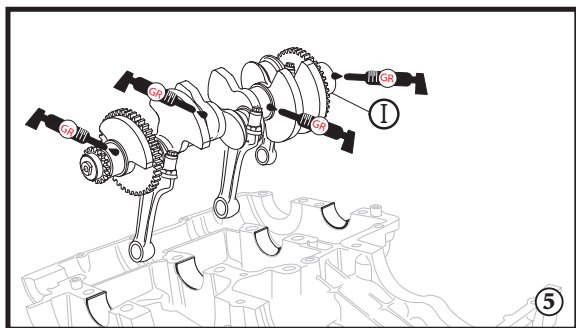
10 N m - 1.01 Kgf·m



**AREXONS SYSTEM 52A70
THREAD BRAKES**



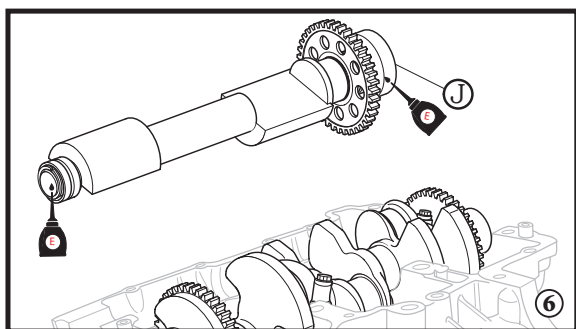
**Recommended lubricant
ENGINE OIL**



- ⑤ Install:
• the engine shaft ①



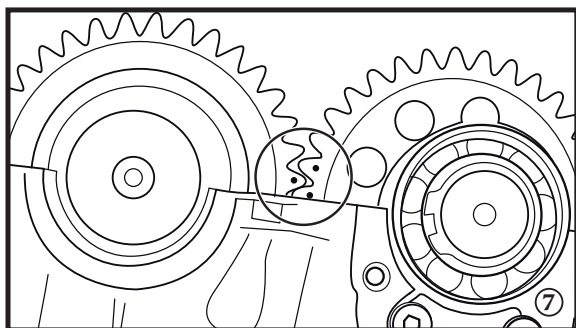
Recommended lubricant
COPPER GREASE



- ⑥ Install:
• the balancing counter-shaft ⑪

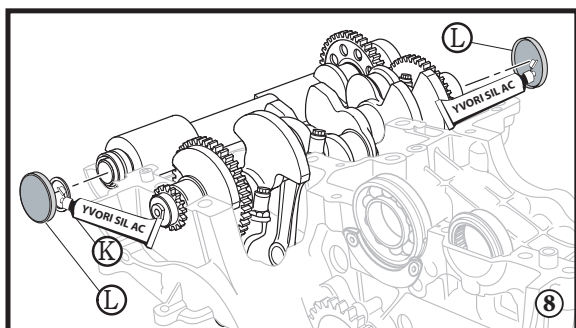


Recommended lubricant
ENGINE OIL



WARNING

Ensure that the cogwheels of the balancing counter-shaft and of the engine shaft are in phase as shown in figure ⑦.



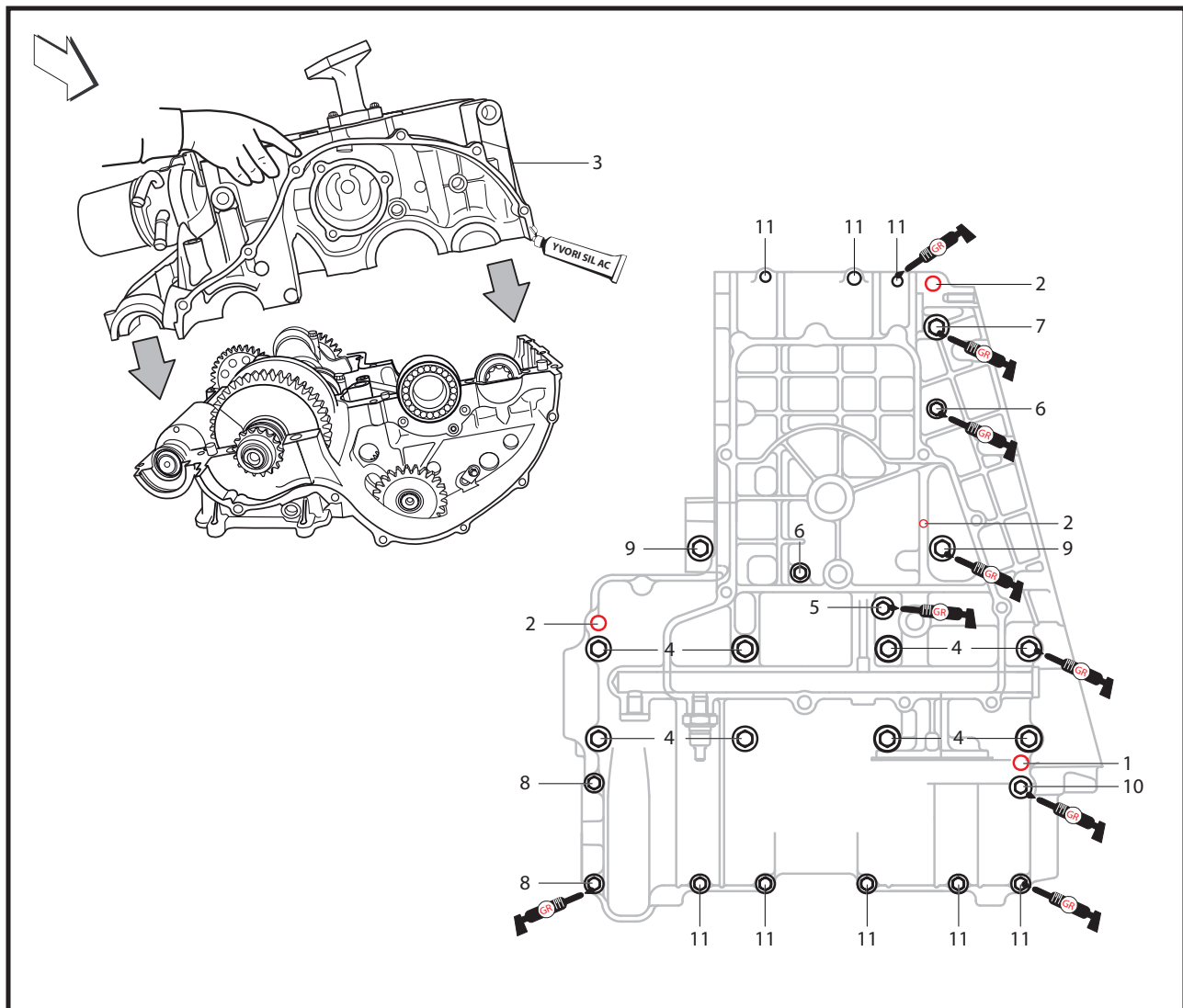
- ⑧ Install:
• the seal ring ⑫
• the two caps ⑬



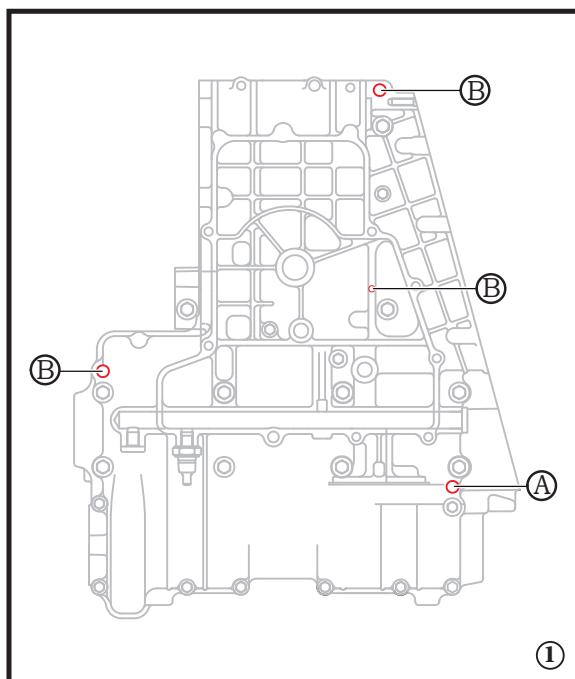
Recommended paste
**TUTELA PROFESSIONAL
IVORY SIL AC**



LOWER BASE INSTALLATION



SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1		Lower Base Installation	1	Install the pieces in the given order. NOTE: _____ Apply copper grease on all screws. _____
2		Bush	3	
3		Bush	1	
4		Lower Base	8	
5		Screw	1	NOTE: _____ Install the respective washers first. _____
6		Screw	2	
7		Screw	1	
8		Screw	2	NOTE: _____ Install the respective washer first. _____
9		Screw	2	
10		Screw	1	
11		Screw	8	NOTE: _____ Insert the engine oil and the cooling liquid once the operations have been completed. _____



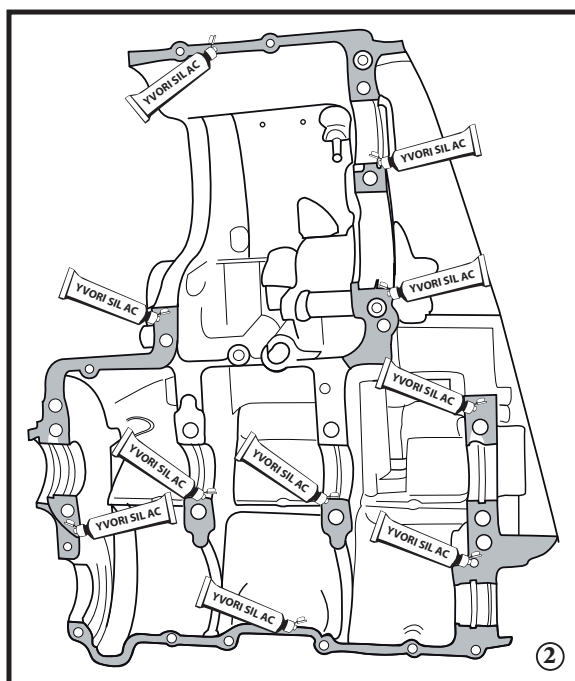
LOWER BASE INSTALLATION

- ① Install:
- the centring bush (A)
 - the centring bushes (B)

NOTE: _____
Accurately clean the contact surfaces of the upper and lower base with solvent. _____



Recommended solvent
TUTELA MOTOR CLEAN



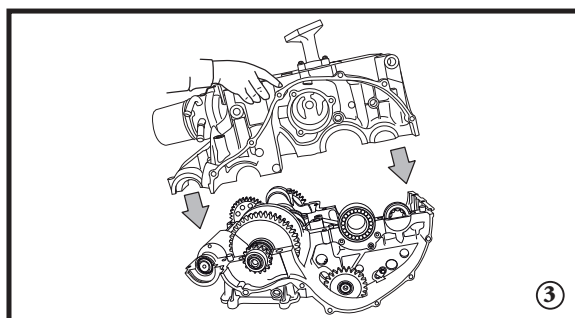
- ② Apply:
- the sealing paste on to the contact surface as shown in the figure.

WARNING _____

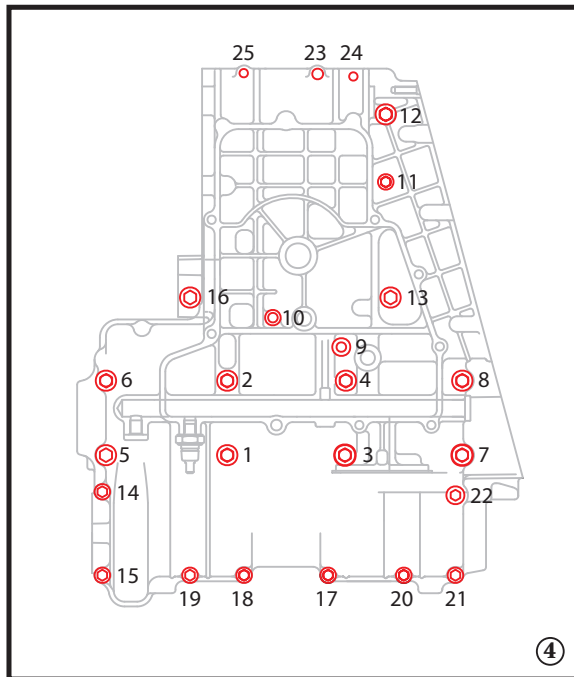
Do not apply the sealing paste in the engine oil flow holes. _____



Recommended paste
TUTELA PROFESSIONAL
IVORY SIL AC



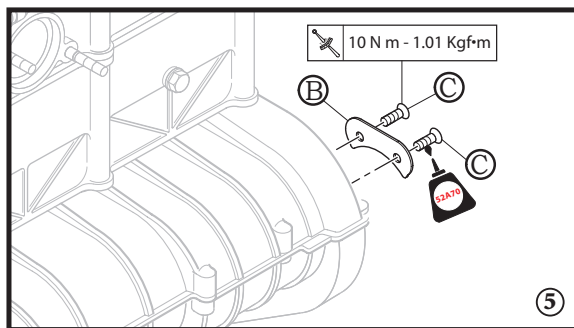
NOTE: _____
Hit the reinforced parts of the base with a rubber hammer, perfectly coupling the two half-carter as shown in figure ③ _____



- ④ Install:
• the screws

HALF-CARTER CLOSING FASTENING TORQUES

SEQUENCE	FASTENING TORQUES
1 ~ 8	1st PHASE: 12.7 N m - 1.22 Kgfm 2nd PHASE: 24.5 N m - 2.49 Kgfm 3rd PHASE: 45.0 N m - 4.58 Kgfm
9 ~ 12	1st PHASE: 12.7 N m - 1.22 Kgfm 2nd PHASE: 30 N m - 3.05 Kgfm
13 ~ 15	1st PHASE: 10 N m - 1.01 Kgfm 2nd PHASE: 24.5 N m - 2.49 Kgfm
16	1st PHASE: 10 N m - 1.01 Kgfm 2nd PHASE: 24.5 N m - 2.49 Kgfm
17 ~ 25	1st PHASE: 10 N m - 1.01 Kgfm



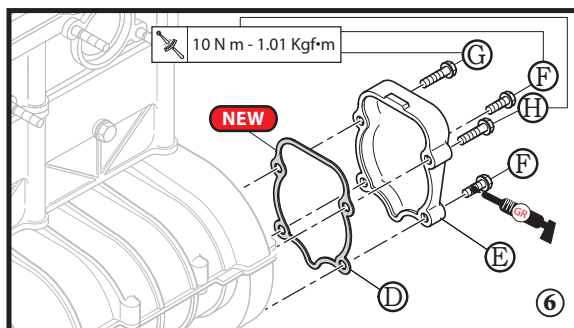
- ⑤ Install:
• the plate (B)
• the screws (C)

Torque fasten with:

10 N m - 1.01 Kgfm



AREXONS SYSTEM 52A70
STRONG THREAD BREAKS



- ⑥ Install:
• the counter-shaft lid gasket (D)
• the counter-shaft lid (E)
• the screws (F)
• the screw (G)
• the screw (H)

Torque fasten all screws.

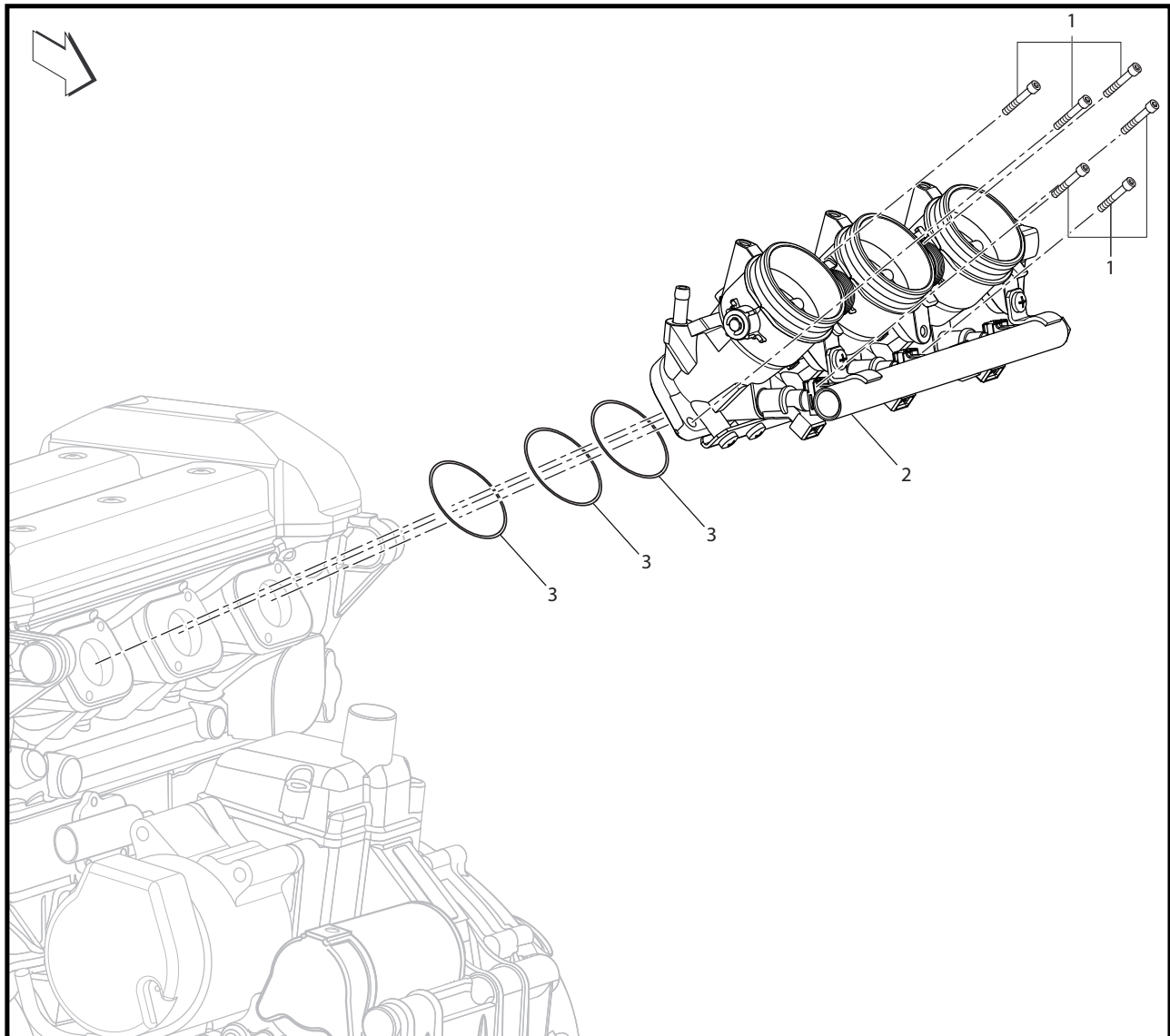
10 N m - 1.01 Kgfm



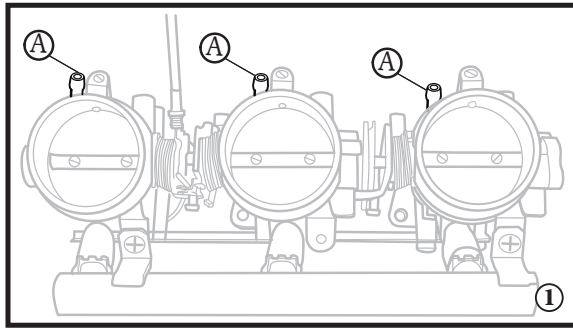
Recommended lubricant
COPPER GREASE



THROTTLED BODY REMOVAL



SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1 2 3		Throttled Body Removal Screw Throttled Body O-Ring Gasket	6 1 3	Remove the pieces in the given order.



THROTTLED BODY ADJUSTMENT

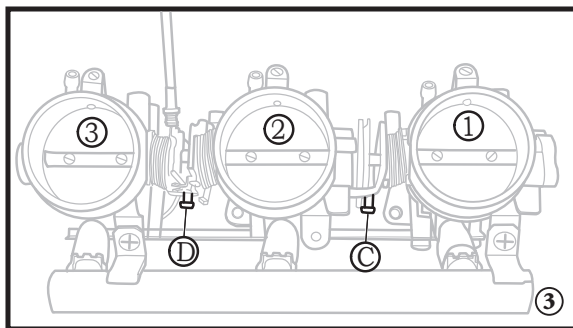
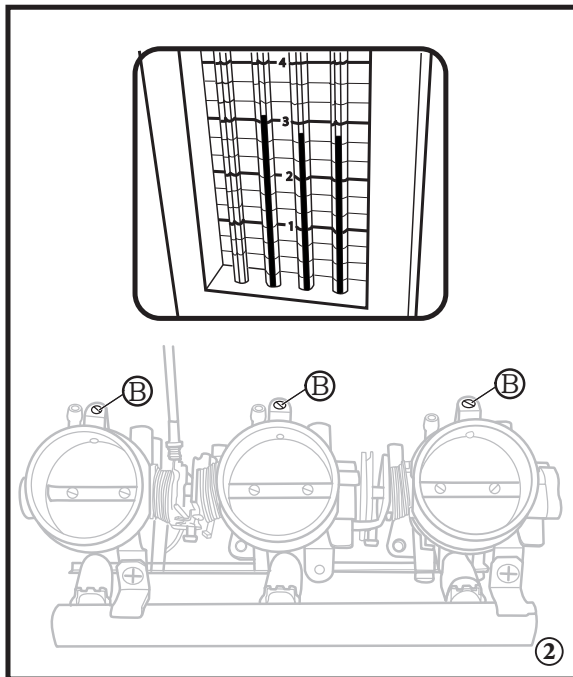
- ① Connect:
- **the vacuum meter tubes** ① directly to the fittings

- ② Start:
- **the engine** and bring it to a temperature of approx. 90°/95°C.

Check:

- **the alignment of the mercury columns** with engine power to the minimum. Eventually proceed with the balancing.

NOTE: Ensure that the bypass screws ② of bodies 1-2-3 are completely closed.

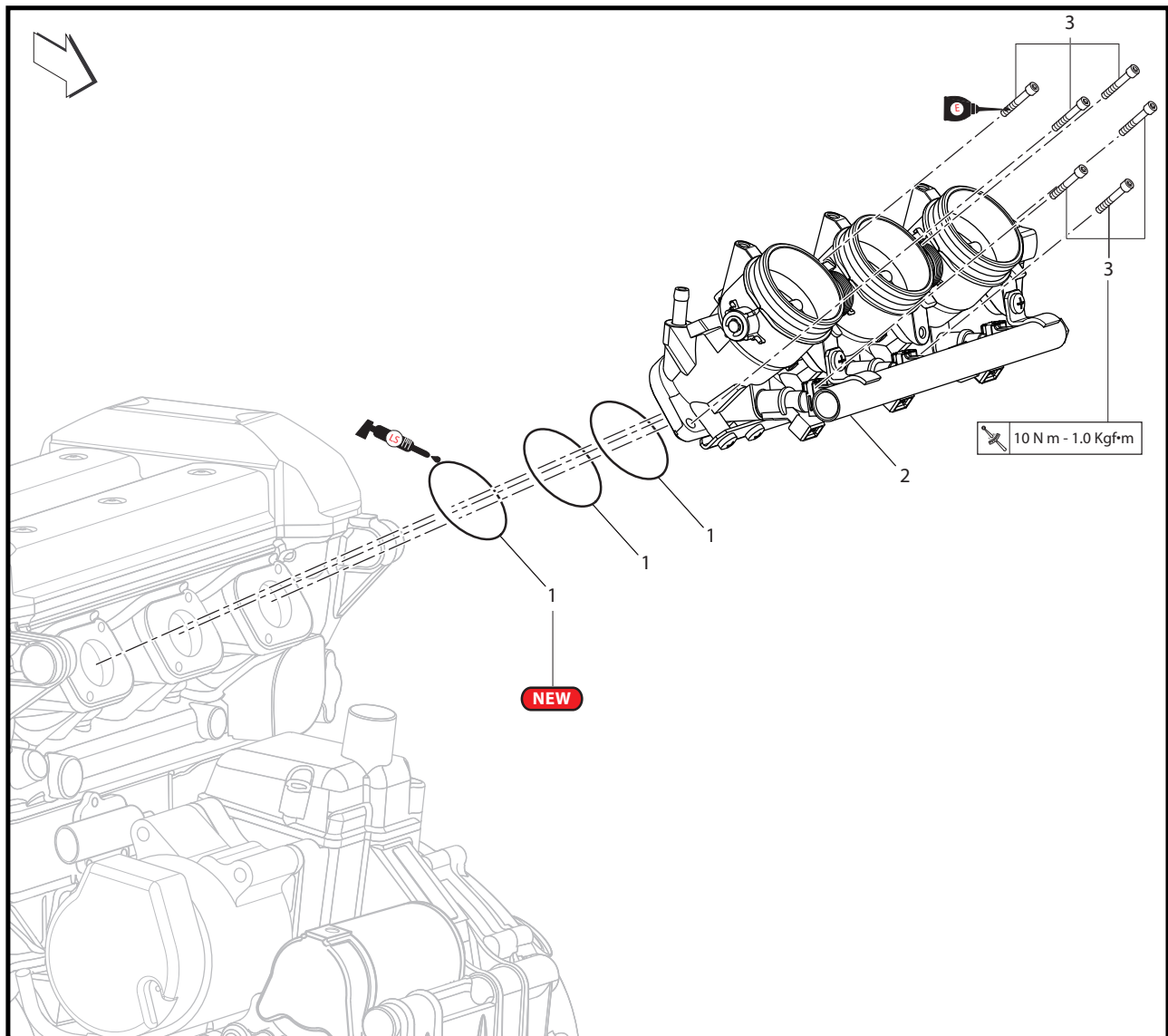


- ③ Correct:
- **the alignment values** by acting on the pair screws ③ and ④ with a screwdriver.
- Align body 1 with body 2 by acting on the pair screw ③.
- Align body 2 with body 3 by acting on the pair screw ④.

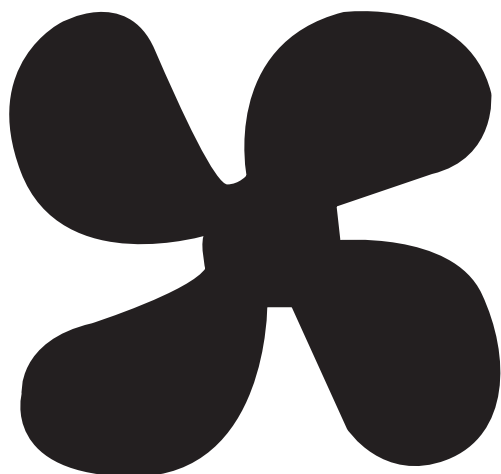
NOTE: Having reached an optimal alignment on the 3 bodies, it is possible to perfect the correction by individually acting on the by-pass screws ②.



THROTTLED BODY INSTALLATION



SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1 2 3	   	Throttled Body Installation O-Ring Gasket Throttled Body Screw	3 1 6	Install the pieces in the given order.



cool



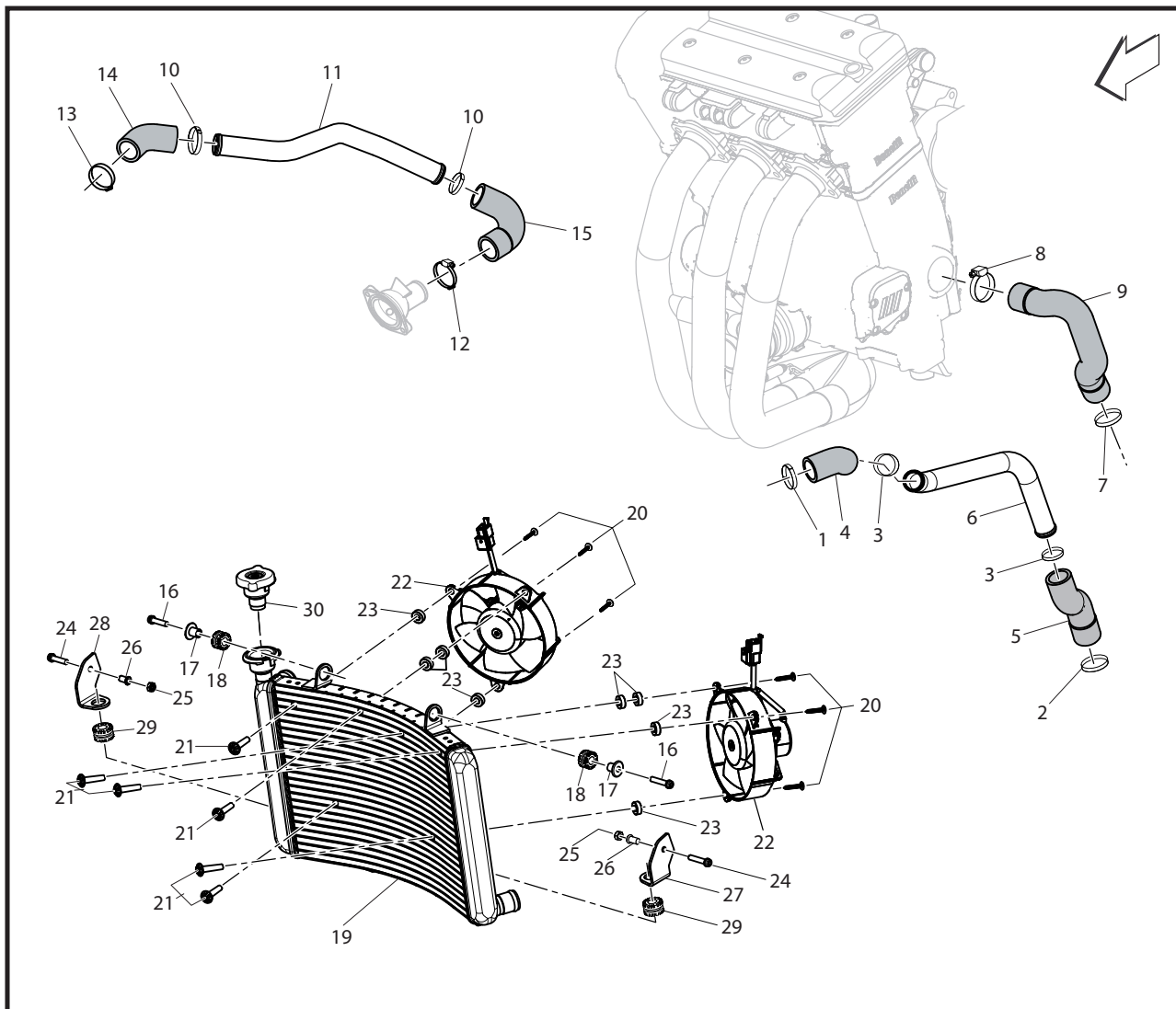
CHAPTER 6

COOLING PLANT

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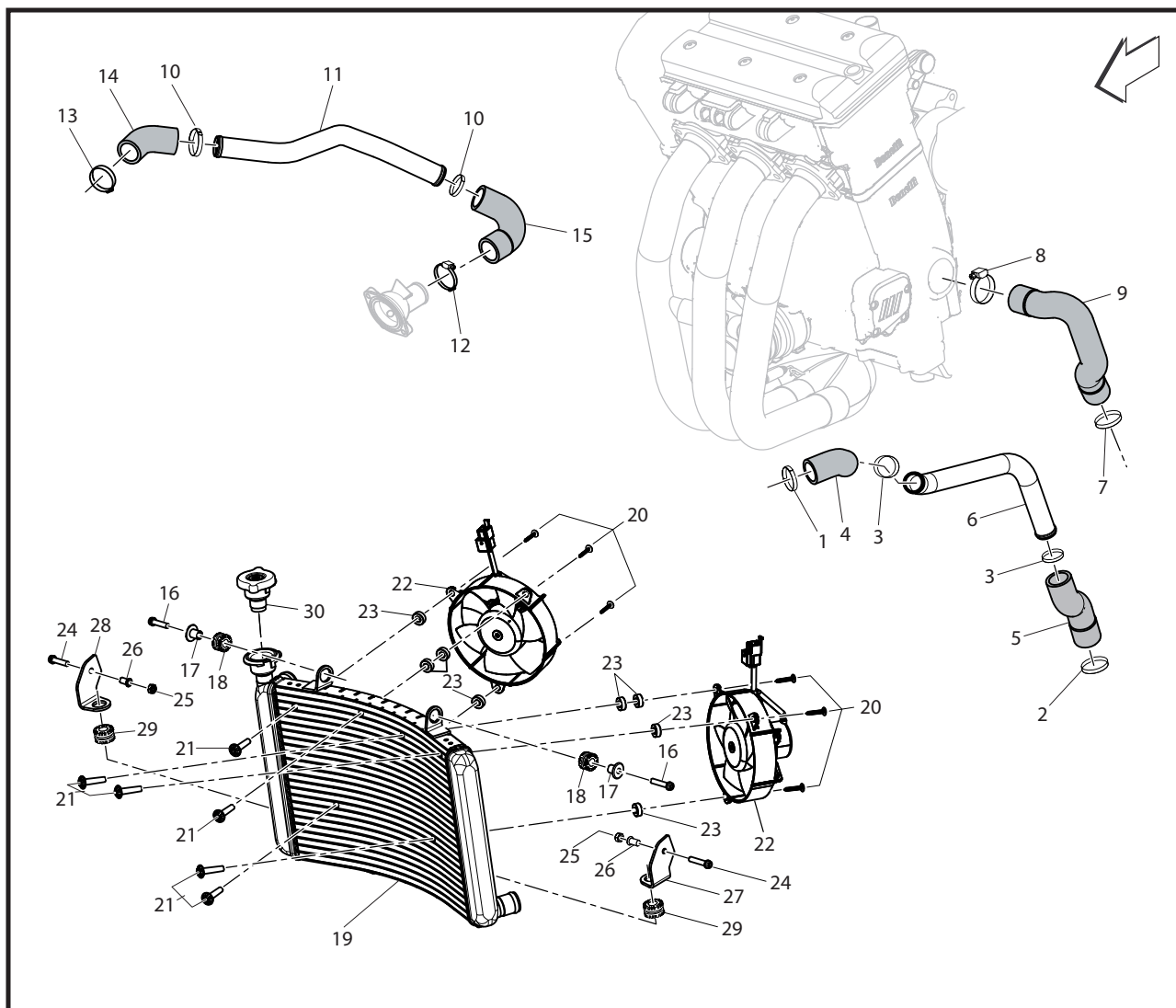


RADIATOR REMOVAL

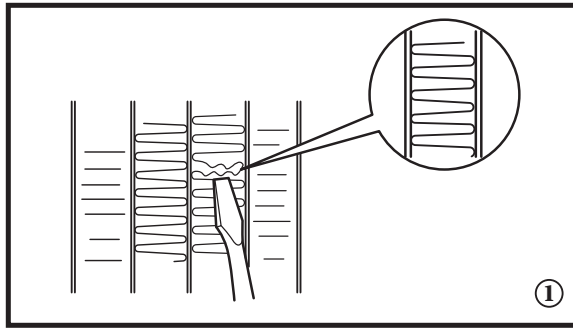


SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
		Alternator Lid Removal Right And Left Tank Lids Removal Engine Protection Removal Radiator Removal		Remove the pieces in the given order. NOTE: Drain the cooling liquid before carrying out the operations. See "FRAME 4.120" paragraph. See "FRAME 4.112" paragraph. See "FRAME 4.120" paragraph.
1		Deformable Strip	1	
2		Deformable Strip	1	
3		Deformable Strip	2	
4		Radiator Sleeve	1	
5		Left Engine Sleeve	1	
6		Left radiator Sleeve	1	
7		Deformable Strip	1	
8		Screw Strip	1	
9		Sleeve	1	
10		Deformable Strip	2	
11		Right Radiator Sleeve	1	
12		Screw Strip	1	
13		Deformable Strip	1	
14		Radiator Sleeve	1	
15		Right Engine Sleeve	1	

RADIATOR REMOVAL



SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
16		Screw	2	Disconnect the electric fans n. 22.
17		Upper Bush	2	
18		Rubber Pad	2	
19		Water Radiator	1	
20		Screw	6	NOTE: _____ Careful when removing the spacers, when installing place them in the correct sequence. _____
21		Special Fixing Pin	6	
22		Electric fan	2	
23		Spacer	8	
24		Screw	2	
25		Nut	2	
26		Lower Bush	2	
27		Left Support	1	
28		Right Support	1	
29		Rubber Pad	2	
30		Radiator Cap	1	



RADIATOR CONTROL

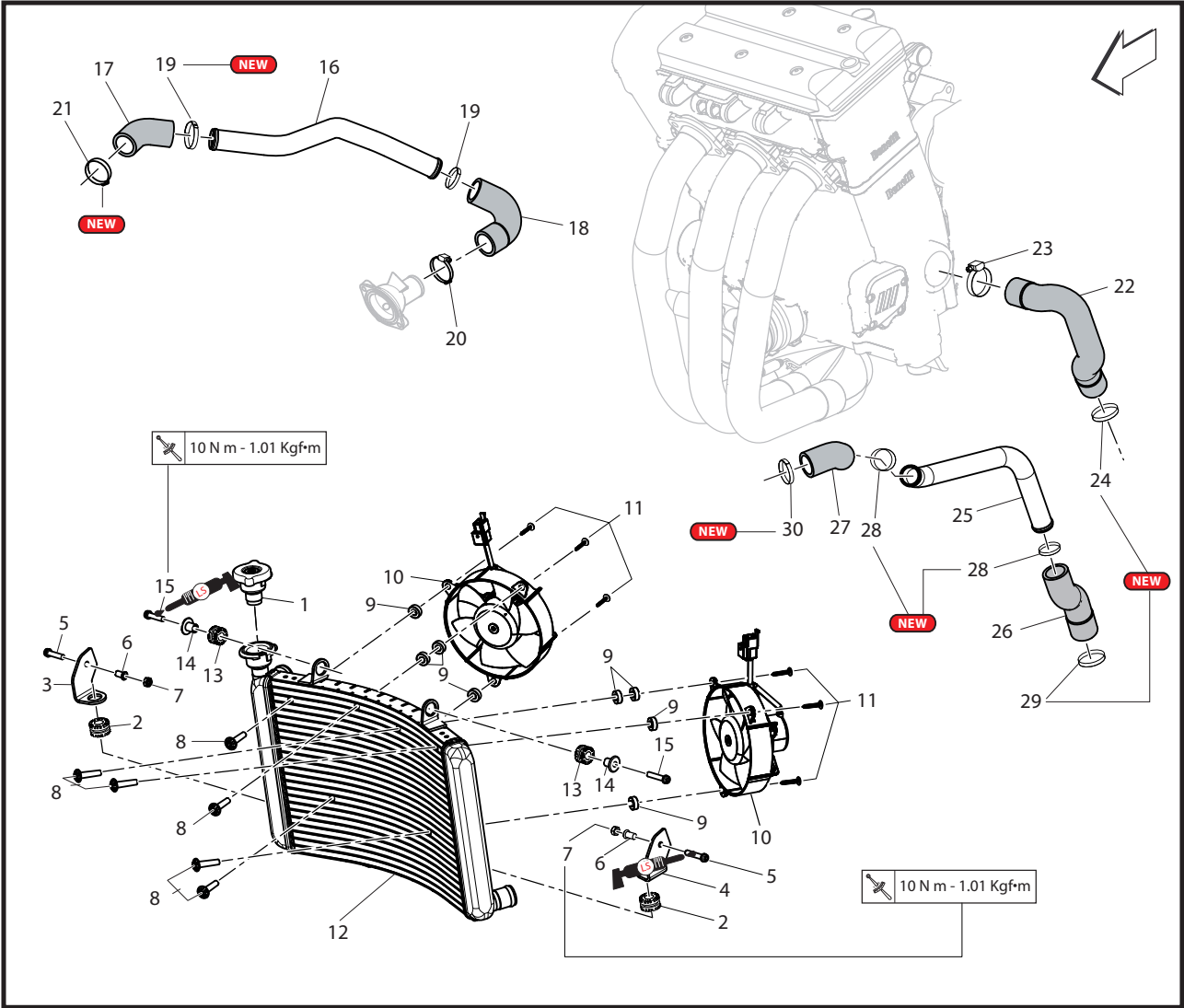
- ① Check:
 - **the radiator flaps**
In the presence of obstructions → Clean.
Apply a jet of compressed air on the rear part of the radiator.
In the presence of damages → Repair or replace.

NOTE: Straighten the eventually crushed flaps using a flat head thin screwdriver.

- ② Check:
 - **the radiator flexible tubes**
 - **the radiator piping**
In the presence of cracks/damages → Replace.

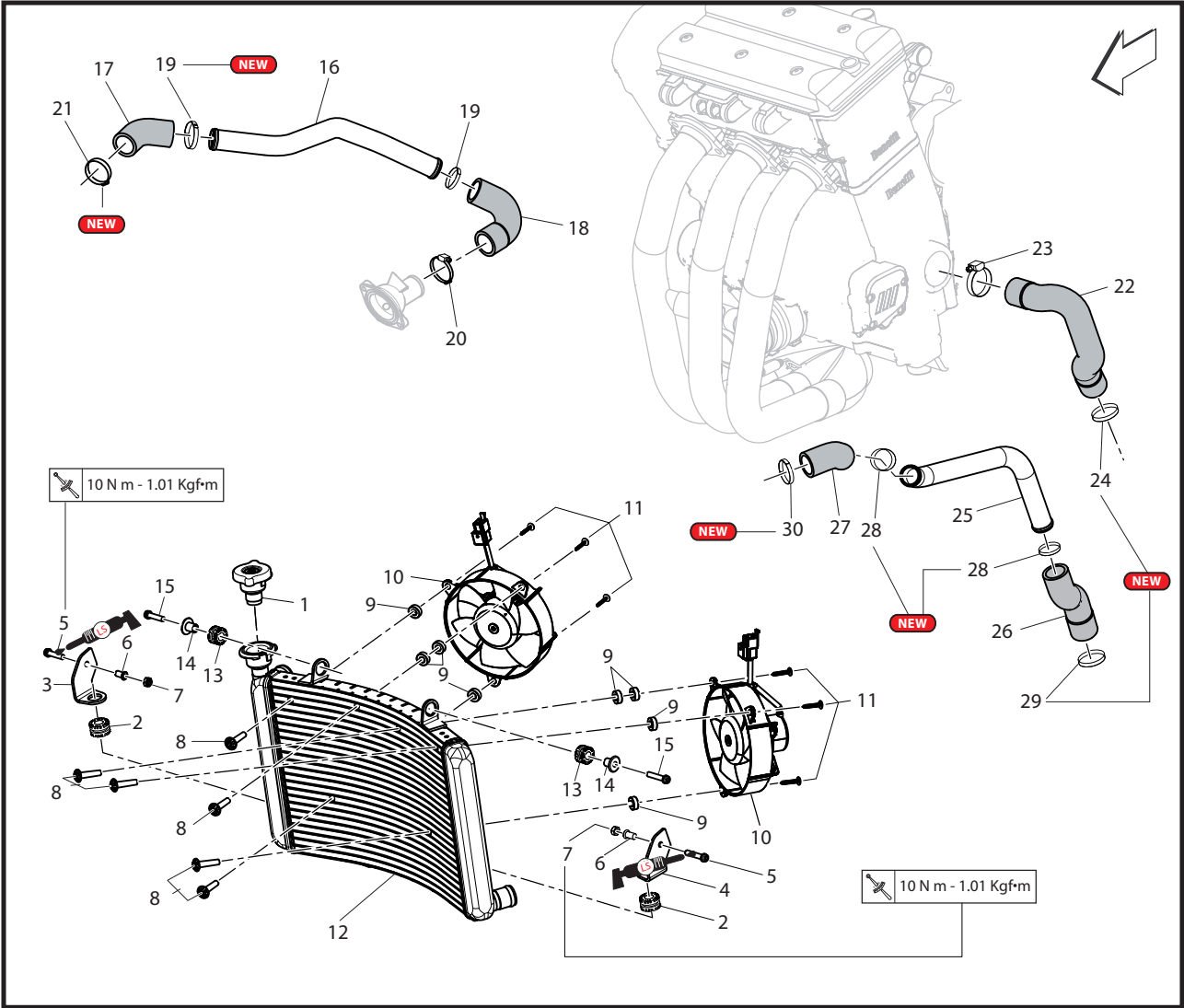
- ③ Check:
 - **the radiator fan**
In the presence of damages → Replace.
If functioning is faulty → Check and repair.
See "ELECTRIC PLANT 7.34" chapter.

RADIATOR INSTALLATION



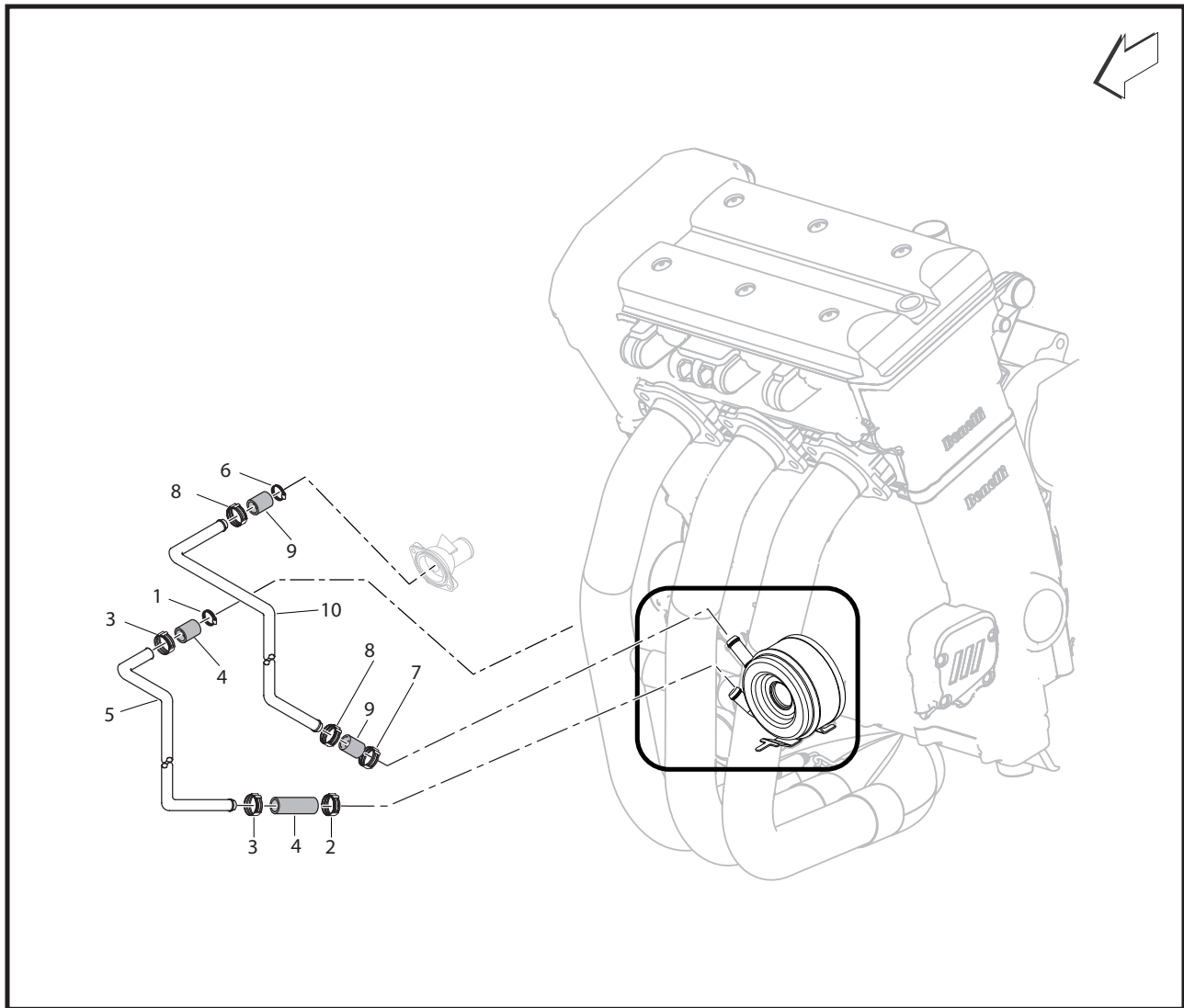
SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1		Radiator Installation	1	Install the pieces in the given order. NOTE: <u>Carefully place them in the correct sequence, carry out the operations in reverse order to removal.</u>
2		Radiator Cap	2	
3		Rubber Pad	1	
4		Right Support	1	
5		Left Support	1	
6		Screw	2	
7		Lower Bush	2	
8		Nut	2	
9		Special Fixing Pin	6	
10		Spacer	8	
11		Electric fan	2	Manually fasten. Connect the electric fans 10. NOTE: <u>Change them only if worn.</u>
12		Screw	6	
13		Water Radiator	1	
14		Rubber Pad	2	
15		Upper Bush	2	
16		Screw	2	
17		Right Radiator Sleeve	1	
18		Radiator Sleeve	1	
19		Right Engine Sleeve	1	
20			2	

RADIATOR INSTALLATION



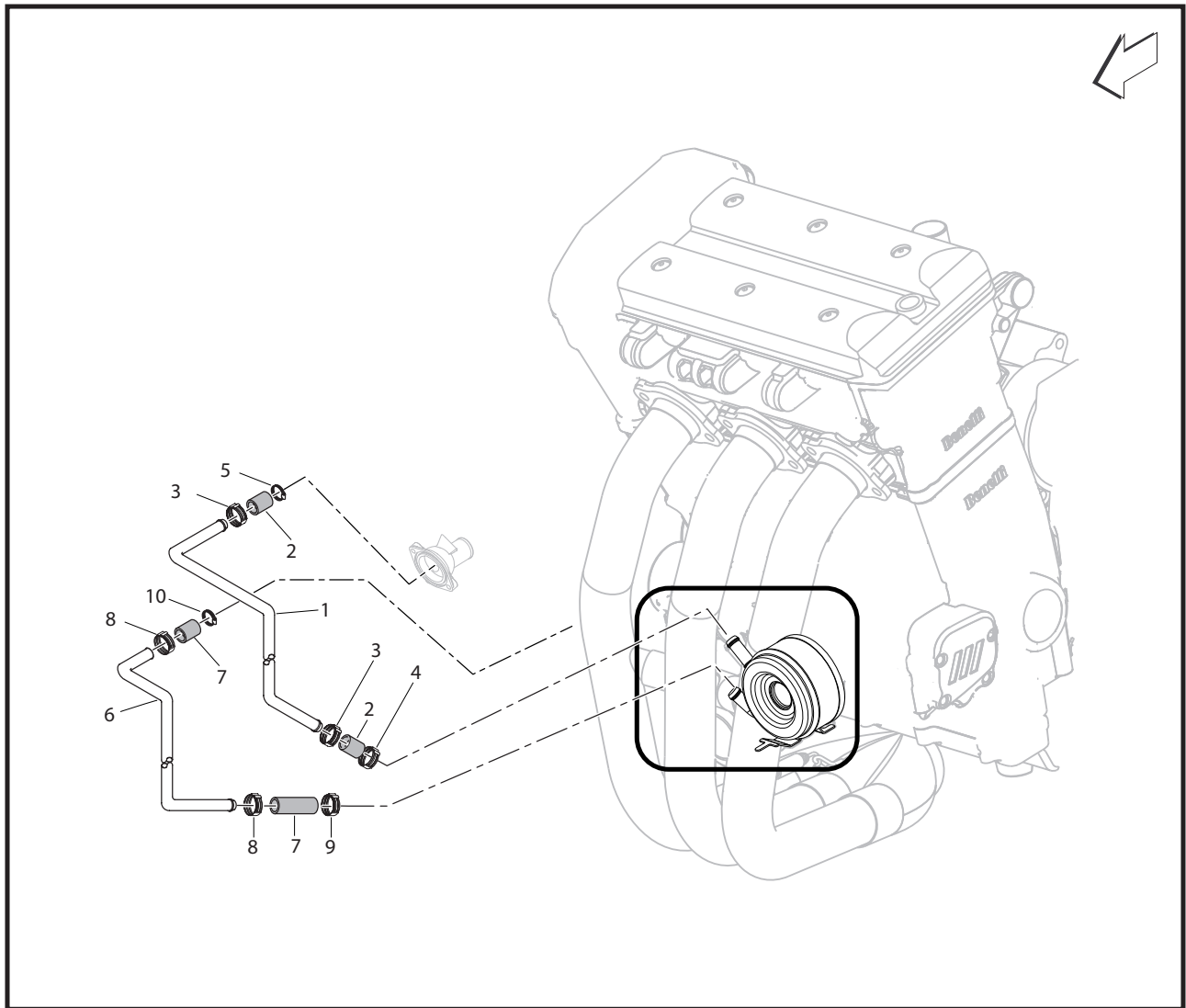
SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
19	NEW	Deformable Strip	2	Install the pieces in the given order.
20		Screw Strip	1	
21	NEW	Deformable Strip	1	
22		Sleeve	1	
23		Screw Strip	1	
24	NEW	Deformable Strip	1	
25		Right Radiator Sleeve	1	
26		Left Radiator Sleeve	1	
27		Radiator Sleeve	1	
28	NEW	Deformable Strip	2	
29	NEW	Deformable Strip	1	NOTE: _____ Insert the cooling liquid once operations have been completed. _____
30	NEW	Deformable Strip	1	

COOLING CIRCUIT REMOVAL



SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1		Cooling Circuit Removal		Remove the pieces in the given order.
1		Click Strip	1	NOTE: Drain the cooling liquid before carrying out the operations.
2		Click Strip	1	NOTE: The click strips can be re-used for the installation being careful during the dismantling phase.
3		Click Strip	2	
4		Water Tube	2	
5		Exchanger Outlet Tube	1	
6		Screw Strip	1	
7		Click Strip	1	
8		Click Strip	2	
9		Water Tube	2	
10		Exchanger Input Tube	1	

COOLING CIRCUIT INSTALLATION



SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1		Cooling Circuit Installation	1	Install the pieces in the given order.
2		Exchanger Input Tube	2	
3		Water Tube	2	
		Click Strip		NOTE: _____ Unless worn, re-use the removal click strips, otherwise change them. _____
4		Click Strip	1	
5		Screw Strip	1	
6		Exchanger Outlet Tube	1	
7		Water Tube	2	
8		Click Strip	2	
9		Click Strip	1	
10		Click Strip	1	
				NOTE: _____ Insert the cooling liquid once operations have been completed. _____

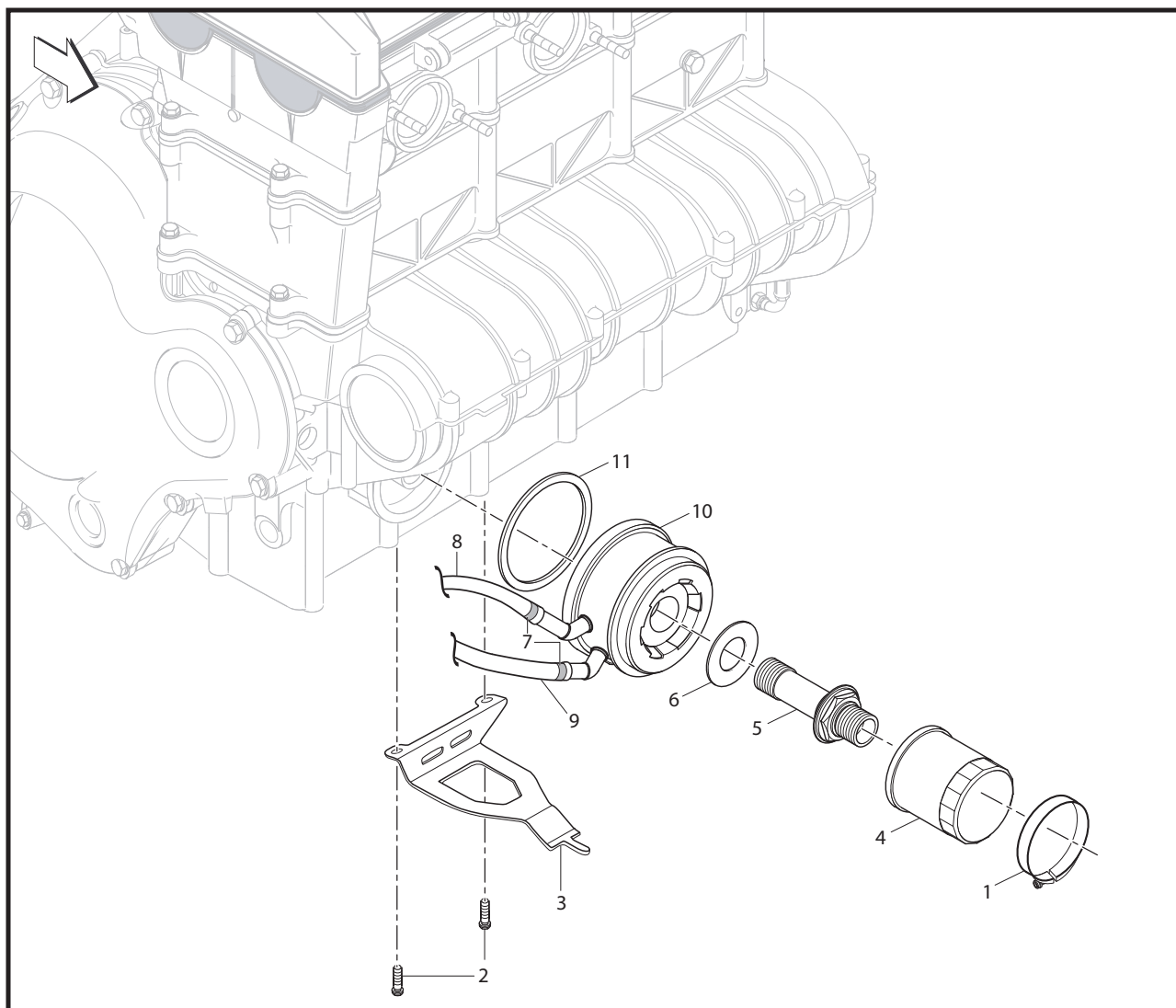
COOLING CIRCUIT INSTALLATION

- ① Fill:
 - **the cooling system** (with the specified amount of recommended cooling liquid)
See paragraph "ROUTINE INSPECTIONS AND ADJUSTMENTS 3.44".

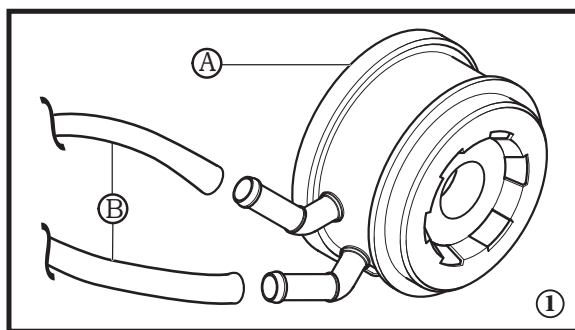
- ② Check:
 - **the cooling system**
In the presence of leaks —→ Repair or replace the faulty parts.



OIL DISTRIBUTOR REMOVAL



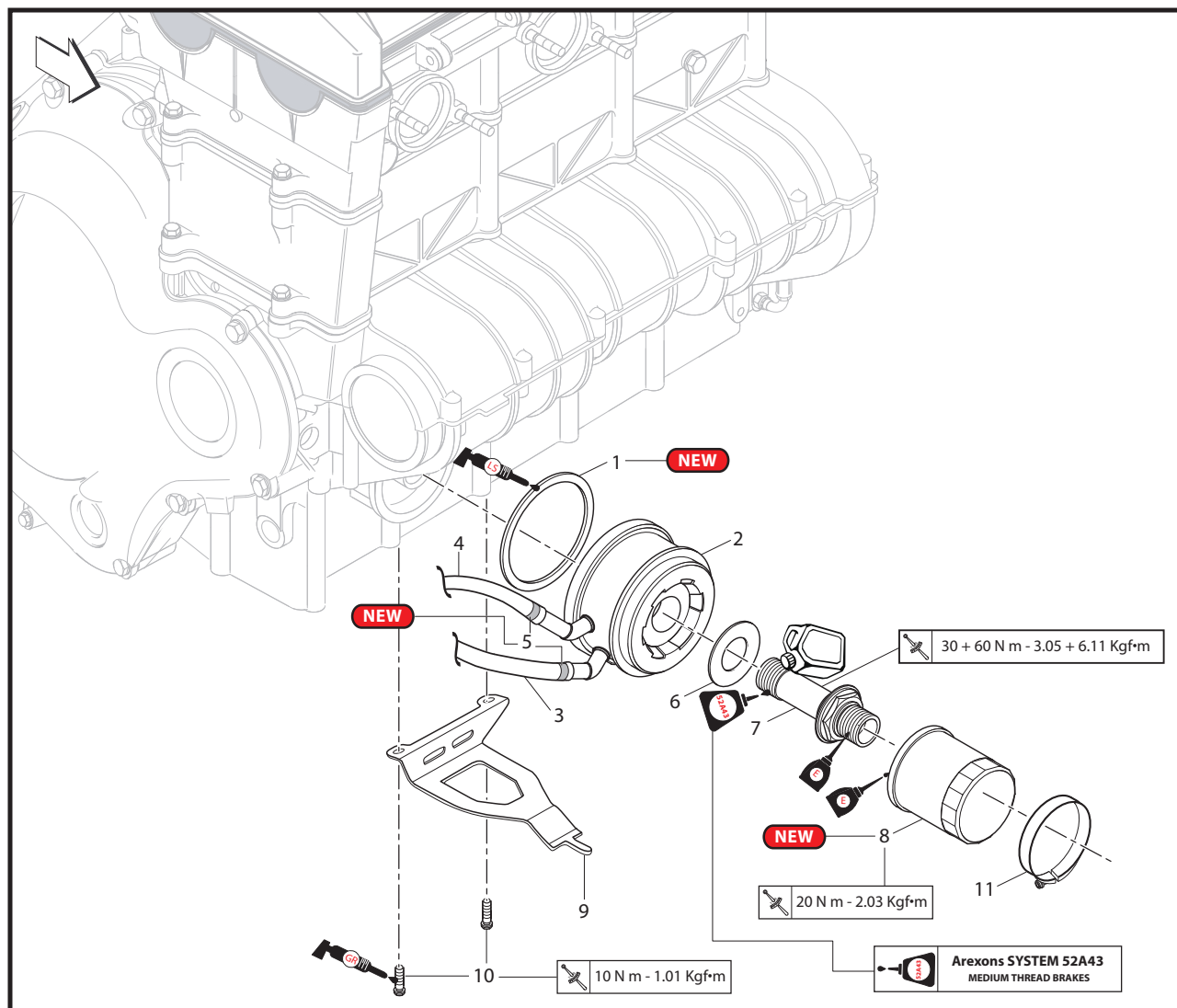
SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
		Engine Protection Removal Drain Collectors Removal		Remove the pieces in the given order. See "FRAME 4.120" paragraph. See "FRAME 4.155" paragraph.
		Oil Distributor Removal		NOTE: <u>Drain the engine oil and the cooling liquid before carrying out the operations.</u>
1		Strip	1	
2		Screw	2	
3		Plate	1	
4		Oil Filter	1	NOTE: <u>Remove the oil filter using the tool specific for the removal and installation of oil filters.</u>
5		Special Screw	1	
6		Shim	1	
7		Click Strip	1	
8		Flow Tube	2	
9		Outlet Tube	1	
10		Oil Distributor	1	
11		Seal Ring	1	



OIL DISTRIBUTOR CONTROL

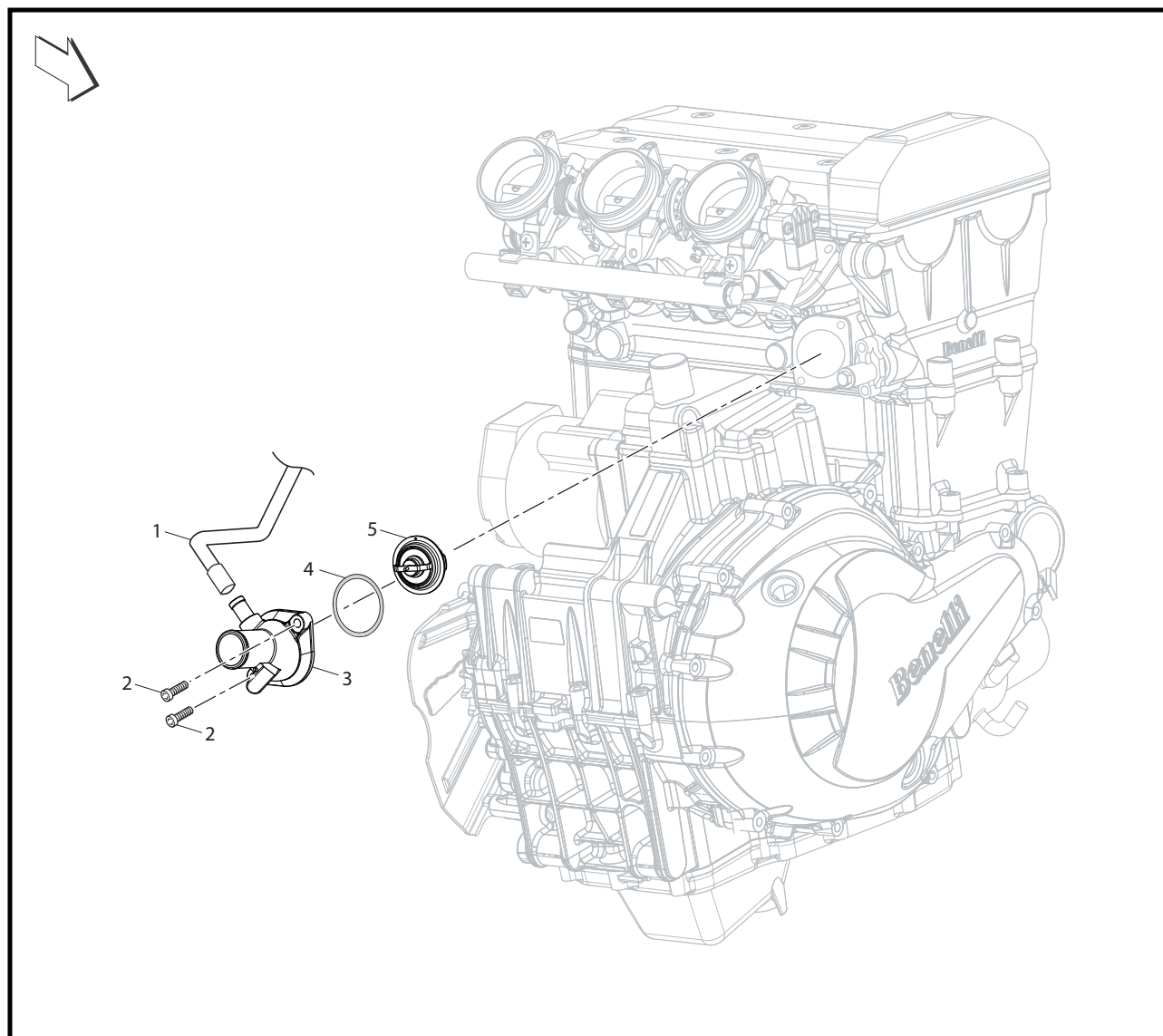
- ① Check:
- **the oil distributor** ①
In the presence of clinks/damages → Replace.
 - **the flow and outlet flexible tubes** ②
In the presence of cracks/damages/wear lines → Replace.

OIL DISTRIBUTOR INSTALLATION

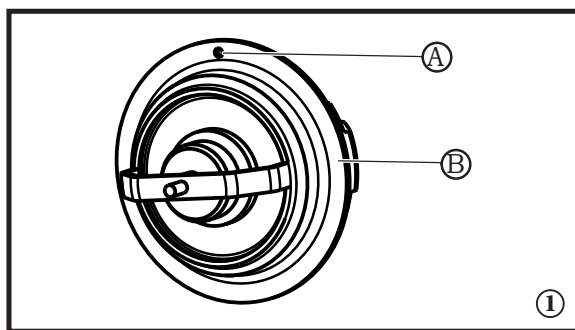


SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1		Oil Distribution Installation	1	Install the pieces in the given order. NOTE: _____ Accurately remove grease from the thread of the special screw. _____ NOTE: _____ Install the oil filter using the tool specific for the removal and installation of oil filters. _____ NOTE: _____ Insert the engine oil and the cooling liquid once the operations have been completed. _____
2		Seal Ring	1	
3		Oil Distributor	1	
4		Outlet Tube	1	
5		Flow Tube	1	
6		Click Strip	2	
7		Shim	1	
8		Special Screw	1	
9		Oil Filter	1	
10		Plate	1	
11		Screw	2	
		Strip	1	

THERMOSTAT REMOVAL

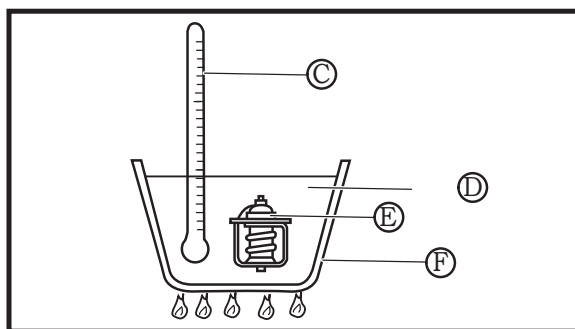


SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1 2 3 4 5		Thermostat Removal Exchanger Outlet Tube Screw Thermostat disk O-Ring Gasket Thermostat	1 2 1 1 1	Remove the pieces in the given order. NOTE: <u>Drain the cooling liquid before carrying out the operations.</u>

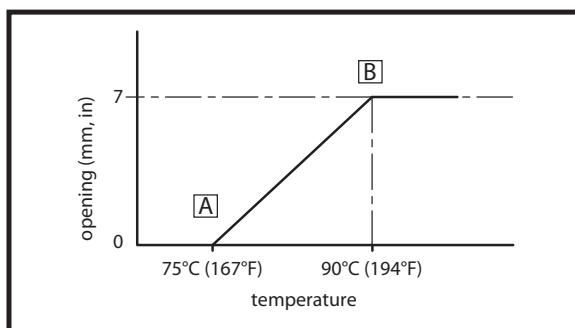


THERMOSTAT CONTROL

- ① Check:
- **the by-pass hole** A
In the presence of clogging → Replace.
 - **the thermostat** B
If it does not open at 75° ~ 90° C (167 ~ 194° F) → Replace.

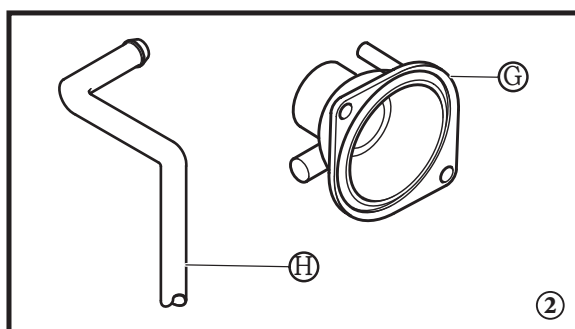


- (a) Place the thermostat in a container full of water.
- (b) Slowly heat the water.
- (c) Place a thermometer in the water.
- (d) Mixing the water, keep an eye on the thermostat and the temperature shown on the thermometer.
- (e) When the temperature of 75°C is reached, the thermostat valve starts to open reaching a temperature of 90°C. The thermostat valve reaches an opening of at least 7 mm.



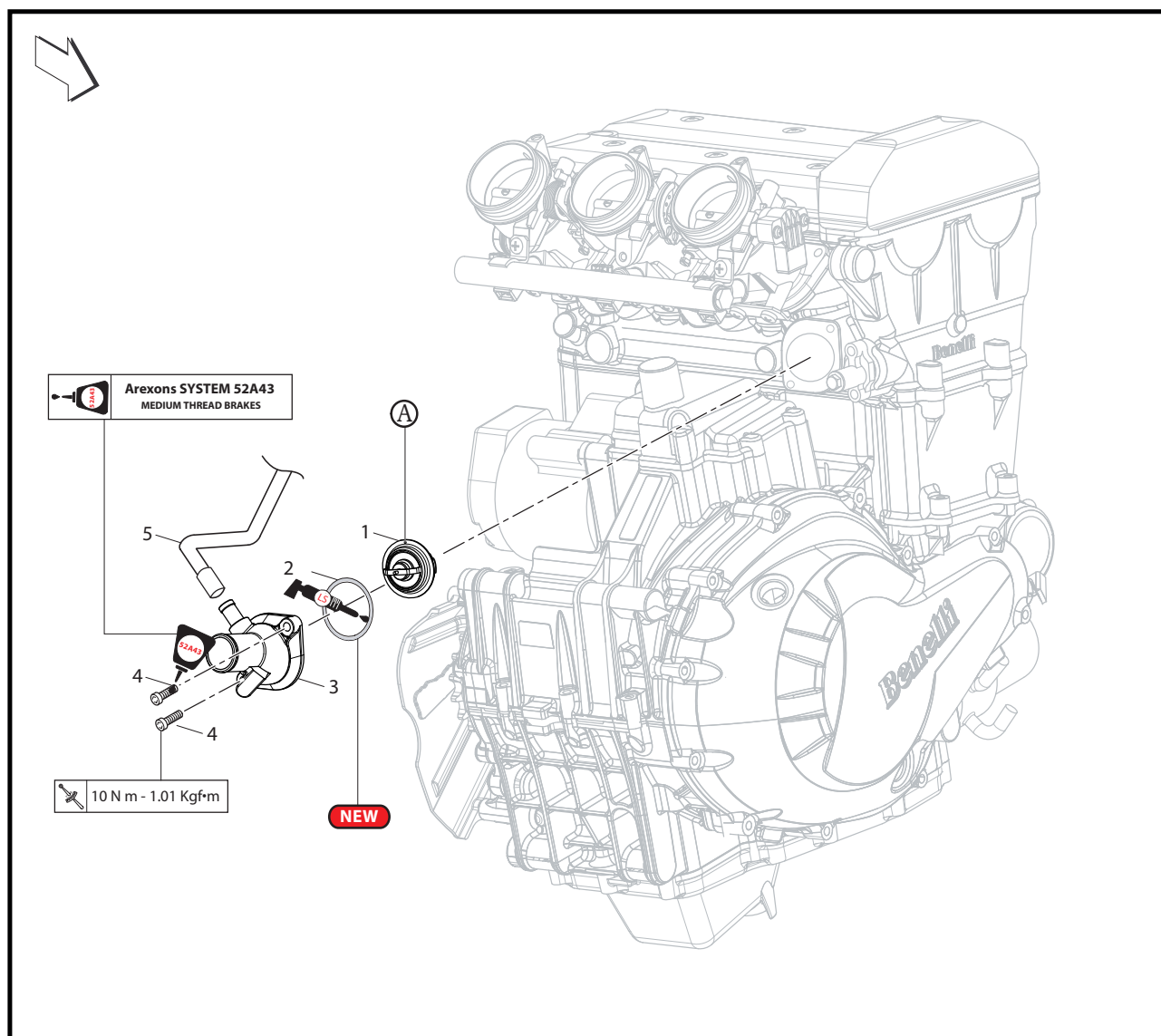
- C Thermometer
 D Water
 E Thermostat
 F Container
 A Completely closed
 B Completely open

NOTE:
 If in doubt on the precision of the thermostat, replace it. A faulty thermostat can cause significant overheating or undercooling.



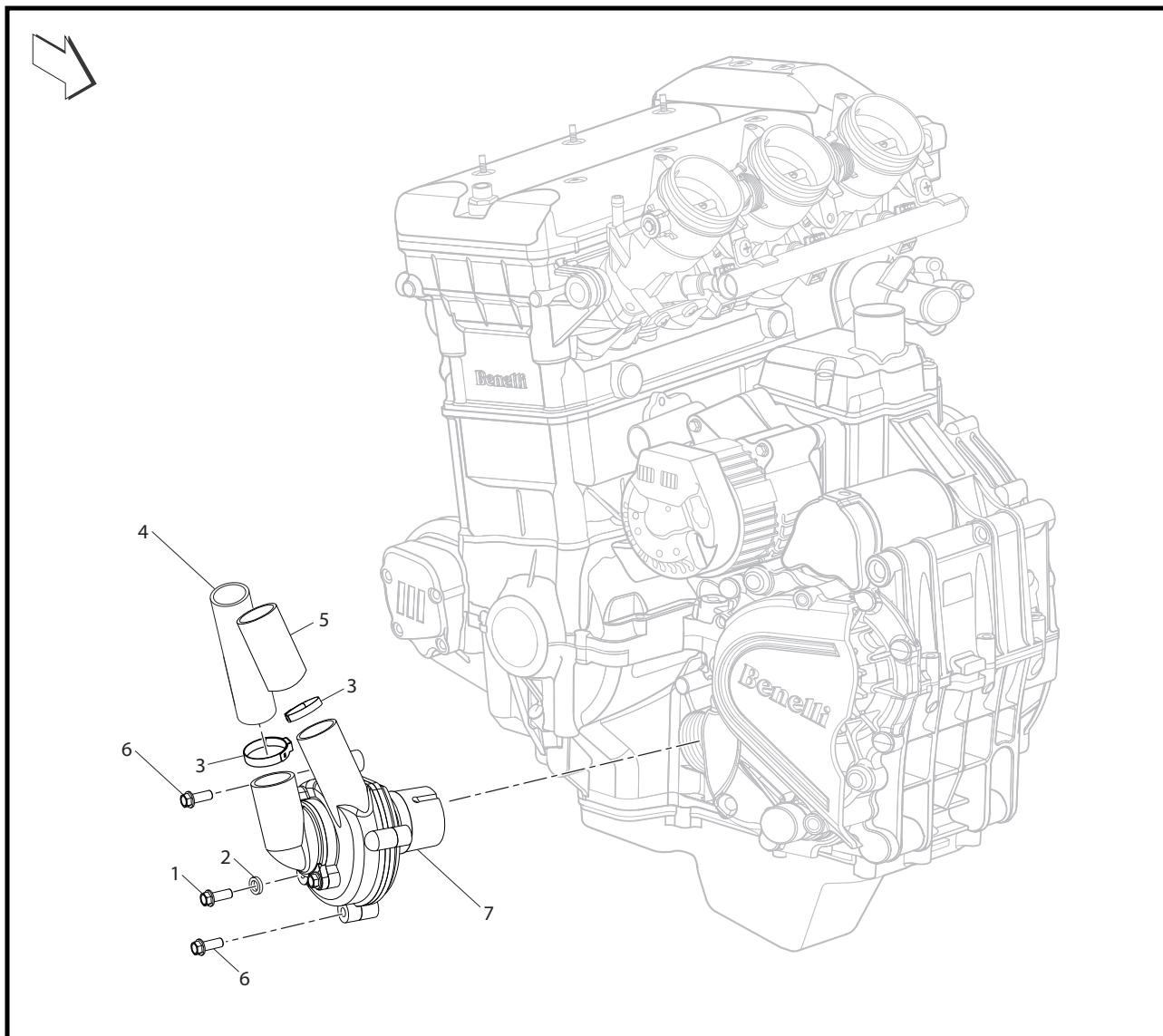
- ② Check:
- **the thermostat disk** G
 - **the tubes connected to it** H
In the presence of breaks → Replace.

THERMOSTAT INSTALLATION

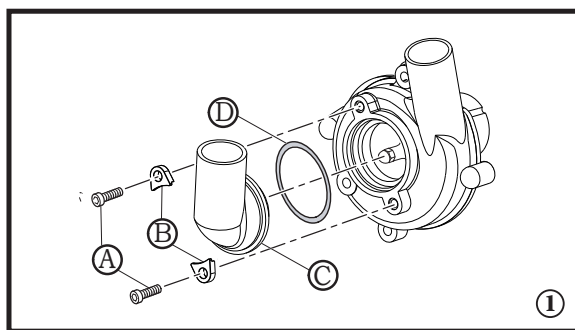


SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1		Thermostat Installation Thermostat	1	Install the pieces in the given order
2		O-Ring Gasket	1	NOTE: <u>Install the thermostat with the vent hole  facing upwards.</u>
3		Thermostat disk	1	
4		Screw	2	
5		Exchanger Outlet Tube	1	
				NOTE: <u>Insert the cooling liquid once operations have been completed.</u>

WATER PUMP REMOVAL

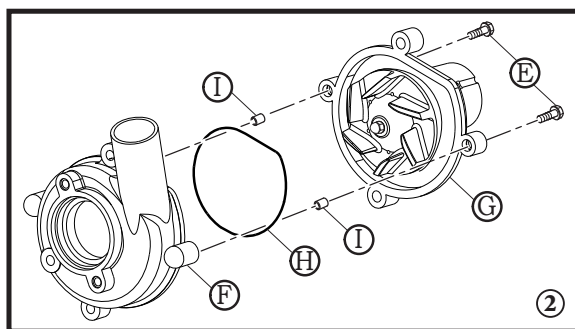


SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1		Water Pump Removal	1	Remove the pieces in the given order. NOTE: <u>Drain the cooling liquid before carrying out the operations.</u>
2		Screw	1	
3		Washer	1	
4		Strip	2	
5		Water Flow Tube	1	
6		Water Return Tube	1	
7		Screw	2	
		Water Pump	1	

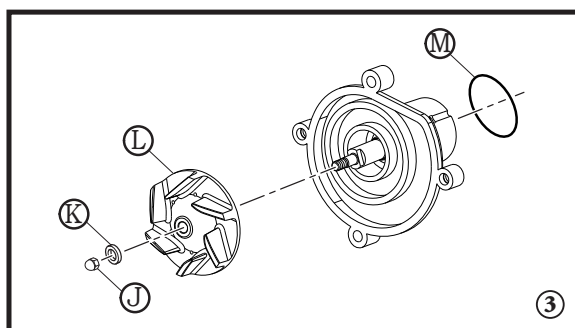


WATER PUMP REMOVAL

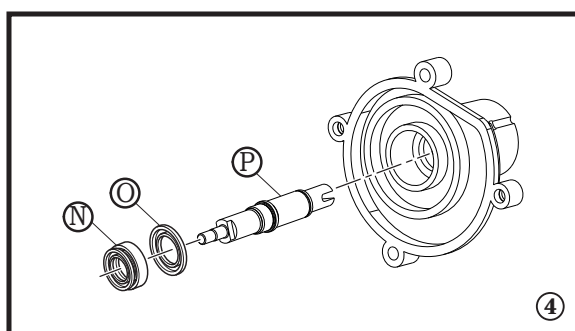
- ① Remove:
- the screws **A**
 - the plates **B**
 - the water input elbow **C**
 - the O-Ring gasket **D**



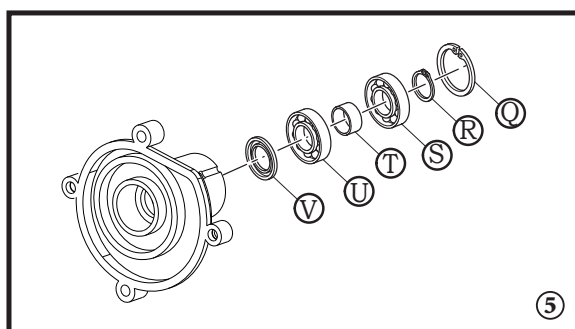
- ② Remove:
- the screws **E**
 - the water pump lid **F**
 - the water pump body **G**
 - the O-Ring gasket **H**
 - the centring bushes **I**



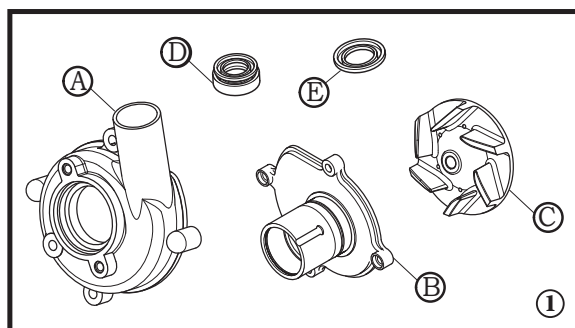
- ③ Remove:
- the cap nut **J**
 - the seal washer **K**
 - the water pump impeller **L**
 - the O-Ring gasket **M**



- ④ Remove:
- the mechanical seal **N**
 - the back **O**
 - the water pump shaft **P**

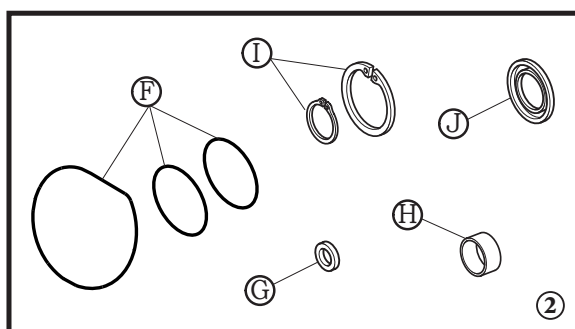


- ⑤ Remove:
- the internal seeger **Q**
 - the external seeger **R**
 - the bearing **S**
 - the spacer **T**
 - the bearing **U**
 - the seal ring **V**

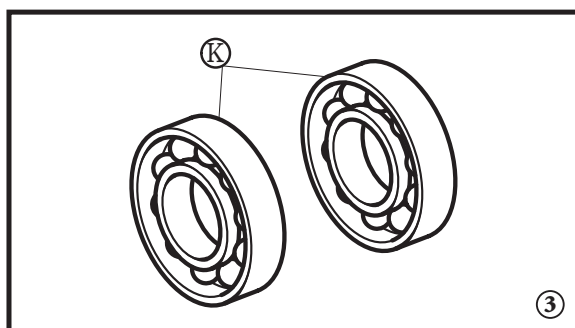


WATER PUMP CONTROL

- ① Check:
- the water pump lid (A)
 - the water pump body (B)
 - the water pump impeller (C)
 - the mechanical seal (D)
 - the back (E)
- In the presence of damages/cracks/wear lines → Replace

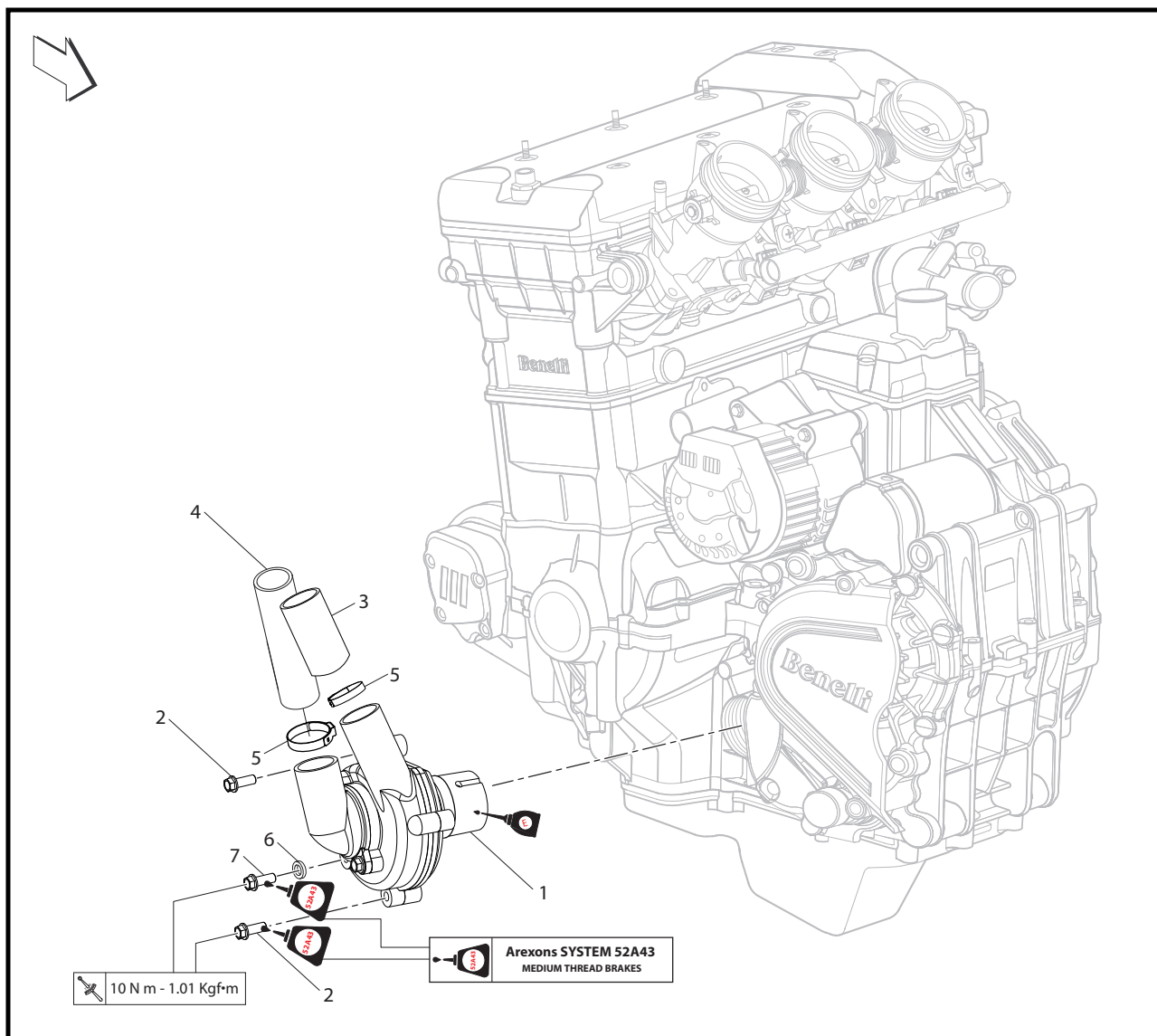


- ② Check:
- the gaskets (F)
 - the seal washer (G)
 - the spacer (H)
 - the seegers (I)
 - the seal ring (J)
- In the presence of damages/cracks/wear lines → Replace.

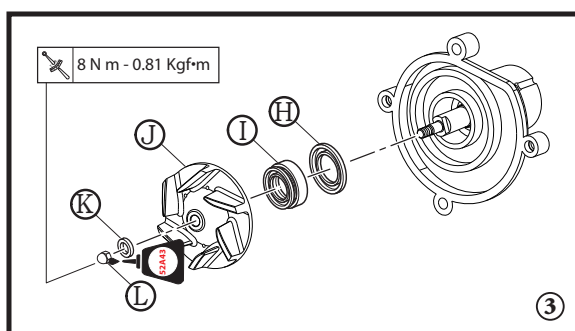
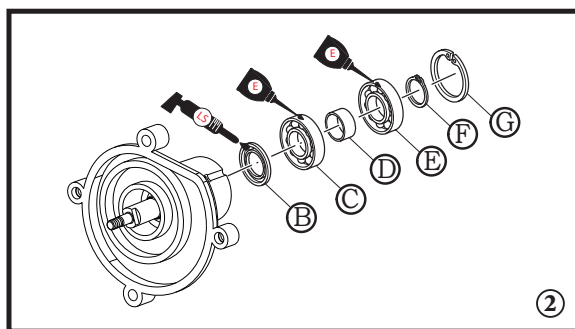
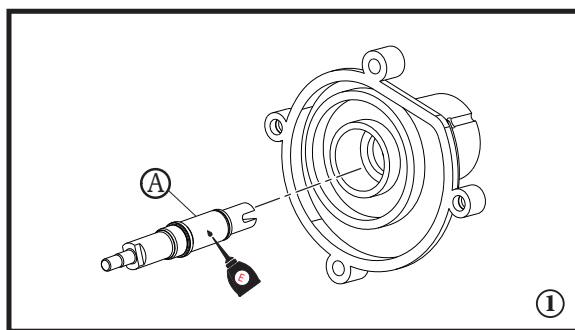


- ③ Check:
- the bearings (K)
- If the movement is not smooth → Replace

WATER PUMP INSTALLATION



SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1		Water Pump Installation	1	Install the pieces in the given order. NOTE: _____ Insert the cooling liquid in the circuit once operations have been completed. _____
2		Water Pump	2	
3		Screw	1	
4		Water Return Tube	1	
5		Water Flow Tube	2	
6		Strip	1	
7		Washer	1	
		Screw	1	



WATER PUMP INSTALLATION

- ① Install:
- the water pump shaft (A)

NOTE: Lubricate the water pump shaft as shown in the figure before installing it.

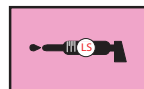


Recommended lubricant
ENGINE OIL

- ② Install:
- the seal ring (B)
 - the bearing (C)
 - the spacer (D)
 - the bearing (E)
 - the external seeger (F)
 - the internal seeger (G)



Recommended lubricant
ENGINE OIL



Recommended lubricant
TUTELA MR2 GREASE

- ③ Install:
- the back (H)
 - the mechanical seal (I)
 - the water pump impeller (J)
 - the seal washer (K)
 - the cap nut (L)

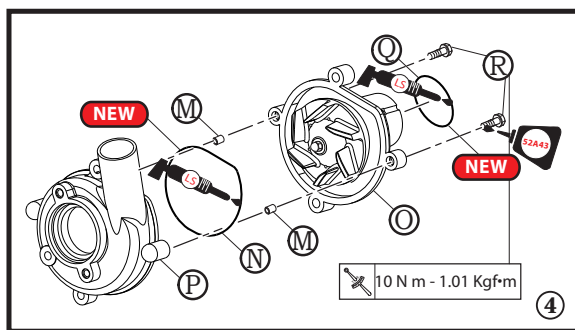
Torque fasten with:

8 N m - 0.81 Kg·m



AREXONS SYSTEM 52A43
MEDIUM THREAD BRAKES

NOTE: During installation of the back and of the mechanical seal, ensure they are clean and that there are no traces of grease.

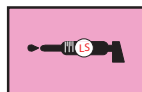


- ④ Install:
- the centring bushes (M)
 - the O-Ring gasket (N)
 - the water pump body (P)
 - the water pump lid (Q)
 - the O-Ring gasket (O)
 - the screws (R)

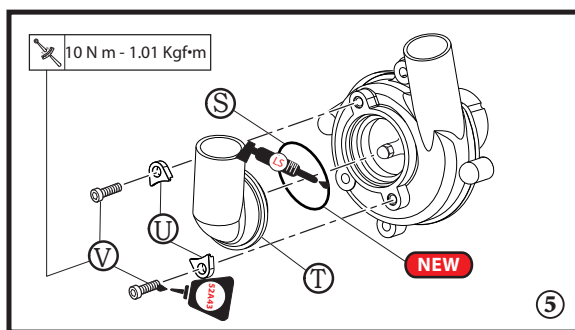
Torque fasten the 2 screws with: 10 N m - 1.01 Kg·m



AREXONS SYSTEM 52A43
MEDIUM THREAD BRAKES



Recommended lubricant
TUTELA MR2 GREASE

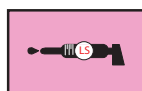


- ⑤ Install:
- the O-Ring gasket (S)
 - the water input elbow (T)
 - the plates (U)
 - the screws (V)

Torque fasten the 2 screws. 10 N m - 1.01 Kg·m

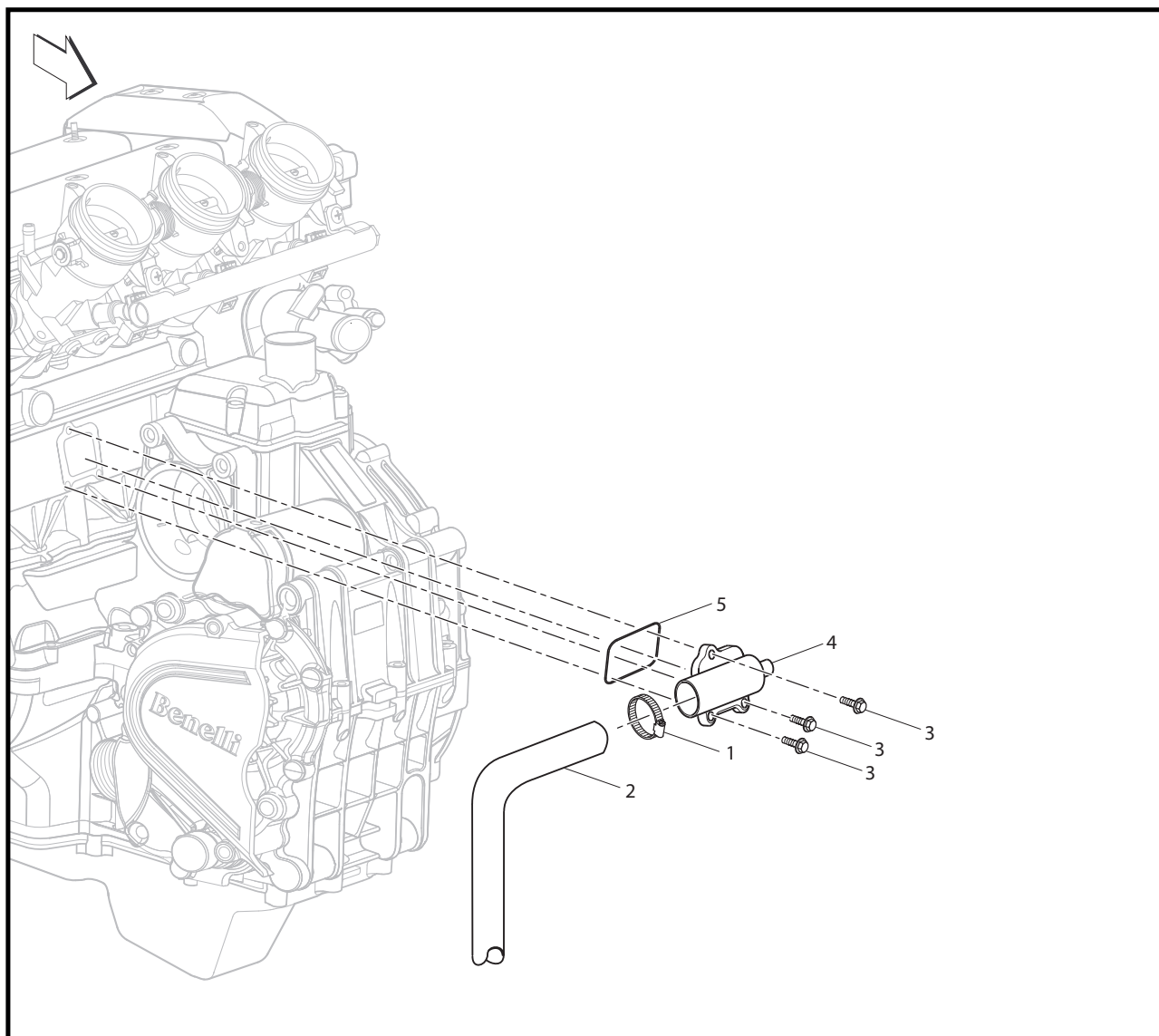


AREXONS SYSTEM 52A43
MEDIUM THREAD BRAKES

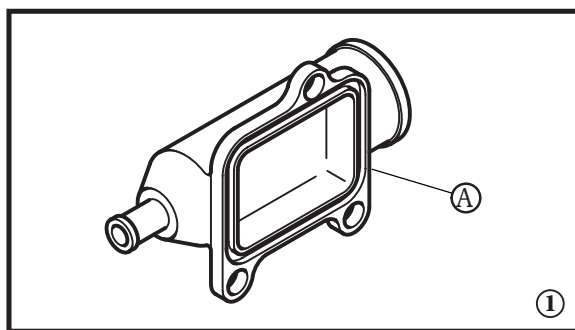


Recommended lubricant
TUTELA MR2 GREASE

WATER COLLECTOR REMOVAL



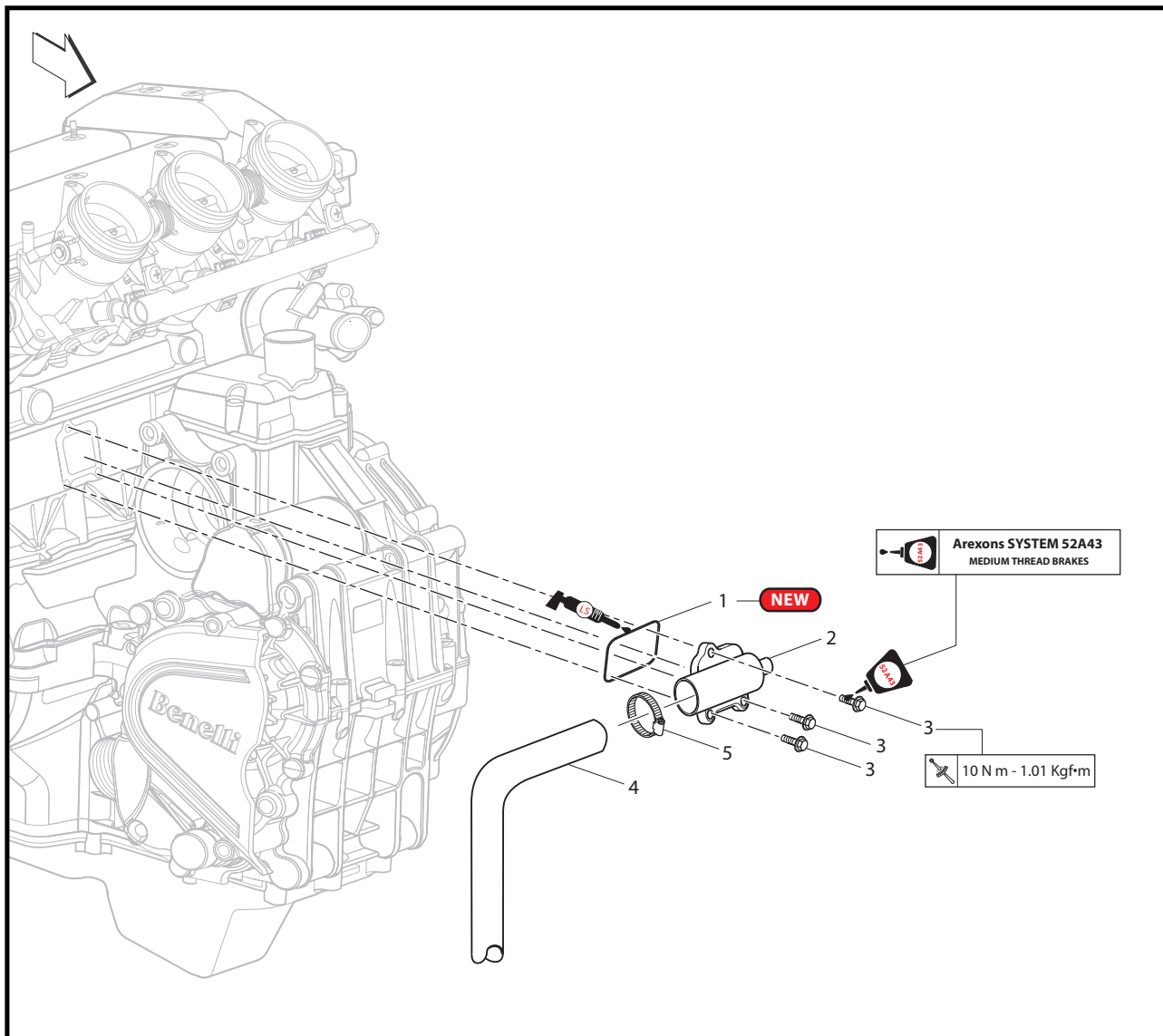
SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1 2 3 4 5		Alternator Removal Water Collector Removal Strip Water Tube Screw Water Collector Water Collector Gasket	1 1 3 1 1	Remove the pieces in the given order. NOTE: <u>Drain the cooling liquid before carrying out the operations.</u> See "ENGINE 5.122" paragraph.



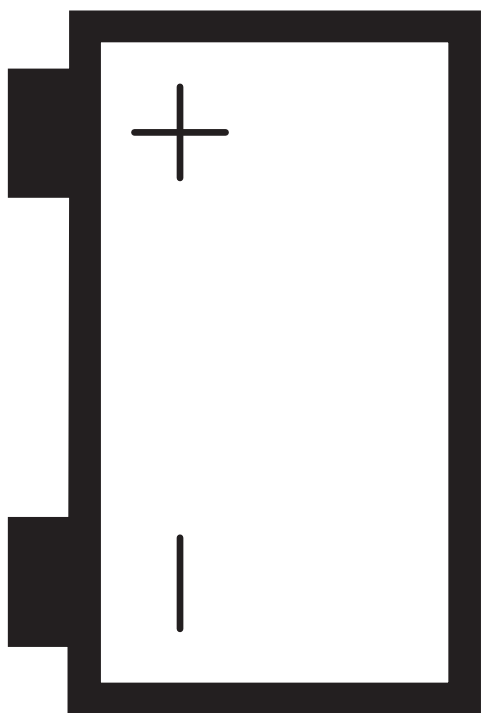
WATER COLLECTOR CONTROL

- ① Check:
- **the water collector** ①
- In the presence of damages/breaks → Replace.

WATER COLLECTOR INSTALLATION



SQ.	SYMBOLS	INTERVENTION/DESCRIPTION	Q.TY	OBSERVATIONS
1		Water Collector Installation Water Collector Gasket Water Collector Screw Water Tube Strip	1	Install the pieces in the given order. NOTE: <u>Insert the cooling liquid once operations have been completed.</u>
2			1	
3			3	
4			1	
5			1	



CELE



CHAPTER 7 ELECTRIC PLANT

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DESCRIPTION OF SYSTEM FOR ENGINE MANAGEMENT

Each model is equipped with an electronic engine management system with a control that includes both fuel ignition and distribution.

The electronic control module (ECM) obtains information from the sensors placed around the engine, from the cooling and inlet systems and calculates, with precision, the ignition advance and the fuel requirement for all engine speeds and loads. Furthermore, the system has hardware diagnostics functions compliant with the requirements of the State of California, USA, for on board diagnostics.

This function assures that, in case of a fault in the system, the type of fault and engine data at the time of the fault are stored in the ECM memory.

This stored data can be recovered by a Benelli dealer using an appropriate service equipment provided to all Benelli dealers (see Axone/Benida instruction manual).

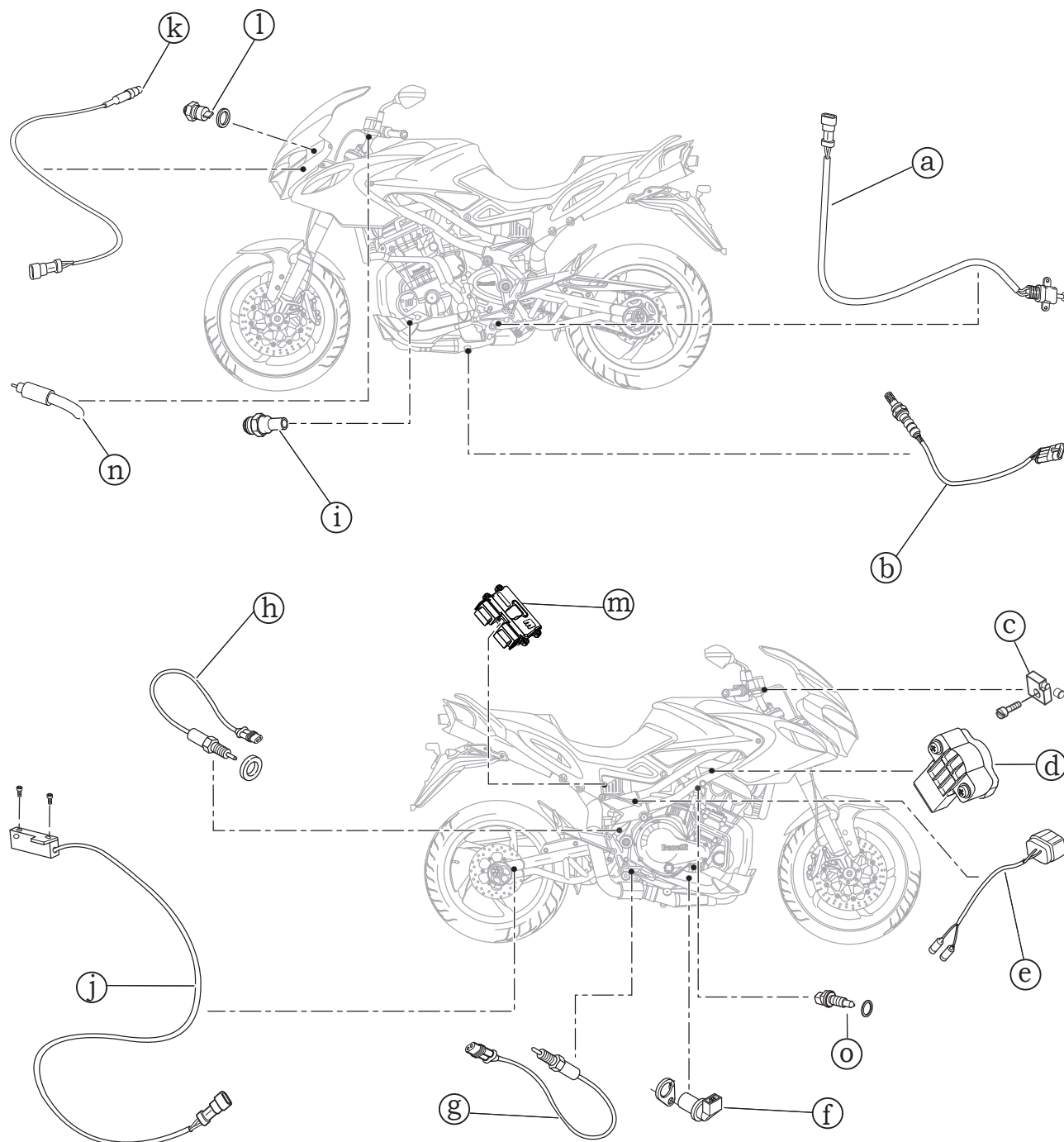
In this way, a precise diagnosis of the fault and defect, timely repaired, can be made.

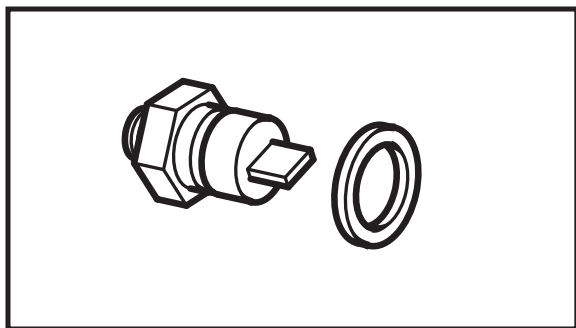
SENSORS POSITION

- (a) Side Trestle Sensor
- (b) Lambda Probe
- (c) Front Brake Sensor
- (d) Potentiometer
- (e) Fall Sensor

- (f) Phase Sensor
- (g) Hydrostop
- (h) Neutral Switch
- (i) Oil Pressure Sensor
- (j) Speed Sensor

- (k) Ambient Temperature Probe
- (l) Air Temperature Sensor
- (m) Barometric Pressure Sensor
- (n) Clutch Switch
- (o) Cooling Liquid Temperature Sensor





SYSTEM SENSORS

INLET AIR TEMPERATURE SENSOR

Placed underneath the on board equipment (dashboard)

Considering that the air density (and, therefore, the amount of oxygen available to burn the fuel) varies with the temperature, an inlet air temperature sensor has been arranged.

Variations in the air temperature (and, therefore, in the air density) are compensated by adjusting the amount of fuel injected to a level compliant with the clean combustion and low emissions.

- ① Remove:
 - **the fixed cap**
See "FRAME 4.110" paragraph.
 - **the equipment support**
See paragraph "ROUTINE INSPECTIONS AND ADJUSTMENTS 3.89"
- ② Disconnect:
 - **the inlet air temperature sensor**Loosen:
 - **the nut**
- ③ Check:
 - **the resistance**
using the multitester

DATA OF RESISTANCE TO THE TYPICAL CONDITIONS

AMBIENT TEMPERATURE	RESISTANCE VALUE
30 °C	1.6 a 1.8 K Ω
25 °C	1.9 a 2.2 K Ω
20 °C	2.3 a 2.7 K Ω
15 °C	2.9 a 3.3 K Ω
10 °C	3.5 a 4.0 K Ω
5 °C	4.4 a 4.9 K Ω
0 °C	5.5 a 6.1 K Ω

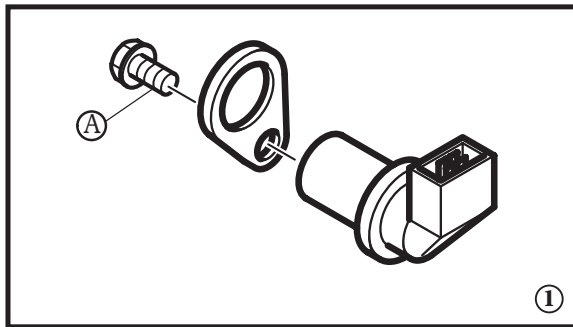


PHASE SENSORS

Placed in the right part of the engine near the engine shaft

The position sensor of the elbow shaft detects the movement of a cogwheel fixed at the right end of the engine shaft through reading of a particular wheel made of 28 teeth, equally distant, next to a space of three times the length.

The reading interpretation is used by the ECM to determine the position of the engine shaft compared to the point where the fuel is injected and to the need for fuel ignition.



- ① Remove:
- the screw ①

- ② Check:
- the distance between phase sensor and phonic wheel

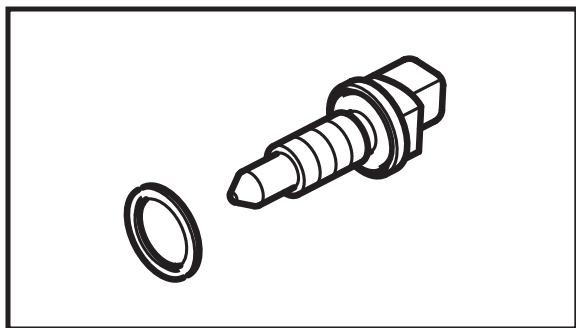


Distance between phase sensor and phonic wheel
1 mm (0.039 in)

- ③ Check:
- the resistance with a multimeter



Resistance
 $500 \pm 100 \Omega$



TEMPERATURE SENSOR OF THE COOLING LIQUID

Placed on the right side of the cylinder head

The information of the cooling liquid temperature received by the ECM is used to optimise the power supply at all engine temperatures, and to calculate the power supply requirement upon cold and hot start-ups.

- ① Remove:
- **the seat**
See "FRAME 4.130" paragraph.
 - **the tank**
See "FRAME 4.118" paragraph.
 - **the air filter box**
See "ROUTINE INSPECTIONS AND ADJUSTMENTS 3.10" paragraph.

RESISTANCE DATA TO THE TYPICAL CONDITIONS

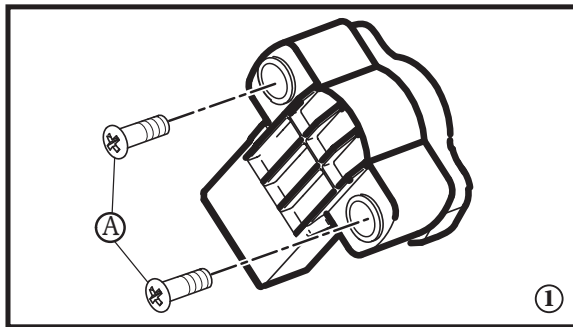
AMBIENT TEMPERATURE	RESISTANCE VALUE
20 °C	2.35 a 2.65 KΩ
10 °C	3.60 a 4.00 KΩ
0 °C	5.60 a 6.25 KΩ



POSITION SENSOR OF THE THROTTLE BODIES UNIT (POTENTIOMETER)

Placed on the right end of the small shaft of the throttle bodies unit

The throttle bodies unit position sensor (potentiometer), managed and powered directly by ECM, supplies a signal that identifies the throttle opening position used by the same ECM to determine the fuel dosing and the ignition advance.



- ① Remove:
- **the seat**
See "FRAME 4.130" paragraph.
 - **the tank**
See "FRAME 4.118" paragraph.
 - **the air filter box**
See "ROUTINE INSPECTIONS AND ADJUSTMENTS 3.10" paragraph.
 - **the throttled body**
See "ENGINE 5.154" paragraph.
 - **the two screws** Ⓐ

- ② Check:
- **the resistance**
with the multimeter positioned on symbol Ω between PIN 1 and PIN 3 (the more external PINs).



Resistance
 $4000 \Omega \pm 20 \%$

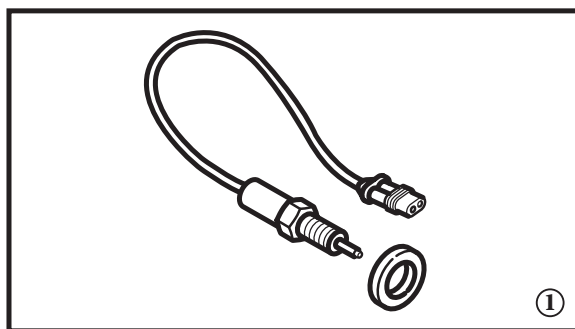
NEUTRAL SWITCH

Located inside the gear change box

The neutral switch indicates when the gear change is in neutral.

Furthermore, the neutral switch supplies a signal relating to the safety device that prevents start-up with the trestle lowered and the gear engaged.

IF a gear is engaged with the trestle lowered, power supply to the ECM is interrupted causing the engine to switch off.



- ① Remove:
 - **the seat**
See "FRAME 4.130" paragraph.
 - **the tank**
See "FRAME 4.118" paragraph.
 - **the shock absorber**
See "FRAME 4.89" paragraph.
 - **the rear wheel**
See paragraph "FRAME 4.16".
 - **the swing arm**
See "FRAME 4.99" paragraph.

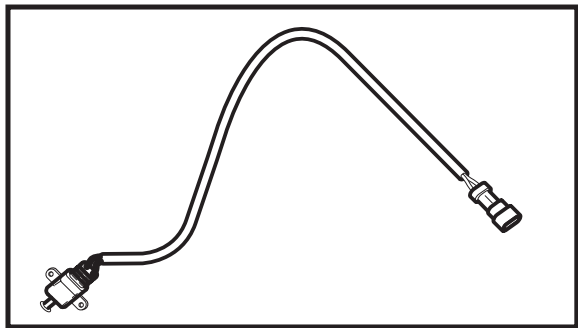
- ② Check:
 - **the continuity**
with the multimeter positioned on symbol  (continuity/diode trial function), position one terminal on the sensor point and the other on the PIN.

		ENGINE MASS
ON (neutral)		
OFF (neutral excluded)		

WARNING

When connecting and disconnecting the gear change switch wire, ensure to place the ignition switch on OFF, to avoid damages to the electronic parts.

In case of no continuity between the wire of the neutral sensor and the mass, replace the component.



SIDE TRESTLE SENSOR

Placed at the top of the side trestle shank

If the side trestle is lowered, the engine will not start until the gear change is placed in neutral or the stand in closed position.

- 2

Disconnect:

 - the connector of the side trestle switch

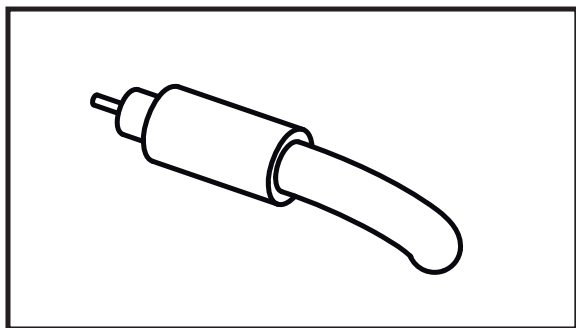
- 3

Measure:

 - the continuity using a multimeter.

STAND	PIN 1	PIN 2
Lifted		
Lowered		

If the above conditions are satisfied, the stand switch functions, otherwise replace the component.



CLUTCH SWITCH

Placed on the clutch lever

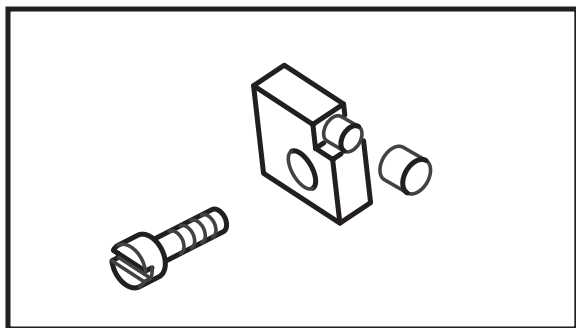
The engine will not start until the lever is pulled up to the handle bar.

- ① Disconnect:
- **the clutch switch cables**

- ② Use:
- **the tester**
- and check on the clutch switch pins the table

CLUTCH	PIN 1	PIN 2
Pulled		
Released		

If the above conditions are satisfied, the clutch switch functions, otherwise replace the component.



FRONT BRAKE SENSOR

Placed on the front brake pump

It is a switch in contact with the brake lever used for switching on the stop lights.

- Disconnect:
 - the contacts of the electric plant on the sensor
 proceed as shown for the control

- Use:
 - the multimeter
 position on the symbol  (continuity/diode trial function), and check the functioning as shown in the table

SENSOR	PIN 1	PIN 2
Pulled Brake Lever		
Brake Lever Released		

If the above conditions are satisfied, the front brake sensor functions, otherwise replace the component.

SPEED SENSOR

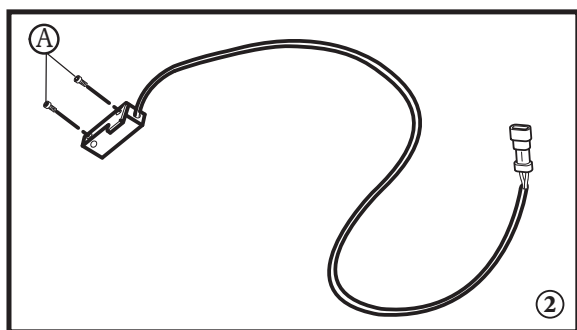
Placed on the rear calliper support

Reads the fixing screws of the rear brake disk.

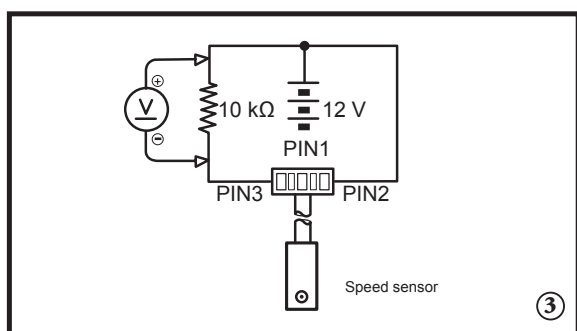
If the speed is not indicated on the dashboard or it does not function correctly, check the speed sensor and the electric connections with reference to the cable paths on the electric layout.

If the sensor and the connection are correct, check the functioning of the speedometer.

- ① Disconnect:
 - **the connector** of the speed sensor wire



- ② Remove:
 - **the two screws** ①
 - **the speed sensor**

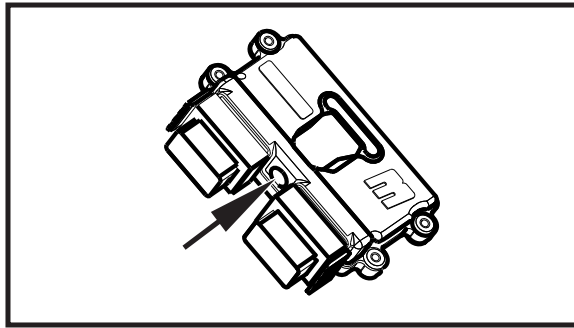


- ③ Connect:
 - **a 12V battery** (between pin1 and pin2)
 - **a 10kΩ resistance** (between pin2 and pin3)
 - **the multimeter** (probe + with pin2 and probe – with pin3) as shown in the figure.

If a screwdriver touching the speed sensor surface is moved when in the above specified conditions, the voltage indicated by the tester changes (0V → 12V or 12V → 0V).

If the voltage indicated by the tester does not change, replace the speed sensor with a new one.

NOTE: The highest voltage indicated by the tester (12V) is the battery voltage.



BAROMETRIC PRESSURE SENSOR

Inside the control unit

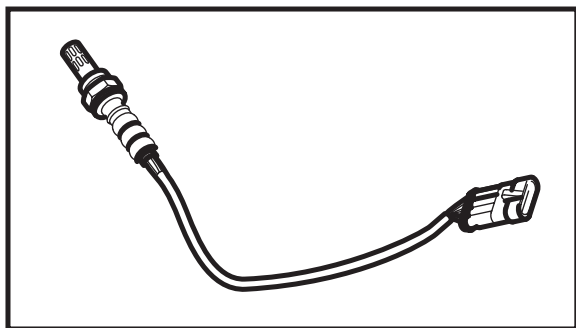
The atmospheric pressure is detected by means of a sensor placed inside the injection module.

This sensor enables the detection of the air density in different environmental conditions (which, for example, the use of the vehicle in areas having different heights).

With this information, the amount of fuel for the injector is calibrated adjusting to the prevailing conditions.

- ① Remove:
 - **the control unit**See "FRAME 4.132" paragraph.

- ② If the sensor detects conflicting barometric pressure references from the real ones, check there is not dust or debris obstructing the air passage hole, otherwise replace the part.



LAMBDA PROBE

Placed on the drain collector near the catalyst

The Lambda probe is able to detect the concentration of oxygen inside the exhaust gas; precisely the lambda value indicating the ratio between air and petrol, where:

- Value 1, when combustion is stoichiometric
- < of 1, when petrol is in excess
- > of 1, when air is in excess

The probe then transmits as electric signal to the control unit that adjusts the inflow of fuel and air inside the combustion chamber.

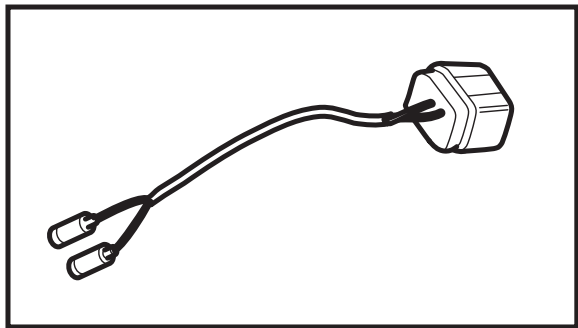
① Check:

• the resistance

with the multimeter positioned on symbol Ω between PIN 1 and PIN 5 (the more external PINs).



Resistance
 $9 \pm 2 \Omega$



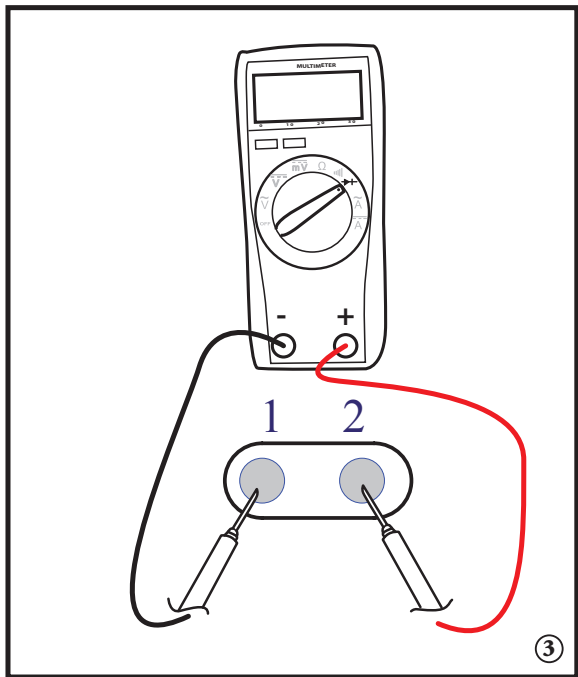
FALL SENSOR

Placed in the centre of the bike in correspondence with the expansion vessel
In case of fall, it interrupts the flow of petrol to the injection system.

- 1

Remove:
• **the seat**
See "FRAME 4.130" paragraph.
• **the tank**
See "FRAME 4.118" paragraph.
• **the air filter box**
See "ROUTINE INSPECTIONS AND ADJUSTMENTS 3.10" paragraph.
- 2

Disconnect:
• **the connector of the fall sensor**

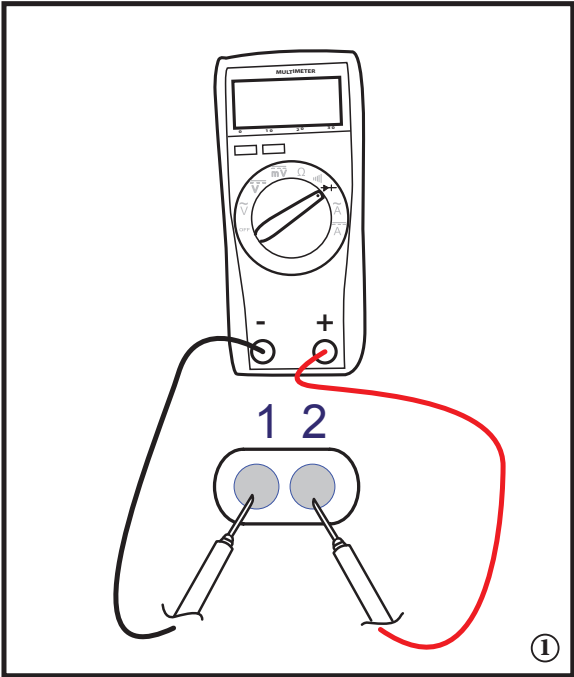
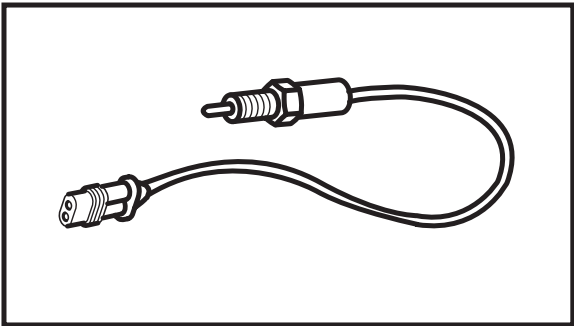


- 3

Check:
• **the continuity**
with the multimeter positioned on PIN 1 and PIN 2 and check the table.

FALL SENSOR	PIN 1	PIN 2
Position Horizontal	●	●
Position Vertical	●	●

If the above conditions are satisfied, the fall sensor functions, otherwise replace the component.



HYDROSTOP

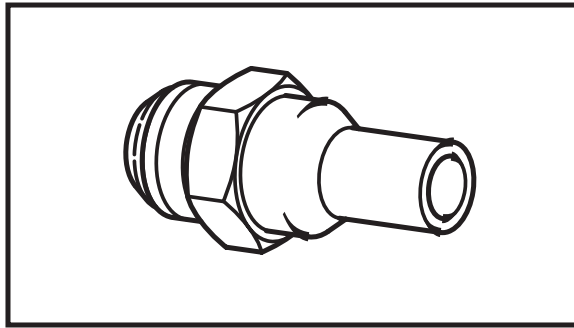
Placed on the rear brake pump

It is a switch that works by reading the oil pressure exercised on the pump.
It is used to switch on the stop lights.

- ① Check:
- **the continuity**
with the multimeter positioned on PIN 1 and PIN 2
and check the table.

BRAKE	PIN 1	PIN 2
Calibrated		
Released		

If the above conditions are satisfied, the hydrostop functions, otherwise replace the component.



OIL PRESSURE SENSOR

Placed on the lower half carter

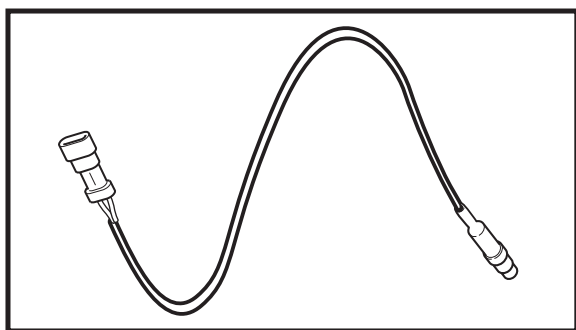
It measures the oil pressure in ball bearing gallery.

- ① Disconnect:
 - **the electric coupling**
- ② Remove:
 - **the oil pressure sensor** from the half-carter
- ② Check:
 - **the continuity** between PIN1 and the sensor mass using an air pressure regulator with inflow on the detection hole.
 - Calibrate the air pressure regulator at 2 bar
 - Progressively lower the pressure until 0.4 - 0.7 bar are reached.



Continuity between PIN1 and mass
0.4 - 0.7 bar

In case of no continuity between PIN1 and engine mass, replace the component.



AMBIENT TEMPERATURE SENSOR

Placed near the equipment

It reads the ambient temperature and sends the value to the equipment.

- ① Remove:
- **the fixed cap**
See "FRAME 4.110" paragraph.
 - **the equipment support**
See "ROUTINE INSPECTIONS AND ADJUSTMENTS 3.89" paragraph.

- ② Disconnect:
- **the ambient temperature probe**

- ③ Check:
- **the continuity**
with the multimeter positioned on PIN 1 and PIN 2 and check the table.

°C	Ω	TOLLERANCE
5	21 K	± 0.5 K
10	19 K	± 0.5 K
25	10 K	± 0.5 K
40	6 K	± 0.5 K

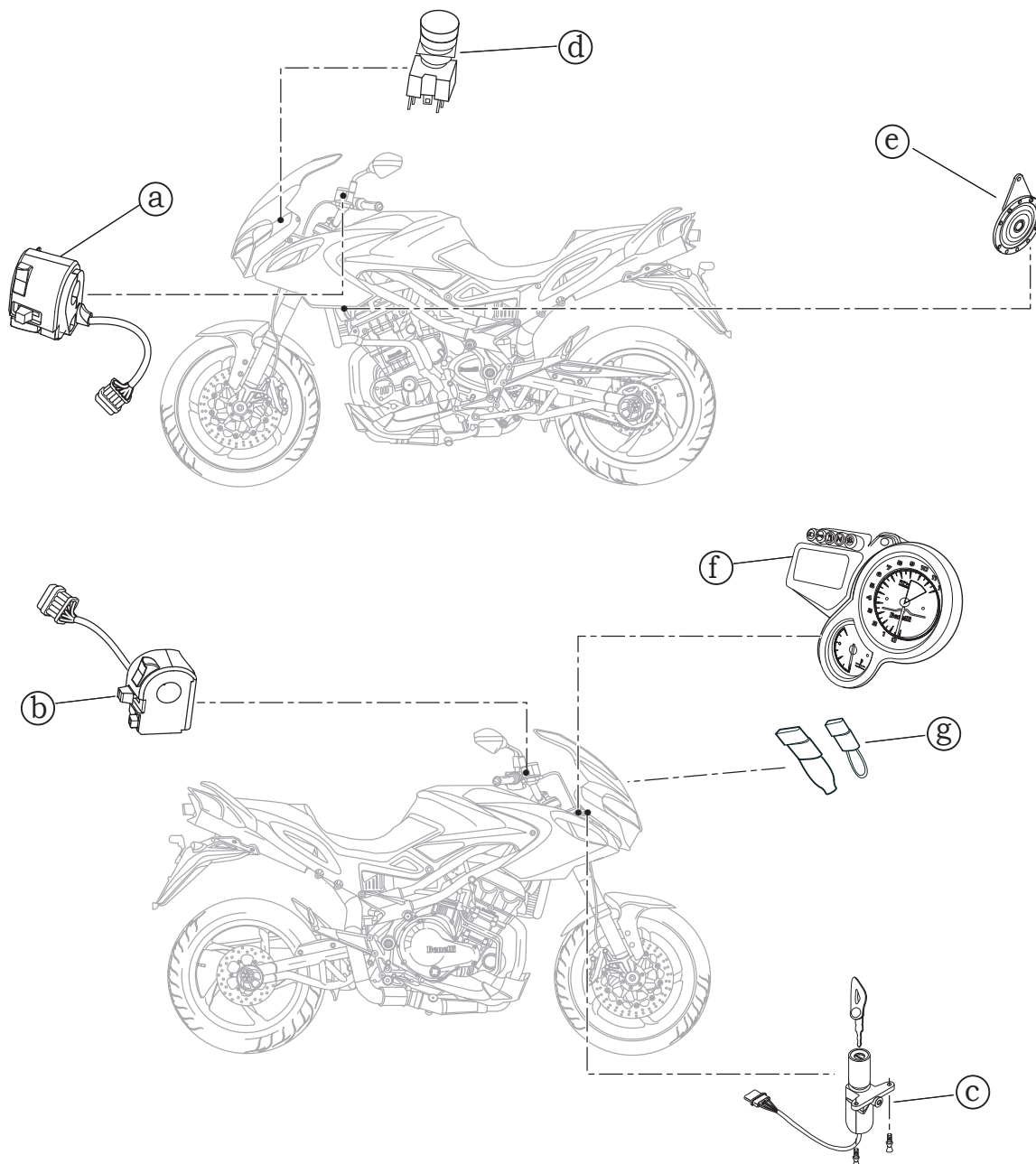
If the above conditions are satisfied, the lambda probe functions, otherwise replace the component.

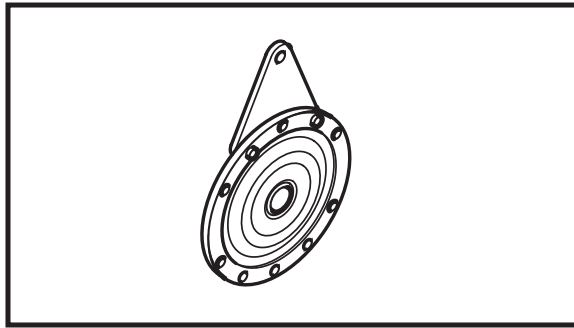
DEVICES POSITION

- (a) Right Electric Device
- (b) Left Electric Device

- (c) Ignition Switch
- (d) Map Button

- (e) Horn
- (f) Equipment
- (g) Diode





SYSTEM DEVICES

HORN

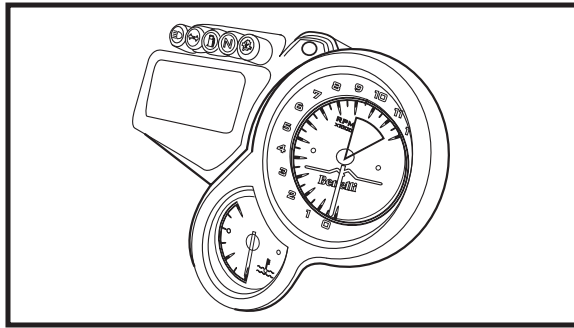
Placed on the right side trellis underneath the right tank fairing

The horn is an electric-mechanic device used as acoustic warning device.

- ① Remove:
 - **the fixing screw on the frame**

- ② Disconnect:
 - **the wires of the acoustic warning device**

- ③ Connect:
 - **PIN1 and PIN2**
to the battery and check functioning.



EQUIPMENT

Placed on the headlight equipment support small frame

The equipment supplies the driver all information regarding the functioning of the bike:

- **indicator luminous warning lights:**

- high beams warning light
- indicators warning light
- fuel reserve warning light
- gear change in neutral warning light
- injection malfunctioning warning light

- **cooling liquid temperature indicator**

It indicates the cooling liquid temperature

- **revs counter**

It indicates the number of engine revolutions per minute

- **alarm LED**

It switches on when the oil pressure value or that of the cooling temperature or that of the battery voltage is incorrect (possibility of more anomalies occurring simultaneously).

In case it switches on check, with reference to the type of alarm communicated (H, O, BAT, OIL) the cause or nature of the relative signalling.

- ① Remove:
 - **the fixed cap**
See "FRAME 4.110" paragraph.
 - **the equipment support**
See "ROUTINE INSPECTIONS AND ADJUSTMENTS 3.89" paragraph.
- ② Disconnect:
 - **the equipment pin**
- ③ Loosen:
 - **the two fixing nuts**
- ④ Take out:
 - **the equipment**

IGNITION SWITCH

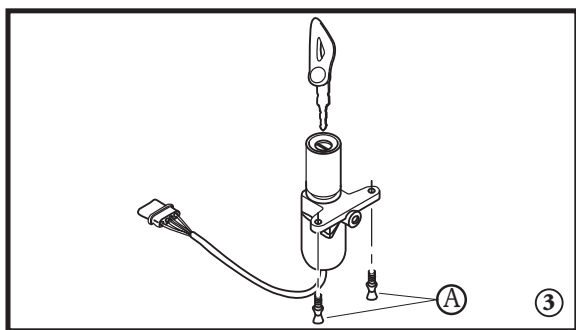
Placed behind the steering tube

The ignition switch is used for:

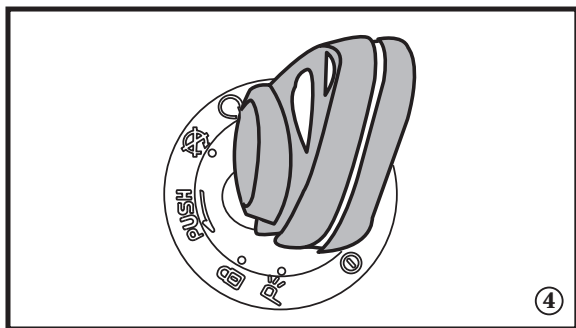
- giving the main contact to the electric plant
- closing the steering lock
- keep the parking lights switched on during all requested conditions

- ① Remove:
 - **the seat**
See "FRAME 4.130" paragraph.
 - **the right and left tank lids**
See "FRAME 4.112" paragraph.
 - **the tank**
See "FRAME 4.118" paragraph.
 - **the steering lock lid**
See "FRAME 4.112" paragraph.
 - **the air filter box**
See "ROUTINE INSPECTIONS AND ADJUSTMENTS 3.10" paragraph.
 - **the conveyor**
See "ROUTINE INSPECTIONS AND ADJUSTMENTS 3.10" paragraph.

- ② Disconnect:
 - **the key lock wiring**



- ③ Remove:
 - **the two fixing pull screws on the trellis** ①



- 4

Check:

 - the continuity

with the multimeter and check the table.

	PIN 1	PIN 2	PIN 3	PIN 4
Key ON				
Key OFF				
Lock				
Parking				

If the above conditions are satisfied, the ignition switch functions, otherwise replace the component.

- Key at "ON" position

All electric circuits are active, the equipment and warning lights carry out the self-diagnosis; the engine can be started.
 The key cannot be removed.

Key at "OFF" position

All electric circuits are deactivated
 The key can be removed.

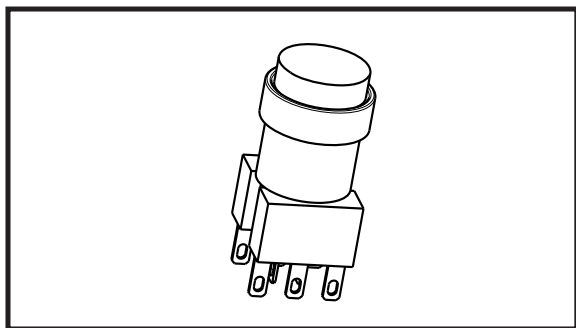
Key at "LOCK" position

All electric circuits are deactivated and the steering wheel is locked.
 The key can be removed.

Key at "PARKING" position

All electric circuits are deactivated except for the parking lights (position lights) and the steering wheel is locked.
 The key can be removed.

NOTE: Do not leave the key in "PARKING" position for a long time in order to avoid discharging the battery of the bike.



MAP BUTTON

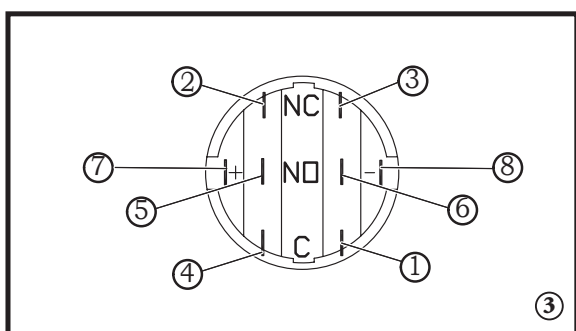
Placed on the dashboard support small frame

The map button is used to change the mapping of the control unit.

- 1) With the button released the map loaded on block 1 (button state 0, contact open) is selected
- 2) With the button pressed the map loaded on block 2 (button state 1, contact closed) is selected

- ① Remove:
- **the cap**
See "FRAME 4.110" paragraph.
 - **the equipment support**
See "ROUTINE INSPECTIONS AND ADJUSTMENTS 3.89" paragraph.

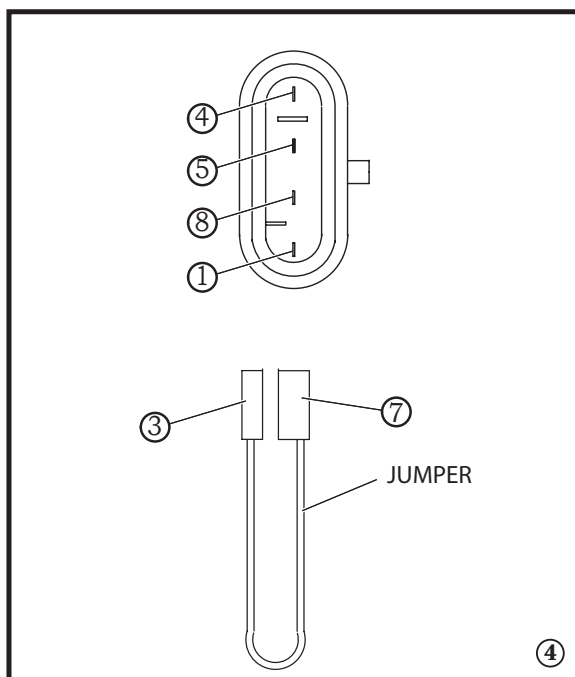
- ② Disconnect:
- **the map button wiring**



- ③ Check:
- **the continuity**
between n. 4 and n. 5
between n. 1 and n. 6
with button pressed

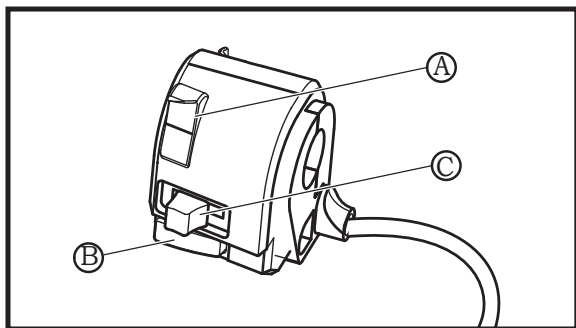
Check:

- **the continuity**
between n. 4 and n. 2
between n. 1 and n. 3
with button released



- ④ Check:
 • **the connections**
 must be reported as shown in the table.

- ① Brown/Red
- ④ Purple/Black
- ⑤ Purple/Green
- ⑧ Black
- ③ Brown/Red
- ⑦ Brown/Red



RIGHT ELECTRIC DEVICE

Placed on the right side of the handle bar

The right electric device is made of:

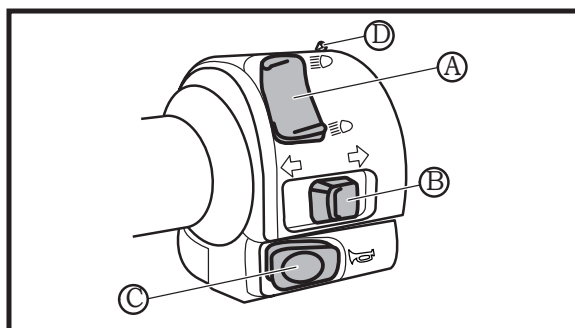
- **RUN/OFF button** Ⓐ
it is used to close the contact of the electric plant in case of an emergency
- **start-up button** Ⓑ
it is used to start the engine
- **emergency lights switch** Ⓒ
it is used to activate the 4 indicators in case of an emergency

- Check:
 - **the continuity**
with the multimeter position on RUN/OFF button placed at ON
- Check:
 - **the continuity**
with the multimeter positioned on the start-up button at ON
- Check:
 - **the continuity**
with the multimeter positioned on the emergency lights switch at ON

Check the table.

	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6
Emergency lights switch	●	—	—	●		
Run/Off Button			●	—	—	●
Start-up Button		●	—	—	●	

If the above conditions are satisfied, the emergency lights switch, the Run/Off button and the start-up button function, otherwise replace the components.



LEFT ELECTRIC DEVICE

Placed on the left side of the handle bar

The left electric device is made of:

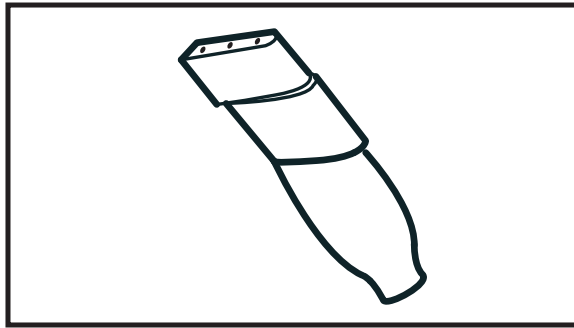
- **lights switch command** **A**
high beam/dipped beam shunting switch
- **indicators command** **B**
by moving the command to the left or to the right, the relative indicators will be activated.
The command returns to the centre; press to deactivate the indicators
- **acoustic warning device button** **C**
press to activate the acoustic warning device.
- **high beams flash button** **D**
used to signal ones presence in conditions of scarce visibility

- Check:
 - **the continuity**
with the multimeter positioned on the relative terminals with the horn button pressed.
- Check:
 - **the continuity**
with the multimeter positioned on the relative terminals with the flash button pressed.
- Check:
 - **the continuity**
with the multimeter positioned on the relative terminals with reference to the selection (right/left).
- Check:
 - **the continuity**
with the multimeter positioned on the relative terminals with reference to the selection (high beam/dipped beam).

Check the table.

	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7	PIN 8	PIN 9	PIN 10
Acoustic Warning Device		●	—	—	—	●				
High Beam Light				●	—	●				
Dipped Beam Light			●	—	—	●				
Flash Button High Beams				●	—	—	●			
Right indicator								●	—	●
Left Indicator									●	—

If the above conditions are satisfied, the acoustic warning device, the lights switch command, the high beams flash button function, otherwise replace the components.

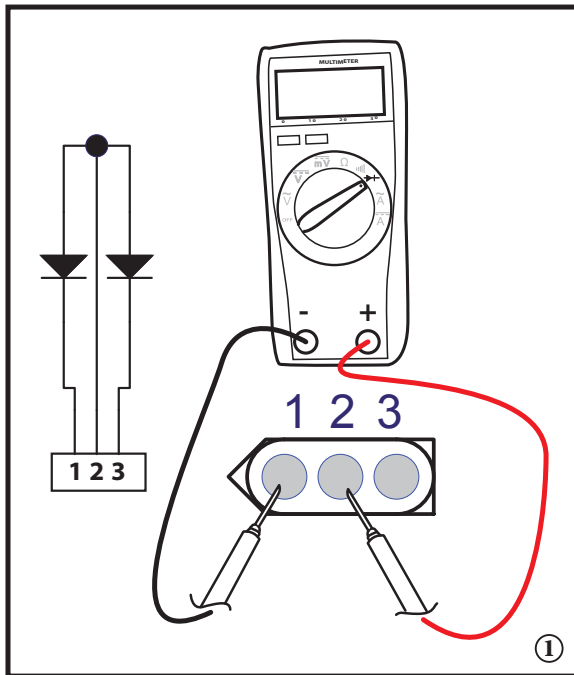


DIODE MODULES

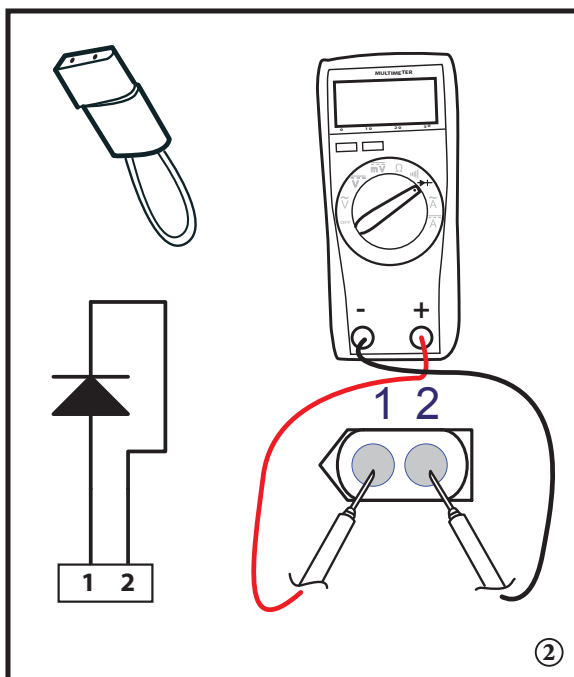
Placed underneath the on board equipment

INDICATORS DIODE MODULE

The device can be identified by the number of insertions present on the relative connector (3 PIN).



- ① Check:
- **the continuity**
with the multimeter positioned on symbol $\rightarrow|$ (continuity/diode trial function), with terminal + (positive) on PIN2 and with terminal - (negative) on PIN1 and then on PIN3.



NEUTRAL SENSOR DIODE MODULE

The device can be identified by the number of insertions present on the relative connector (2 PIN).

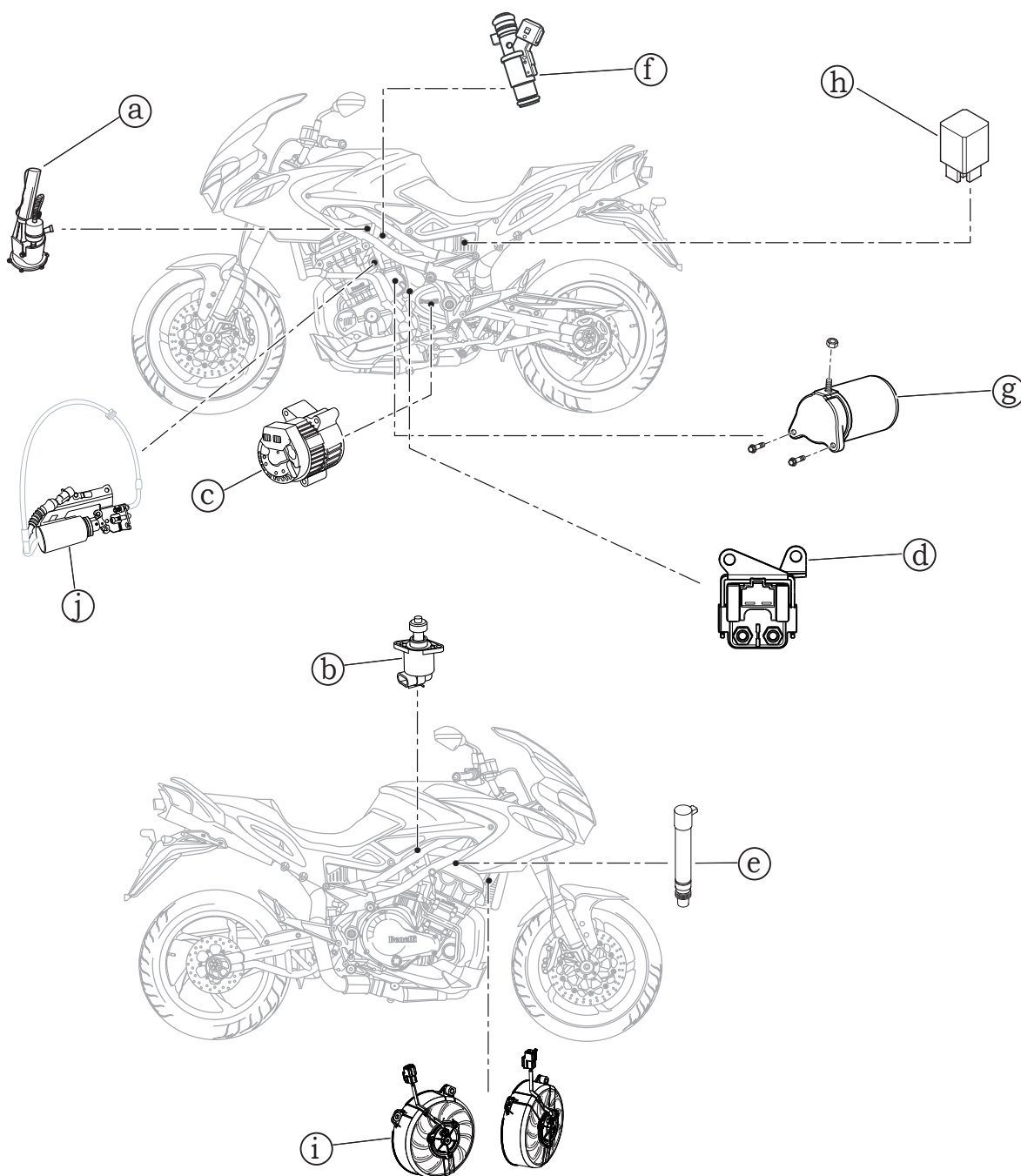
- ② Check:
- **the continuity**
with the multimeter positioned on symbol $\rightarrow|$ (continuity/diode trial function), with terminal + (positive) on PIN1 and with terminal - (negative) on PIN2.

ACTUATORS POSITION

- (a) Fuel Pump
- (b) Stepper
- (c) Alternator
- (d) Remote Control Switch

- (e) Ignition Reels
- (f) Injectors
- (g) Start-up Motor

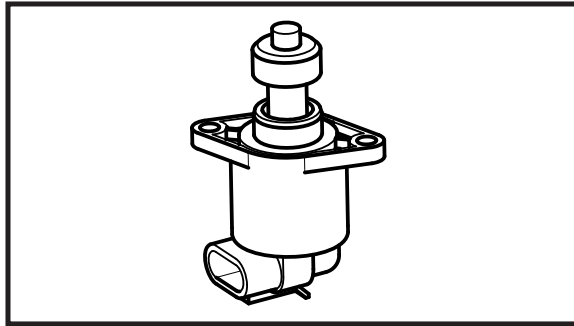
- (h) Injection Relay
- (i) Cooling Vent
- (j) Solenoid





SYSTEM ACTIVATING ACTUATORS

In reply to the signal received by the sensors, the ECM adjusts a series of electronic and electric-mechanic actuators.
The function and position of the actuators is shown below.



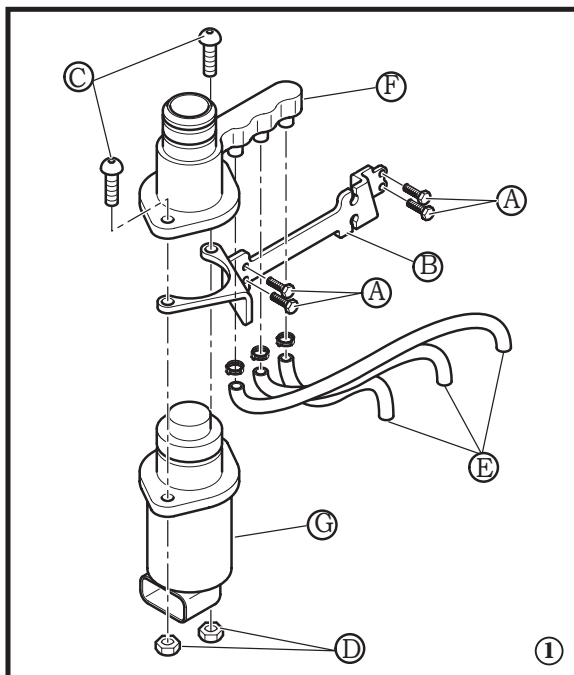
AIR AT MINIMUM CONTROL SYSTEM (STEPPER)

Located inside the air filter box

The system includes a valve for controlling the air passage underneath the throttles of the throttled body and equipped with a step-by-step engine (stepper). The system controls the following parameters:

- **Functioning at minimum**
- **Air supply in case of engine overrevving.**
- **Correction of the air/fuel ratio working at minimum speeds at heights above sea level.**
- **Correction of the air/fuel ratio in cold and hot start-ups.**

When the step-by-step engine (stepper) is activated, it more or less opens the air passage control valve and allows a certain flow of air along a series of tubes in the throttle bodies unit.



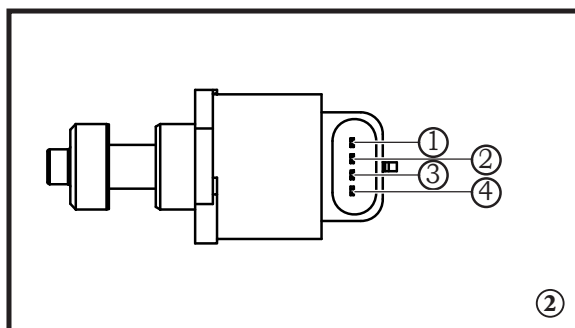
- ① Remove:
- **the seat**
See "FRAME 4.130" paragraph.
 - **the right and left tank lids**
See paragraph "FRAME 4.112".
 - **the tank**
See paragraph "FRAME 4.118"
 - **the air filter box**
See "ROUTINE INSPECTIONS AND ADJUSTMENTS 3.10" paragraph.
 - **the 4 plate screws** ①
 - **the plate** ②
 - **the 2 screws** ③
 - **the two nuts** ④

Disconnect:

- **the 3 air tubes** ⑤

Remove:

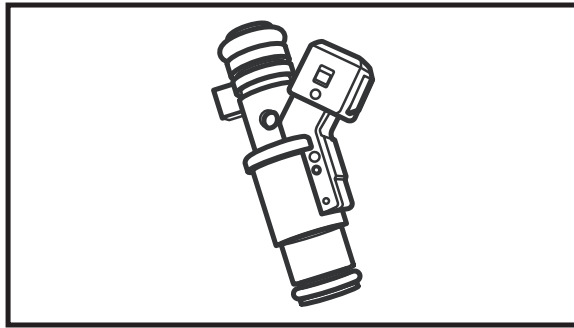
- **the distributor** ⑥
- **the stepper** ⑦



- ② Check:
- **the resistance**
- with the multimeter positioned on symbol Ω between PIN1 and PIN4 and then between PIN2 and PIN3



Resistance
 $50 \pm 5 \Omega$



INJECTORS

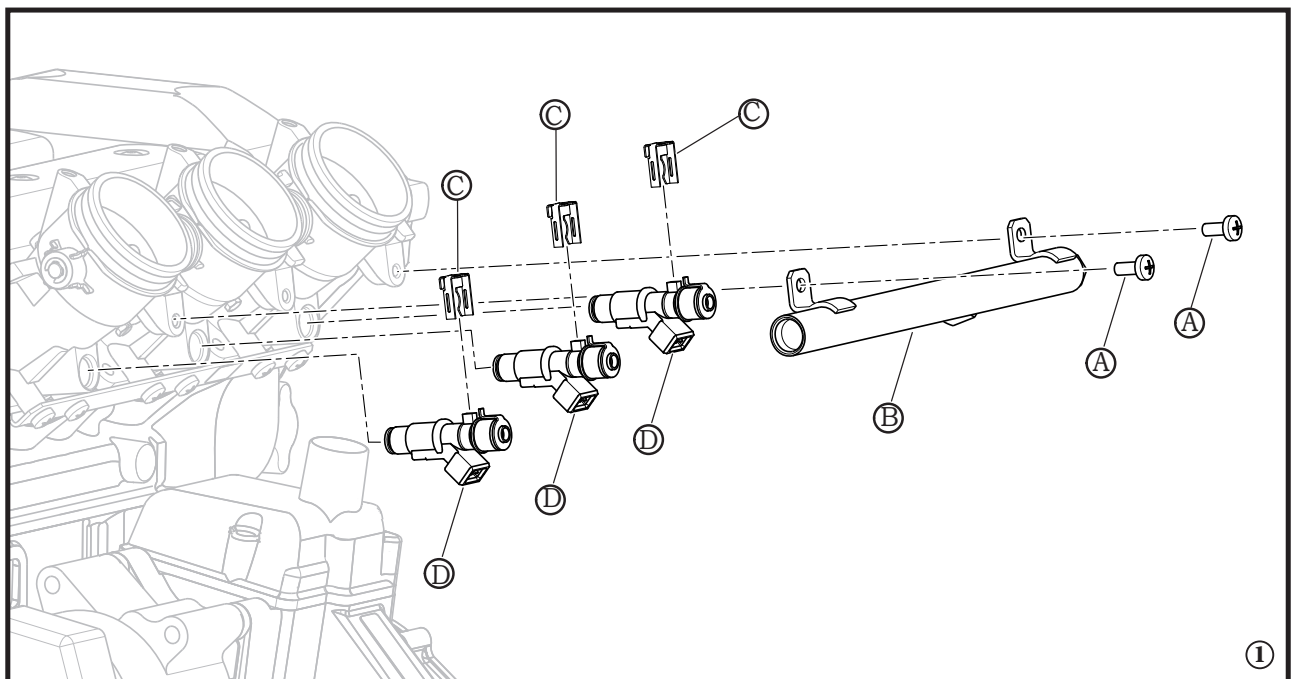
Positioned on the throttle bodies unit

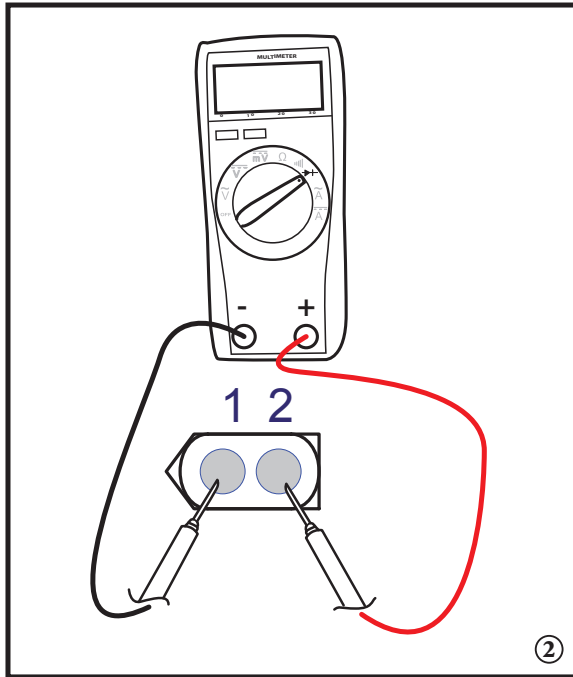
The engine is equipped with three quadruple jet injectors.

The jet quantity of the injectors is constant, but the opening duration of every injector is variable.

The duration of each injection is calculated by the ECM according to the data received by the various system sensors.

- ① Remove:
- **the seat**
See "FRAME 4.130" paragraph.
 - **the right and left tank lids**
See "FRAME 4.112" paragraph.
 - **the tank**
See "FRAME 4.118" paragraph.
 - **the air filter box**
See "ROUTINE INSPECTIONS AND ADJUSTMENTS 3.10" paragraph.
 - **the 2 flute screws** ①
 - **the flute** ②
 - **the injectors retainer clips** ③
 - **the injectors** ④

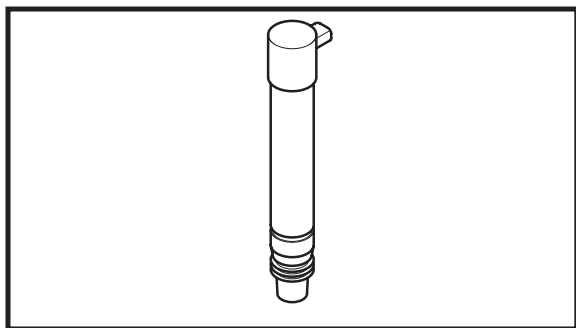




- ② Check:
- **the resistance**
with the multimeter positioned on symbol Ω
between PIN1 and PIN2



Resistance
 $12 \pm 2 \Omega$



IGNITION REELS

Placed directly on the head of every spark plug

The ignition reel gives the necessary high voltage and ignition energy to produce high voltage sparks between the ignition spark plug electrodes.

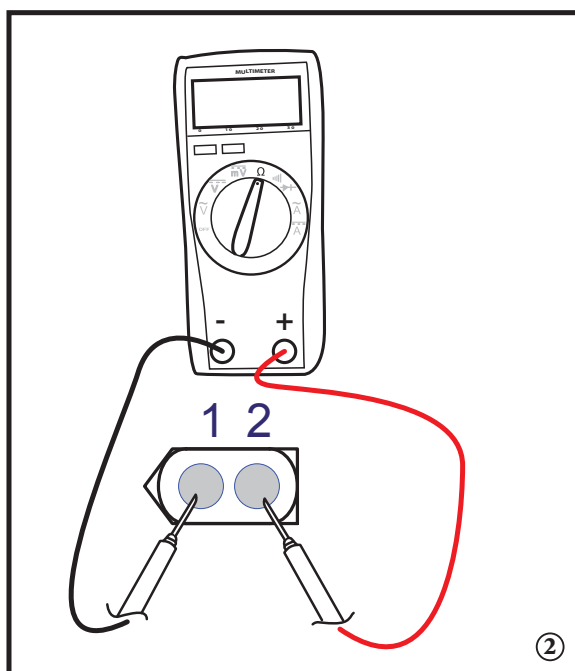
The ECM, through the reading of the various system sensors, determines the relative ignition and advance times.

There are 2 types of reels:

SAGEM: the connector is inside the head

BERU: the connector is wired.

- ① Remove:
 - **the seat**
See "FRAME 4.130" paragraph.
 - **the right and left tank lids**
See "FRAME 4.112" paragraph.
 - **the tank**
See "FRAME 4.118" paragraph.
 - **the air filter box**
See "ROUTINE INSPECTIONS AND ADJUSTMENTS 3.10" paragraph.
 - **the conveyor**
See "ROUTINE INSPECTIONS AND ADJUSTMENTS 3.10" paragraph.
 - **the reels**
See "ROUTINE INSPECTIONS AND ADJUSTMENTS 3.6" paragraph.

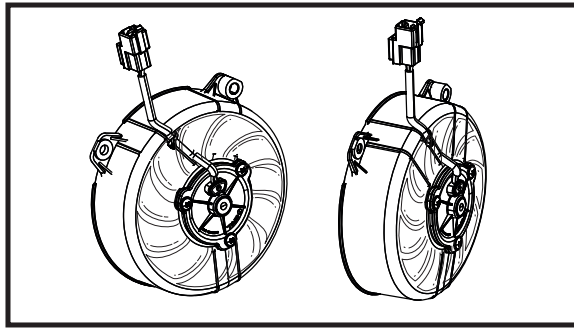


- ② Check:
 - **the resistance**
with the multimeter positioned on symbol Ω between PIN1 and PIN2



Resistance
 $0.6 \pm 0.1 \Omega$

This check is valid for both types of reels.



COOLING VENTS

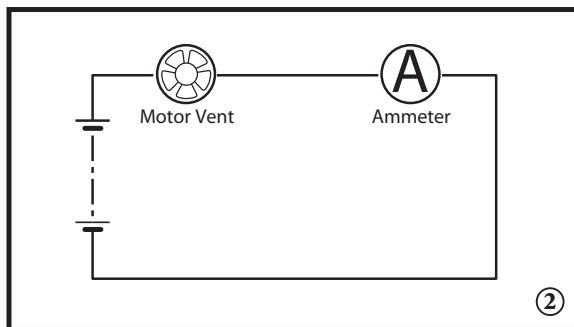
Placed on the radiator body

The ECM activates and deactivates the cooling vents according to a signal received from the cooling liquid temperature sensor.

When the cooling liquid temperature reaches the upper threshold temperature, the cooling vents activate by means of a command from the ECM.

When the cooling liquid temperature drops sufficiently, lower threshold temperature, the cooling vents deactivate by means of a command from the ECM.

- ① Remove:
 - **the coupler** of the cooling vent wire.



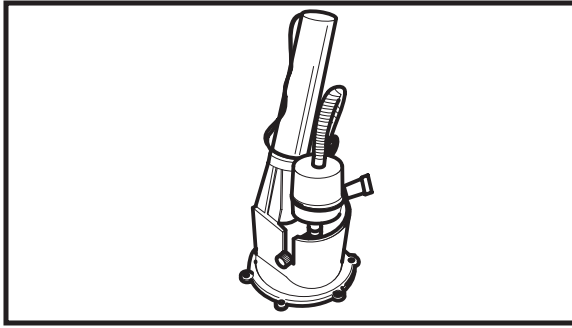
- ② Check:
 - **the charge current of the vent motor** with an ammeter connected as shown in the figure.

The voltmeter is used to check that the battery powers the motor at 12 volt.

When the vent turns at full speed, the ammeter must show no more than 5 amp.

If the motor does not turn, replace the vent motor unit with a new one.

NOTE: It is not necessary to remove the cooling vent from the radiator to carry out the above trial.



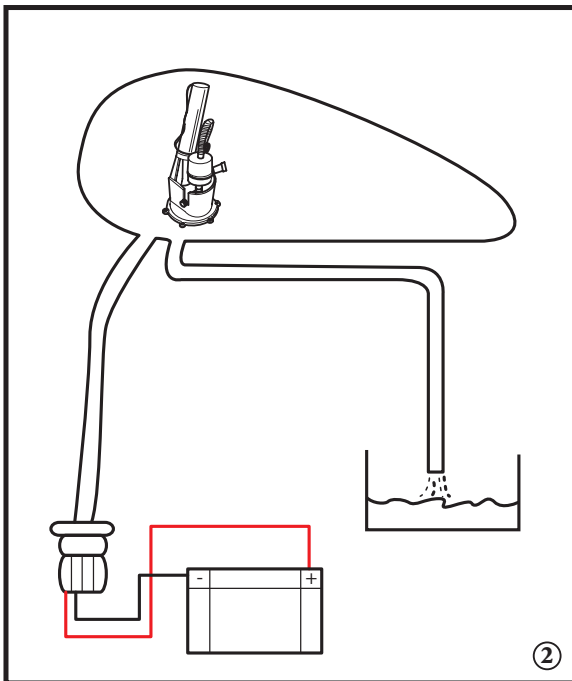
FUEL PUMP

Placed inside the fuel tank

The electric pump distributes the fuel inside the supply circuit, by means of a pressure regulator, at a constant pressure of 3.5 bar.

The ECM directly manages the functioning of the pump guaranteeing, from the first activation of the board with a timed function, the correct fuel pressure necessary for engine start-up and with a continuous functioning for the subsequent normal use of the vehicle.

- ① Remove:
 - **the seat**
See "FRAME 4.130" paragraph.
 - **the right and left tank lids**
See "FRAME 4.112" paragraph.
 - **the tank**
See "FRAME 4.118" paragraph.



- ② Check:
 - **the fuel pump**
 - Ⓐ Place the outlet tube inside a container to drain the petrol.
 - Ⓑ Connect the battery (12 V) to the petrol pump.
PIN1 positive cable +
PIN2 negative cable -
- ③ Check:
 - **the resistance**
with the multimeter positioned on symbol Ω between PIN3 and PIN4

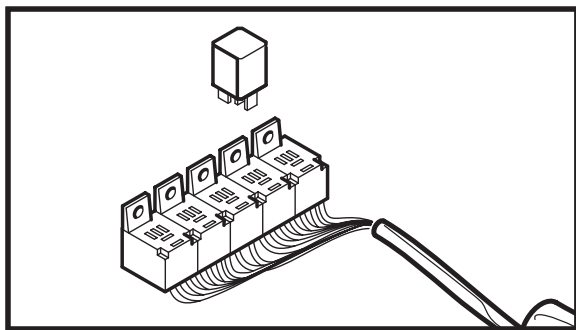


Resistance with full tank
 $12 \pm 2 \Omega$



Resistance with empty tank
 $285 \pm 2 \Omega$

- Ⓒ If the above conditions are satisfied, the fuel pump functions, otherwise replace the part.



SERVICES RELAY UNIT

Placed inside the object compartment below the vehicle seat

The relay unit is managed by the ECM to drive every load in an optimum manner like:

- **the lighting system**

The ECM ensures that all lights switch on in certain conditions, also allowing an energy saving when in discharged battery condition.

- **the fuel pump**

The fuel pump is activated only when the start-up motor starts to make the engine rev.

- **the electric fans**

- **the injection**

The ECM autonomously manages the excitement of the injection relay according to the relative conditions which ignition, switch off and relative use of the vehicle; through this management, it is possible to guarantee a stable power supply to the ECM allowing it to carry out the correct memorising and setting of the parameters procedures during the stop phases, continuing to self-power for a few seconds after board switch off.

- **the services**

All "under lock and key" devices like the dashboard, the various safety devices and the lighting system, are connected to the services relay.

- ① Remove:
 - **the seat**See "FRAME 4.130" paragraph.

- ② Check:
 - **the resistance**with the multitester positioned on symbol Ω between PIN1 and PIN2

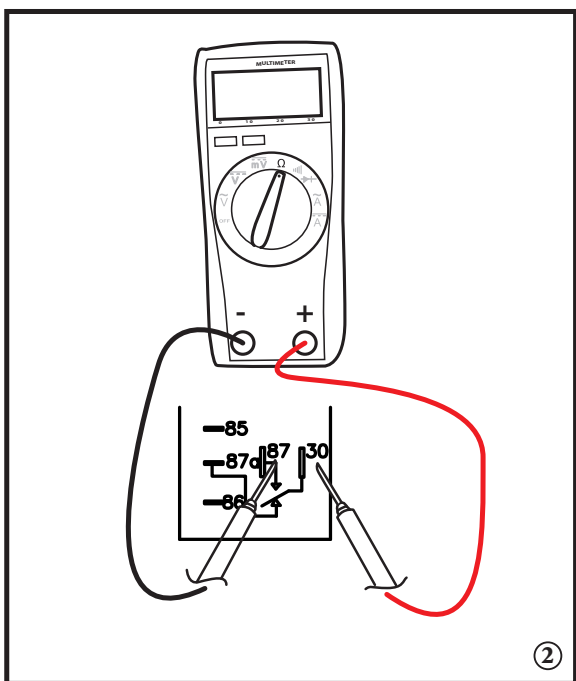
	Resistance $12 \pm 2 \ \Omega$
---	--

- ③ Use:
 - **the tester**and check on the pins of the relay the table powering PIN 85 and PIN 86 from the battery

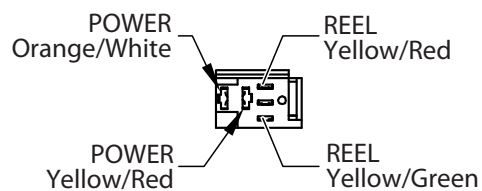
RELAY	PIN 87	PIN 30	PIN 87A
Powered by the battery			
Not powered by the battery			

If the above conditions are satisfied, the relay function, otherwise replace the components.

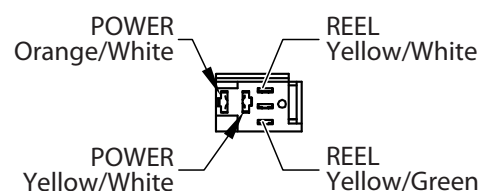
NOTE: _____
This procedure must be applied to all the above relay. _____



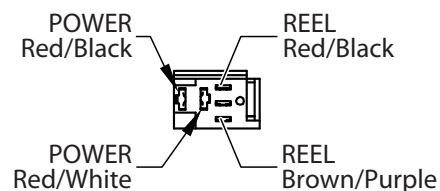
DIPPED BEAMS RELAY



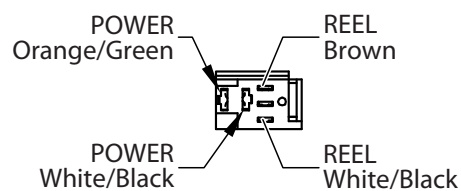
HIGH BEAMS RELAY



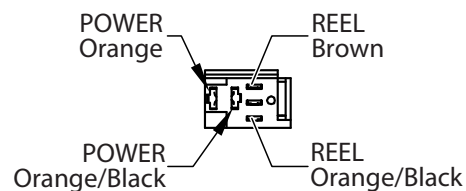
INJECTION RELAY

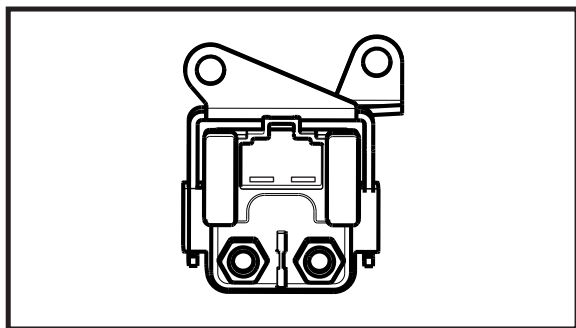


ELECTRIC FANS RELAY



PETROL PUMP RELAY





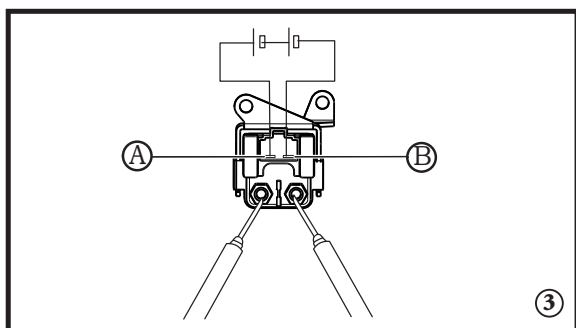
REMOTE CONTROL SWITCH

Placed on the left side of the bike near the pinion carter

The remote control switch closes the power contact on the start-up motor.

- ① Remove:
- **the alternator lid**
- See "FRAME 4.120" paragraph.

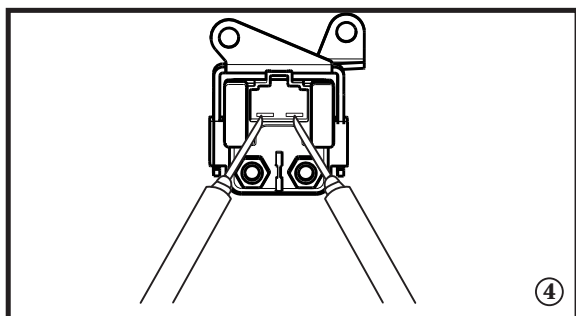
- ② Disconnect:
- **the battery cable** ⊖
 - **the start-up motor cable**
 - **the battery cable**
 - **the start-up relay connector**
- Remove:
- **the start-up relay**



- ③ Apply:
- **12 volt to the terminals A and B**
- Check:
- **the continuity**
- between the power terminals as shown in the figure. If there is continuity, the start-up relay is in good conditions.

WARNING

Do not apply the battery voltage to the start-up relay for more than 5 seconds as it may overheat suffering damages to the winding.

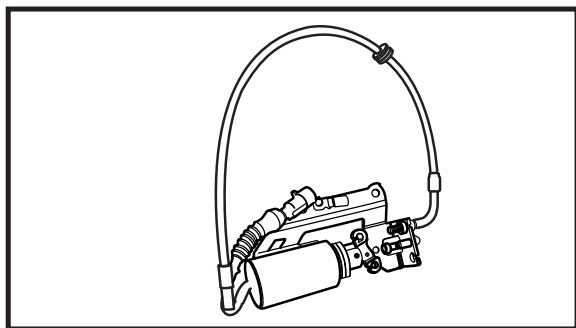


- ④ Check:
- **the winding**
- if it is "open" or "at mass" and if there is resistance. The winding is in good conditions if the resistance is:



Start-up relay resistance

3 - 6 Ω

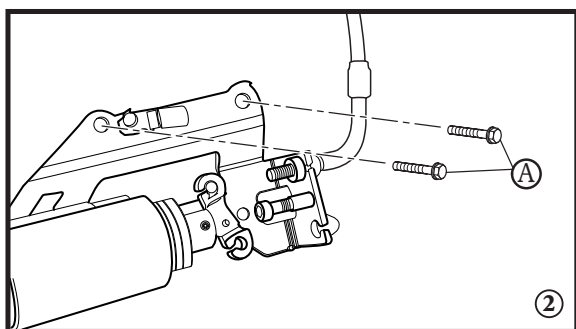


SOLENOID

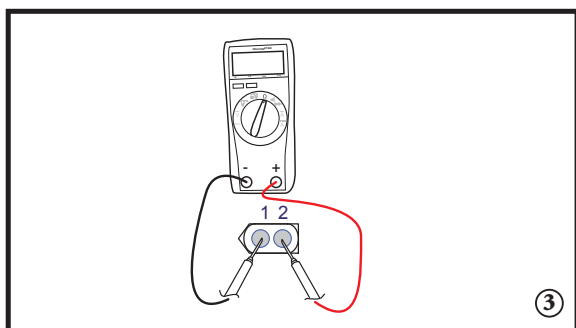
Placed on left side underneath the injectors flange

The opening and closing is managed through the ECM to improve the torque/power supply in different use conditions of the vehicle.

- ① Remove:
 - **the seat**
See "FRAME 4.130" paragraph.
 - **the right and left tank lids**
See "FRAME 4.112" paragraph.
 - **the tank**
See "FRAME 4.118" paragraph.
 - **the air filter box**
See "ROUTINE INSPECTIONS AND ADJUSTMENTS 3.10" paragraph.

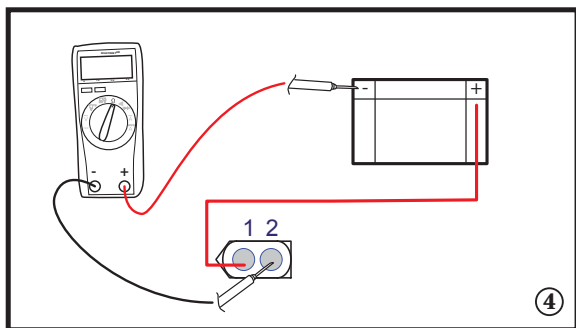


- ② Disconnect:
 - **the cable connected to the drain valve**
 Remove:
 - **the two screws A**



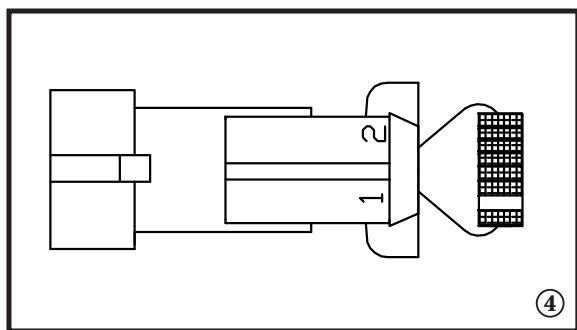
- ③ Measure:
 - **the reel impedance**
with the multimeter positioned on symbol Ω between PIN1 PIN 2 as shown in the figure.

	Reel resistance $3 - 6 \Omega$
---	--



- ④ Measure:
 - **the current absorbed by the solenoid**
using the multimeter

	Absorbed Current $8.7 \pm 1 A$
---	--

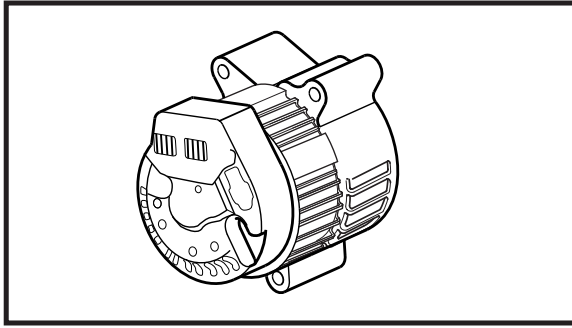


- ④ Check:
- **the diode**
Check that it is correctly positioned as shown in the figure.

Even if only one control results negative, replace the part.

ATTENTION

At every inspection of the solenoid device, check the integrity of the contacts and the functioning of the diode.

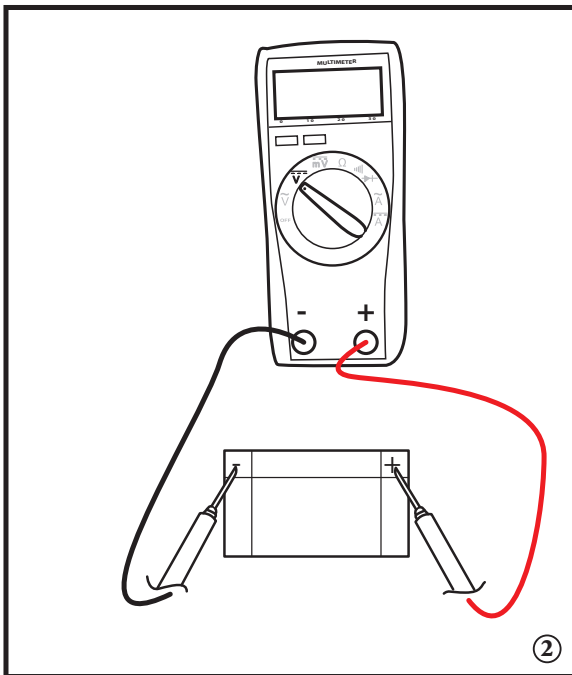


ALTERNATOR

Placed on the left side of the vehicle

It allows the balancing of the electric consumptions through the recharging of the battery.

- ① Switch on:
- **the bike**



- ② Measure:
- **the voltage**
with the multimeter positioned on symbol $\overline{V}$ at the ends of the battery



With bike switched off

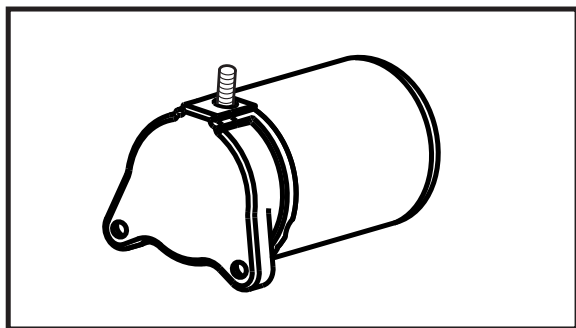
$12.7 \pm 0.5 \text{ V}$



With bike revving up at 3.000 rpm

$13.5 \pm 0.5 \text{ V}$

If the above conditions are satisfied, the alternator functions, otherwise replace the component.



START-UP MOTOR

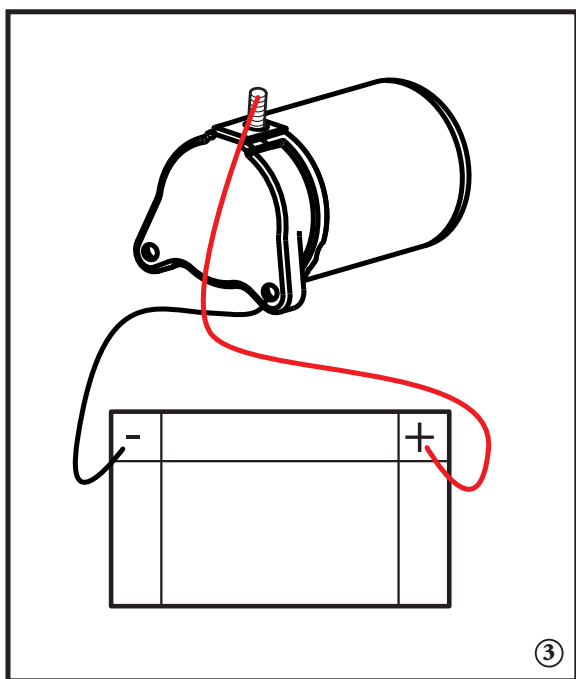
Placed on the left side of the vehicle

It is used to start the bike.

- ① If the motor does not start, check:
- **the right electric block**
See paragraph "7.25".
 - **the clutch switch**
See paragraph "7.9".

If the motor still does not start, carry out the following check:

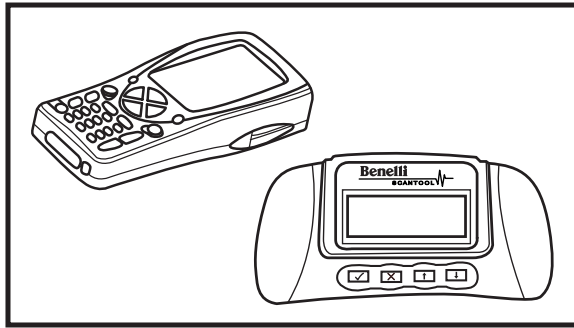
- ② Remove:
- **the start-up motor**
See "ENGINE 5.125" paragraph.



- ③ Lock:
- **the start-up motor**
in a vice.

Carry out:

- **the connections**
as shown in the figure and check the correct functioning.



SYSTEM DIAGNOSTICS IGNITION AND INJECTION

There are two special tools for the injection and ignition system diagnosis.

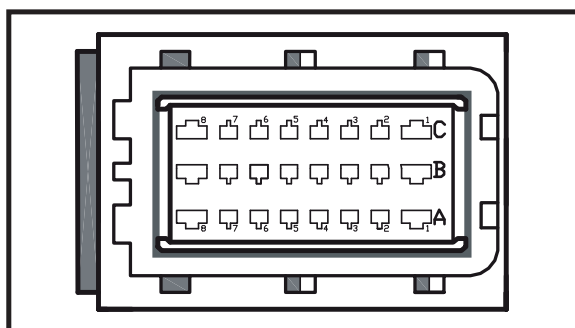
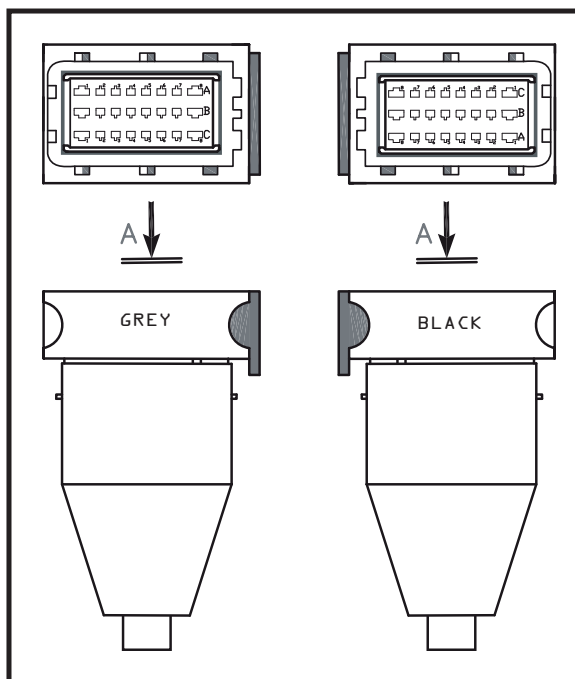
there are two special tools.

(Code R180197036000) AXONE

(Code R300082003000) BENDIA

A Diagnostic software, able to identify the faults present or that have occurred on the bike, is included in the special equipment.

This Software has a guide manual for using the same program, in order to perform the control on every individual system component.



NUMBERING OF CONNECTORS ECM

The diagram at the side shows the sequence of the two ECM connectors.

These pin numbers correspond directly to the pin numbers supplied during the diagnostics procedures and to the layout drawing of the wiring used in this manual.

Each connector has 24 pins arranged on three rows numbered A, B, and C and on eight columns as shown at the side.

The first column is called 1 and the eighth column 8.

The position of each ECM connector is described through this manual, through the identification of connector 1 (black) or 2 (grey), followed by the row number and the column number where it is situated. In the example at the side, pin 6/B is shown by the intersection of the lines.



ADDITIONAL DIAGNOSIS

The following tables, if used correctly, will help identify the fault in the system, once the diagnostics problem code has been stored.

NOTE

1) **Black Connector**

2) **Grey Connector**

INJECTORS -WALBRO ECU 1

FAULT CODE	POSSIBLE CAUSE	PRECAUTION
P1201/02/03	The flooding indicates short circuit Open or short circuit - injectors 2/1/3	Ensure that the injectors' relative connectors are inserted correctly. Disconnect the ECM and proceed with the location 1 test.

NOTE

1) **ECU Black Connector**

2) **ECU Grey Connector**

LOCATION TEST

TEST	RESULT	PRECAUTION
1) Check the integrity of the terminal and the cable: - pin ECM 1/BI - pin ECM 1/CI - pin ECM 1/B2	Ok	Proceed with test 2
	Faulty	Repair the fault, proceed with test 6
2) Check the value of the safety relay white/red resistance: - pin 1/RO/BI of ECM to pin 1/C1 of ECM (injector 2) - pin 1/RO/BI of ECM to pin 1/B1 of ECM (injector 1) - pin 1/RO/BI of ECM to pin 2/B8 of ECM (injector 3)	from 15.5 to 16.3	Disconnect the relative injector and proceed with test 3
	Open circuit	Proceed with test 4
	Short circuit	Disconnect the relative injector and proceed with test 3
3) Check if the cable is in short circuit: - pin 1/BI of ECM to the mass - pin 1/CI of ECM to the mass - pin 2/B8 of ECM to the mass	Ok	Proceed with test 7
	Short circuit	Locate and repair the wiring fault, proceed with test 7
4) Check the continuity of the cable: - pin 1/AB of ECM to injection relay - pin 1/BI of ECM to pin 2 of connector (injector 2) - pin 1/CI of ECM to pin 2 of connector (injector 1) - pin 2/B8 of ECM to pin 2 of connector (injector 3)	Ok	Proceed with test 6
	Open circuit	Locate and repair the wiring fault, proceed with test 7

TEST	RESULT	PRECAUTION
5) Check the continuity of the cable for short circuit: - pin 1/RO/BI of ECM to pin 1/B1 of ECM (injector 1) - pin 1/RO/BI of ECM to pin 1/C1 of ECM (injector 2) - pin 1/RO/BI of ECM to pin 2/B8 of ECM (injector 3)	Ok	Proceed with test 6
	Short circuit	Locate and repair the cables fault, proceed with test 7
6) Check the resistance of the relative injector: - between pin 1 and pin 2	from 15.5 to 16.3	Proceed with test 7
	Faulty	Replace the relative injector and proceed with test 7
7) Connect the wiring, reset the fault code and activate the engine to check the fault has been eliminated.	Ok	Activity Performed - end the test
	The fault remains	Contact Benelli after-sales assistance

POSITION SENSOR OF THE THROTTLE BODIES UNIT (POTENTIOMETER) - WALBRO ECU 1

FAULT CODE	POSSIBLE CAUSE	PRECAUTION
P0122	Low sensor input voltage	Check and take note of the sensor data of the diagnostics tool (see Axone or Bendia instruction manual)
P0123	High sensor input voltage	Ensure that the sensor connector is inserted correctly. Disconnect the ECM and proceed with the location 1 test.

LOCATION TEST

TEST	RESULT	PRECAUTION
1) Check the integrity of the terminal and the cable: - pin ECM 1/B5 - pin ECM 1/B7 - pin ECM 1/B3	Ok	Disconnect the sensor and proceed with test 2
	Faulty	Repair the fault, proceed with test 5
2) Check if the cable is in short circuit: - pin 1/B7 of ECM to the mass	Ok	Proceed with test 3
	Short circuit	Locate and repair the wiring fault, proceed with test 5
3) Check the continuity of the cable: - pin 1/B3 of ECM to pin 3 of sensor - pin 1/B7 of ECM to pin 2 of sensor - pin 1/B5 of ECM to pin 1 of sensor	Ok	Proceed with test 4
	Open circuit	Locate and repair the wiring fault, proceed with test 5
4) Check if the cable is in short circuit: - pin 1/B7 of ECM to pin 1/B5 of ECM - pin 1/B7 of ECM to pin 1/B3 of ECM	Ok	Replace the position sensor of the throttle bodies unit, proceed with test 5
	Short circuit	Locate and repair the wiring fault and proceed with test 5
5) Connect the wiring, reset the fault code and activate the engine to check the fault has been eliminated.	Ok	Activity Performed - end the test
	The fault remains	Contact Benelli after-sales assistance

IGNITION REEL - WALBRO ECU 1

FAULT CODE	POSSIBLE CAUSE	PRECAUTION
P1351/52/53	Open or short circuit - 2/1/3 ignition reel	Ensure that the connector of the relative ignition reels is inserted correctly. Disconnect the ECM and proceed with the location 1 test.

LOCATION TEST

TEST	RESULT	PRECAUTION
1) Check the integrity of the terminal and the cable: - pin ECM 1/A8 (BOB1) - pin ECM 1/B8 (BOB2) - pin ECM 1/A1 (BOB3)	Ok	Proceed with test 2
	Faulty	Repair the fault, proceed with test 7
2) Check the value of the safety relay white/red resistance: pin 1/RO/BI of ECM at: - pin 1/B8 of ECM (ignition reel 2) - pin 1/A8 of ECM (ignition reel 1) - pin 2/A1 of ECM (ignition reel 3)	0.8 Ω	Disconnect the relative reel and proceed with test 3
	Open circuit	Proceed with test 4
	Short circuit	Disconnect the relative reel and proceed with test 5
3) Check the cable for short circuit: - pin 1/B8 of ECM to the mass - pin 1/A8 of ECM to the mass - pin 2/A1 of ECM to the mass	Ok	Proceed with test 7
	Short circuit	Locate and repair the cables fault, proceed with test 7
4) Check the continuity of cable P1/RO/BI with each pin 2 of the ignition reels: Power pin 8 of the lock relay with each pin of the ignition reels. - pin 1/B8 of ECM to pin 1 of ignition reel 2 - pin 1/A8 of ECM to pin 1 of ignition reel 1 - pin 2/A1 of ECM to pin 1 of ignition reel 3	Ok	Proceed with test 6
	Open circuit	Locate and repair the cables fault, proceed with test 7
5) Check the cable for short circuit RO/BI from safety relay with: Power pin 8 of lock relay at: - pin 1/B8 of ECM (ignition reel 2) - pin 1/A8 of ECM (ignition reel 1) - pin 2/a1 of ECM (ignition reel 3)	Ok	Proceed with test 6
	Short circuit	Locate and repair the cables fault, proceed with test 7
6) Check the resistance of the relative ignition reel: - pin 1 of ignition reel to pin 2 of ignition reel	0.8 Ω	Proceed with test 7
	Faulty	Replace the relative ignition reel, proceed with test 7
7) Connect the wiring, reset the fault code and activate the engine to check the fault has been eliminated.	Ok	Activity Performed - end the test
	The fault remains	Contact Benelli after-sales assistance

COOLING LIQUID TEMPERATURE SENSOR -WALBRO ECU 1

FAULT CODE	POSSIBLE CAUSE	PRECAUTION
P0118	C.C. engine temperature sensor	Ensure that the connector is inserted correctly. Disconnect the ECM and proceed with the location 1 test Disconnect the sensor and proceed with the location 1 test.
P0119	C.A. engine temperature sensor	Proceed with location test 1

LOCATION TEST

TEST	RESULT	PRECAUTION
1) Check the integrity of the terminal and the cable: - pin ECM 1/B2 - pin ECM 1/C6	Ok	Proceed with test 2
	Faulty	Repair the fault, proceed with test 7
2) Check the resistance value - pin 1/B2 of ECM to pin 1/E4 of ECM (dependant on temperature, see below)	Ok	Disconnect the temperature sensor and proceed to 6
	Open circuit	Proceed with test 3
	Short circuit	Disconnect the temperature sensor and proceed to 4
3) Check the continuity of the cable: - pin 1/C6 of ECM to pin 2 of sensor - pin 1/B2 of ECM to pin 1 of sensor	Ok	Proceed with test 5
	Open circuit	Locate and repair the wiring fault, proceed with test 7
4) Check the wiring for short circuit - pin 1/C6 to pin 1/B2 of ECM	Ok	Proceed with test 5
	Short circuit	Locate and repair the cables fault and proceed with test 7
5) Check the cable for short circuit - pin 1/C6 to mass	Ok	Proceed with test 7
	Short circuit	Locate and restore the wiring fault, proceed with test 7
6) Connect the wiring, reset the fault code and activate the engine to check the fault has been eliminated.	Ok	Activity Performed - end the test
	The fault remains	Contact Benelli after-sales assistance

AIR TEMPERATURE SENSOR -WALBRO ECU 1

FAULT CODE	POSSIBLE CAUSE	PRECAUTION
P1502	Open or short circuit to positive (+) pole battery	Check and take note of the display data of the diagnostics tool (see Axone instruction manual) if available. Check and take note of the sensor data of the diagnostics tool (see Bendia instruction manual). Ensure that the sensor connector is inserted correctly. Disconnect the ECM and proceed with the location 1 test.
P1501	Short circuit to mass	Disconnect the sensor and proceed with the location test

LOCATION TEST

TEST	RESULT	PRECAUTION
1) Check the integrity of the terminal and the cable: - pin ECM 1/B2 - pin ECM 1/E5	Ok	Proceed with test 2
	Faulty	Repair the fault, proceed with test 7
2) Check the resistance value - pin 1/B2 of ECM to pin 1/C5 of ECM (dependant on temperature, see below)	Ok	Disconnect the temperature sensor and proceed to test 6
	Open circuit	Proceed with test 3
	Short circuit	Disconnect the temperature sensor and proceed to test 4
3) Check the continuity of the cable: - pin 1/C5 of ECM to pin 2 of sensor - pin 1/B2 of ECM to pin 1 of sensor	Ok	Proceed with test 5
	Open circuit	Locate and repair the wiring fault, proceed with test 7
4) Check the wiring for short circuit - pin 1/E5 to pin 1/B2 of ECM	Ok	Proceed with test 5
	Short circuit	Locate and repair the cables fault and proceed with test 7
5) Check the resistance of the sensor: - pin 1 of sensor at pin 2 of sensor (dependant on temperature, see below)	Ok	Proceed with test 7
	Faulty	Replace the temperature sensor and proceed to test 7
6) Check the cable for short circuit - pin 1/C5 of ECM to the mass	Ok	Proceed with test 7
	Short circuit	Locate and restore the wiring fault, proceed with test 7
7) Connect the wiring, reset the fault code and activate the engine to check the fault has been eliminated.	Ok	Activity Performed - end the test
	The fault remains	Contact Benelli after-sales assistance

FUEL PUMP -WALBRO ECU 1

FAULT CODE	POSSIBLE CAUSE	PRECAUTION
P1231	Open or short circuit to the mass	Check if the pump activates briefly when ignition is activated. Ensure that the pump connector is inserted correctly. Disconnect the ECM and proceed with the location 1 test.
P1232	Short circuit to positive (+) pole battery	Disconnect the fuel pump and proceed with the location 4 test.

LOCATION TEST

TEST	RESULT	PRECAUTION
1) Check the integrity of the terminal and the cable: - pin ECM 2/A2	Ok	Disconnect the fuel pump and proceed with test 2.
	Faulty	Repair the fault, proceed with test 5
2) Check the cable for short circuit - pin 2/A2 of ECM to the mass	Ok	Proceed with test 3
	Short circuit	Locate and repair the wiring fault, proceed with test 5
3) Check the continuity of the cable: blue/green from petrol pump relay: - pin 1/H1 to pin 2 of fuel pump - pin 1 of fuel pump + 12 vDC with ignition key in position on	Ok	Proceed with test 4
	Open circuit	Locate and repair the cables fault, proceed with test 5
4) Check the cable for short circuit RO/BI safety relay: - pin 2/A2 of ECM to pin 2/E1 of ECM	Ok	Proceed with test 5
	Short circuit	Locate and repair the cables fault, proceed with test 5
5) Connect the wiring, reset the fault code and activate the engine to check the fault has been eliminated.	Ok	Activity Performed - end the test
	The fault remains	Contact Benelli after-sales assistance

NOTE

Another possible cause of the malfunctioning of the TPS/AIR TEMPERATURE/H₂O TEMPERATURE sensors may be the absence of 5 Vdc power supply.

Check as follows:

Disconnect AIR TEMPERATURE/H O TEMPERATURE/TPS according to the anomaly encountered and check by turning the board and using the volthmmeter that:

- on pin 2 of AIR TEMPERATURE connector (or on Pin 1/C5 of ECU) there is a voltage of between 4.5 ~ 5.5 Vdc
- on pin 2 of ENGINE TEMPERATURE (or on pin 1/C6 of ECU)
- on pin 1 of TPS command (or on pin 1/B5 of ECU)_____

SENSOR POWER SUPPLY VOLTAGE -WALBRO ECU 1

FAULT CODE	POSSIBLE CAUSE	PRECAUTION
P0562	Faulty battery/alternator - low voltage	Check and take note of the sensor data of the diagnostics tool (see Axone or Bendia instruction manual). Ensure that the voltage through the battery is acceptable, take note of the voltage. Disconnect the ECM and proceed with the location 1 test.
P0563	Faulty alternator - high voltage	Ensure that the output voltage of the alternator is acceptable, take note of the voltage.

NOTE

- 1) Using a volthmmeter ensure that the battery is charged
- 2) Check that there are 12 Vdc on the brown cable (alternator) once the board is switched on.
- 3) Start the bike and go to 3.500 rpm and, using a volthmmeter, then connecting the battery, check the voltage is between 13.5/ 14.5 Vdc

BAD FUNCTIONING OF THE ENGINE DIAGNOSIS WARNING LIGHT LAMP (MIL) -WALBRO ECU 1

FAULT CODE	POSSIBLE CAUSE	PRECAUTION
P1601	Open or short circuit to the mass	Ensure that the warning light lamp connector is correctly inserted and that the bulb is operational. Replace if faulty. Disconnect the ECM and proceed with the location 1 test.
P1602	Short circuit to positive (+) pole battery	Disconnect the warning light lamp and proceed with test 4.

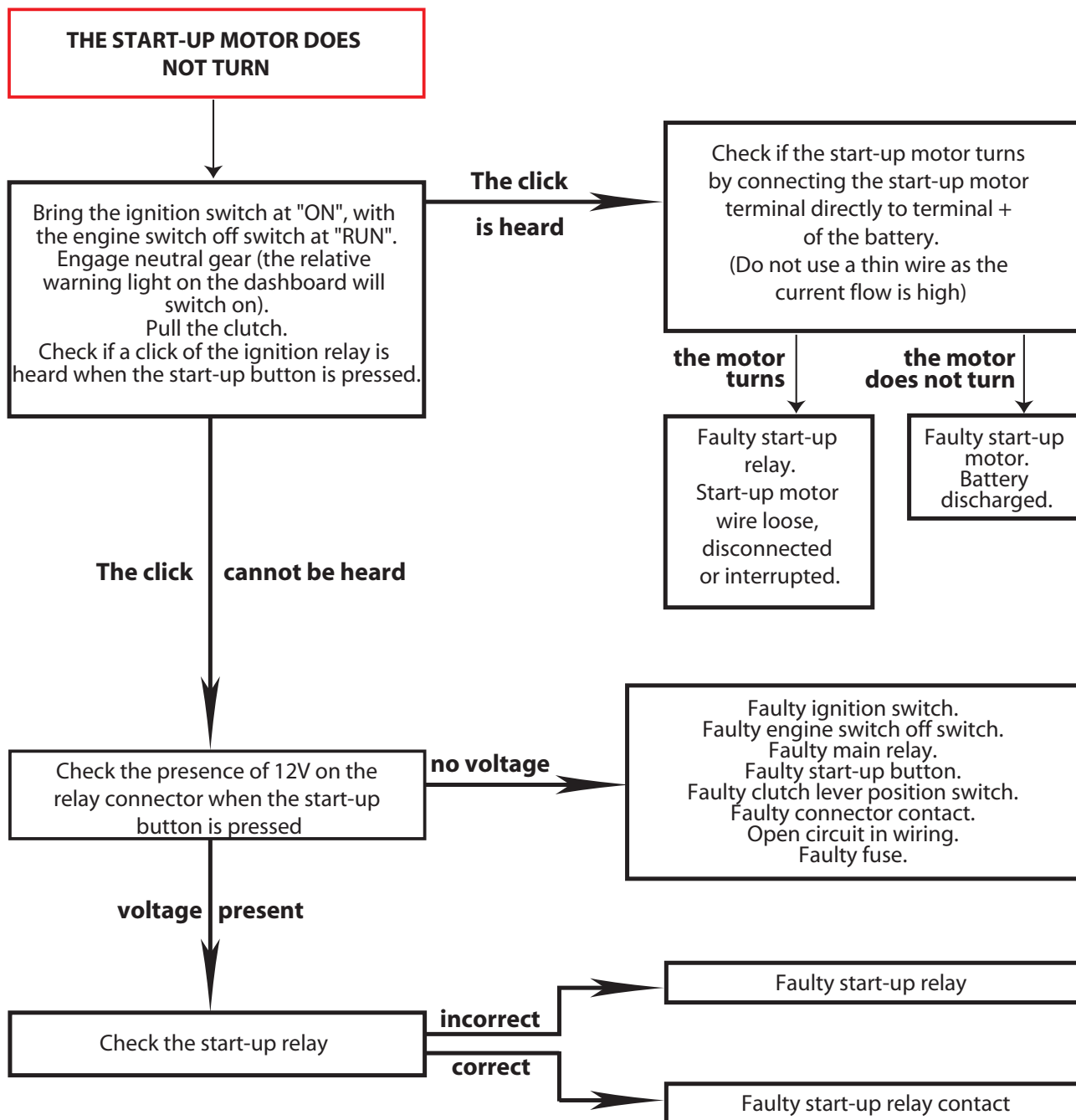
COOLING VENT -WALBRO ECU 1

FAULT CODE	POSSIBLE CAUSE	PRECAUTION
P1552	Open or short circuit to the mass	Check and take note of the sensor data of the diagnostics tool (see Axone or Bendia instruction manual). Ensure that the vent connector is inserted correctly. Disconnect the ECM and proceed with the location 1 test.
P1553	Short circuit to positive (+) pole battery	Disconnect the vent and proceed with test 4.

LOCATION TEST

TEST	RESULT	PRECAUTION
1) Check the integrity of the terminal and the cable: - pin ECM 2/A4	Ok	Disconnect the vent and proceed with test 2
	Faulty	Repair the fault, proceed with test 5
2) Check the cable for short circuit - pin 2/A4 of ECM to the mass	Ok	Proceed with test 3
	Short circuit	Locate and repair the wiring fault, proceed with test 5
3) Check the continuity of the cable: - Vent cable with electric fans of ECM	Ok	Proceed with test 4
	Open circuit	Locate and repair the cables fault, proceed with test 5
4) Check the cable for short circuit: - pin 2/A4 of ECM to pin 1/RO/BI injection relay of ECM	Ok	Proceed with test 5
	Short circuit	Locate and repair the cables fault, proceed with test 5
5) Connect the wiring, reset the fault code and activate the engine to check the fault has been eliminated.	Ok	Activity Performed - end the test
	The fault remains	Contact Benelli after-sales assistance

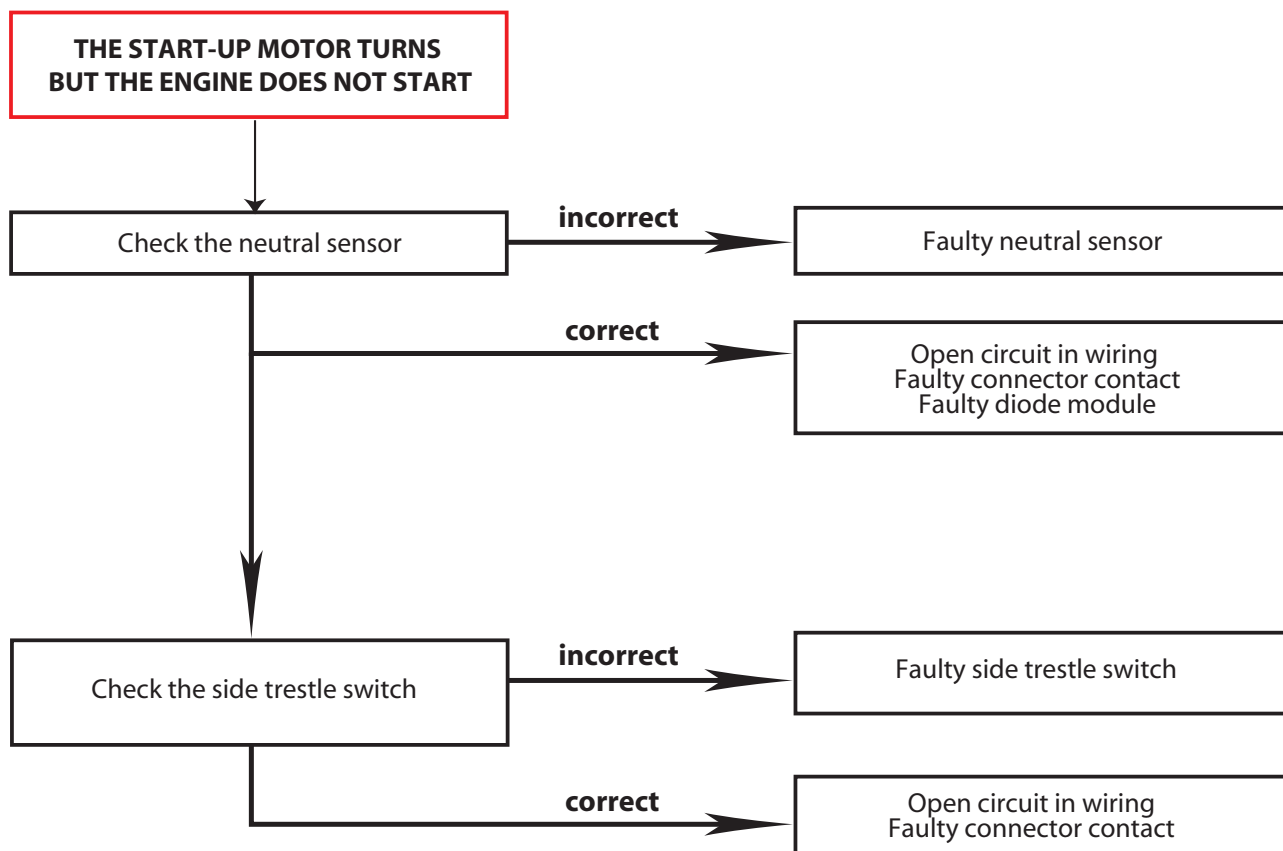
START-UP SYSTEM DIAGNOSTICS



NOTE

The safety conditions upon bike start-up are managed by the ECU (control unit) as described below:

- with gear engaged and trestle stand lowered, the start-up motor turns but it does not start the engine.
- with neutral gear engaged and trestle stand lowered, the start-up motor turns and starts the engine.





ELECTRIC PART

COMPONENT	ANOMALY	INTERVENTION
GEAR SYSTEM Battery warning light on	- Faulty alternator - Faulty alternator connection - Faulty battery	Replace Check Replace
MAIN No function	- Fuse 30A - Burnt remote control switch - Oxidised battery connections	Replace Replace Deoxidise/Restore
POWER SUPPLY PLANT Services 12V No function enabled	- Faulty key switch - Faulty key switch connection - Faulty main relay - Faulty main relay connection	Replace Deoxidise/Restore Replace Deoxidise/Restore
ELECTRIC START-UP Start-up motor does not work	- Burnt bike fuse 10A - Faulty bike fuse 10A connection - Faulty clutch switch - Faulty start-up motor - Faulty start-up button - Faulty right electric block connection - Faulty start-up remote control switch - Faulty power cables connections	Replace Deoxidise/Restore Replace Replace Replace Deoxidise/Restore Replace Deoxidise/Restore
COOLING PLANT Electric fans do not work	- Burnt electric fans fuse - Faulty electric fans fuse connection - Faulty ECU - H₂O Bulb - Faulty H₂O bulb connection - Faulty electric fan	Replace Deoxidise/Restore Replace Replace Deoxidise/Restore Deoxidise/Restore
INDICATORS/LIGHTS PLANT Front/rear position lights do not work	- Burnt lights fuse - Faulty lights fuse connection - Faulty key switch - Faulty key switch connection - Burnt lamps - Faulty lamps connections - Faulty lights switch - Faulty lights switch connection	Replace Deoxidise/Restore Replace Deoxidise/Restore Replace Deoxidise/Restore Replace Deoxidise/Restore
HIGH BEAMS/DIPPED BEAMS LIGHTS INDICATORS Front/rear position lights do not work	- Burnt lights fuse - Faulty lights fuse connection - Faulty key switch - Faulty key switch connection - Burnt lamps - Faulty lamps connections - Faulty lights switch - Faulty lights switch connection	Replace Deoxidise/Restore Replace Deoxidise/Restore Replace Deoxidise/Restore Replace Deoxidise/Restore
High beams/dipped beams lights do not work	- Burnt lights fuse - Faulty lights fuse connection - Burnt lamps - Faulty lamps connections - Faulty lights switch - Faulty lights switch connection - Faulty high beam + dipped beam lights relay - Faulty high beam dipped beam lights relay connection	Replace Deoxidise/Restore Replace Deoxidise/Restore Replace Deoxidise/Restore Replace Deoxidise/Restore
Rear stop light does not work	- Burnt 10A fuse - Faulty 10A fuse connection - Burnt lamp - Faulty lamps connections - Faulty front brake lever switch - Faulty front brake lever switch connection - Faulty rear brake lever switch - Rear brake lever switch connection	Replace Deoxidise/Restore Replace Deoxidise/Restore Replace Deoxidise/Restore Replace Deoxidise/Restore
Rear stop light remains on	- Blocked front brake lever switch - Blocked rear brake lever switch	Replace/Repair Replace/Repair



COMPONENT	ANOMALY	INTERVENTION
Acoustic warning device does not work	• Burnt bike fuse 10A • Faulty bike fuse 10A connection • Faulty warning device • Faulty switch • Faulty acoustic warning device connection • Faulty switch connection	Replace Deoxidise/Restore Replace Replace Deoxidise/Restore Deoxidise/Restore
Indicators do not work	• Burnt bike fuse 10A • Faulty bike fuse 10A connection • Faulty intermittence • Faulty intermittence connection • Burnt lamps • Faulty lamps connections • Faulty indicators switch • Faulty indicators switch connection	Replace Deoxidise/Restore Replace Deoxidise/Restore Replace Deoxidise/Restore Replace Deoxidise/Restore
Indicator remains on	• The lamp of the other indicator, same side, is burnt • the connection of the other indicator is faulty	Replace Deoxidise/Restore
DASHBOARD PLANT		
Dashboard does not light up	• Burnt 2A fuse • Faulty 2A fuse connections • Faulty dashboard • Faulty dashboard connection	Replace Deoxidise/Restore Replace Deoxidise/Restore
Dashboard does not work	• Burnt 2A fuse • Faulty 2A fuse connections	Replace Deoxidise/Restore
Speedometer does not work	• Faulty speed sensor • Faulty speed sensor connection • Burnt 10A fuse • Faulty 10A fuse connection • Faulty dashboard • Faulty dashboard connection	Replace Deoxidise/Restore Replace Deoxidise/Restore Replace Deoxidise/Restore
Oil warning light does not light up	• Faulty oil pressure sensor • Faulty oil pressure sensor connection • Faulty dashboard • Faulty dashboard connection • Burnt warning light	Replace Deoxidise/Restore Replace Deoxidise/Restore Replace dashboard
Neutral warning light does not light up	• Faulty neutral sensor • Faulty neutral sensor connection • Burnt warning light	Replace Deoxidise/Restore Replace dashboard
Battery state warning light on	• Faulty alternator connection • Faulty dashboard • Faulty dashboard connection • Faulty battery • Faulty alternator	Deoxidise/Restore Replace Deoxidise/Restore Replace Replace
Fuel reserve warning light does not light up	• Faulty fuel level sensor • Faulty fuel level sensor connection • Faulty dashboard • Faulty dashboard connection • Burnt warning light	Replace Deoxidise/Restore Replace Deoxidise/Restore Replace dashboard
Indicators warning light does not light up	• Faulty intermittence • Faulty intermittence connection • Faulty dashboard • Faulty dashboard connection • Burnt warning light	Replace Deoxidise/Restore Replace Deoxidise/Restore Replace dashboard
Position lights warning light does not light up	• Faulty dashboard • Faulty dashboard connection	Replace Deoxidise/Restore
Head lights warning light does not light up	• Faulty dashboard • Faulty dashboard connection • Burnt warning light	Replace Deoxidise/Restore Replace dashboard



COMPONENT	ANOMALY	INTERVENTION
INJECTION H ₂ O temperature indicator does not work Throttled body potentiometer Air temperature sensor signals error	• H₂O Bulb • Burnt 10A fuse • Faulty 10A fuse connection • Faulty dashboard • Faulty dashboard connection • Faulty ECU connection • Faulty potentiometer • Faulty potentiometer connection • Faulty sensor • Faulty sensor connection	Replace Replace Deoxidise/Restore Replace Deoxidise/Restore Deoxidise/Restore Replace Deoxidise/Restore Replace Deoxidise/Restore
FUEL INJECTION PLANT Injector does not inject fuel	• Burnt 25A fuse • Faulty 25A fuse connection • Faulty injection relay • Faulty injection relay connection • Faulty injector • Faulty injector connection • Faulty injection ECU • Faulty side stand injector • Faulty engine pick up • Phonic wheel/pick up light incorrect • Faulty petrol pump • Faulty neutral sensor	Replace Deoxidise/Restore Replace Deoxidise/Restore Replace Deoxidise/Restore Replace Replace Replace Replace Replace Replace Replace
IGNITION PLANT No spark plugs spark	• Burnt 25A fuse • Faulty fuse 25A connection • Faulty injection relay connection • Faulty reels • Reels connections • Faulty injection ECU • Faulty spark plug • Faulty motor mass connection • Faulty side stand switch • Faulty engine pick up • Phonic wheel/pick up light incorrect • Faulty neutral sensor	Replace Deoxidise/Restore Deoxidise/Restore Replace Deoxidise/Restore Replace Replace Replace Replace Replace Replace Replace Replace



FRAME

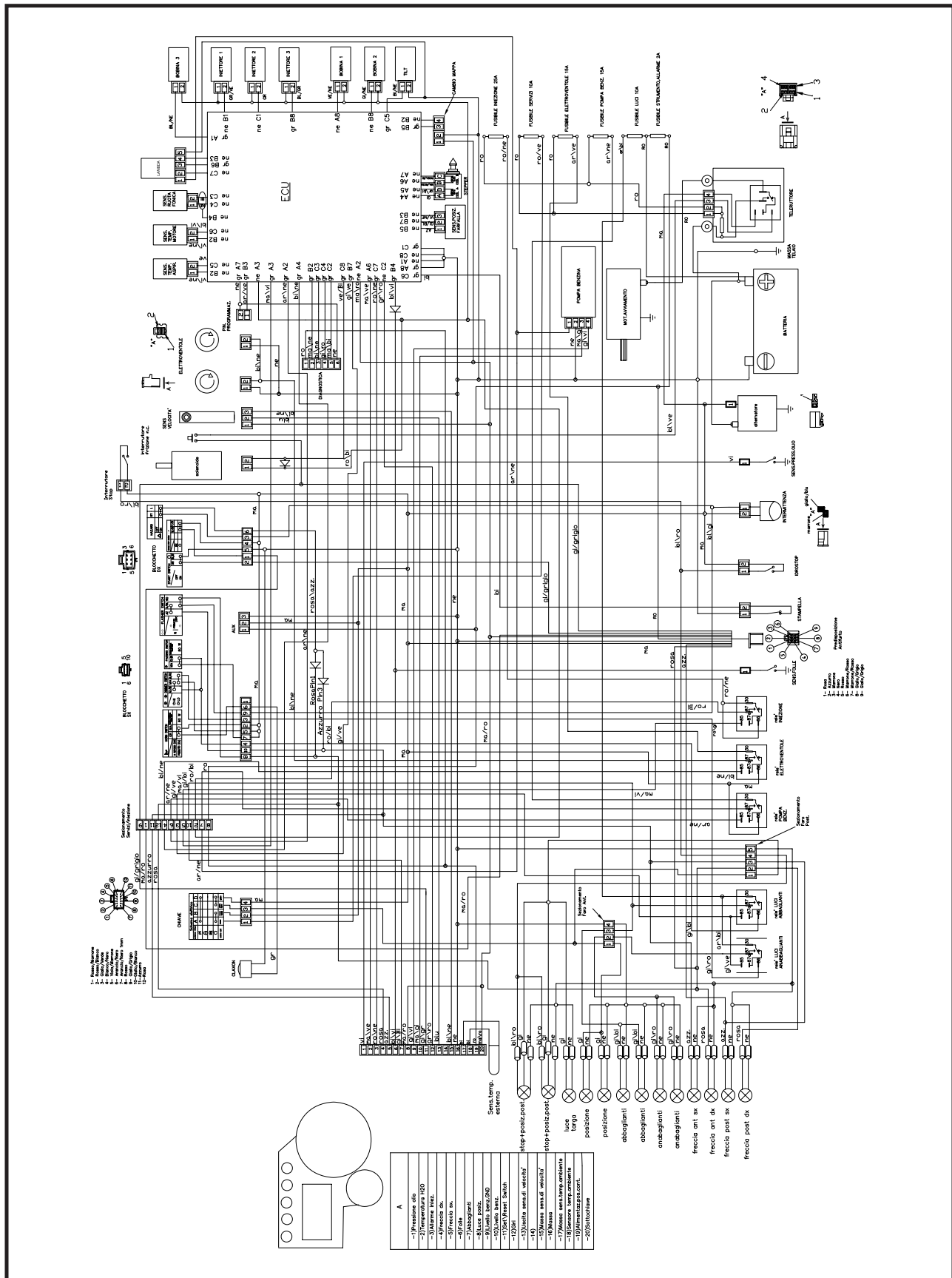
COMPONENT	ANOMALY	INTERVENTION
STEERING WHEEL Hard steering wheel The bike tends to steer or does not proceed in a straight line	• Damaged steering bearings • Excessively fastened steering bearings • Bent kingpin • Excessively brakes steering shock absorber • Damaged steering shock absorber joints • Low tyre pressure • Bent fork • Bent frame • Bent swing arm • Damaged steering bearings • Bent wheel pin • Damaged swing arm bearings	Replace Adjust Replace Adjust Replace Adjust Replace Replace Replace Replace Replace Replace
FRONT WHEEL Front wheel oscillates/vibrates Front wheel hardly turns	• Bent wheel rim • Wheel not balanced • Faulty tyre • Tyre not suitable • Damaged wheel bearings • Pin fixing screws not fastened • Pin fixing ring nut not fastened • Damaged bearings • Bent wheel pin • Brakes pads rub excessively against the disks (see brakes) • Bent brake disks • Wheel pin ring nut excessively fastened	Replace Balancing Device Replace Replace Fasten Fasten Fasten Replace Replace Check Replace Torque fasten
FRONT SUSPENSION Front suspension too soft Front suspension too stiff	• Deteriorated fork oil • Low forks oil level • Low tyre pressure • Damaged fork • High fork oil level • High tyre pressure	Replace Top-up Adjust Adjust Adjust Adjust
REAR WHEEL Front wheel oscillates/vibrates Rear wheel hardly turns	• Bent wheel rim • Wheel not balanced • Faulty tyre • Tyre not suitable • Damaged wheel bearings • Fixing nut not fastened • Suspension screws not fastened • Damaged suspension bearings • Damaged bearings • Wheel hub seal ring out of seat • Brakes pads rub excessively against the disk • Bent brake disk • Damaged transmission chain	Replace Balancing Device Replace Replace Fasten Fasten Fasten Replace Replace Check Check Replace Replace
REAR SUSPENSION Rear suspension too soft Rear suspension too stiff	• Insufficient spring pre-load • Insufficiently extended hydraulic brake • Low tyre pressure • Damaged shock absorber • Excessive spring pre-load • Excessive extended hydraulic brake • High tyre pressure • Damaged swing arm bearings • Damaged suspension balancing device bearings • Damaged shock absorber joints • Damaged suspension connecting rod joints • Bent swing arm pin	Adjust Adjust Adjust Replace Adjust Adjust Adjust Replace Replace Replace Replace Repair Replace

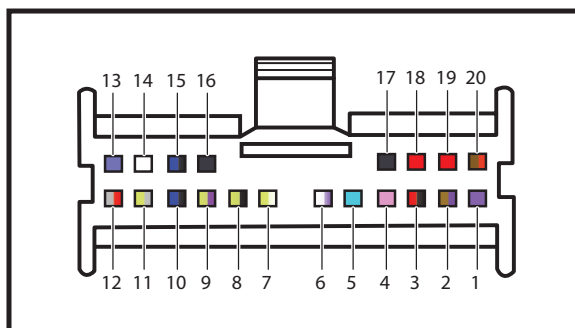


COMPONENT	ANOMALY	INTERVENTION
BRAKES Brakes lever and pedal too soft or "spongy" Brakes lever and pedal too hard Insufficient braking power Pads rub against brake disks	• Air bubbles inside the hydraulic circuit • Leaks inside hydraulic circuit • Damaged callipers seals • Damaged pump seals • Callipers pistons do not slide smoothly • Low hydraulic liquid level • Deformed brake disks • Bent brake lever and pedal • Dirty disks • Air bubbles inside the hydraulic circuit • Leaks inside hydraulic circuit • Damaged callipers seals • Damaged pumps seals • Calliper pistons do not slide smoothly • Low hydraulic liquid level • Deformed brake disks • Damaged pads springs • Deformed brake disks • Callipers pistons do not slide smoothly • Hydraulic liquid level too high • Brakes pads worn out over the limit	Bleed Repair Replace Replace Check Top-up Replace Replace Clean Bleed Repair Replace Replace Check Top-up Replace Replace Replace Check Adjust Replace
DRAIN PLANT Excessive exhaust noise Poor engine performances	• Damaged exhaust pipe • Loosened tube fixings • Damaged exhaust pipe • Loosened tube fixings	Replace Fasten Replace Fasten
COOLING PLANT Engine temperature too high Engine temperature too low	• Cooling liquid level too low • Faulty cooling vents • Liquid expansion vessel cap • Faulty cooling • Faulty electric fan thermal switch • Faulty instrument temperature sensor • Thermostat locked closed • Bent or obstructed radiator flaps • Scaled radiators • Damaged water pump • Faulty ignition/injection plant • Fuel not suitable • Faulty engine cooling circuit • Spark plug thermal degree not suitable • Carbonaceous residues storage inside head/piston • Thermostat locked open	Top-up Replace Replace Replace Replace Replace Replace Repair/Clean Clean Replace Check Replace Check Replace Clean



ELECTRIC LAYOUT

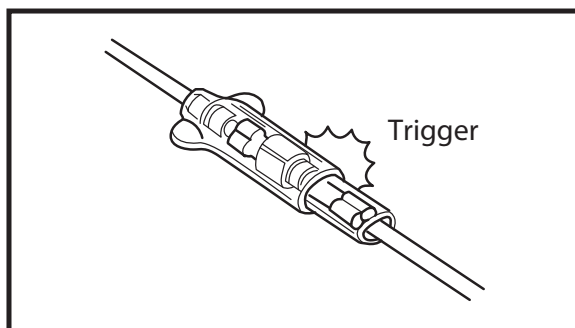




To identify the contacts of the various components refer to the layout below.

CONTACTS	COLOURS
1) Oil Pressure	Purple
2) H ₂ O Temperature	Brown/Purple
3) Injection Alarm	Red/Black
4) Right Indicator	Pink
5) Left Indicator	Blue
6) Neutral	White/Purple
7) High beams	Yellow/White
8) Position Light	Yellow/Black
9) GND Petrol Level	Yellow/Purple
10) Petrol Level	Brown/Yellow

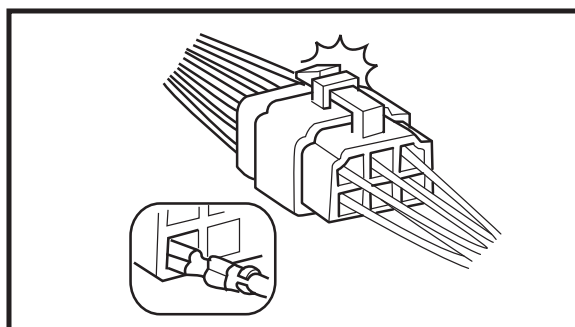
CONTACTS	COLOURS
11) Set/Reset Switch	Yellow/Grey
12) Revolutions	Grey/Red
13) Speed Sensor Output	Blue
14)	
15) Speed Sensor Mass	Blue/Black
16) Mass	Black
17) Ambient Temperature Sensor Mass	Black
18) Ambient Temperature Sensor	Red
19) Permanent Positive	Red
20) Under lock and key	Brown/Red



MAINTENANCE WARNINGS

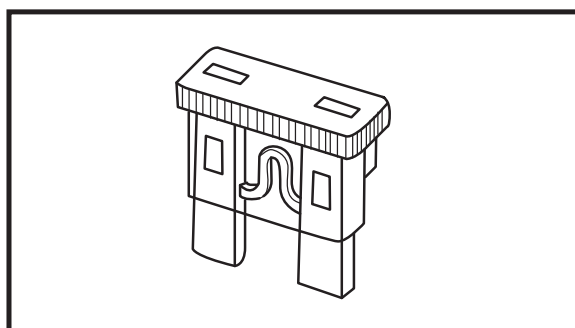
CONNECTORS

- When connecting a connector, push until a trigger is heard.
- Check whether the connector is corroded or dirty and if its cover is broken.



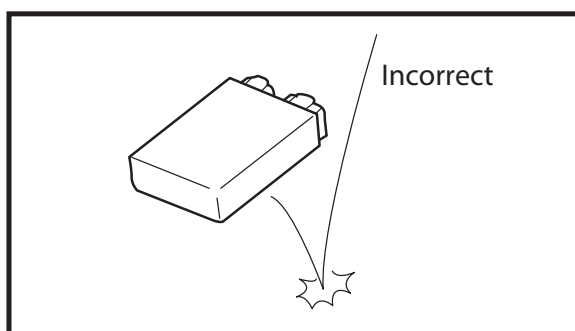
COUPLERS

- With a lock type coupler, release the lock before disconnecting it and push all the way when connecting it.
- When connecting the coupler, ensure to grip the coupler body and not to pull the wires.
- Check whether the terminals of the coupler are loose or bent.
- Check whether the terminals are corroded or dirty.



FUSES

- When a fuse triggers, investigate the cause, repair and, therefore, replace the fuse.
- Do not use a fuse with a different capacity from the original.
- Do not use a wire or another replaced for the fuse.

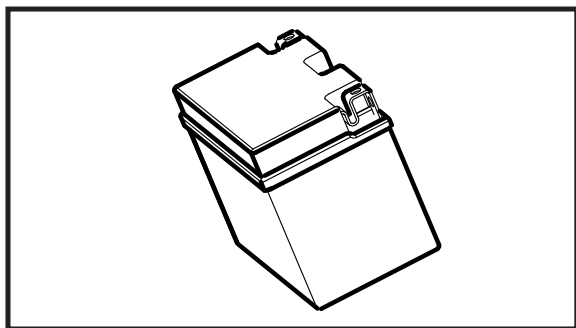


PARTS TO SEMI-CONDUCTORS

ATTENTION

Careful not to drop the parts with an ECU type incorporated semi-conductor.

When checking the parts, carefully follow the control instructions.
The non compliance with the correct procedure can cause serious damages.



BATTERY

ATTENTION

Do not use batteries different from those specified.

The MF battery (without maintenance) assembled in this vehicle does not require maintenance operations like the electrolyte level control and the distilled water top-up.

Note that the charge system for an MF battery is different to that for a normal battery.

Therefore, do not replace an MF battery with a normal one.

The recommended battery is:
YUASA YTZ 14 S

Charge following the method indications shown on the battery packaging, however, see "ROUTINE INSPECTIONS AND ADJUSTMENTS 3.79" paragraph.

ATTENTION

Hydrogen is not produced during the normal charging of the battery but it may be produced when the battery is excessively charged. Therefore, do not go near the battery with flames during charging.

Should the terminals be corroded, remove the battery, pour hot water over them and clean using a metal brush.

Once connection is completed, grease slightly. Install a cap on the positive terminal.

BATTERY EFFICIENCY CONTROL

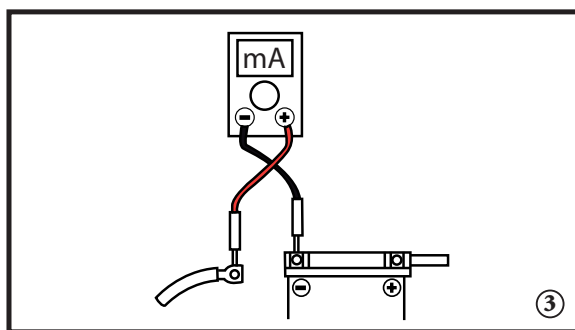
BATTERY CURRENT LEAKS CONTROL

- ① Remove:
- **the seat**
- See "FRAME 4.130" paragraph.

- ② Bring:
- **the ignition switch**
- to OFF position.

Disconnect:

- **the battery negative cable**



- ③ Connect:
- **the multimeter**
- between the negative terminal and the negative cable of the battery, in function of the ammeter in continuous current

ATTENTION

As the current leaks during malfunctioning may be high, firstly use a high range of multimeter to avoid damages.

Do not bring the ignition switch to ON when measuring the current.

With the control board switched off, the current leaks must be $\geq 2 \sim 2.5$ mA.

On the contrary, identify the source of such absorption by disconnecting the connectors of every individual powered utility

NOTE:

In case of installing antitheft devices, disconnect the latter before carrying out the checks.

CHARGE OUTPUT CONTROL

- ① Remove:
 - **the alternator lid**
See "FRAME 4.120" paragraph.

- ② Start:
 - **the engine**
and make it rev at 2000 r/min with the lights switch at ON and the selector on HI headlights position.

- ③ Measure:
 - **the DC voltage**
between the positive and negative terminals of the battery using a multimeter.
If the tester indicates less than 13.0V or more than 15.0V, the cause to be identified is in the generator.

NOTE: _____
When carrying out this test, ensure that the battery is fully charged. _____



Output for charge
 13.0 V - 14.5 V a 2000 g/min

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BENELLI Q.J. s.r.l.
Strada della Fornace Vecchia
61100 - Pesaro - Italy



Benelli

