1. 柴油机使用说明
Usage Instruction

1.1 226B系列柴油机代号含义

The signification of the code of 226B series diesel engine

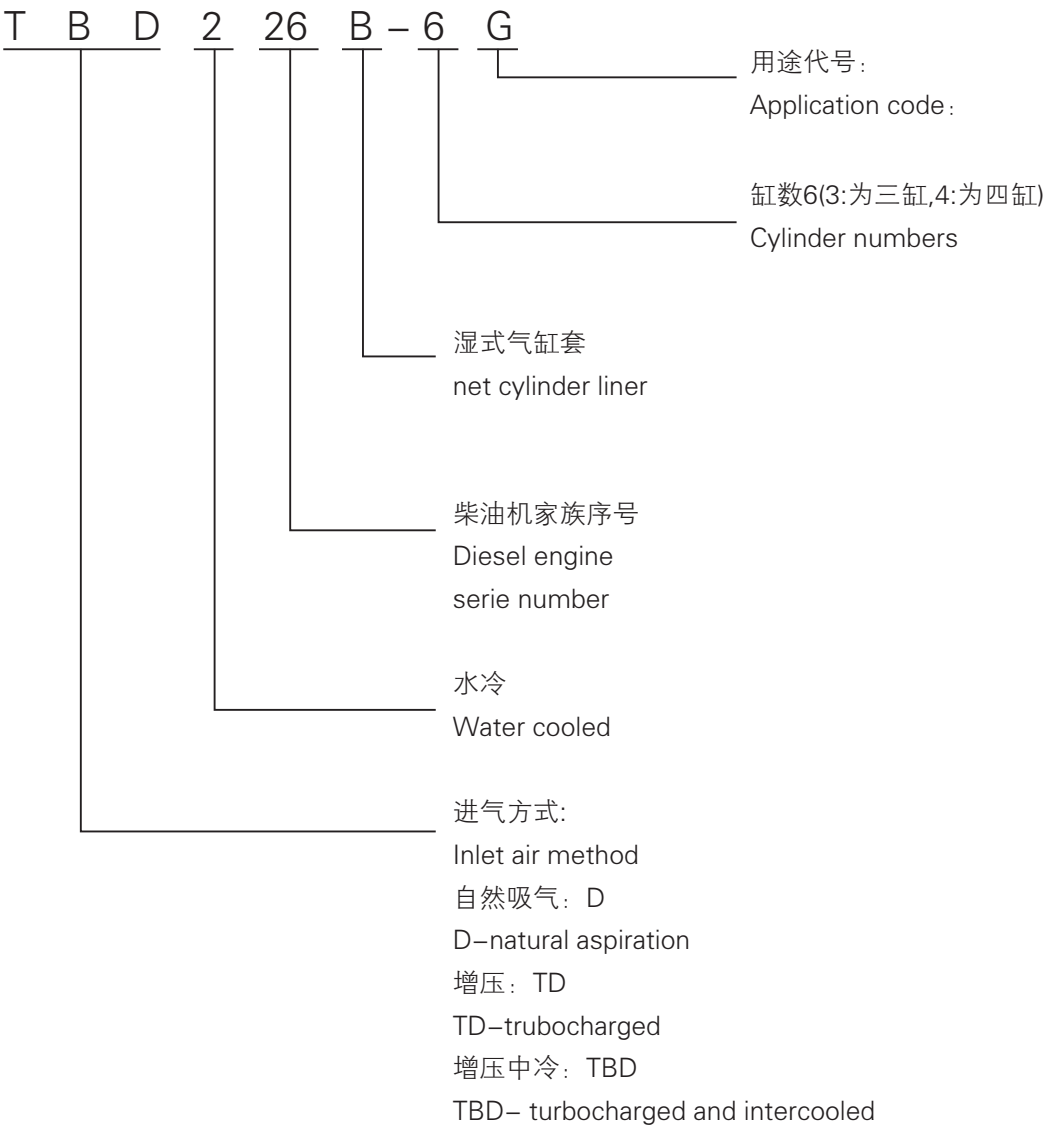
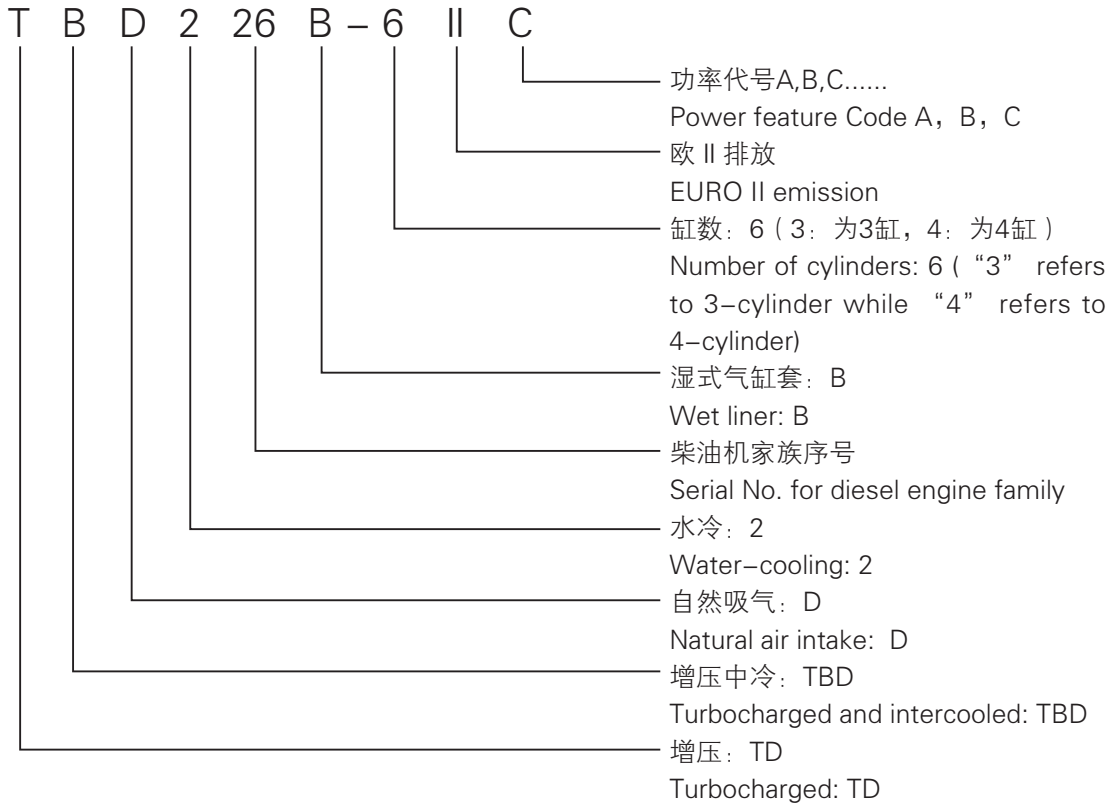


表1 用途特征代号说明
Description of application codes

符号 Symbol	用途 application
无符号 N/A	通用型及固定动力 General–purpose and stationary power
C	船用主机 Main marine engine
D	发电机组 Generating set
CD	船用发电机组 Marine generating set
G	工程机械 Construction machinery
T	拖拉机 Tractor



1.2 新柴油机使用须知

Operating notice for new diesel engine

●工程机械及拖拉机用柴油机，在最初使用的 60h 内，柴油机应在部分负荷（油门在 3/4 位置以下）工作。

During the first 60h, the speed of diesel engine for construction machinery and tactor is limited to work at partial load (fuel throttle is at 3/4 positon).

●汽车用柴油机，在汽车使用的最初 2000Km（约 60h）内应限制柴油机转速不超过标定转速的 80%。

During the first 2000km (about 60h), the speed of diesel engine for vehicle is limited to not exceed 80% of the rated speed.

●新机经初期使用磨合后，需要更换机油，否则可能造成柴油机零件的过度磨损或损坏。正确地维护保养将使您的柴油机有更好的性能、更经济的运转及更长的寿命。

After a running–in period in the first use, the oil in new diesel engine should be replaced. If not, the parts of diesel engine could be worn out or damaged. The correct maintenance will make diesel engine better in performance, more economic running and longer in service life.

●每日检查油压表、温度表、报警指示灯和其它仪表，确保它们正常使用。

Oil–pressure gauge, temperature gauge, warning indicating lights and other instruments shall be checked every day for their normal function.

●按说明书中要求进行日常维护和保养。

Daily inspection and maintenance should be done according to this instruction.

1.3 柴油机的启封

Unsealing Diesel Engine

当您打开您的柴油机包装箱之后，首先按文件清点柴油机及随机附件，检查柴油机外表有无损伤，然后进行下述工作：

After you have unpacked your diesel engine, firstly you should check diesel engine and the accessories with it and inspect if diesel engine is damaged, and then you begin to do the followings:

●擦拭外露件的防锈层、防蚀剂等。

Clean the antirust coat and anti–corrosive agent on parts close to the air.

●放出燃油滤清器及燃油系统零件内部油封油（也允许燃油系统的油封油不经放出而启动，但必须等燃油系统油封油消耗完正常柴油机已供应到才允许发动机满负荷运行）。

Drain off the oil in oil seals inside fuel filter and parts in fuel system (Start–up is also permitted without draining off the oil–seal's oil in fuel system, but diesel engine may not run under full load until the oil–seal's oil is used up and normally replenished by diesel engine).

●转动飞轮并向进气管内喷溶剂到驱尽油封油为止。

Turn the flywheel and spray in the air inlet valve with solvent until the oil–seal's oil is driven out.

●向增压器排气口喷溶剂，直到驱尽油封油为止。

Spray in the exhaust port of turbocharger with solvent until the oil-seal's oil is driven out.

●根据厂方与用户的协议，对油底内未注油的应按规定注油。

According to the agreement between the manufacturer and the user, fill oil in the empty oil sump as per specifications.

●按厂方与用户的协议，出厂用户需要，已加注满冷却液的应检查冷却液的性能，如果防冻能力满足 -30℃或 -35℃时，其 PH 值为 7-8（中性），总硬度值为 5-15° d[9-27° f（硬度）] 则可以使用这些冷却液，如不合乎要求，则应放出，重新加注含防冻剂的冷却液。

According to the agreement between the manufacturer and the user, check the performance of coolant that has been filled up, if needed. The usable coolant must be under the conditions of temperature -30℃ or -50℃ , pH value 7-8 (neutral), general hardness value 5-15° d[9-27° f (hardness)]. If the coolant cannot meet the above-mentioned requirements, drain off it and add new coolant with anti-freezing agent.

1.4 柴油机的安装就位

Mounting and Positioning of Diesel Engine

●柴油机的起吊、安装、就位调整按柴油机使用说明书的要求进行。

Hoisting, mounting and positioning of diesel engine shall be done in accordance with diesel engine operation manual.

1.5 起动前的准备工作

Preparation before Start-up

●加冷却液

Add coolant

●加机油

Add oil

●加燃油

Add fuel

1.6柴油机的起动

Start-up of Diesel Engine

●将电源开关、电钥匙处于起动位置。

Put the power switch and key in the starting position.

●变速杆处于空档位置。

Place the gear shift lever in the neutral position.

●踩下离合器踏板和油门踏板，然后拉动过量燃油装置的拉手开关（若装有此装的话），并操纵起动机，当发动机起动后应将过量燃油装置的拉手开关复位，若发动机起动不了，则待约 1 分钟后再重复上述操作，发动机起动后，机油压力表应立即显示压力，起动热发动机时，可不必使用过

量燃油装置。

Step on the clutch pedal and accelerator pedal, then pull the handle of excessive fuel device (if available), and operate the starter. After start–up of diesel engine, return the handle of excessive fuel device to its original position. If diesel engine cannot be started, wait for about one minute and repeat the above operation. The pressure value is shown at once on the oil manometer after start–up of the engine. In heat starting of the engine, it is unnecessary to use the excessive fuel device.

低温起动

Start–up in low–temperature

装有电子控制火焰预热起动装置

Flame–preheat starting device with electronic control

发动机水温低于 –23℃时，打开钥匙开关预热指示灯亮，电热塞通电加热，经 50s 后预热指示灯自动闪烁。电热塞已加热到 850–950℃，按下起动按钮，接通起动机，电磁阀自动打开油路，给电热塞供油，进行火焰预热起动，可使发动机在 –25℃下顺利起动。

When the water temperature of the engine is below –23℃ , open the key switch and the preheating indicating light is on lighting, the electro–heat plug is heated through electricity, and for 50 seconds, the preheat indicating light twinkles automatically. After the electro–heat plug has been heated to 850–950℃ , press the starting button and switch on the starter. So the fuel way automatically opened by the electromagnetic valve, through which the electro–heat plug can be supplied with fuel so as to start the engine at –25℃ smoothly with the flame preheat starting device.

1.7 柴油机的运转

Running of Diesel Engine

◆ 柴油机在低于最大扭矩的转速下，全油门持续运转不超过 1 min。

When the engine running at the speed lower than the speed of the biggest torque，it is not allowed to continue running on full load over l min.

◆柴油机全负荷运转后，停车前要怠速运转 3–5 min。

After running on full load，the engine should run in idling speed for 3—5 minutes before stopped.

◆经常注视油压表及冷却液温度表：若压力和温度不符合规定要求时应该将柴油机停车。

Often watch and check the oil pressure gauge and coolant temperature meter. Stop the engine if the pressure and temperature cannot meet the standard requirement.

注意：在冷却液温度低于60℃或高于100℃时连续运转将有损于发动机。

Note：Diesel engine can not continue to run when the coolant temperature is lower than 60℃ or higher than 100℃，because this would damage the engine.

◆柴油机的停止

Engine's running stop

拉动喷油泵手油门置于零位，操作排气制动器，停止发动机，重新调整手油门。

The oil pressure gauge and the coolant thermometer shall often be watched. If the pressure and temperature do not conform to the specified values, diesel engine should be stopped.

注意：发动机在停止之前以怠速运转1–2min后再停车。

Note：The engine should run in idling speed for 1–2 minutes before stopped.

2. 柴油机维护保养指南
Guide For Maintenance Of Diesel Engine

2.1 日常维护

Daily Maintenance

检查；

Inspection；

●机油液面是否在油尺的刻线范围；

Check the oil level；

●冷却液液面；

Check the coolant level；

●风扇有无破损；

Check whether the fan is damaged；

●传动三角皮带有无裂纹、擦伤；

Check whether the V−belt is cracked or scratched；

●附件紧固情况是否良好；

Check whether the accessories are fixed well;

●水油有无泄漏 ;

Check whether the water or oil is leaking;

●充电指示灯是否正常 ;

Check whether the charging indicator light is in order.

2.2 定期保养

Periodic Maintenance

定期保养参照下表进行，若柴油机在多尘环境或在频繁停车情况下工作，须根据情况相应缩短保养周期。

Regular maintenance can be conduct on as per the following table. If the operating condition is heavy dust content or the engine running on started−stopped frequently, the regular maintenance period should be shortened accordingly.

2.2.1 维护保养周期

Maintenance Period

保养周期 Period	柴油机运转时间(h) Running hours(h)	行驶里程(公里) Running Kilometer
第1次检查 The first inspection	30–50	1500–2000
例行检查 Periodical inspection	每隔250 Every 250	1万 10,000
1级保养 Level 1 Maintenance	每隔500 Every 500	2万 20,000
2级保养 Level 2 Maintenance	每隔1000 Every 1,000	4万 40,000
3级保养 Level 3 Maintenance	每隔2000 Every2,000	8万 80,000
4级保养 Level 4 Maintenance	每隔4000 Every 4,000	16万 160,000

2.2.2 保养项目

Maintenance Items

保养项目 Items	更 换 Replacement	调 整 Adjustment	检 查 Inspection
第1次检查 First checking	●机油 Oil ●机油滤清器 Oil filter	气门间隙 Valve clearance	●紧固管路管夹 Tighten pipe clamps ●紧固三角皮带 Tighten V–belts
例行检查 Routine checking	●机油 Oil ●机油滤清器 Oil filter		●紧固三角皮带 Tighten V–belts
1级保养 Level 1 maintenance	●机油 Oil ●机油滤清器 Oil filter ●燃油滤清器 Fuel filter	气门间隙 Valve clearance	●空气滤清器 Air filter ●进气系统 Air intake system ●紧固管路管夹 Tighten pipe clamps ●紧固三角皮带 Tighten V–behs
2级保养 Level 2 maintenance	●机油 Oil ●机油滤清器 Oil filter ●燃油滤清器 Fuel filter	气门间隙 Valve clearance	●空气滤清器 Air filter ●进气系统 Air intake system ●紧固管路管夹 Tighten pipe clamps ●紧固三角皮带 Ti ghten V–belts

保养项目 Items	更 换 Replacement	调 整 Adjustment	检 查 Inspection
3级保养 Level 3 maintenance	●机油 Oil ●机油滤清器 Oil filter ●燃油滤清器 Fuel filter ●冷却液 Coolant ●空气滤清器 Air filter	气门间隙 Valve clearance	●空气滤清器 Air filter ●进气系统 Air intake system ●紧固管路管夹 Tighten pipe clamps ●紧固三角皮带 Tighten V–belts ●在试验台上检查调整喷油泵 Inspect and adj ust the injection fuel pump on test bench
4级保养 Level 4 maintenance	●机油 Oil ●机油滤清器 Oil filter ●燃油滤清器 Fuel filter ●冷却液 Coolant ●空气滤清器 Air filter	气门间隙 Valve clearance	●空气滤清器 Air filter ●进气系统 Air intake system ●紧固管路管夹 Tighten pipe clamps ●紧固三角皮带 Tighten V–belt ●检查增压器轴承间隙 Check the bearing clearance of turbocharger ●在试验台上检查调整喷油泵 Inspect and adj ust the Injection fuel pump on test bench

2.3 维护保养记录

Maintenance Record

柴油机编号 _____ 柴油机编号 _____

Engine number Engine number

柴油机编号 _____ 柴油机编号 _____

Engine number Engine number

日期 Date	公里小时 或间隔时间 Running Kilometers / hours or interval hours	实际里程 Actual Kilometers	保养内容 Maintenance contents	保养者 O'erator	备注 Remark

3. 柴油机保养内容
Maintenance Contents Of Diesel Engine

3.1日常保养
Daily Maintenance

预防性保养从每天做起，了解柴油机工作状况。

Preventive maintenance should be done everyday in order to understand the engine's condition.

起动柴油机以前需检查机油液面、冷却液液面和柴油液面。

Before starting the engine should check the oil level and coolant level

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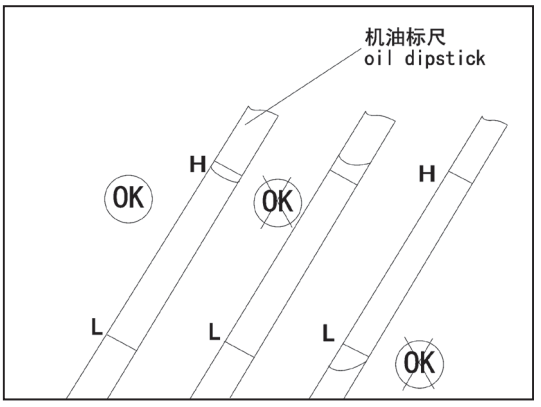


检查：

Inspect：

- 泄漏

  Leakage

- 易损件

  Fast wearing parts

- 柴油机上出现的任何异常

  Any unconventionality

● **检查机油油面高度**

Inspect the oil level height

当油面低于油尺的下刻线或高于油尺的上刻线时，决不允许开动柴油机。

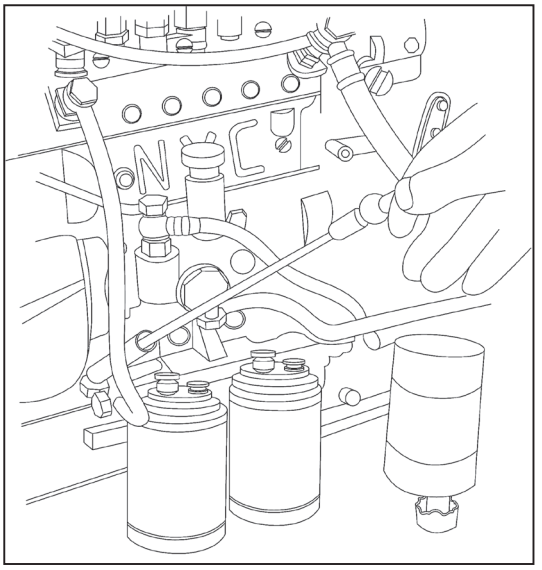
When the oil level is lower than the lower limit or higher than the upper limit, it is not allowed to start the engine.

在柴油机停车后检查油面，至少等 5 分钟后进行，使机油有充分时间流回油底壳。

After the engine stopped, inspect the oil level at least 5 minutes later in order to ensure the oil can flow back to the oil sump.

油尺低位至高位的油量为 3.25 升 (3 缸)、5 升 (4 缸)、6 升 (6 缸)。

The oil–volume values from the low scale mark to the high scale mark are respectively 3.25 liter (3–cylinder engine), 5 liter (4–cylinder engine) and 6 liter (6–cylinder engine).



● 检查冷却液液面

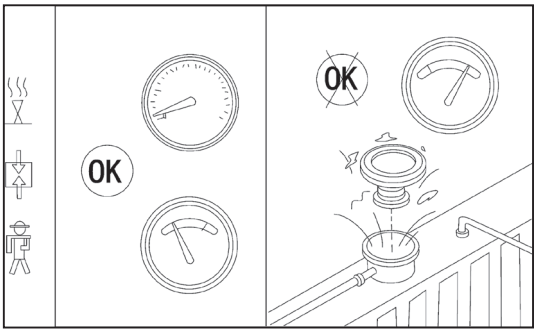
I nspect the coolant level

玻璃视孔观察冷却液面，冷却液不够时，可打开加水口盖加入冷却液。

Inspect the coolant level through the vitreous view hole, if the coolant is not sufficient, open the inlet cover and fill into the coolant.

注意：打开加水口盖时，必须先按下排气按钮，以免发动机热状态时热冷却液会伤人。

Note:When opening the inlet cover, must press down the exhaust button firstly to prevent hot coolant from injuring people.

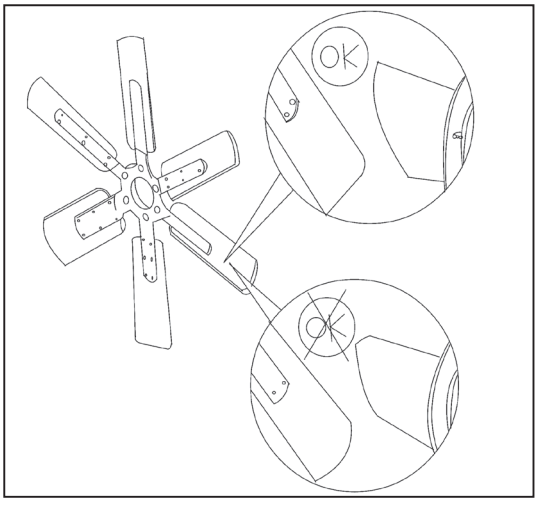


● 检查风扇

Inspect the fan

检查塑料风扇是否变形，铁风扇是否松动，叶片是否弯曲，确保风扇工作可靠。

Check whether the plastic fan is distorted.For steel fan, check whether the rivet loosened and the vane is curved to ensure reliable running

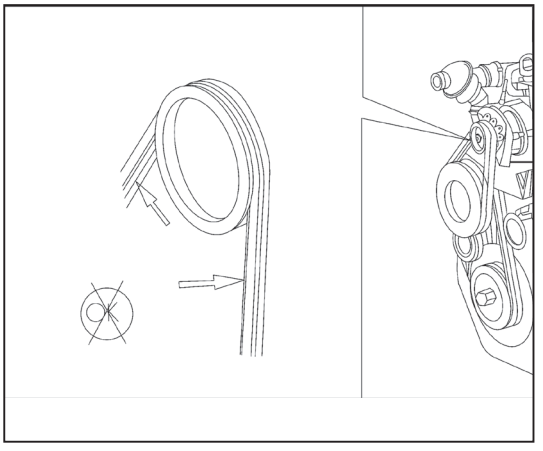


● 检查三角皮带

Check V-belt

用肉眼检查三角皮带，有无裂纹或擦伤，必要时应更换。

Inspect the V-belts with your eyes to find if there is any crack or scratch on the V-belts. Replace them if necessary .



3.2 每隔250h（行驶1万公里）的保养内容

Maintenance contents at intervals of 250h (or running mileage 10,000 km)

除完成每日保养外，增加下列检查项目：

The following contents will be added except daily maintenance items：

机油和机油滤清器的更换

Replacement of the oil and oil filter

柴油机使用后机油将变脏，污染物含量与燃油机油耗总量成正比。

The oil will be polluted after using, the pollution contents is of accordance with the consumption of fuel and oil.

注意：正常使用的柴油机更换机油的周期无论如何不可超过250h(1万公里)。

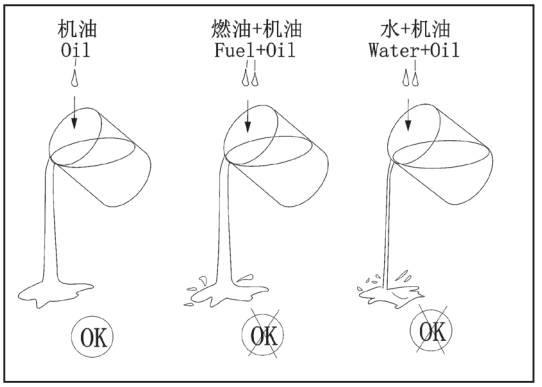
Note:The replacement period of oil under proper using condition cannot beyond 250h (10,000Kilometers)

更换机油和机油滤清器，以清除悬浮在机油中的杂质。

Replace the oil and oil filter to clean the impurities containing in oil.

注意：应在机油是热的时候放油

Note: The oil should be drained off when it is hot.

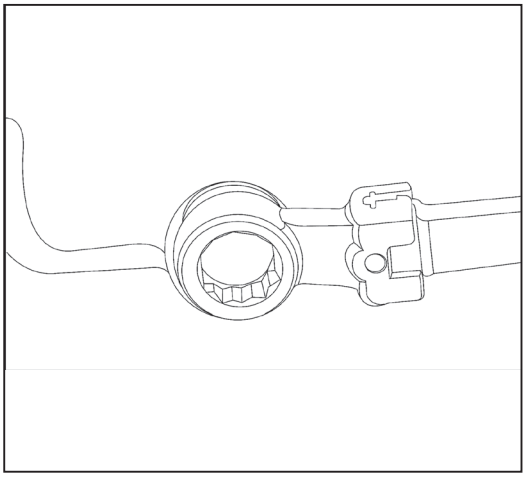


拆下放油螺塞，准备收集 7.25 升（3 缸）、9.5 升（4 缸）、13 升（6 缸）机油。

Dismantle draining plug screw; prepare to collect the oil of 7.25 L, 9.25 L and 13 L respectively to 3–cylinder, 4 cylinder and 6 cylinder engines.

注意：热机油会伤人

Note：Hot oil can injure people.

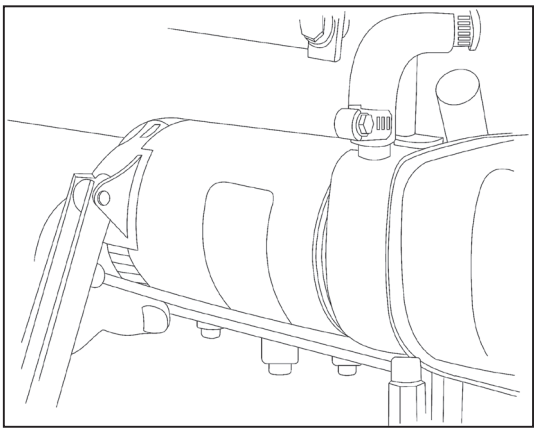


滤清器专用扳手

Tool:The special wrench forfilter

清洁滤清器头部四周，拆下滤清器。

Clean the end surrounding of the filter，and remove it.

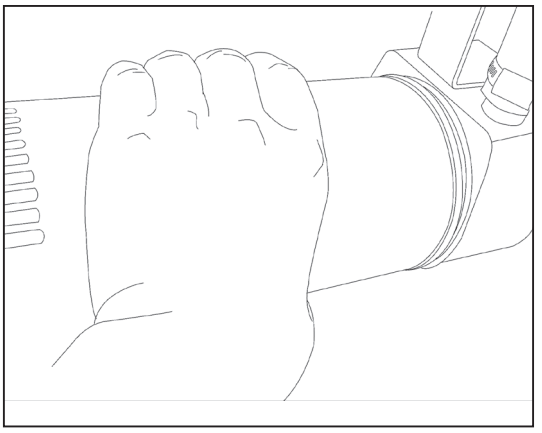


装上新的机油滤清器

Install the new oil filter

注意：安装机油滤清器时，密封圈要校正，且要在密封圈上涂上滑油。

Note：Adjust the seal ring and smear some lubricating oil On it while fitting the oil filter.

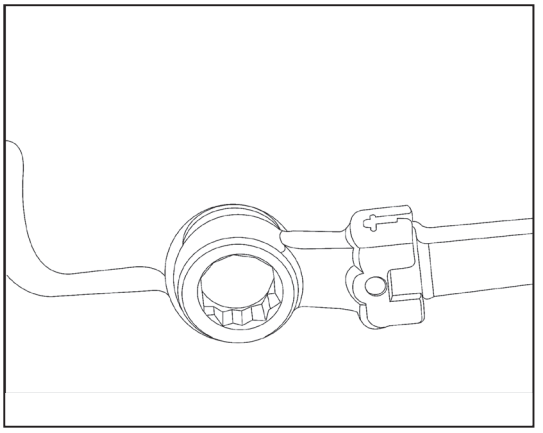


19mm 开口扳手

Tool:19mm open–ended wrench

检查和清洁放油螺塞螺纹及密封表面，并装上放油螺塞。

Check and clean the screw thread and seal ring，and then install the whorl plug.

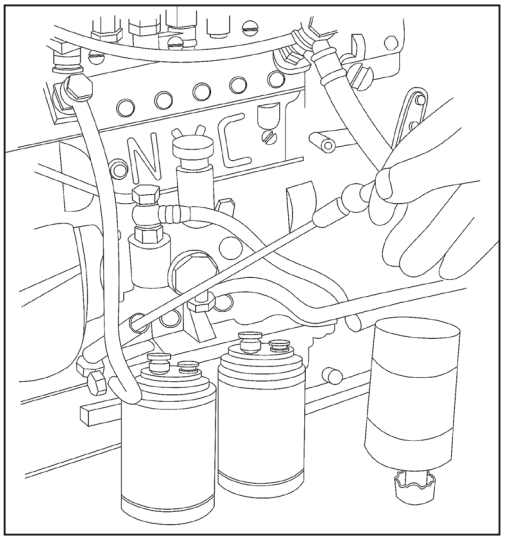


将清洁的机油注入柴油机到油尺的上刻度线，油底壳容量为 7.25 升（3 缸）、9.5 升（4 缸）、13 升（6 缸）机油。

Fill the cleaned oil into diesel engine and let it reach the upper scale mark of dipstick. The capacity of oil sump is 7.25 L, 9.25 L or 13 L respectively to 3–cylinder, 4 cylinder or 6 cylinder engine..

注意：226B 柴油机必须使用 CD 级 15W/40 牌号机油（详见第 53 页）

Note：For 226B diesel engine, CD 15W/40 grade oil must be used .

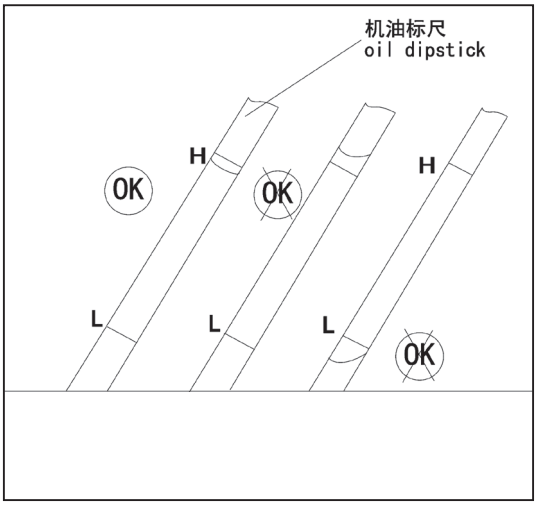


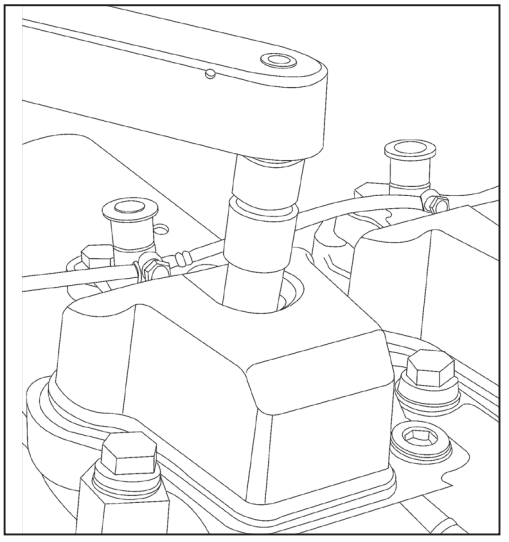
发动机怠速运转，检查滤清器和放油螺塞处是否漏油。

Run th e engine at idling speed and check the filter to find whether it leaks or not.

停车后约 5min 让机油自上部零件流人油底壳，再检查油面高度，必要时补充机油至油尺的上刻线。

Stop the engine and make the oil run into the sump from the upper parts 5 minutes later, then check the oil level, fill oil up to the upper limit if necessary .





● 检查调整气门间隙

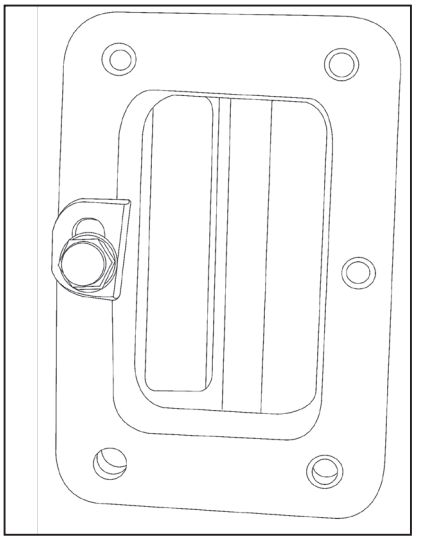
Check and adjust the valve clearance

13mm 套筒扳手

Tool：13mm sleeve wrench

拆下气缸盖罩

Dismantle the cylinder head cover.



慢慢转动柴油机，使飞轮壳上刻线对准飞轮上的 OT 刻度线，此时使第一缸活塞处于压缩行程的上止点位置（一缸进排气阀处于关闭状态）。

Turn diesel engine slowly, make the upper scale mark on flywheel housing align the 0T scale mark on flywheel, and at this time, let the piston of the first cylinder be located in the top dead center in the compression stroke (intake and exhaust valves of Cylinder 1 closed).

塞尺

Tool：Clearance guage

进气门间隙 0.20mm

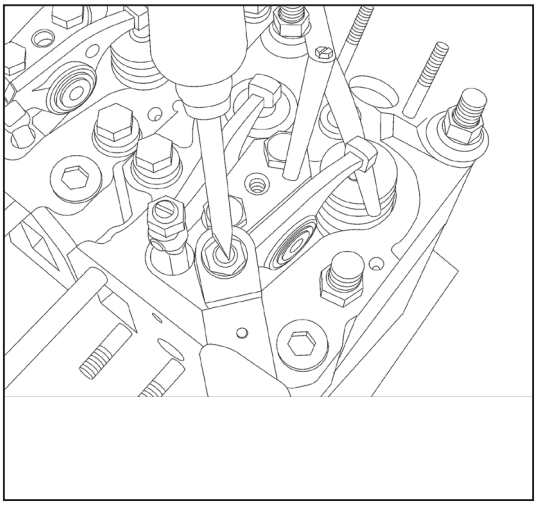
The clearance of intake valve is 0.20 mm

排气门间隙 0.30mm

The clearance of exhaust valve is 0.30 mm

注意：检测气门间隙时，柴油机应为冷态——低于 60℃，塞尺在气门杆顶和摇臂间滑动时，有阻滞发粘感觉时，所测间隙值为准确值。

Note:When check the clearance of valve，the engine should be at the Cool condition–its temperature is less than 60℃ .When the clearance guage glides between the top of valve rod and rocker arm and can be felt retarded and sticky，the measu nng result is proper.



6# 螺丝刀、14mm 梅花扳手

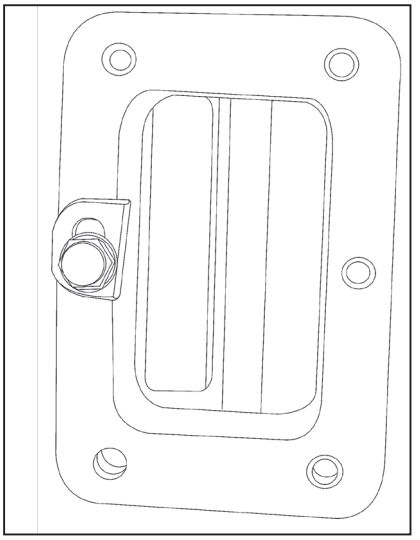
Tools：6#screwdriver and 14mm double offset ring wrench

第一缸活塞位于压缩行程上止点位置。

The piston of 1st cylinder is at TDC of the compression stroke.

此时调整四缸机第 1、2、3、6，六缸机第 1、2、3、6、7、10（从曲轴皮带轮端数）气门的间隙，用塞尺调整好间隙后拧紧摇臂锁紧螺母，并复查气门间隙，直到达到要求为止。

At this time, adjust the 1st, 2nd, 3rd and 6th valve clearances of 4–cylinder engine and the 1st, 2nd, 3rd, 6th, 7th and 10th of 6–cylinder engine (from crankshaft pulley end). Adjust the clearance by using the feeler and tighten the lock nuts of the rock arm. Recheck the valve clearance till it is qualified.



如步骤 A 所示检查或调整气门间隙 (I 表示进气，E 表示排气）。

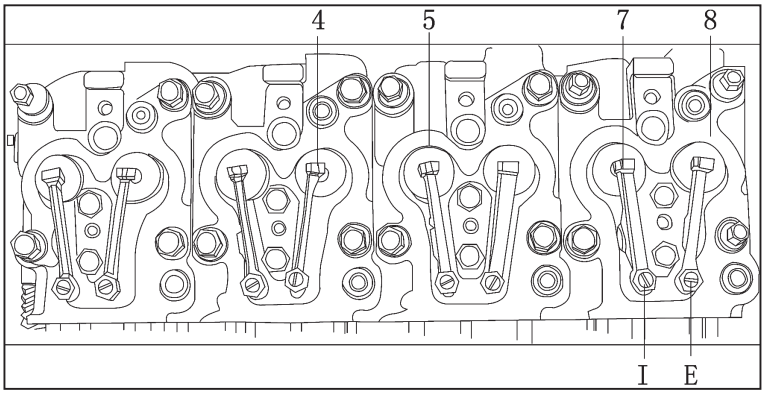
Check and adjust the valve clearance as step A(I–air intake Valve E–air exhaust valve)

用塞尺调整好间隙后拧紧摇臂锁紧螺母，并复查气门间隙，直到到要求为止。

Adjust the clearance by guage and tighten the fixing nut of rocker arm，re–check the clearance till it meets the requirement.

再转动曲轴 360° ；也可以在减震器上做标记后转动 360° 。此时调整四缸机第 4、5、7、8，六缸机第 4、5、8、9、11、12(从曲轴皮带轮端数)气门的间隙，同样松动摇臂锁紧螺母，用塞尺调整好后重新拧紧摇臂锁紧螺母。

Next, turn the crankshaft to 360° ; or mark on the shock absorber, and then turn it to 360° .At this time, adjust the 4th, 5th, 7th, and 8th valve clearances of the 4–cylinder engine and the 4th, 5th, 8th, 9th, 11th and 12th of the 6–cylinder engine (counted from the crankshaft pulley end). Loosen the lock pinch nut of the rock arm, adjust it by using the feeler and tighten it well.

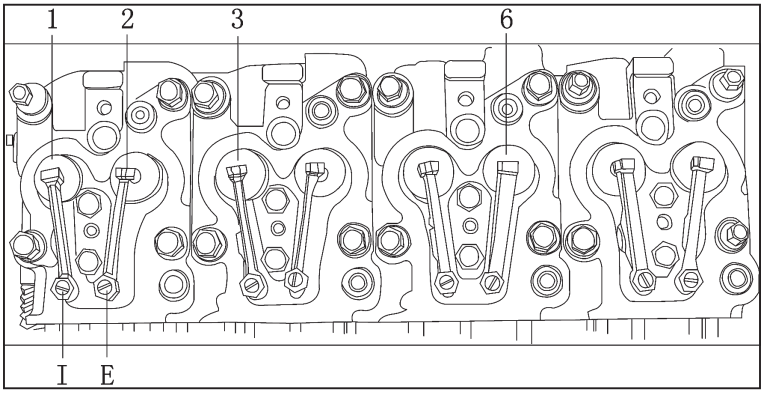


按步骤 B 所示调整气门间隙。

Adjust the valve clearance as stepB.

同样松动摇臂锁紧螺母，用塞尺调整好后重新拧紧摇臂锁紧螺母。

Loosen the fixing nut of rocker arm，adjust the clearance by guage then tighten the nut again.



13mm 套筒扳手

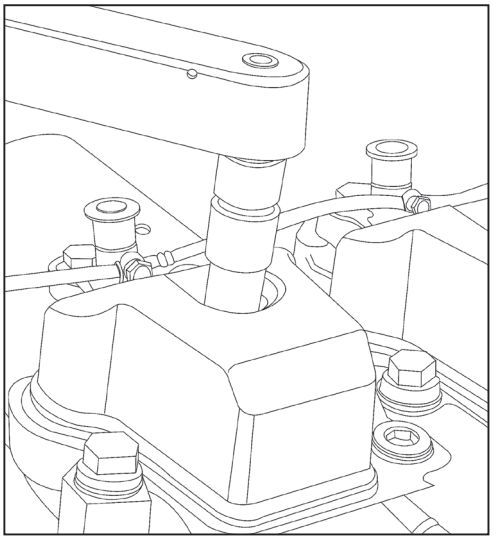
Tool:13mm sleeve wrench

安装气缸盖罩垫片和气缸盖罩。

Install the gasket and cylinder head cover

螺栓拧紧力矩 10–15N・m。

The tightening torque of bolt is 10–15N・m.

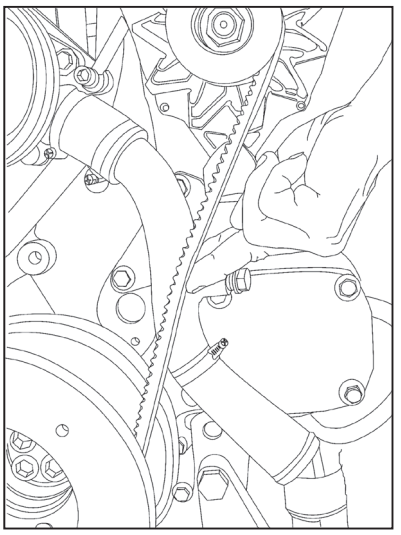


● **检查三角皮带涨紧力**

Check the tension of V–belts

在三角皮带的最大跨距上测量其挠度：一般要求在 4–5kgf 压力下，皮带挠度不大于 20mm。

Measure the flexibility in the max. span of poly V–belt. Generally, under the pressure of 4–5kgf, the belt flexibility is less than 20mm.

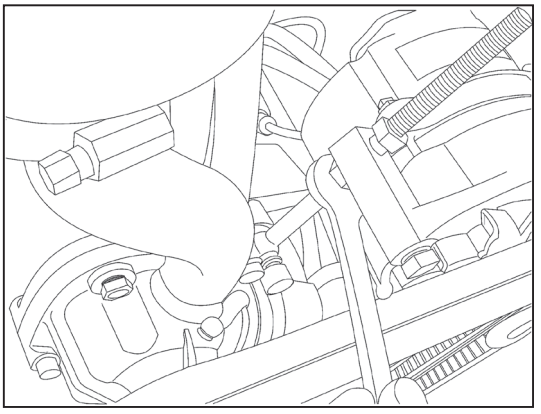


8mm 内六角扳手、16mm 开口扳手

8mm inner–hexagon spanner and 16mm open–ended wrench

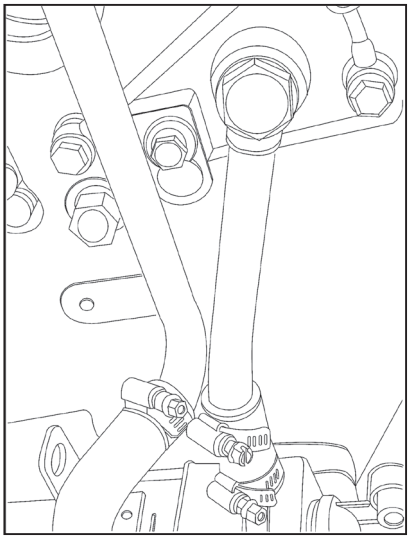
如果挠度大于 20mm, 说明三角皮带松动，需松开涨紧螺栓及锁紧螺母，重新涨紧皮带，然后拧紧涨紧螺栓及锁紧螺母。

If the flexibility is over 20mm, the poly V–belt is shown loose. Unscrew the tensioning bolt and the lock nut, re–tension the V–belt, and then tighten the tensioning bolt and the lock nut.



检查冷却管路橡胶管是否老化有裂缝、软管卡箍是否松动，必要时紧固或更换零件，确保其密封性。

Check the rubber hose in the cooling pipeline for its aged and cracked situation, and check the hose clamps for its loosing. Fasten or change the related parts, if necessary, to ensure the seal performance.



3.3 每隔500h(行驶2万公里)增加以下保养内容:

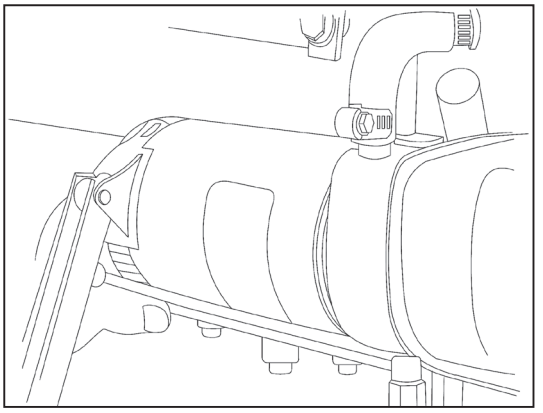
Add the following maintenance contents every 500h(20，000 Kilometers)

更换燃油滤清器

Replace the fuel filter

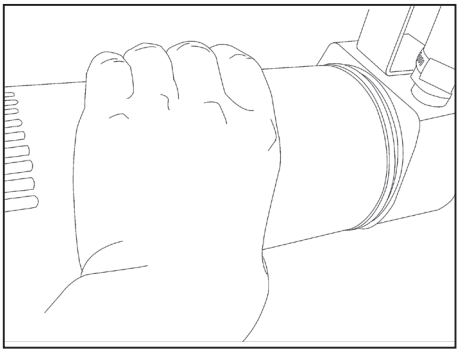
滤清器专用扳手

Special spanner for filter



清洁燃油滤清器头部周围，拆下燃油滤清器。

Clean the fuel filter around the head and take down it.



装上新的燃油滤清器。

Mount a new fuel filter.

排出低压油路和燃油滤清器中的空气。

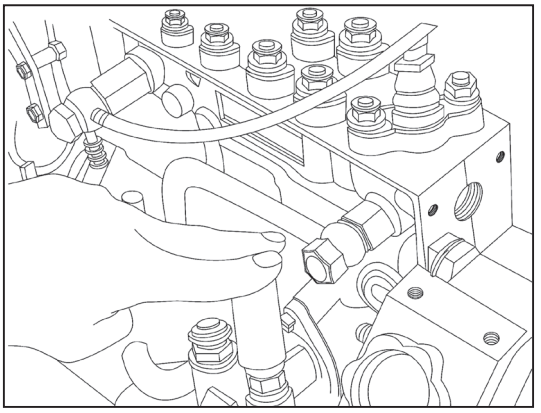
Release the air out of the low–pressure fuel passage and the fuel filter.

拧开喷油泵进油口放油螺钉。

Unscrew the fuel–draining screw fixed in the fuel inlet of injection pump.

按动输油泵柱塞，直到从放油螺钉处流出的柴油没有空气为止。然后拧紧放油螺钉。

Press on the plunger of fuel transfer pump until no air exists in diesel fuel that flows out of the fuel–draining screw; and then tighten up the fuel–draining screw.



● 检查空气滤清器滤芯

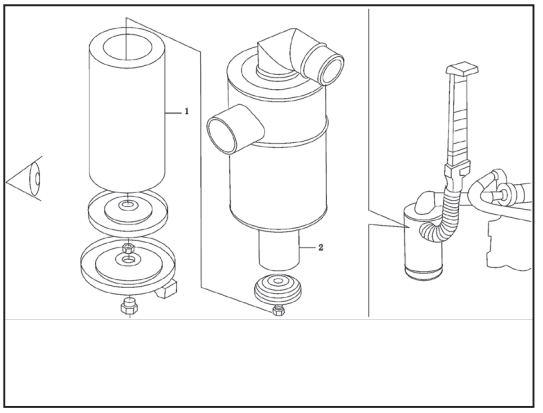
Check the air filter element

柴油机最大允许进气阻力为5kPa，柴油机必须在标定转速和全负荷运转时检查最大进气阻力，当进气阻力达到最大允许极限时，应按制造厂的规定清洁或更换滤芯。

In diesel engine, the allowable max inlet resistance is 5kPa and it must be inspected when the engine works at rated speed and full load. If this resistance reaches the maximum permissible limited value, the filter element shall be cleaned or replaced according to the requirements of manufacturer.

注意：决不允许在没有空滤器时使用发动机。否则灰尘和杂质进入柴油机会导致发动机早期磨损。

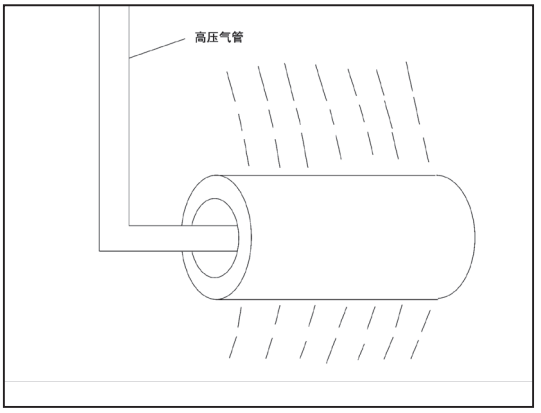
Caution: Never operate the engine in any case of no air filter, otherwise the dust and impurities will come into diesel engine and result in early wear to the machine.



1.纸质主滤芯：Paper filtering element
2.毛毡安全滤芯：Blanketry safety filtering element

从空滤器中拆下空滤芯，轻拍端面使灰尘落下，也可用压缩空气反吹（由内向外吹）。

Take down the filter element from the air filter, clap it at end lightly and make dust on it fall down. Alternatively, blow it inversely with compressed air (from inner to out).



注意：

Nole：

- 不得吹破滤纸
  Don't blow off the air filtering paper
- 不得用水和油清洗滤纸
  Don't clean the air filtering paper by water and oil
- 不得用力拍打或敲打滤芯
  Don't beat the core forcibly.

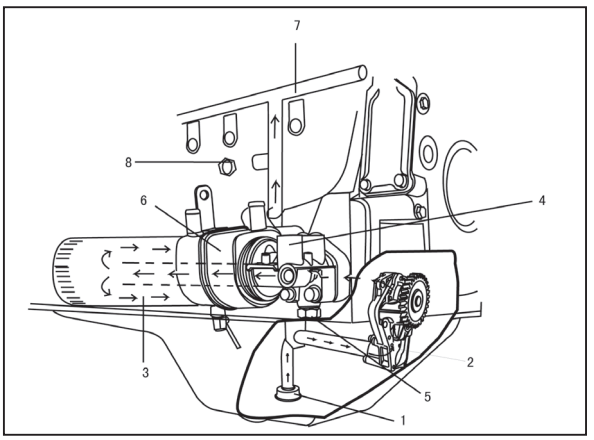
4. 柴油机几大系统示意图
The Main System Flow Chart Of Engine

- 润滑系统
  Lubricating system
- 冷却系统
  Cooling system
- 进排气系统
  Intake and exhaust system
- 燃油系统
  Fuel supplying system

了解 226B 柴油机的各大系统流程，将为您使用维护保养及故障排除提供帮助。

To understand the main system flow chart of the engine will give help to you for operating and maintaining the engine.

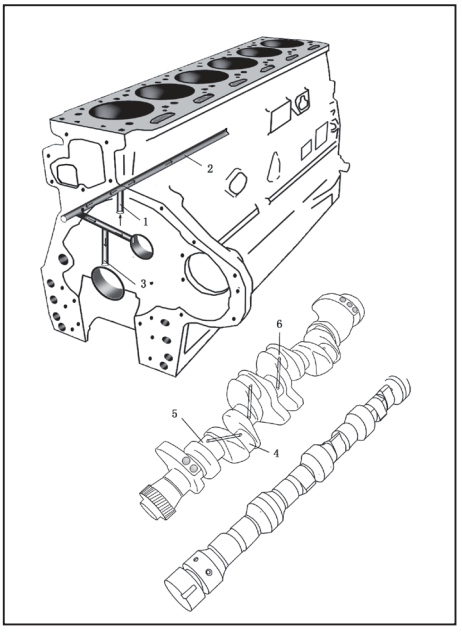
4.1 润滑系统
Lubricating system



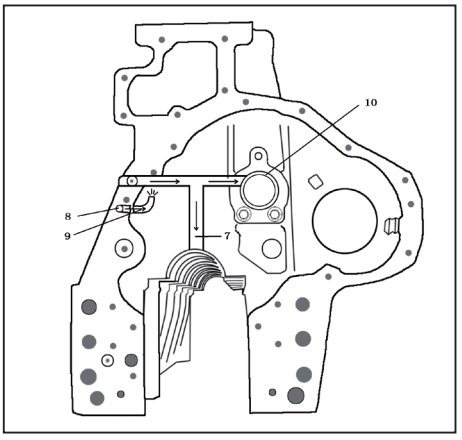
1. 集滤器
   Strainer
2. 机油泵
   Oil pump
3. 机油滤清器
   Oil filter
4. 滤座
   Filter seat
5. 安全阀
   Relief valve
6. 机油泵安全阀
   Safety valve of oil pump
7. 主油道
   Main oil passage
8. 限压阀
   Pressure limiting valve

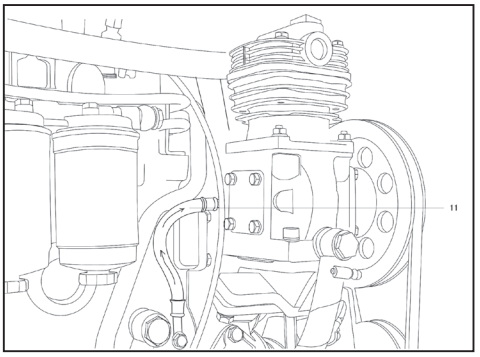
各大运动零件的润滑

Lubricating for main moving parts



1. 机油冷却器来油
   The oil flowing from the oil cooler
2. 主油道
   Main oil passage
3. 通往主轴颈
   Oil to the main crankshaft joumal
4. 连杆轴颈
   Connecting rod journal
5. 曲轴主轴颈处
   The main journal of crankshaf
6. 通往连杆轴承
   Oil to connecting rod beating
7. 主油道通向主轴承的斜油道
   The branch oil passage passing to main Dearing
8. 付油道
   Sub–passage of oil
9. 冷却活塞喷油
   Oil injection nozzle to Cool piston
10. 凸轮轴轴承
    Camshaft beating

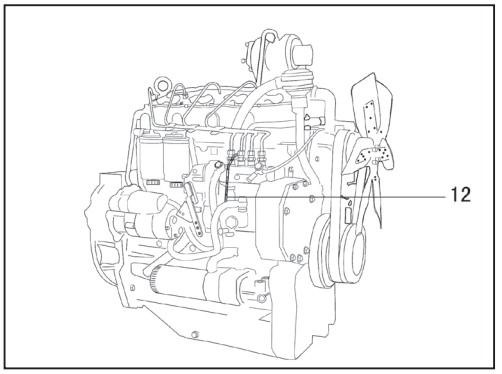




11. 主油道来油润滑空压机
    Lubricating air compressor with oil from main oil passage

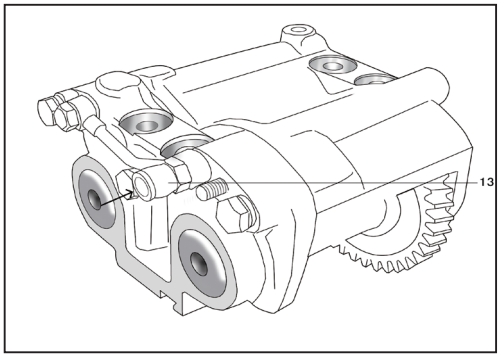
12. 付油道来油润滑喷油泵

Lubricating fuel injection pump with oil from secondary oil passage



13. 付油道来油润滑二级平衡机构

Lubricating two-stage balancing mechanism with oil from main oil passage



摇臂机构的润滑

Lubricating for rocker arm system

1. 主油道斜油孔来油

   Oil flowing from the oil branch passage

2. 挺柱油孔

   Tappet oil hole

3. 挺杆油孔

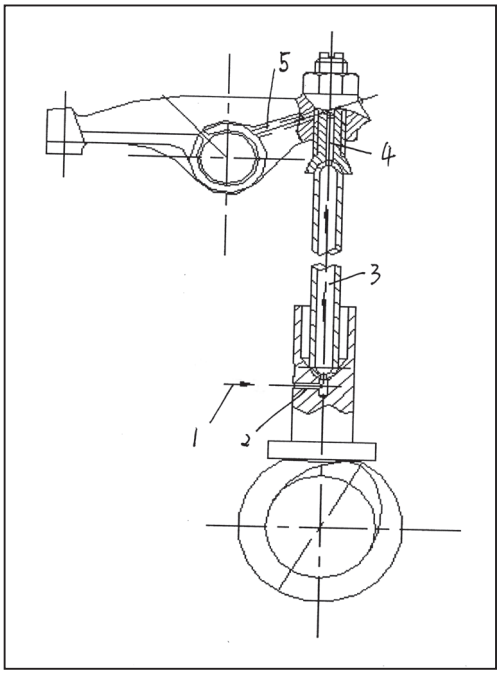
   Push rod oil hole

4. 摇臂螺钉油孔

   Oil hole of rocker arm bolt

5. 摇臂油孔

   Oil hole of rocker arm



增压器的润滑

Lubricating turbocharger

1. 主油道来油

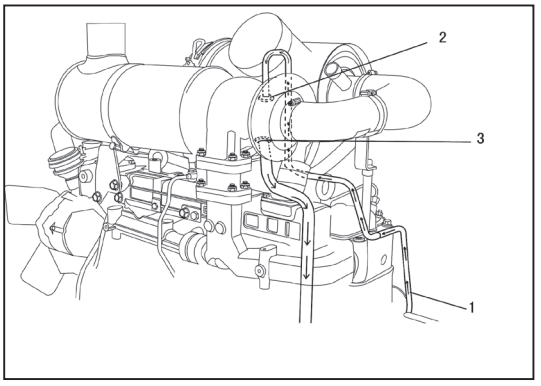
   Oil from the main oil passage

2. 增压器进油口

   Oil inlet of turbocharger

3. 增压器回油口

   The oil outlet of turbocharger



4.2 冷却系统

Cooling system

1. 水泵进水口

   Water pump inlet

2. 水泵

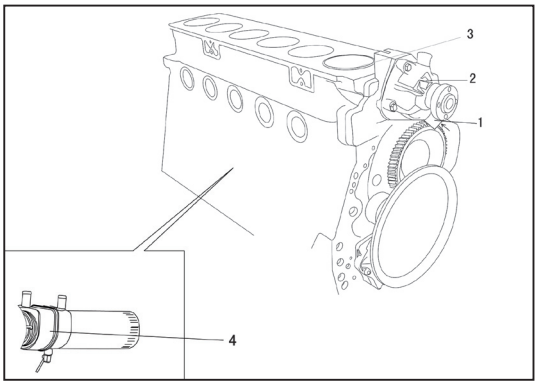
   Water pump

3. 气缸体水套

   Water jacket of cylinder block

4. 机油冷却器

   Oil cooler



1. 气缸体水套

   Water jacket of cylinder block

2. 来自缸体水套之水

   Cooling water flowing from water jacket of cylinder block

3. 气缸垫

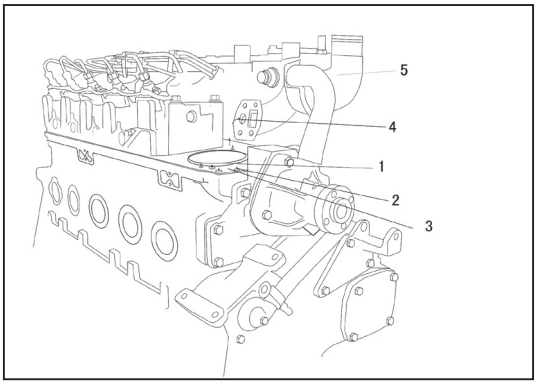
   Cylinder head gasket

4. 流经气缸盖水腔

   Cooling water passing through the water passage of cylinder head

5. 出水口

   Cooling water outlet



1. 机体流出冷却液

   Coolant flowing from cylinder block

2. 调节器

   Thermostat

3. 旁通阀

   Bypass valve

4. 流入水泵的冷却液

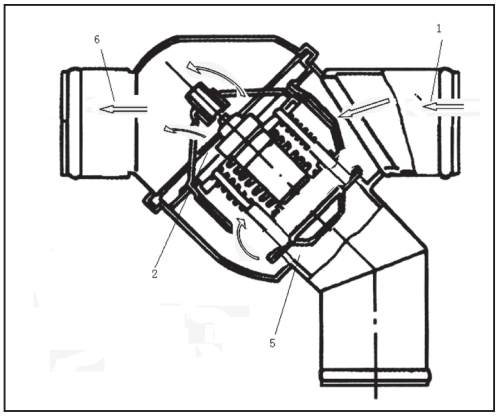
   Coolant flowing into water pump

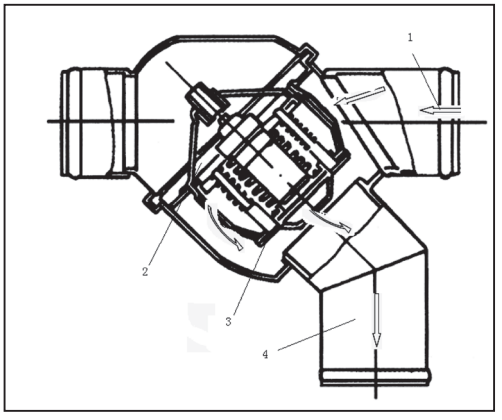
5. 旁通阀关闭

   Bypass valve closed

6. 冷却液流入散热器

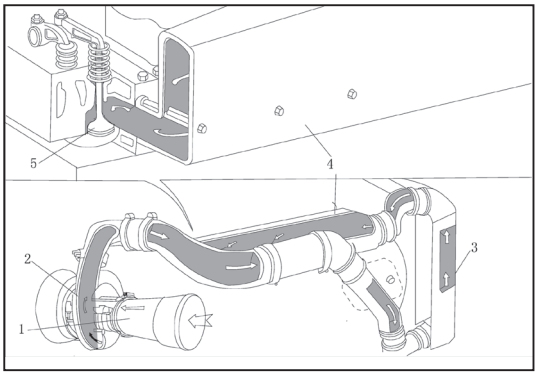
   Coolant flowing into the radiator





4.3 进排气系统

Intake and exhaust system



1. 经过滤清器滤清的空气进入增压器(非增压机无增压器)

Air cleaned through air filter into supercharger (no supercharger unless supercharged engine)

2. 流经中冷器的增压空气(增压非中冷机无中冷器)

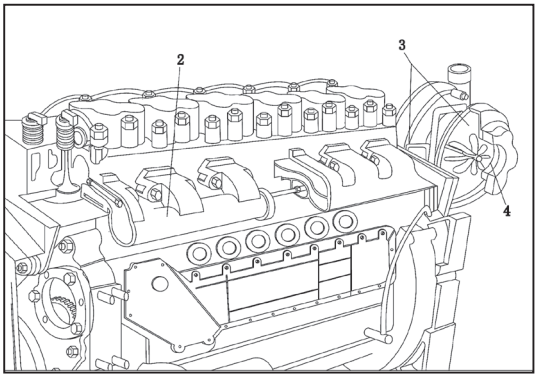
Pressurized air through inter–cooler (no inter–cooler for supercharged and nonintercooled engine)

4. 进气管

Intake manifold

5. 进气门

Intake valve



1. 排气门

Exhaust Valve

2. 排气管

Exhaust manifold

3. 排气进入增压器涡轮

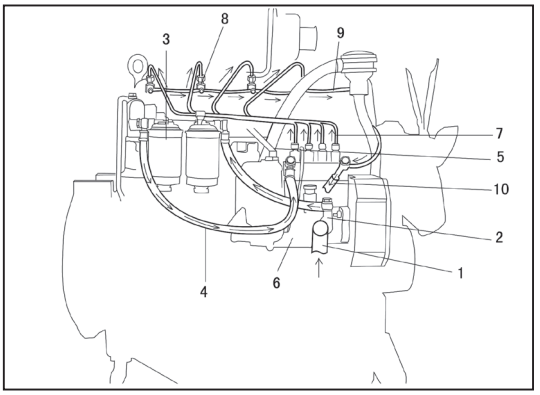
Exhausting gas flowing into the turbo of turbocharger

4. 增压器排气出口

Exhaust outlet of turbocharger

4.4 燃油系统

Fuel supplying system



1. 来自油箱的燃油

   Fuel from the fuel tank

2. 输油泵

   Fuel delivery pump

3. 燃油滤清器

   Fuel filter

4. 低压油管

   Fuel delivery pipe

5. 冒烟限制器空气限制管(非增压机无此件)

Air–limiting pipe of fume limiter (Only existing in supercharger)

6. 喷油泵

   Fuel injection pump

7. 高压油管

   High pressure fuel pipe

8. 喷油器

   Injector

9. 喷油器回油管

   Fuel returning pipe of injector

10. 回油箱燃油管

    Fuel pipe back to the fuel tank

5. 柴油机强力螺栓的拧紧力矩和拧紧方法

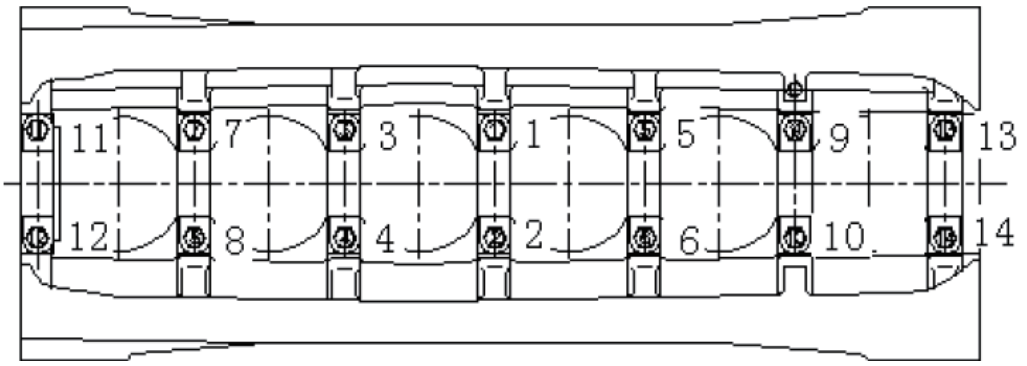
Tightening Torque And Tightening Method Of High Strength Bolts

1. 主轴承螺栓：

Main–Bearing Bolt

8 根 M14（4 缸机为 10 根，6 缸机为 14 根）、22mm 套筒扳手

8 pieces M14 (10 pcs for 4–cylinder engine and 14 pcs for 6–cylinder engine), sleeve wrench 22mm.



6 缸机分两次拧紧（拧紧顺序按上图所示）

For a 6–cylinder engine, tightening is done in two times (in sequence as shown in the above figure).

第一次：70N・m

Firstly, in 70 N・m;

第二次再将螺栓旋扭 90° ±4°；3、4 缸机参照上图按由中间均匀两端延伸的顺序分 2 次拧紧。

Secondly, the bolt is turned 90° ±4°. For 3–cylinder and/or 4–cylinder engines, in reference to the same figure, the bolt is screwed down in two steps, namely even in the middle and extended at two ends.

2. 气缸盖螺栓：

Cylinder Head Bolt：

12 根 M14（4 缸为 16 根，6 缸为 24 根）、17mm 套筒扳手

12 pieces M14 (16 pcs for 4–cylinder engine and 24 pcs for 6–cylinder engine), 17mm sleeve wrench.

按下列顺序拧紧：

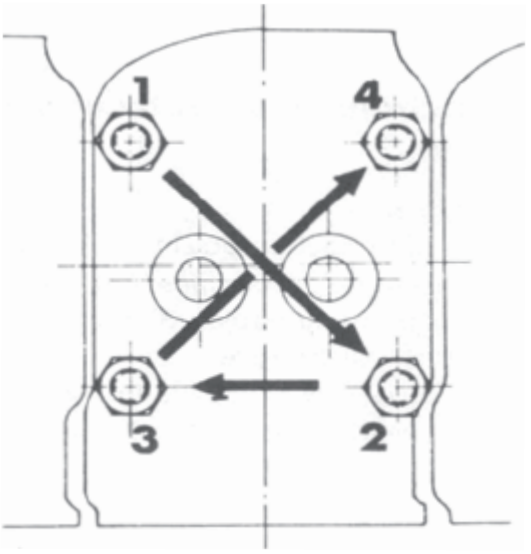
Following such tightening sequence：

第一步：气缸盖安装好后须找正，即进排气口侧应在一个平面内；

Step 1: Cylinder head must be aligned after amounted, i.e. the sides of both air inlet and exhaust outlet should be on the same plane;

第二步：每缸气缸盖螺栓按下图顺序拧紧；

Step 2: The cylinder head bolts on each cylinder shall be screwed down in the order of the under figure;



1. 以 30N・m 力矩预拧紧；

Pre–tighten in 30 N・m torque;

2. 拧转角 120° ±4°；

Turning angle is 120° ± 4°

3. 再拧转角 120° ±4°。

Re–turning angle is 120° ± 4°

第三步：整机气缸盖螺栓拧紧顺序为：

Step 3: The tightening sequence of the cylinder head bolts in the whole engine is as follows:

3 缸机：2–1–3

3–cylinder engine: 2–1–3

4 缸机：2–3–4–1

4–cylinder engine: 2–3–4–1

6 缸机：3–4–5–2–1–6

6–cylinder engine: 3–4–5–2–1–6

并应按第二步规定分 3 次拧紧

And as per Step 2, the course of screw–down shall be carried out in three times.

注意：每个拧紧过程螺栓本身伸长了0.2～0.6mm，多次使用后，其长度只允许到160.5mm，超过了这个长度就要更换新螺栓。

Caution: In every tightening, the bolt itself has an extension of 0.2–0.6 mm in length. In spite of its repeated use, its length cannot be over 160.5 mm, if so, it must be replaced with a new one.

3. 连杆螺栓：

Connecting rod Bolt：Connecting rod Bolt：

两根 M12x1.5 19mm 套筒扳手

Total nos. ：2 pcs M12x1.5 for each connecting rod Tool：19 mm sleeve wrench

第一步：先拧靠，再用 30N・m 的力矩对称扭紧。

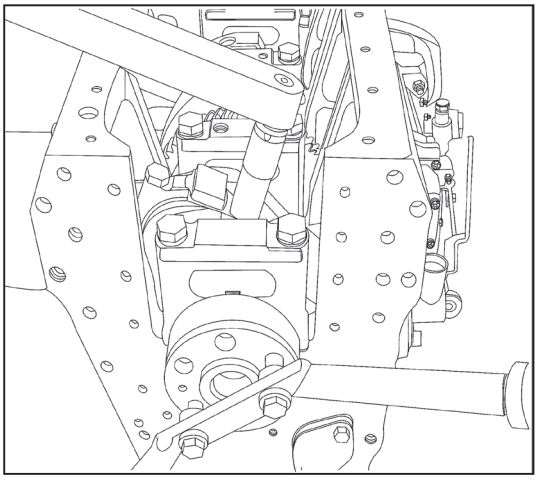
Step 1: Tighten tightly，then tighten these bolts symmetrically with a torque of 30N・m.

第二步：各旋扭 60° ±5°

Step 2：Turn these bolts 60° ±5°.

注意：连杆螺栓只允许使用一次，不允许重复使用。

Caution: The connecting–rod bolt is only of one–time use and may not be used again.



4. 飞轮螺栓：

Flywheel Bolt：

6 根 M16 24mm 套筒扳手

6 pieces M16, 24mm sleeve wrench

第一步：先对称拧靠

Step1: Firstly screw on symmetrically.

第二步：再对称拧紧，力矩为 285–295N・m

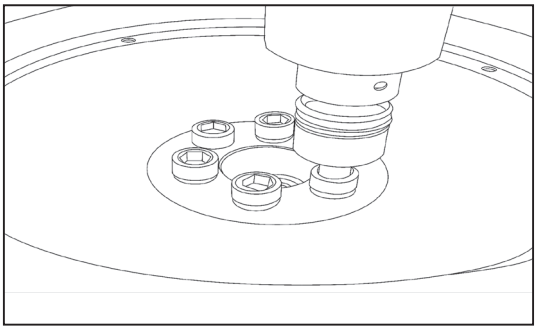
Step 2: Screw down symmetrically in 285–295N・m torque

对达不到扭矩要求的螺栓应更换。

The bolt under the expected torque must be changed.

注意：飞轮螺栓只许使用 2 次。

Note：The flywheel bolt is only allowed to be reused for 2 times.



5. 飞轮壳螺栓：

Bolt for Flywheel Housing

12 根 M10、6 根 M12

16mm、18mm 套筒扳手

12 pieces M10, 6 pieces M12, 16mm and 18mm sleeve wrenches

第一步；先将螺栓拧靠

Step 1: Screw on the bolts

第二步：再分别将螺栓拧紧，M10 螺栓拧紧力矩为 80–85N・m，M12 螺栓拧紧力矩为 140–145N・m;

Step 2: Screw down the bolts in such tightening torque, for M10 80–85N・m and M12, 140–145N・m.

对达不到扭矩要求的螺栓应更换。

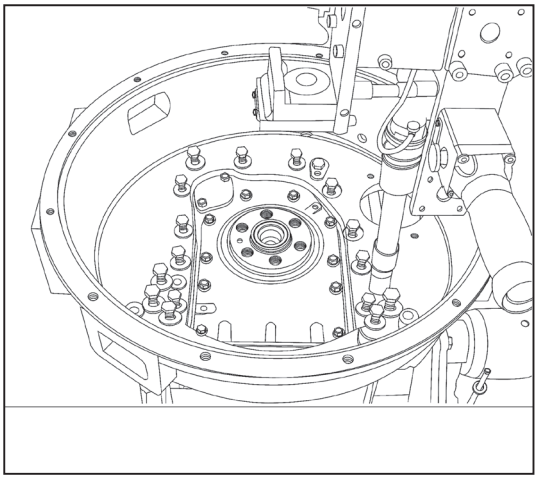
Replace the bolt under the required torque.

飞轮壳螺栓允许重复使用 2 次。

The flywheel housing bolt can only be used twice.

注意：以上几种强力螺栓拧入前均要在螺纹及支撑面上涂润滑油。

Caution: All the above–mentioned strengthening bolts should be coated with lubricating oil on the thread and bearing surfaces before their screwing in.



6. 中间齿轮轴螺栓(欧II结构)：

Intermediate gear shaft bolt (Euro Ⅱ engine)

4 根 M10　15mm 套筒扳手

4 pieces M10, 15mm sleeve wrench

第一步：60N・m 力矩对称扭紧

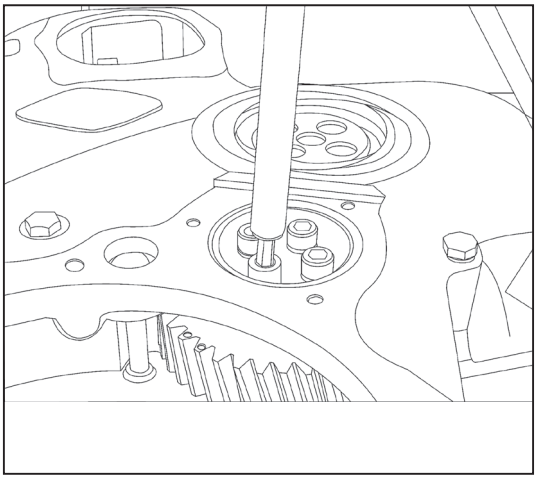
Step 1: Tighten the bolts with torque 60N・m symmetrically.

第二步：分别旋转 90°，扭矩达到 100–125N・m。达不到要求螺栓应更换。

Step 2: Turn the bolts 90°, let the torque value come to 100–125N・m. Replace the bolt under the required torque value.

螺栓拧入前螺纹部位涂乐泰密封胶 242。

Before screwing–in, the thread should be coated with the LOCTITE 242 sealant (a Chinese Brand).



7. 机油泵螺栓：

Oil pump bolt

2 根 M8、1 个 M8 螺母　13mm 套筒扳手

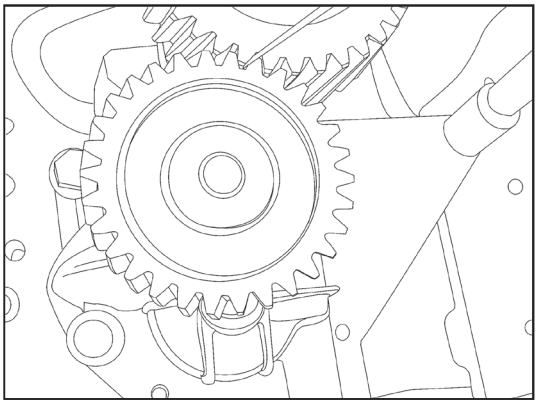
2 pcs M8, M8 nut (1 piece), 13mm sleeve wrench

M8 螺栓一次拧紧到 30–40N・m，M8 自锁螺母一次拧紧到 20–25N・m

The bolt M8 is once tightened to 30–40N・m and the lock nut to 20–25N・m.

拧入前螺纹部位涂乐泰密封胶 242。

Before screwing–in, the thread should be coated with the LOCTITE 242 sealant.



8. 摇臂座螺栓：

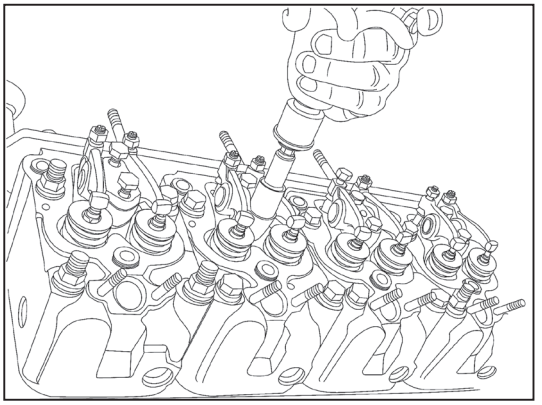
Rocker–arm seat bolt:

M10 螺栓　16mm 套筒子扳手

Bolt M10, 16mm sleeve wrench

一次拧紧到 40–45N・m。

The bolt is once tightened to 40–45N・m.



9. 二级平衡机构紧固螺栓

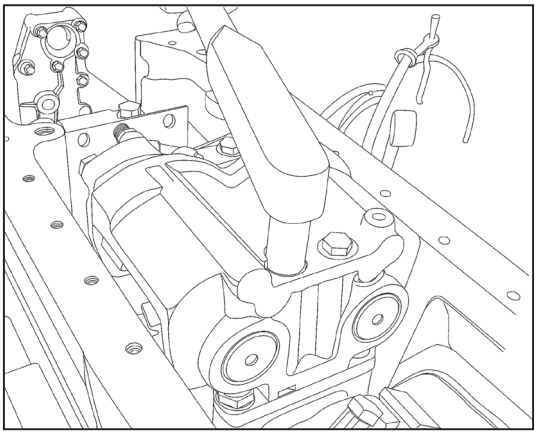
Fastening bolt for two-stage balancing mechanism

4 根 M10 螺栓　16mm 套筒扳手

4 pcs bolts M10, 16mm sleeve wrench

一次拧紧到 35–40N・m。

The bolt is once tightened to 35–40N・m.



10. 喷油泵齿轮紧固螺栓：

Fastening bolt for injection-pump gear:

4 根 M8（M10）　13mm（16mm）套筒扳手

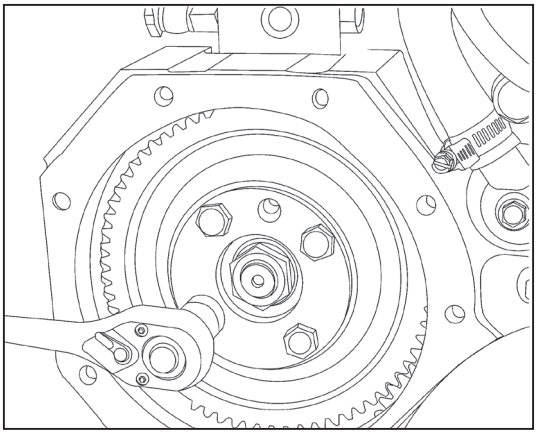
4 pcs bolts M8（M10）, 13mm（16mm）sleeve wrench

一次拧紧到 30–35N・m (60–65N・m)

The bolt is once tightened to 30–35N・m (60–65N・m).

拧入前螺纹部位涂乐泰密封胶 242。

Before screwing-in, the thread should be coated with the LOCTITE 242 sealant.



11. 喷油泵轴上螺母：

Nut for injection–pump shaft：

M18×1.5　27mm 套筒扳手

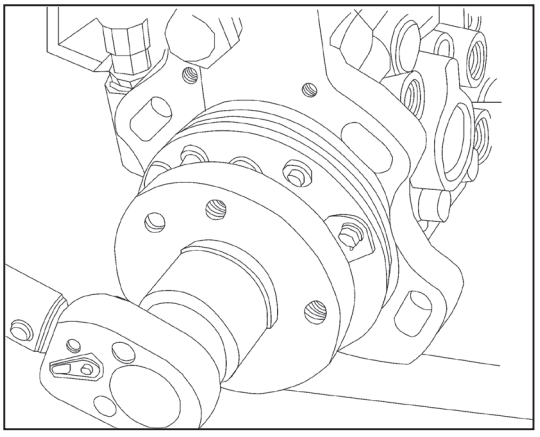
M18 ×1.5, 27mm sleeve wrench

一次拧紧到 100–110N・m。

The nut is once tightened to 100–110N・m.

拧入前螺纹部位涂乐泰密封胶 242。

Before screwing–in, the thread should be coated with the LOCTITE 242 sealant.



12. 凸轮轴齿轮紧固螺栓：

Fastening bolt for camshaft gear：

4 根 M10×1.25,16mm 套筒扳手

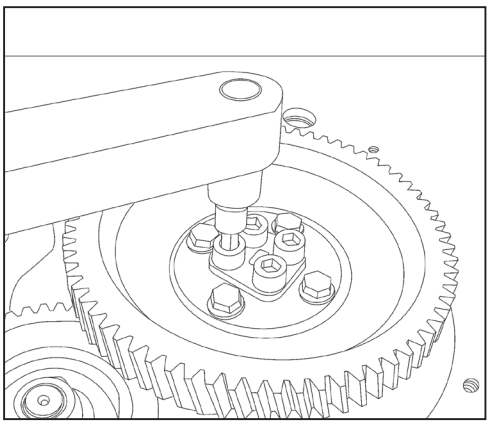
4 pcs M10×1.25,16mm sleeve wrench

对称拧紧到 85–90N・m。

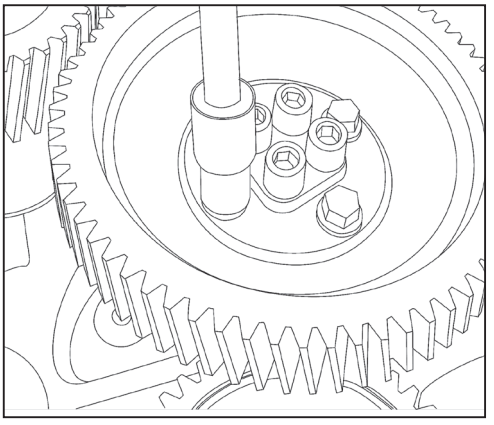
The bolt is symmetrically tightened to 85–90N・m.

拧入前螺纹部位涂乐泰密封胶 242。

Before screwing–in, the thread should be coated with the LOCTITE 242 sealant.



13. 凸轮轴–空压机驱动齿轮紧固螺栓：



Fastening bolt for driving gear of camshaft–air compressor

4 根 M8　13mm 套筒扳手

4 pcs M8, 13mm sleeve wrench

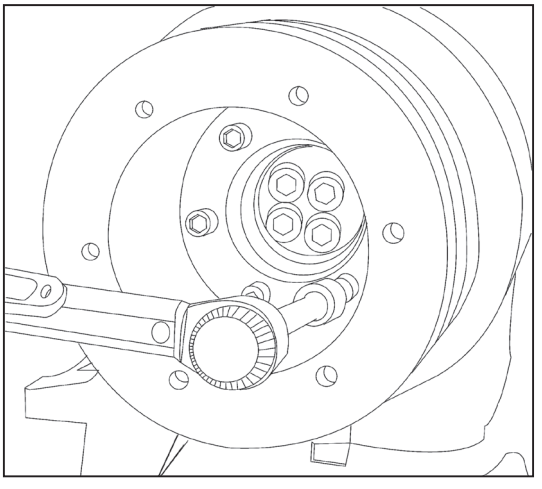
对称拧紧到 55–60N・m。

The bolt is symmetrically tightened to 55–60N・m.

拧入前螺纹部位涂乐泰密封胶。

Before screwing–in, the thread should be coated with the LOCTITE sealant.

14. 皮带轮与轮毂紧固螺栓：



Fastening bolt for belt pulley and hub

6 根 M10 ,8mm 内六角扳手

6 pcs M10, inner–hexagon spanner 8mm

对称拧紧到 65–70N・m。

The bolt is symmetrically tightened to 65–70N・m.

15. 进排气管紧固螺母：

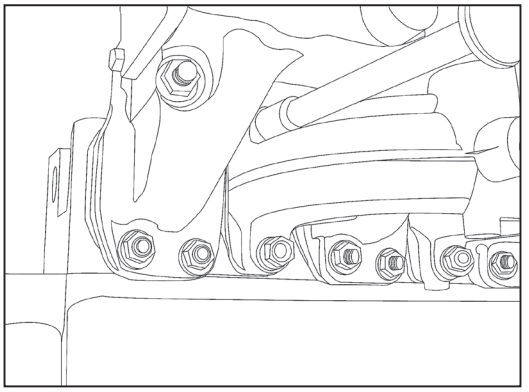
Fastening nut for intake and exhaust manifolds：

M10　16mm 套筒扳手

M10, 16mm sleeve wrench

对称拧紧到 45–50N・m。

Symmetrically tightened to 45–50N・m.



6. 柴油机所用的燃料油、润滑油、冷却液和辅助材料
Fuel，lubricant，coolant And Auxiliary Materials

6.1 燃料油

Fuel：

夏季　0 号柴油 GB252–87　冬季　–10 号柴油　GB252–87

In Summer　No.0 Diesel Fuel GB252–87　In Winter　No.–10 Diesel Fuel GB252–87

当冬季温度为 –20℃，选用 –20 号柴油。冬季温度低于 –30℃，采用 –35 号柴油。

In winter，when the temperature is – 20℃，you should use No.–20 Diesel Fuel.If the te–mperature is below–30℃，you should use No.–35 Diesel Fuel.

6.2 润滑油：

Lubricant：

6.2.1 增压发动机选用：GBl1123 CD级机油。

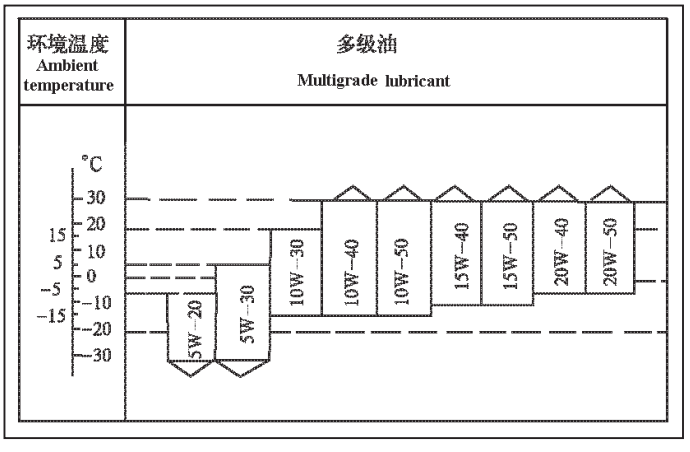
Turbocharged Engine：GB11123 CD oil.

6.2.2 允许以高品位的机油代替较低品位的。

It is allowed to replace low–grade oil with high–grade oil.

6.2.3 发动机润滑油的粘度可参照下图选用。

Please reference the following chart to choose viscosity of lubricant.



6.2.4 油面处于油标尺上限位置时，机油容量约7.25升（4缸为9.5升，6缸为13升），油标尺上下刻度间的落差约为3.25升（4缸为5升，6缸为6升）；根据用户协议，出厂时油底壳内，可以是充油，也可以是不充油的。当充油时，该油内含有特种磨合（防蚀）剂，用户可在运行2000公里（或50小时）时将机油全部放出，更换新机油。润滑油推荐使用中国石化长城高级润滑油公司生产的长城牌柴油机机油CD级15W/40。

When the oil level is located in the upper limit position of the oil dipstick, the oil capacity is about 7.25L (9.5L for 4–cylinder engine and 13L for 6–cylinder). According to the agreement with users, by the date of delivering the machine, whether or not the oil has been charged in the oil sump is no matter. The oil that has already been filled contains a special kind of running–in (anti–corrosive) agent. Users may drain off the oil and refresh it after the working period of 2000km or 50 hours. It is recommended to make use of the oil product, by name as Changcheng Diesel Engine Oil CD–grade 15W/40, produced by China Petrochemistry Changcheng High–Grade Lubricant Company.

6.3 冷却液：冷却系统加入防冻液，此液体具有防锈防冻的能力。（配比请参阅防冻液说明）

Coolant：The antifreeze that can be against rusting and freezing is added in the cooling system. Its compounding proportion is stated in the instruction of antifreeze.

6.4 辅助材料：

Auxiliary Materials：

6.4.1 本机在装修过程中，可使用乐泰510、242、271、277、262等规格的密封胶和粘接剂。

In the course of installation and maintenance of this diesel engine, the sealant and adhesive, such as LOCTITE 510, 242, 271, 277 and 262, can be applied.

6.4.2 细钼粉

Fine molybdenum powder.

6.4.3 各种辅助材料的使用部位见下表。

Where all kinds of auxiliary materials can be used is listed in the following table.

226B 系列柴油机所用的辅助材料表
Various auxiliary materials for 226B series diesel engine

序号 Serial No.	名称 Name	颜色 Color	用途与应用 Function and Application
1	细钼粉 Fine Molybdenum Powder	黑色 Black	涂在平滑的金属表面防止咬合。 Apply to smooth surface of metal to prevent biting. 例如：涂在气缸套外表面。 eg,Apply to exterior surface of cylinder liner.
2	二硫化钼油剂 Molybdenum disulfide Lube	深灰色 Dark Grey	零件处在较高温度下防粘着。 To prevent adhesion of parts under higher temperature. 例：增压器排气口螺栓等。 eg，Apply to the bolts of exhaust outlet of turbocharger.
3	乐泰242 Loctite 242 glue	兰色 Blue	涂在螺纹部位固持、密封。 Apply to thread to seal. 例：各种螺栓、螺纹部位。 eg，Apply to bolts and thread.
4	乐泰262 Loctite 262 glue	红色 Red	涂在螺纹部位锁紧密封、高力度。 Apply to thread to lock and seal. 例：气缸盖副螺栓。 eg，Apply to auxiliary bolts of cylinder head.
5	乐泰5910 Loctite5910 glue	红色 Red	涂在金属表面起密封作用。 Apply to surface of metal to seal. 例：气缸体与曲轴箱结合面。 eg，Apply to bond surface of"cylinder block and crankcase.
6	乐泰271 Loctite 271 glue	红色 Red	涂在金属表面起密封作用。 Apply to surface of metal to seal. 例：油道碗形塞。 eg，Apply to oil channel plug.
7	乐泰277 Loctite 277 glue	红色 Red	芯子与孔之间的密封。 Sealing of plug and hole. 例：机身水腔碗形塞。 eg，Apply to the water reservoir plug of cylinder block.

本章注意：为确保您所购的柴油机的正常使用，必须按本说明中规定，使用正确牌号的燃油、机油。

Caution in this Chapter: To ensure that the diesel engine you have bought functions normally, you must have a correct option relating to the brand and type of fuel and oil according to this instruction.

7. 电器部分
Electrical Appliance

电机部分包括发电机、起动机等。

This section consists of generator,starter,sensor of water temperature indicator,induction plug of oil pressure,etc.

发电机

Generator

发电机为三相交流发电机，经硅整流为直流。

The generator is three–phase alternator，after silicon rectification the current change into direct current.

输出电压 214V　电流 80A；输出电压 28V，电流根据用户需要可配 27A、35A、55A、70A 旋转方向右旋。

Output voltage: 14V, Current: 80A；output voltage28V;According to user requirement,the etectric current provided are: 27A、35A、55A、70A Rotary direction: Right.

最大允许转速 12000 转 / 分

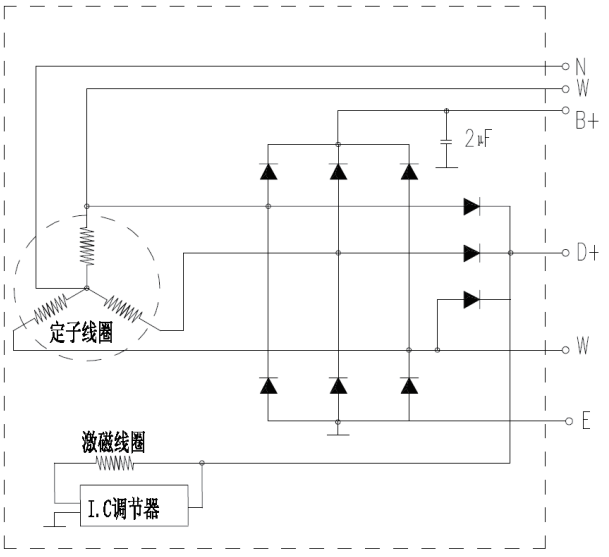
Max. allowable revolution speed: 12000 r/min

额定负荷转速 7333 转 / 分

Revolution speed at rated load: 7333 r/min

电路图：

Circuit Diagram：



接线柱

Connection Pole

D+ 接充电指示灯　螺纹规格 M4

D+connect to Charging(electri6cation)Indicating Lamp，the screw specification：M4

W 接测速电机　螺纹规格 M5

W connect to Speed Measuring Motor，the screw specification：M5

B+ 接蓄电池正极负载，电机外壳接地 螺纹规格 M6

B+connect to the positive electrode of battery，generator shell is grounded，the screw specification：M6

起动机

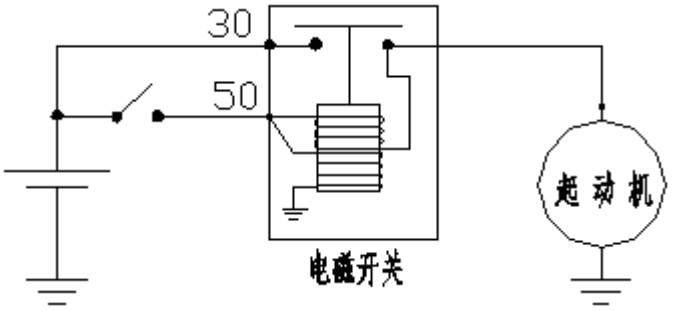
Starter

直流起动机电压 12V，功率 4kW; 电压 24V; 功率 6KW（4KW）旋转方向右旋（面向柴油机输出端看），齿轮数 10 齿。

DC starter voltage: 12 V, Power: 4 kW;Dcstarter voltage:24V;Power:6KW（4KW）right rotation (face to diesel engine output end), 10 teeth.

电路图：

Circuit Diagram：



外部接线柱：

Extemal Connection Pole：

30 接蓄电池正极 螺纹规格 M10

30 connect to the positive electrode of battery，the screw specification：M10

50 接电磁开关 螺纹规格 M5

50 connect to the electromagnetic switch the screw specification：M5

起动机外壳接地

Starter casing earthing.

8. 主要零部件的调整与更换
Adjustment And Replacement Of Main Components

8.1 冷却系统
Cooling System

● 更换多楔带

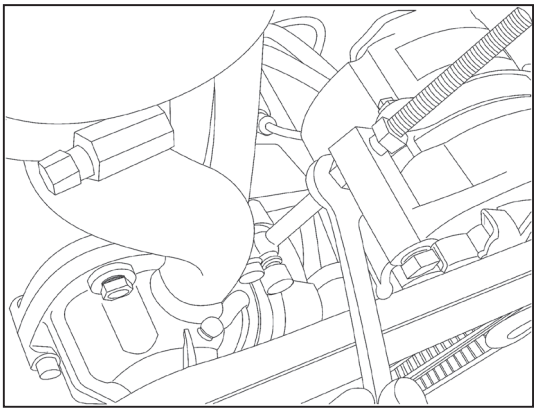
Replace poly V–belt

8mm 内六角扳手、 16mm 开口扳手

Inner–hexagon spanner 8mm, open–ended spanner 16mm

松开发电机涨紧螺栓紧固螺栓及换上多楔带，涨紧合适后重新拧紧涨紧螺栓紧固螺栓和涨紧螺栓螺母。

Unscrew the fastening bolt and nut of tensioning bolt, and take down the belt of generator.



● 更换水泵

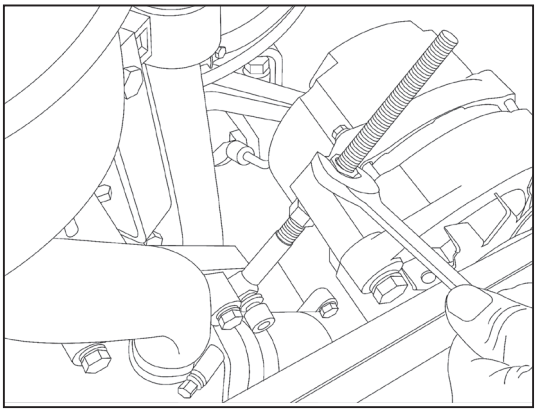
Replace water pump

8mm 内六角扳手、 16mm 开口扳手

Inner–hexagon spanner 8mm, open–ended spanner 16mm

松开发电机涨紧螺栓紧固螺栓及涨紧螺栓螺母，拿下发电机皮带。

Unscrew the fastening bolt and nut of tensioning bolt, and take down the belt of generator.

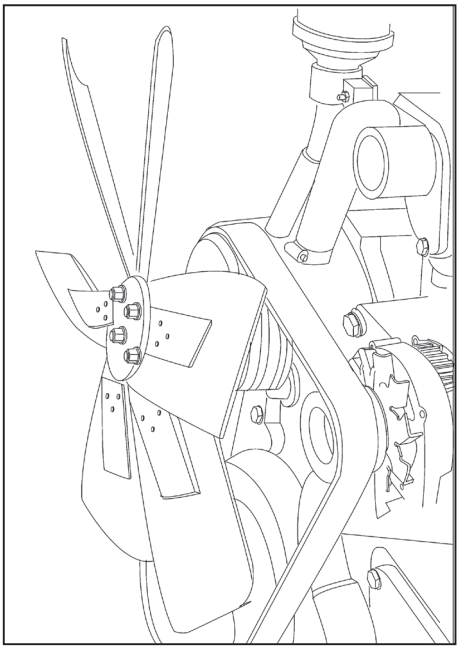


13mm 开口扳手

Open–ended spanner 13mm

拆下风扇紧固螺栓，拿下风扇、中间法兰及水泵皮带轮。

Loosen the fastening bolt of fan and dismantle the fan, intermediate flange and the belt pulley of water pump.

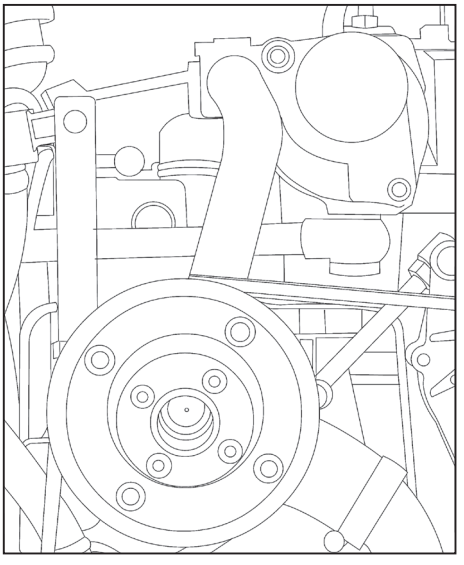


6# 螺丝刀

6# screw–driver

松开小循环胶管卡箍。

Loosen the clamp ring on rubber hose for small cycle.

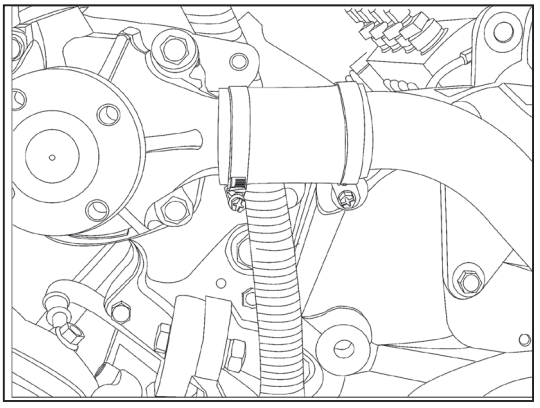


6# 螺丝刀

6# screw–driver

松开水泵进水口胶管卡箍。

Loosen the hose clamp ring in the water inlet of water pump.

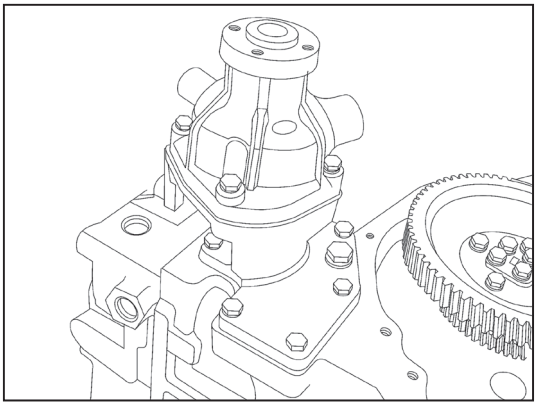


13mm 套筒扳手

Sleeve wrench 13mm

拆下水泵紧固螺栓，拿下水泵。

Take apart the fastening bolt on water pump and take away the water pump.



擦净水泵密封面。

Clean the sealed surface of water pump.

更换水泵密封垫片。

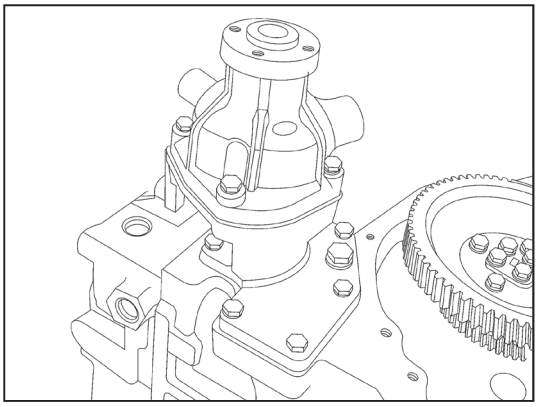
Change the seal gasket of water pump.

13mm 套筒扳手

Sleeve wrench 13 mm

换上新的水泵，拧紧 4 个螺栓。

Put on a new water pump and screw down the 4 bolts to fix it.

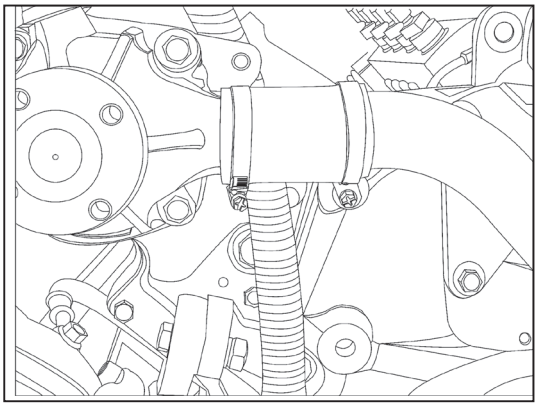


6# 螺丝刀

6# screw–driver

拧紧水泵进水口胶管卡箍。

Tighten the hose clamp ring in the water inlet of water pump.

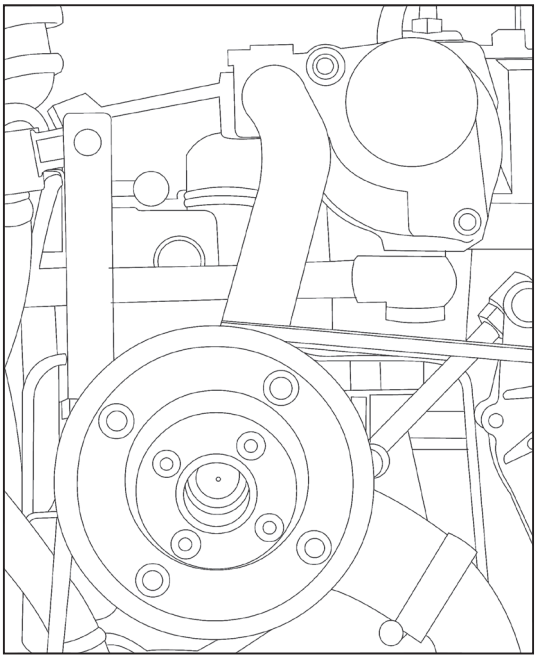


6# 螺丝刀

6#.screw–driver

拧紧小循环胶管卡箍。

Tighten the clamp ring on rubber hose for small cycle.

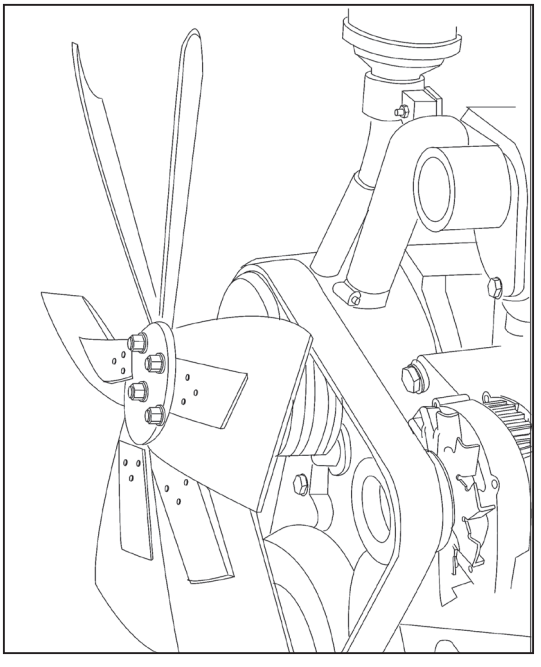


13mm 开口扳手

Open–ended spanner 13mm

依次装上水泵皮带轮、中间法兰、风扇，拧紧 4 个螺栓。

Reassemble the belt pulley, inter–flange and fan in the proper order, and tighten the 4 bolts.

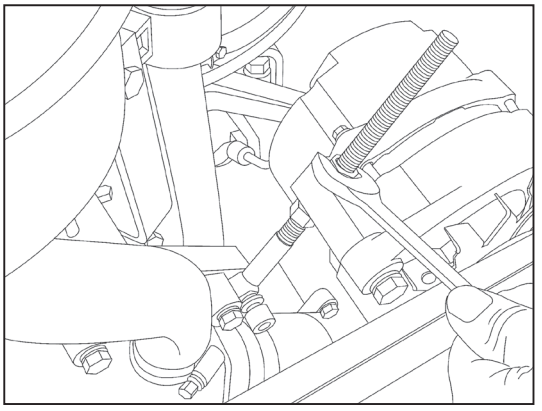


8mm 内六角扳手、16mm 开口扳手

Inner–hexagon spanner 8 mm, open–ended spanner 16mm

装上三角皮带，涨紧合适后重新拧紧涨紧螺栓紧固螺栓和涨紧螺栓螺母。

Put on the V–belt and tension it properly, and then re–tighten the fastening bolt and nut of tensioning bolt.



8.2 润滑系统
Lubricating System

● 更换机油冷却器

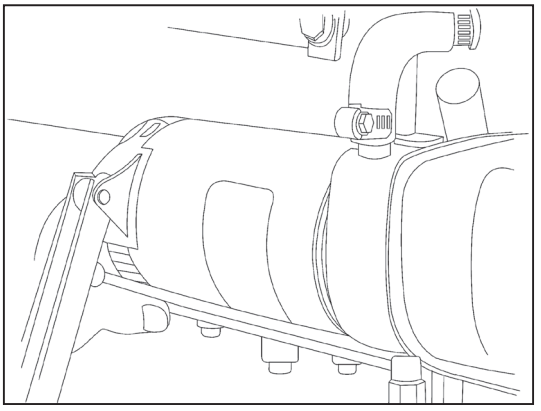
Replace oil cooler.

滤清器专用扳手。

Special wrench for oil filter.

拆下机油滤清器。

Dismantle the oil filter.

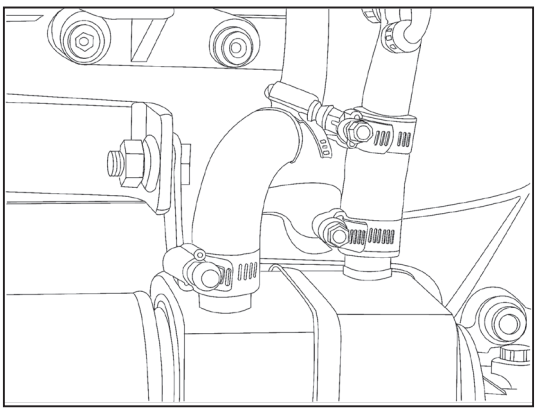


6# 螺丝刀

6# screw–driver

松开机油冷却器进出水胶管卡箍。

Loosen the water inlet/out hose clamp ring of oil cooler.

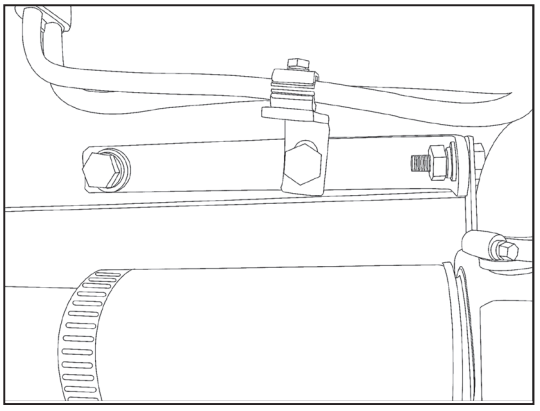


16mm 开口扳手

16mm Open–ended spanner

松开机油冷却器固定螺栓。

Unscrew the fastening bolt of oil cooler.

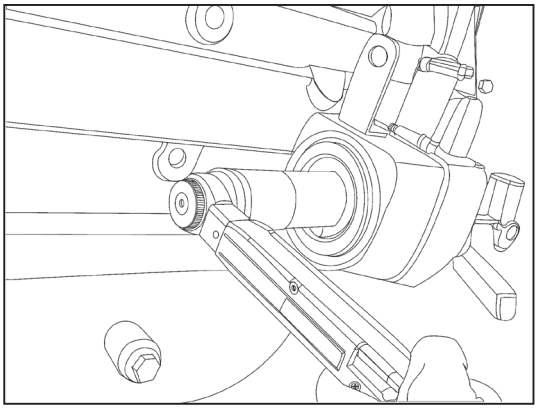


27mm 套筒扳手

27mm Sleeve wrench

松开连接螺套，拿下机油冷却器。

Unscrew the nipple and take down the oil cooler.

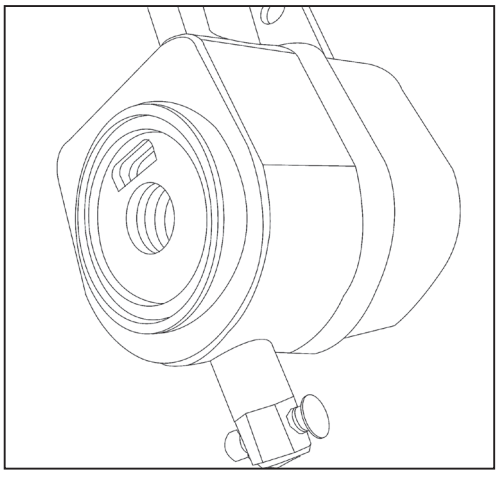


17mm 开口扳手

Open–ended spanner 17mm

拆下放水阀。

Dismantle the water–draining valve.

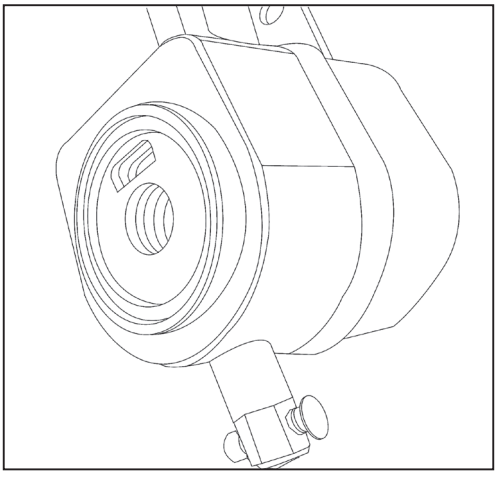


17mm 开口扳手

Open–ended spanner 17mm

将放水阀装到新的机油冷却器。

Mount the drain valve on the new oil cooler.

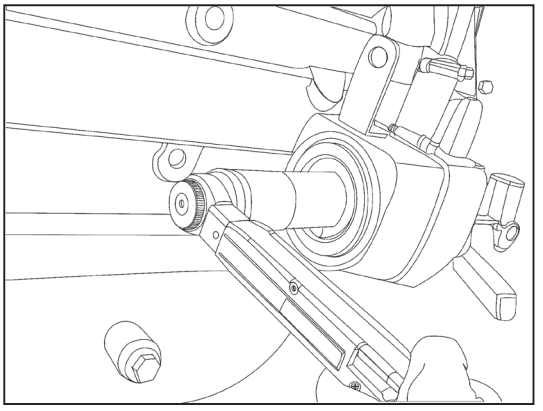


27mm 套筒扳手

27mm Sleeve wrench

清理机油冷却器与滤座安装面并更换新的密封垫片，更换新的机油冷却器，拧紧连接螺套。

Clean the oil cooler and the connecting surface of filter seat, change the seal gasket and substitute the oil cooler with a new one, and then tighten the nipple.

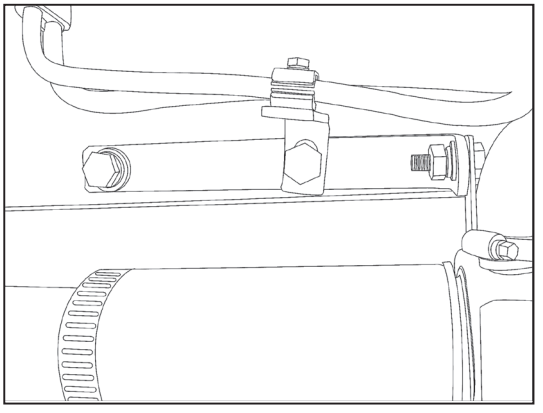


16mm 开口扳手

16 mm Open–ended spanner

拧紧机油冷却器固定螺栓。

Screw down the fastening bolt for the oil cooler.

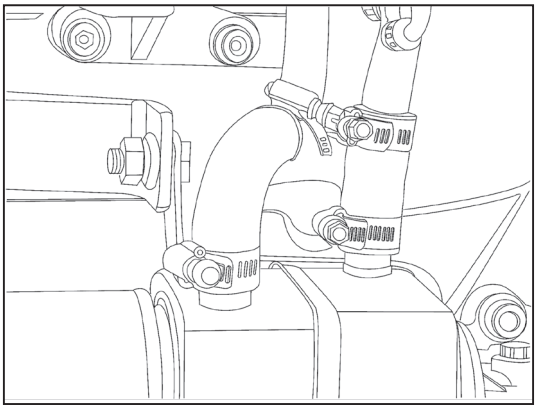


6# 螺丝刀

6# screw–driver

拧紧机油冷却器进出水胶管卡箍。

Tighten the water inlet/out hose clamp ring on the oil cooler.

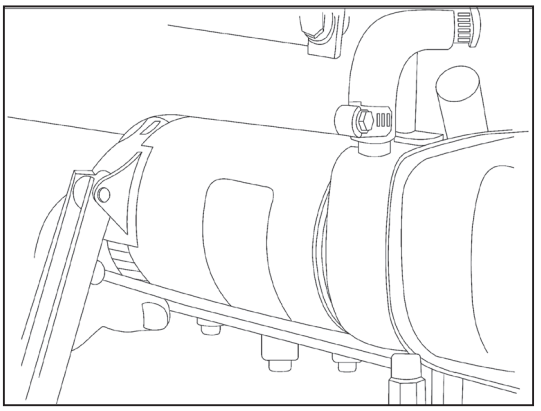


滤清器专用扳手

Special spanner for oil filter

装上机油滤清器。

Put on the oil filter.

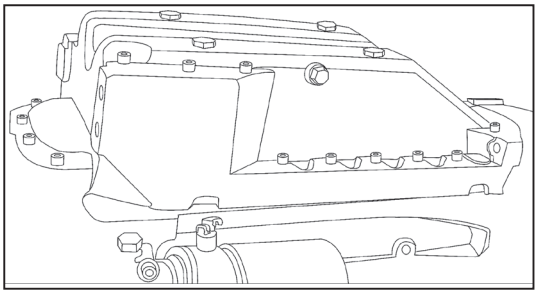


18mm 套筒扳手、6mm 内六角扳手

18mm Sleeve wrench, 6 mm Inner–hexagon spanner

松开油底壳与飞轮壳连接螺栓，松开油底壳紧固螺栓，拆下油底壳。

Unscrew the bolt connecting the oil sump with the flywheel housing, loosen the fastening bolt of oil sump and take down the oil sump.

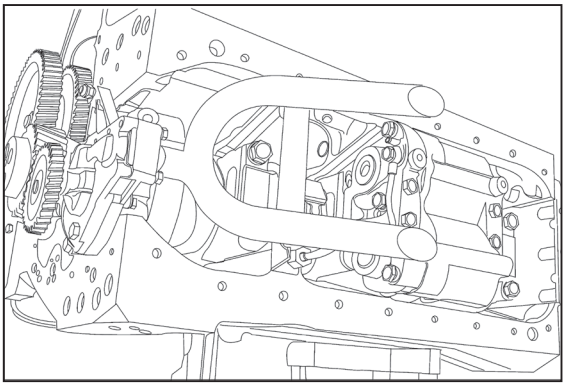


13mm、19mm 套筒扳手

13mm and 19mm Sleeve wrenches

松开润滑油进油管安装螺栓和螺纹接头，拿下润滑油进油管。

Loosen the mounting screw and the thread joint on lubricating oil inlet pipe, then take down the oil inlet pipe.

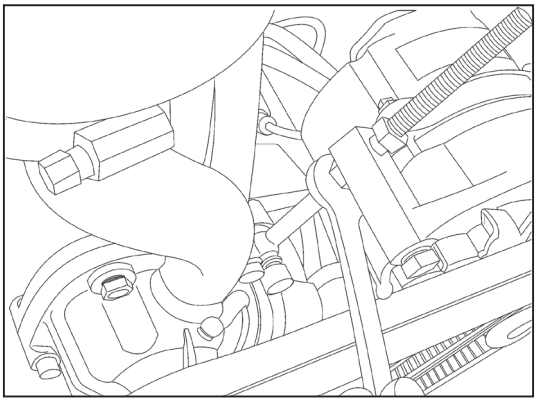


8mm 内六角套筒扳手、16mm 开口扳手

8mm,Inner-hexagon sleeve wrench, 16mm open-ended spanner

松开发电机涨紧螺栓紧固螺栓及涨紧螺栓螺母，拿下多楔带。

Unscrew the fastening bolt and nut of tensioning bolt of generator, and then pull down the poly V-belt.

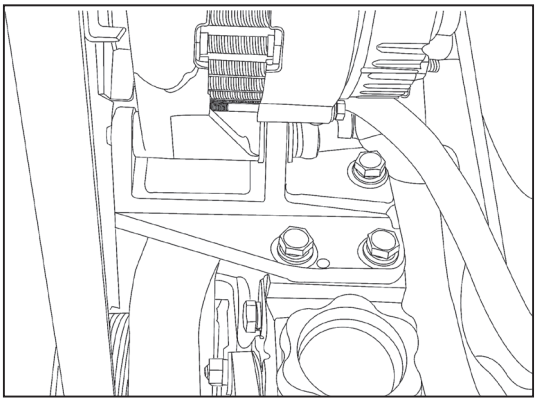


4mm 内六角套筒扳手

4mm Inner-hexagon sleeve wrench

松开发电机紧固螺栓，拆下发电机。

Unscrew the fastening bolt for generator and take down the generator.

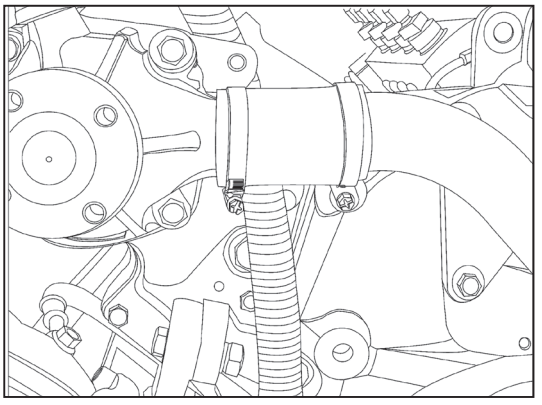


6# 螺丝刀、13mm 套筒扳手

6# screw-driver, 13mm sleeve wrenches

松开水泵进水口胶管卡箍及进水接管紧固螺栓，拆下进水接管。

Loosen the hose clamp ring in the water inlet and the fastening bolt on water inlet connecting pipe, and then dismantle the water inlet connecting pipe.

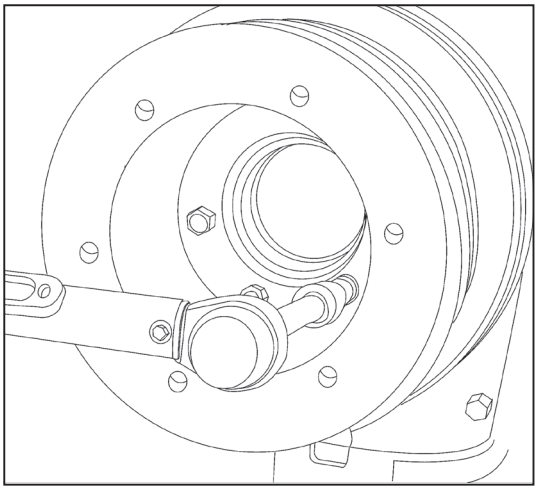


8mm 内六角套筒扳手

Inner-hexagon 8mm sleeve wrench

松开曲轴皮带轮紧固螺栓，拆下曲轴皮带轮及减振器。

Unscrew the mounting bolt for belt pulley of crankshaft and dismantle the belt pulley and the shock absorber.

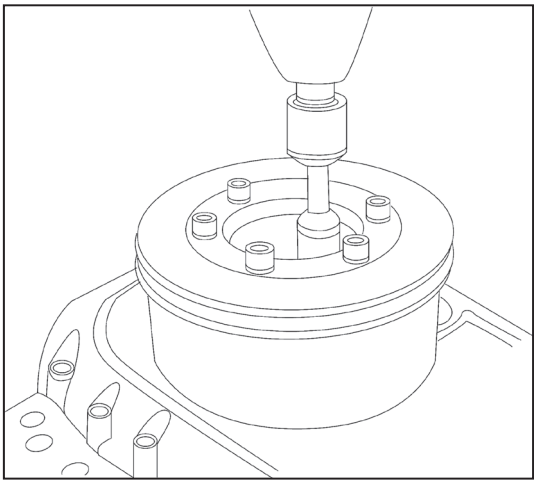


14mm 内六角套筒扳手

Inner-hexagon 14mm sleeve wrench

松开轮毂紧固螺栓，拆下轮毂。

Dismantle the hub after loosening the hub bolt.

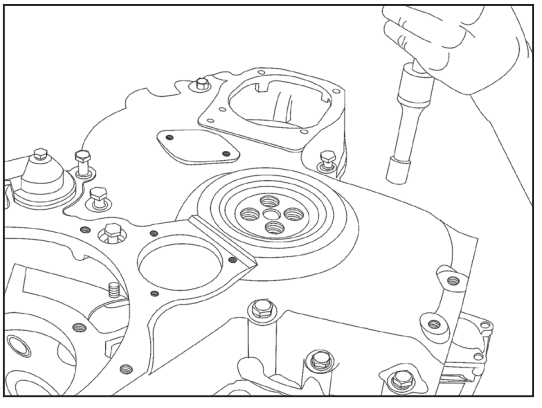


4mm 内六角套筒扳手、13mm 套筒扳手

Inner-hexagon 4mm sleeve wrench, 13mm sleeve wrenches

松开前墙盖紧固螺栓，拆下前墙盖。

Unscrew the fastening bolt on front wall cover and dismantle the front wall cover.

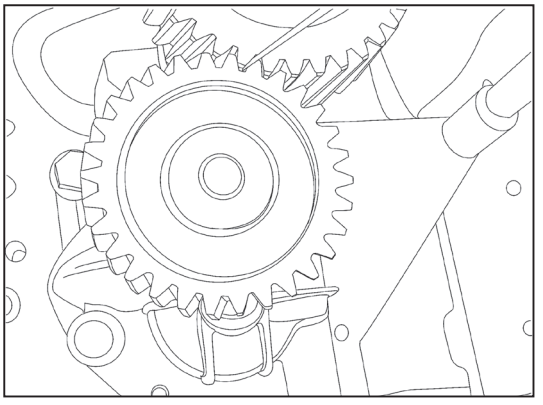


13mm 套筒扳手

13mm Sleeve wrench

松开机油泵紧固螺栓及螺母，拆下机油泵。

Unscrew the fastening bolt and nut, dismantle the oil pump.

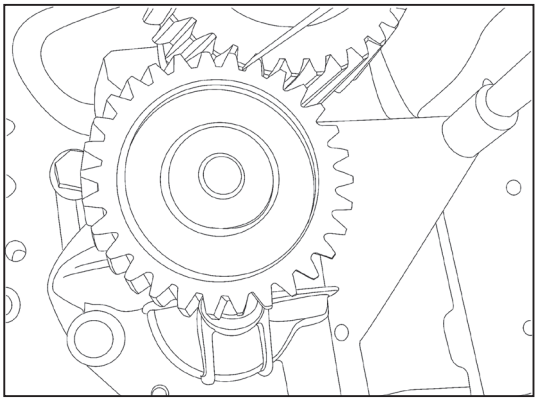


塞尺、13mm 套筒扳手

Feeler, 13mm Sleeve wrench

清理机油泵与机体结合面，安装新的机油泵，调整齿轮侧向间隙（侧隙 0.2mm），拧紧螺栓及螺母。

Clean the connecting surface of oil pump with cylinder block, mount a new oil pump, adjust the side clearance of gear (side clearance 0.2 mm), and then tighten the bolt and nut.

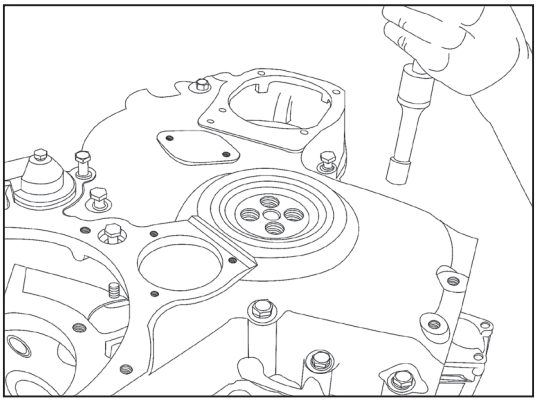


4mm 内六角套筒扳手、13mm 套筒扳手

4mm Inner-hexagon sleeve wrench, 13mm sleeve wrench

擦净前墙盖与机体结合面涂上密封胶，装上前墙盖，拧紧前墙盖紧固螺栓。

Clean up the connecting surface of the front wall cover with the cylinder body, coat the sealant on it, and then re-mount the front wall cover and tighten the bolt on it.



14mm 内六角套筒扳手

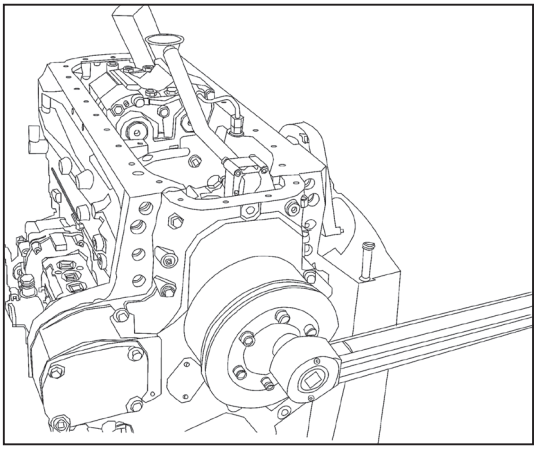
Inner-hexagon 14mm sleeve wrench

装上轮毂，拧紧轮毂紧固螺栓。

Re-mount the hub and screw the bolt on it.

注意：轮毂伸入时应动作轻柔，以免损坏曲轴前油封唇部。

Caution: To avoid damage to the front-seal lip of crankshaft, put in the hub lightly.

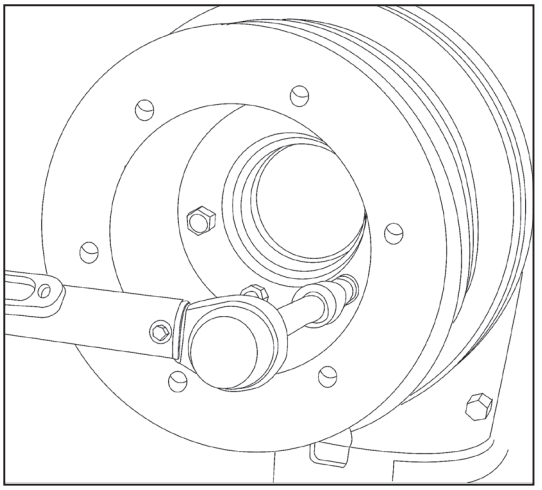


8mm 内六角套筒扳手

Inner-hexagon 8mm sleeve wrench

依次装减振器及曲轴皮带轮，拧紧曲轴皮带轮紧固螺栓。

Put on the shock absorber and the belt pulley of crankshaft in turn, and then screw down the bolt on the belt pulley of crankshaft.



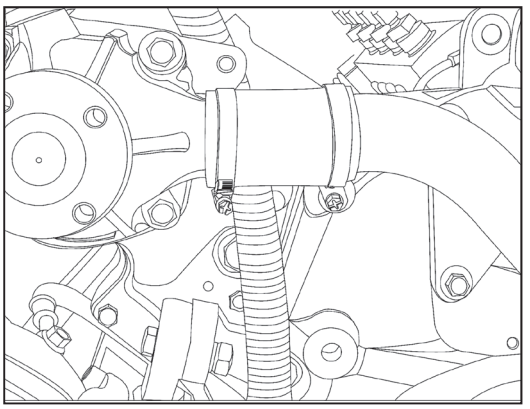
6# 螺丝刀、13mm 套筒扳手]

6# screw-driver, 13mm sleeve wrench

装上进水接管，拧紧水泵进水口胶管卡箍及进水

接管紧固螺栓。

Put on the water inlet connecting pipe, tighten the water inlet hose clamp ring and the bolt on it.

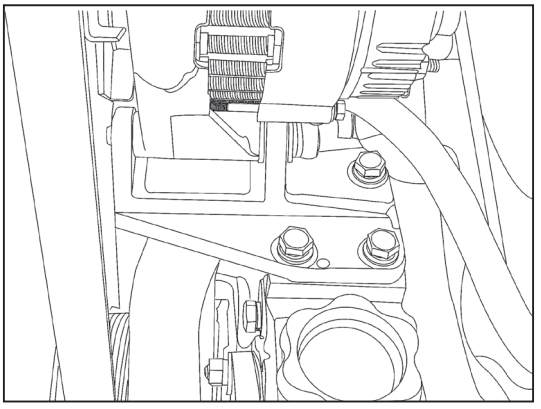


4mm 内六角套筒扳手

Inner-hexagon 4mm sleeve wrench

装上发电机，拧紧发电机紧固螺栓。

Mount the generator and tighten the bolt on it.

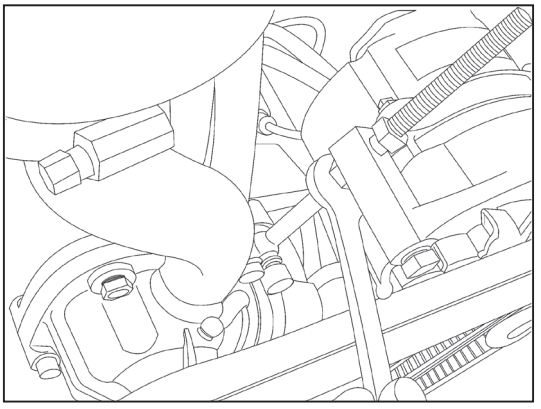


8mm 内六角套筒扳手、16mm 开口扳手

Inner-hexagon 8mm sleeve wrench, 16mm open-ended spanner

装上多楔带，调整合适后拧紧发电机涨紧螺栓紧固螺栓及涨紧螺栓螺母。

Put on the poly V-belt and adjust it properly, and then screw down the fastening bolt and nut for generator.

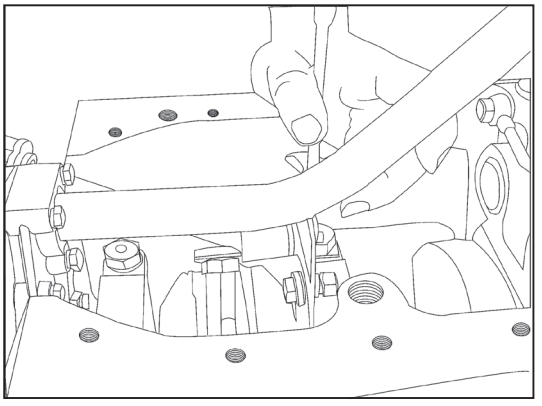


13mm、19mm 套筒扳手

13mm and 19mm Sleeve wrench

更换新的 O 型密封圈，装好润滑油进油管并用螺栓固定在角板上。

Replace the O–seal ring, fit on the lubricating oil inlet pipe, and instalt the oil inlet pipg and fasten with bolt on the angle plate.

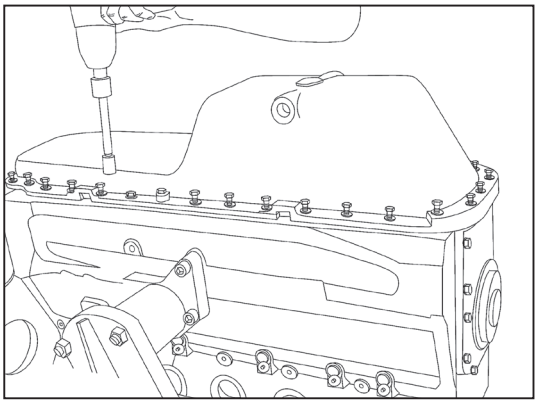


18mm 套筒扳手、 6mm 内六角扳手

18mm Sleeve wrench, 6mm Inner–hexagon spanner

装好油底壳，拧紧油底壳与飞轮壳连接螺栓及油底壳紧固螺栓。

Fit on the oil sump, tighten the bolt connecting oil sump with flywheel housing and the fastening bolt for the oil sump.

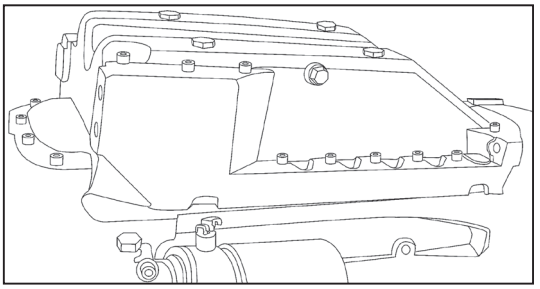


18mm 套筒扳手、6mm 内六角扳手

18 mm Sleeve wrench , 6 mm Inner–hexagon spanner

松开油底壳与飞轮壳连接螺栓，松开油底壳紧固螺栓，拆下油底壳。

Loosen the connecting bolt between oil sump and flywheel housing, unscrew the fastening bolt on oil sump and take down the oil sump.

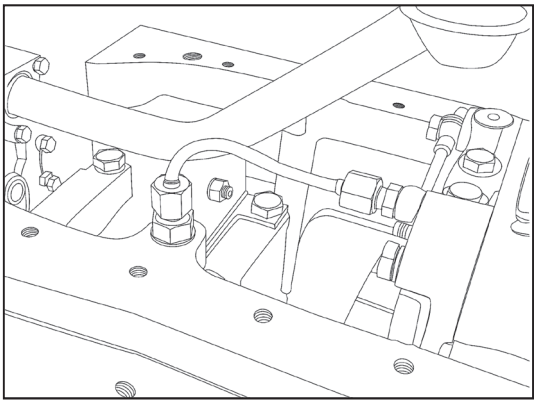


17mm 开口扳手

17 mm Open–ended spanner

松开润滑油管接头。

Loosen the joint of lubricating oil pipe.

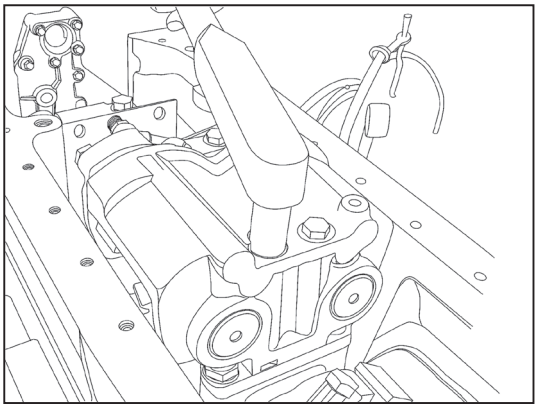


16mm 套筒扳手

16mm Sleeve wrench

松开紧固螺栓，拿下二级平衡机构。

Unscrew the fastening bolt and take down the two-stage balancing mechanism.

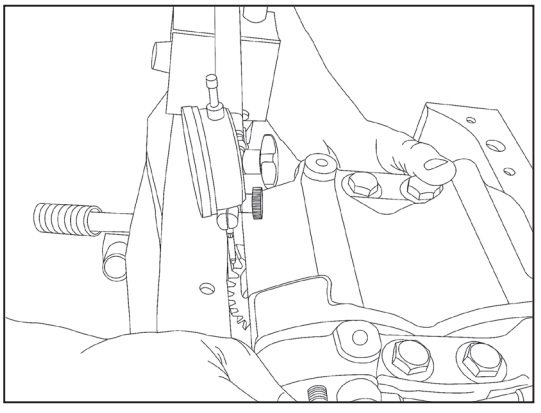


16mm 套筒扳手

16mm Sleeve wrench

装上二级平衡机构，调整齿轮侧向间隙到 0.3–0.4mm，拧紧螺栓力矩到 34–40N・m。

Re-mount the two-stage balancing mechanism; adjust the side clearance of gear to 0.3–0.4mm and the tightening torque to 34–40N・m.

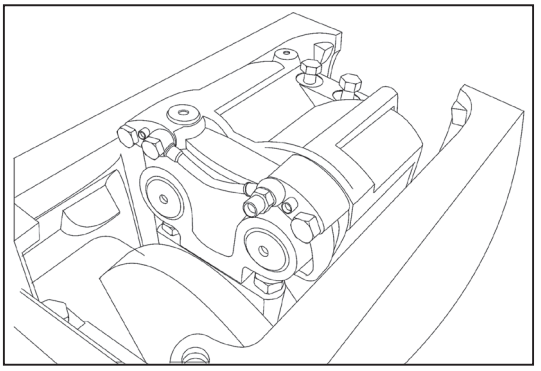


17mm 开口扳手

17mm Open–ended spanner

拧紧润滑油管接头。

Screw down the joint of lubricating oil pipe.

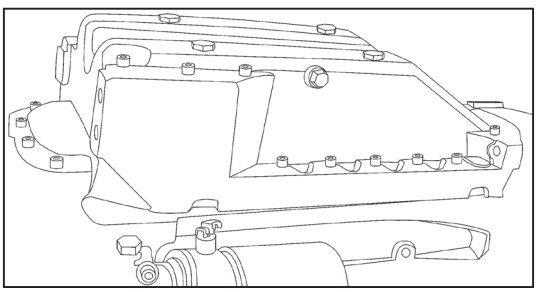


18mm 套筒扳手、6mm 内六角扳手

18mm Sleeve wrench, 6mm Inner–hexagon spanner

装好油底壳，拧紧油底壳与飞轮壳连接螺栓及油底壳紧固螺栓。

Fit on the oil sump, tighten the bolt connecting oil sump with flywheel housing and the fastening bolt on the oil sump.



8.3 供油系统
Fuel supply system

● 更换喷油泵

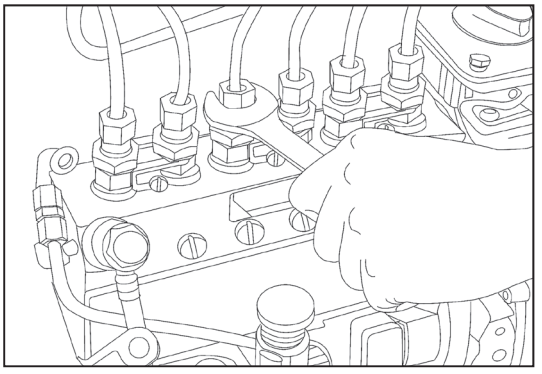
Replace fuel injection pump

18mm 开口扳手

18mm Open–ended spanner

拆下高压油管与喷油泵连接接头。

Dismantle the joint connecting high–pressure fuel pipe and fuel injection pump.

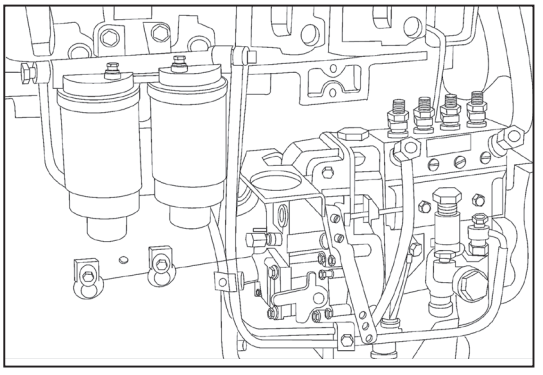


19mm 开口扳手

19mm Open–ended spanner

拆下喷油泵与燃油滤清器进回油管。

Dismantle the fuel injection pump and the oil in/out pipes of fuel filter.

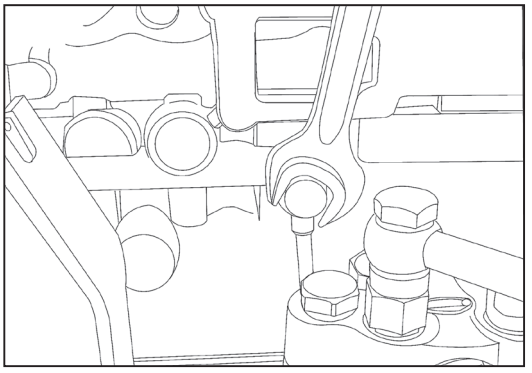


16mm 开口扳手

16mm Open–ended spanner

拆下喷油泵润滑油管。

Dismantle the lubricating–oil pipe of the fuel injection pump.

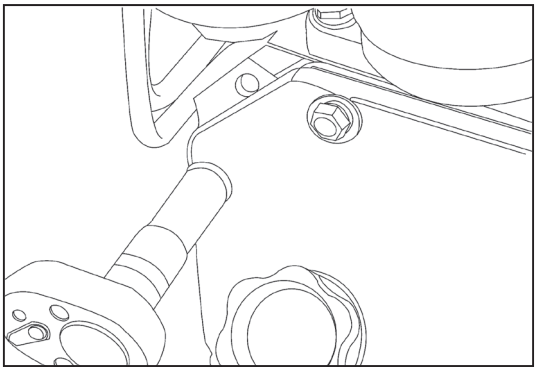


18mm 开口扳手

18 mm Open–ended spanner

拆下进油接头。

Dismantle the oil inlet joint.

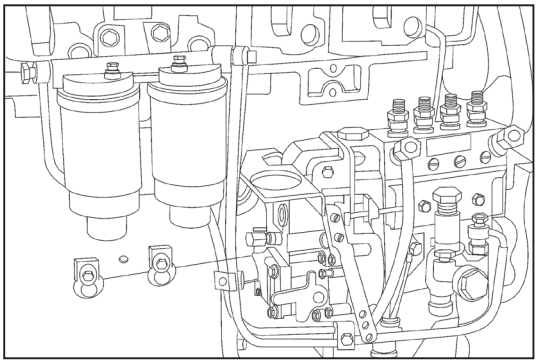


10mm 套筒扳手

10mm Sleeve wrench

拆下停车电磁铁。

Take down the stopping electromagnet.

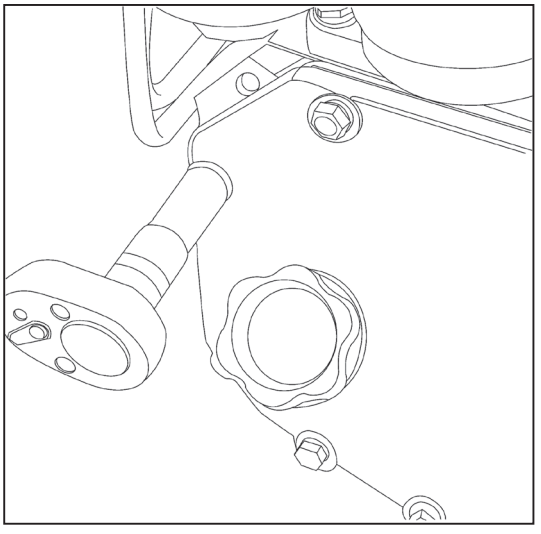


13mm 套筒扳手

13mm Sleeve wrench

松开螺栓，拆下喷油泵检查孔盖板。缓慢盘车，使飞轮壳上的刻度线对准飞轮上“OT”刻线，确定第一缸活塞处在压缩行程上止点位置。

Unscrew the bolt and dismantle the cover of inspection hole on fuel injection pump. Make a slow barring of engine and let the scale mark on the flywheel housing align the “0T” mark on the flywheel, so as to determine that the piston of the first cylinder is exactly in the top dead center.

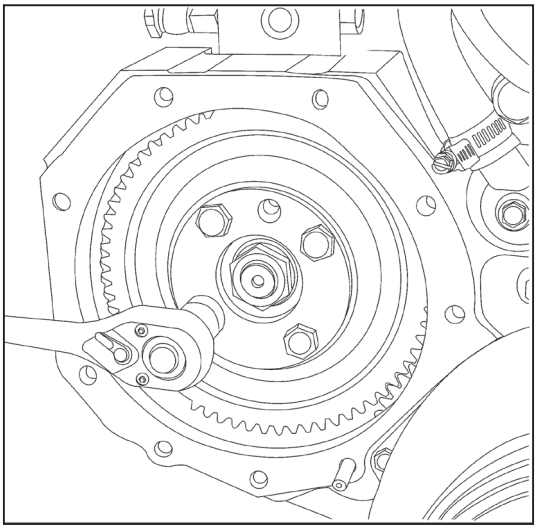


13mm 套筒扳手

13mm Sleeve wrench

松开螺栓，拆下喷油泵齿轮。

Unscrew the bolt and take down the fuel injection pump gear.



16mm 套筒扳手

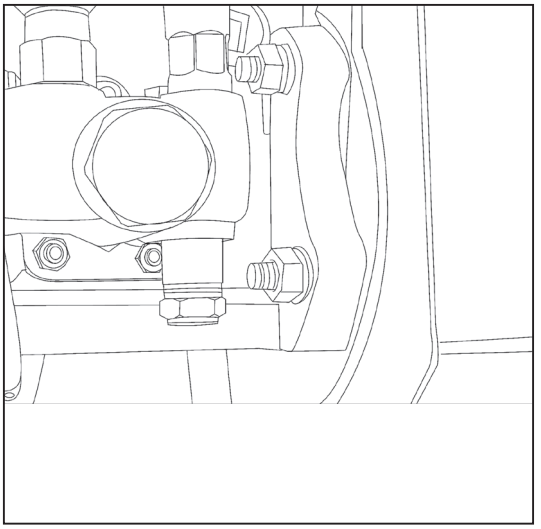
16mm Sleeve wrench

松开螺栓，拆下喷油泵。

Unscrew the bolt and take down the fuel injection pump.

注意：不能损坏O型密封圈。

Caution: Do not damage the O–ring.

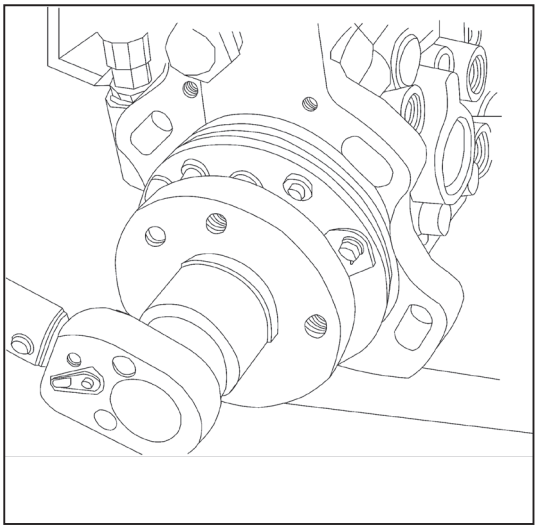


27mm 套筒扳手

27mm Sleeve wrench

松开螺母，拆下喷油泵轮毂。

Unscrew the nut and dismantle the fuel injection pump hub.

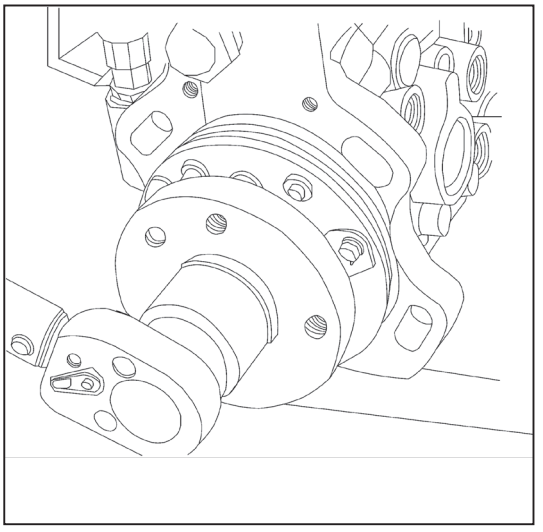


27mm 套筒扳手

27mm Sleeve wrench

将喷油泵轮毂装到新的喷油泵，拧紧锁紧螺母到规定扭矩。

Put the hub on a new fuel injection pump and screw down the lock nut to the required torque value.

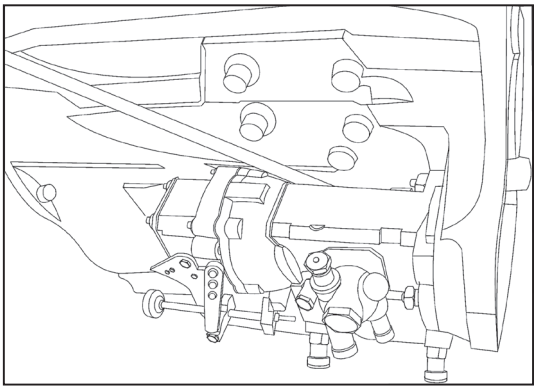


16mm 套筒扳手

16mm Sleeve wrench

装好新的喷油泵，拧紧螺栓。

Mount the new pump and tighten the bolt to fix it.

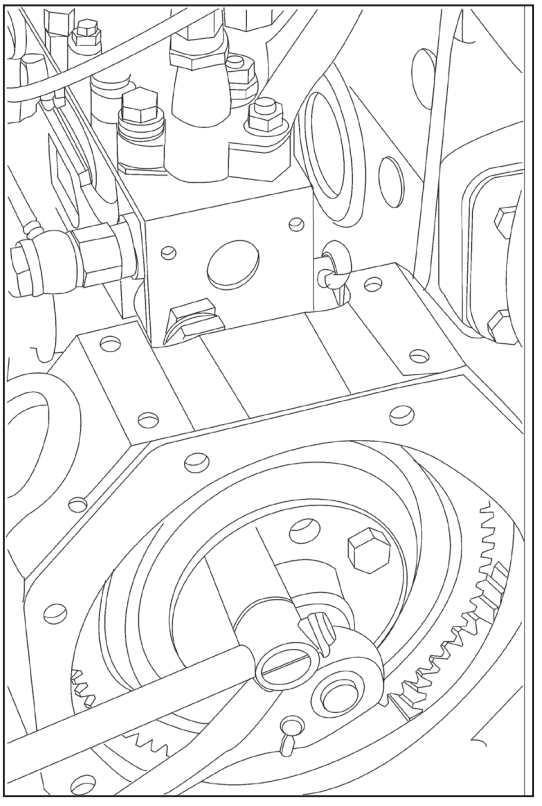


27mm 套筒扳手

27mm Sleeve wrench

转动喷油泵凸轮轴，直到一缸出油口油面微动为止。

Turn the camshaft of fuel injection pump until the fuel level in the first cylinder’s fuel outlet moves slightly.

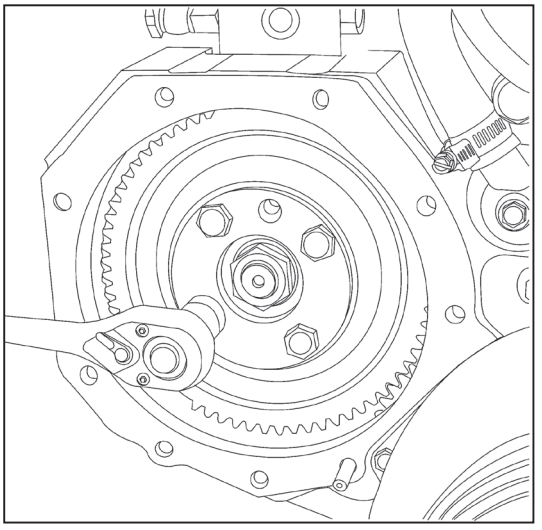


13mm 套筒扳手

13mm Sleeve wrench

装好喷油泵齿轮，拧紧螺栓。

Put on the gear of fuel injection pump and tighten the bolt on it.

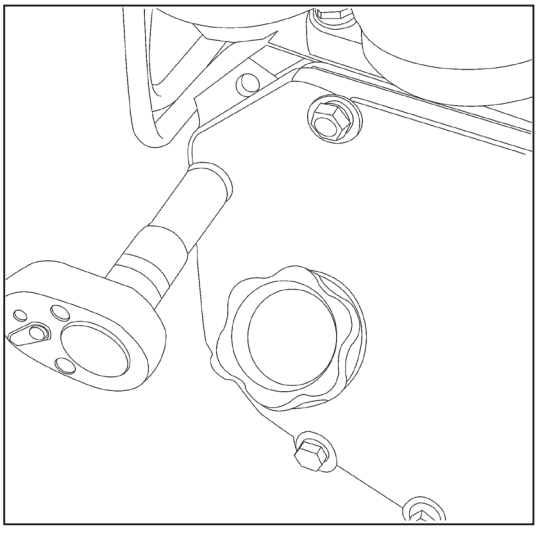


13mm 套筒扳手

13mm Sleeve wrench

装好喷油泵检查孔盖板，拧紧螺栓。

Put on the inspection hole cover of fuel injection pump and tighten the bolt on it.

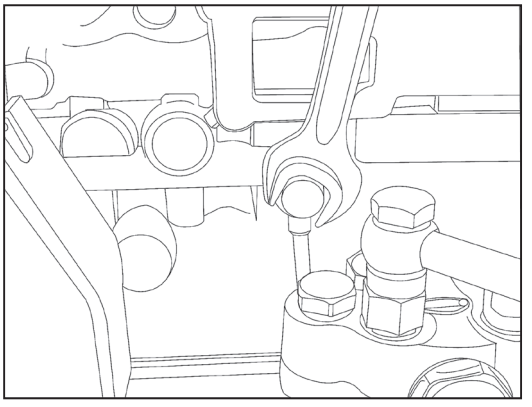


16mm 开口扳手

16mm Open–ended spanner

装好润滑进油管，拧紧空心螺栓。

Fix the lubricating–oil inlet pipe and tighten the hollow bolt.

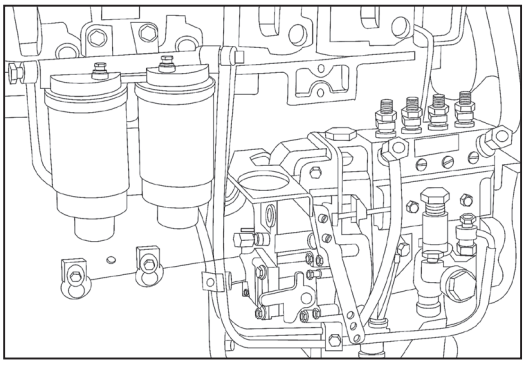


19mm 开口扳手

19mm Open–ended spanner

装好喷油泵与燃油滤清器进出油管，拧紧空心螺栓。

Mount the inlet and outlet pipes of fuel injection pump and fuel filter, and then tighten the hollow bolt.

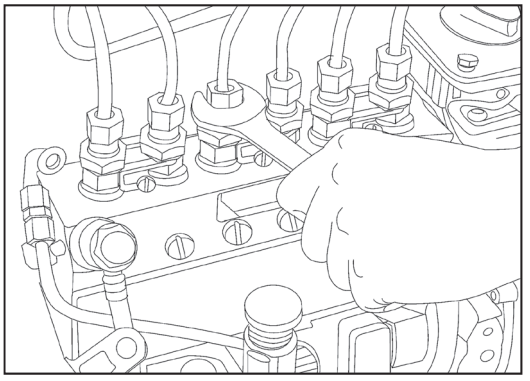


18mm 开口扳手

18mm Open–ended spanner

装好高压油管，拧紧接头。

Mount the high–pressure fuel pipe and tighten the joint.



● 更换喷油器

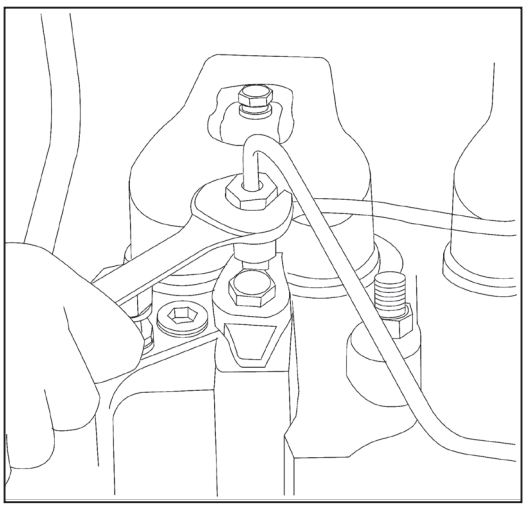
Replace fuel injector

18mm 开口扳手

18mm Open–ended spanner

清理喷油器四周并拆下高压油管与喷油器连接接头。

Clean the fuel injector all round and dismantle the joint connecting the high–pressure fuel pipe with the fuel injector.

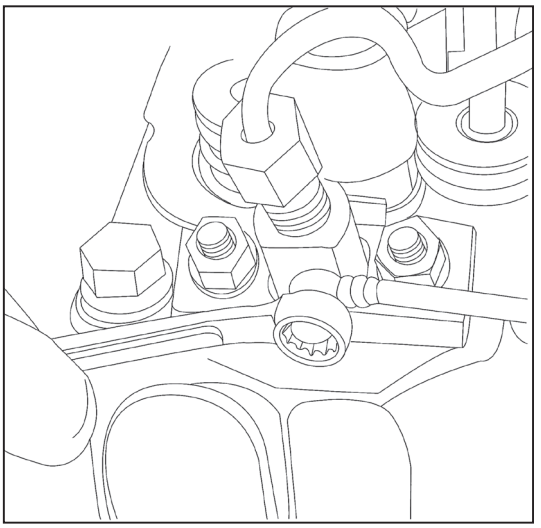


10mm 开口扳手

10mm Open–ended spanner

拆下喷油器回油管。

Dismantle the fuel return pipe of fuel injector.



13mm 开口扳手

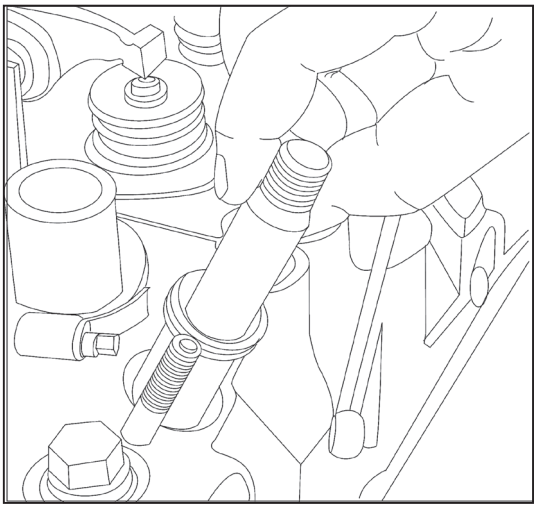
13mm Open–ended spanner

松开固定架紧固螺母，拿下固定架。

Unscrew the fastening nut on support and take down the support.

拆下喷油器。

Dismantle the fuel injector.



清洁喷油器座孔。

Clean the fuel–injector seat hole.

更换新的密封垫圈。

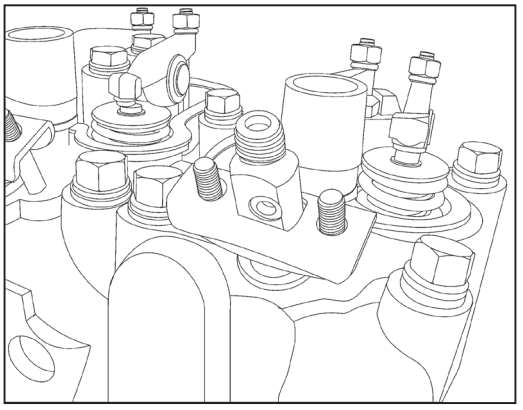
Replace the seal gasket.

更换新的喷油器然后装上新的轴用挡圈、平垫片和O型密封圈。

Mount a new fuel injector, and then put on new shaft checking–ring, flat gasket and O–seal ring.

将新的喷油器装入喷油器座孔。

Mount a new fuel injector in the fuel injector's seat hole.

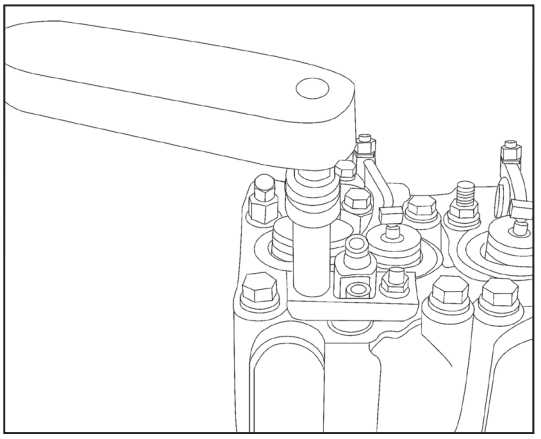


13mm 开口扳手

13mm Open–ended spanner

装好固定架，拧紧螺母到10–15N·m。

Mount the support and screw down the nut to 10–15N·m.

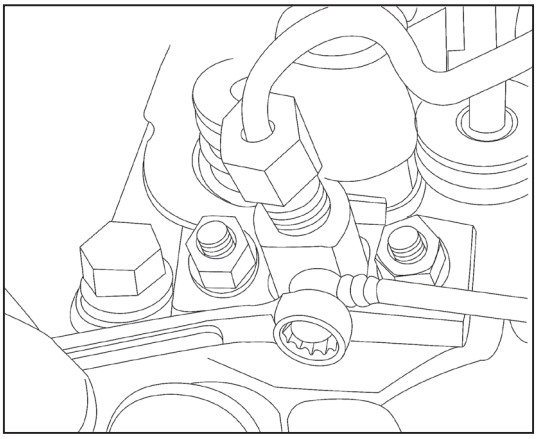


10mm 开口扳手

10mm Open–ended spanner

安装好喷油器回油管。

Mount the fuel return pipe of injector.

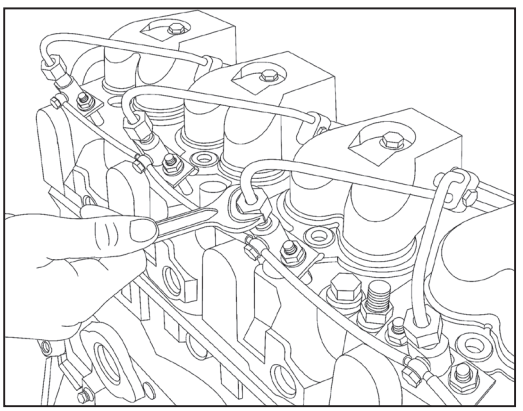


18mm 开口扳手

18mm Open–ended spanner

拧紧喷油器与高压油管连接接头。

Screw down the joint connecting the fuel injector with the high–pressure fuel pipe.



8.4 进排气系统
Intake and Exhaust System

●更换废气涡轮增压器

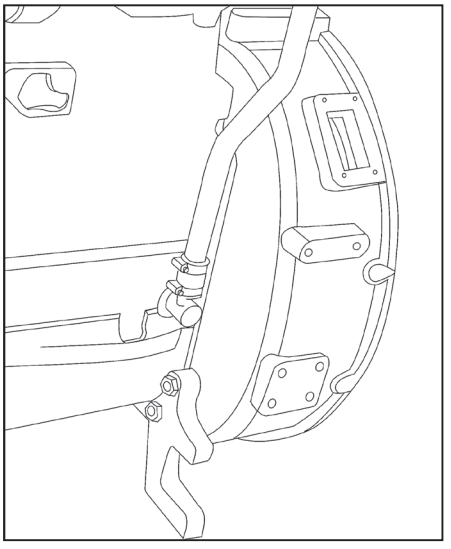
Replace the waste gas supercharger

6mm 螺丝刀

6mm Screw–driver

松开增压器回油管软管卡箍。

Loosen the hose clamp ring of supercharger oil return pipe.

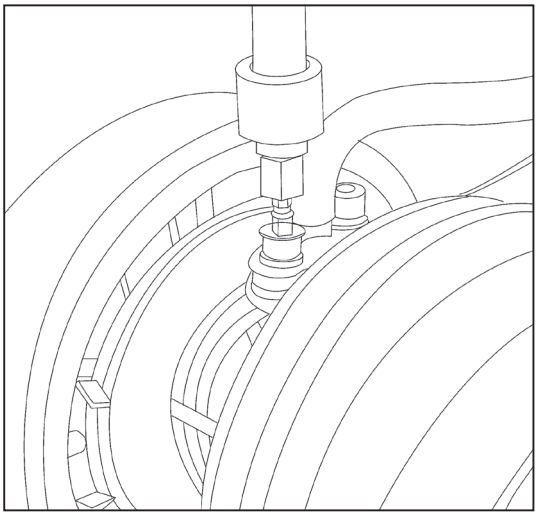


6mm 内六角扳手

6mm Inner–hexagon spanner

拆下增压器进油管内六角螺栓，抬起进油管法兰。

Dismantle the inner–hexagon bolt on the inlet pipe of supercharger and lift the flange of inlet pipe.



13mm 开口扳手

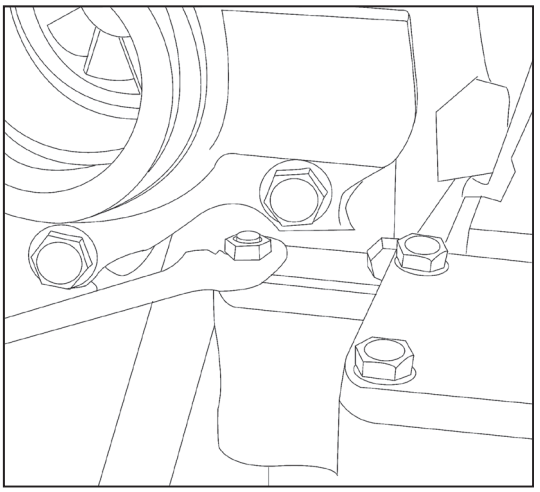
13mm Open–ended spanner

松开排气管和增压器连接法兰自锁螺母，拿下增压器。

Loosen the self–lock nut on the flange connecting exhausting pipe with supercharger, and then take down the supercharger.

更换新的增压器

Replace the supercharger.



注意：如果废气涡轮增压器不是立即更换，则应盖好各进出气口，以防止任何物品掉入气缸里。

Caution: If the waste gas supercharger is not replaced immediately, so all the air inlet and outlet ports should be properly covered to prevent any substances from coming into the cylinder.

6mm 内六角扳手

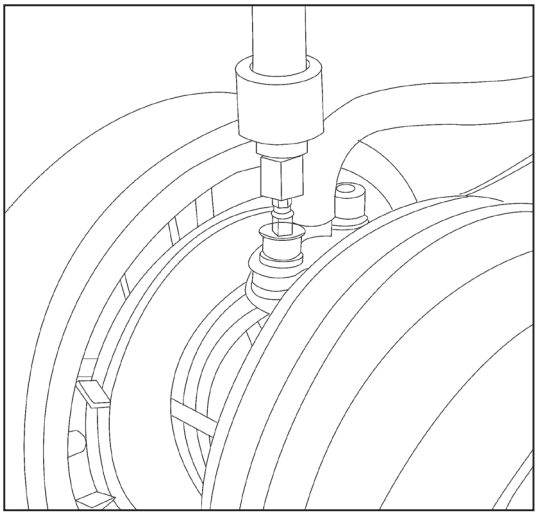
6mm Inner–hexagon spanner

更换新的进油管垫片，并拧紧进油管螺栓。

Mount new inlet pipe gasket and tighten the bolt on the inlet pipe.

注意：安装进油管垫片时，一定对正垫片油孔和增压器法兰处油孔，且加入干净的机油并转动涡轮叶轮，使机油流入轴承室。

Caution: When the oil inlet pipe is mounted, it is necessary to align the oil holes of the gasket and the supercharger flange, to add the clean oil and turn the blade wheel of turbine for the entrance of oil into the bearing area.



9.柴油机典型故障及处理
Typical Troubles And Remedy Of Diesel Engine

柴油机故障现象很多，由于各种柴油机结构和使用环境不同，故障原因也不相同，是多方面因素所造成的，对具体问题，应根据不同情况具体分析。

There are various symptoms of diesel troubles. The failure causes vary from one diesel engine to another because of the differential structures and using environments of different diesels. A trouble might be caused by many factors; different troubles should be studied according to their peculiar symptoms.

9.1柴油机不能起动或起动困难

No start or hard starting

序号 No	可能的原因 Cause	排除方法 Remedy
1	燃油系统中的故障 Fuel system failure	
	1）燃油箱开关未打开或无油 1) Fuel tank switch is off or there is no fuel in fuel tank.	打开开关或加足燃油 Switch on it or refuel sufficiently.
	2）燃油系统内有空气 Air in fuel system.	检查管路接头是否松动，排除油路中的空气 Check whether the joints of pipelines are loose and exhaust the air in fuel line.
	3）输油泵不供油 Feed pump failure	检查输油泵，不合格的予以更换 Check the feed pump and change the unqualified.
	4）喷油器雾化不良 Bad fuel atomization	调整或检修喷油器 Check and adjust the fuel injectors.
	5）供油提前角不对5) Incorrect fuel supply advance angle	检查调整供油提前角 Check and adjust the fuel supply advance angle
	6）燃油管或燃油滤清器堵塞 6) Fuel pipes or fuel filter jammed	检查清理Check and clean them
2	气缸压缩压力不足…… Low compression pressure of cylinders	……
	1）活塞环、气缸套磨损过大1) Excessively–worn piston rings or cylinder liners	检查气门间隙及气门的密封情况，研磨气门 Check and change the piston rings. If necessary, change the cylinder liners and pistons
	2）气门漏气 Valve leakage	检查气门间隙及气门的密封情况，研磨气门 Check the valve clearance and valve sealing. Grind the valves.
	3）气缸垫漏气 Cylinder gasket Leakage	检查气缸垫是否漏气并排除 Check whether the cylinder gaskets leak and remedy them.
3	起动系统的故障　　Starting system faults	
	1）蓄电池亏电 Low battery voltage	对蓄电池充电和检修 Check and recharge the battery
	2）电器线路各接点接触不良 Poor contact of the electrical circuit	检修线路 Check and repair the electrical circuit.
	3）起动机不转或无力 Starter stall or low power output	检修起动电机 Check and repair the starting motor.
	4)起动机齿轮不能与飞轮齿圈正确啮合4) Starter gear is unable to engage correctly with the flywheel ring gear.	将飞轮齿圈转一角度，若还不能起动应检查起动机 Turn the flywheel ring gear for a certain angle. If it still cannot engage correctly, then check and repair the starter.

9.2柴油机运转不稳定
Instable Runnin

序号 No	可能的原因 Cause	排除方法 Remedy
1	燃油系统内有空气 Air in fuel system	检查管路接头是否松动，排除油路中的空气 Check whether the joints of pipelines are loose and exhaust the air in fuel line.
2	燃油系统阻塞 Fuel system jammed	清洗或更换柴油滤清器 Clean or change the fuel filter.
3	喷油泵各缸供油不均匀 Uneven fuel delivery for each cylinder	检修喷油泵并在油泵试验台上调整使各缸供油量一致 Check the fuel injection pump and adjust the pump on the test–rig to uniform the fuel delivery for each cylinder.
4	个别喷油器工作不好 Some injectors work poorly.	检确定状态不好的喷油器，清洗或更换 Pick out the poor injectors. Clean or change them.
5	调速器工作不稳 Governor works unsteadily.	检查调速器排除故障 Check and repair the governor.
6	燃油质量不好，或油中有水 Poor fuel quality or water in fuel	检查燃油，必要时予以更换 Check the fuel. Change it if necessary.

9.3柴油机功率不足
Insufficient power

序号 No	可能的原因 Cause	排除方法 Remedy
1	燃油系统故障Fuel system failure	
	1）燃油系统阻塞或进入空气1) Fuel system jammed or air in the system	清洗或更换柴油滤清器、排除空气Clean or change the fuel filter. Exhaust the air.
	2) 喷油器雾化不良，喷油压力不够2) Bad atomization of injectors, low injection pressure	检查校验喷油器，必要时予以更换Check the fuel injectors. Change them if necessary.
	3）喷油泵泵故障，供油不足或不均匀3) Injection pump failure, insufficient fuel supply or uneven delivery	检修或更换Check or change it.
	4）供油提前角不符合要求4) Incorrect fuel supply advance angle	检查调整供油提前角Check and adjust the fuel supply advance angle
	5）燃油质量低劣，或油中有水5) Poor fuel quality or water in fuel	检查燃油，必要时予以更换Check the fuel. Change it if necessary.
2	气缸压缩压力不足Low compression pressure of cylinders	
	1）活塞环、气缸套磨损过大1) Excessively–worn piston rings or cylinder liners	检查更换活塞环、必要时更换缸套、活塞Check and change the piston rings. If necessary, change the cylinder liners and pistons.
	2）气门漏气2) Valve leakage	检查气门间隙及气门的密封情况，研磨气门Check the valve clearance and valve sealing. Grind the valves.
	3）气缸垫漏气3) Cylinder gasket Leakage	检查气缸垫是否漏气并排除Check whether the cylinder gaskets leak and remedy them.
3	空气滤清器堵塞Air filter jammed	清理或更换滤芯Clean or change the filter element
4	排气通道和消声器阻塞Exhaust passage and muffler jammed	检查清理排气通道和消声器Check and clean the exhaust passage and muffler.
5	排气管不畅通Exhaust pipe jammed	查找原因并排除Find out the cause and solve the problem.

9.4柴油机机油压力不正常
Abnormal engine oil pressure

序号 No	可能的原因 Cause	排除方法 Remedy
1	油底中机油油面太低 Low oil level in the sump	加机油致规定油面 Add oil to specified level
2	机油压力表失灵 Oil pressure gauge failure	检修或更换Check, repair or replace
3	机油粗滤器、滤清器堵塞 Primary oil filter or filter jammed	清洗、更换滤清器滤芯 Clean or change the fuel filter element.
4	曲轴主轴承、连杆轴承过度磨损 Excessively−worn crankshaft main bearing and connecting rod bearings	检修或更换Check or change them.
5	机油牌号不对，机油中有水 Incorrect engine oil grade or water in engine oil	检查机油牌号，查明原因，更换机油 Check the oil grade and cause. Change the engine oil.
6	机油泵主、从动齿轮磨损 Engine oil driving, driven gears wear	更换机油泵Change engine oil pump
7	限压阀失效Pressure limiting valve failure	检查更换Check and change it.
8	机油管路堵塞或漏油Engine oil line jammed or oil leakage	检查并做相应处理 Check and solve the problem correspondingly.

9.5柴油机过热
Overheating

序号 No	可能的原因 Cause	排除方法 Remedy
1	柴油机长时间超负荷运转 Long time overloaded running	减小负荷 Reduce the load
2	燃烧不良 Poor combustion	检查喷油情况及供油提前角 Check the fuel injection and fuel supply advance angle.
3	机油温度过高 Overheated engine oil	
	1）机油不足或过多1) Insufficient or excessive engine oil	检查游标尺，按规定增减机油量 Check the oil dipstick. Increase or reduce the engine oil according to requirement.
	2）机油冷却器内部堵塞2) Oil cooler jammed	清洗或更换机油冷却器 Clean or change the oil cooler.
4	冷却水温度过高Overheated coolant	
	1)冷却水量不足 Insufficient coolant	更换机油泵 Change engine oil pump
	2）水泵排量不足 Low delivery capacity of the water pump	检查水泵叶轮间隙，必要时换 Check the impeller clearance. Change it, if necessary.
	3）风扇转速不足 Low fan speed	调整风扇皮带张紧度 Adjust the tension of fan belt.
	4）冷却系统中水垢过多 Excessive scale in cooling system	清除水垢 Clean the scale
	5）散热器散热效果差5) Low radiating capability of the radiator	去除散热片上污垢，改善水箱通风条件 Clean the dirt on the cooling fins and improve the ventilation of the radiator.
	6）节温器失灵不开启 Thermostat failure	查明后更换 Change it after finding out the cause

9.6柴油机烟色不正常
Abnormal smoke

序号 No	可能的原因 Cause	排除方法 Remedy
1	排气冒白烟Excessive white smoke	
	1）喷油器雾化质量不好，有滴漏现象1) Bad atomization of fuel injectors and fuel dribbling	检查喷油压力和喷雾情况Check the fuel injection pressure and spray.
	2）柴油中有水2) Water in diesel fuel	清洗柴油箱和滤清器，更换柴油Clean the fuel tank and filter. And change the diesel fuel.
	3）气缸压缩压力不足3) Low compression pressure of cylinders	检查气门、气缸垫、活塞环漏气原因并排除Check reason for leakage of the valves, cylinder gaskets and piston rings. Solve the problems.
2	排气冒蓝烟Excessive blue smoke	
	1）油底壳机油油面太高1) Excessively–high oil level in sump	放出多余机油Drain the redundant engine oil.
	2)活塞环磨损或弹力不足，窜机油2) Piston ring wear or low flexibility, oil blow–by	检查更换活塞环Check and change the piston rings.
	3）气门密封失效3) Valve sealing failure	检查气门有密封情况，更换气门阀杆密封套Check the valve sealing and change the seal sleeve of valve stem.
3	排气冒黑烟Excessive black smoke	
	1）柴油机超负荷1) Diesel over–loaded	调整至规定负荷Reduce the load to the given level.
	2）喷油不良，雾化不好2) Bad fuel injection and bad atomization	检修或更换喷油泵出油阀及喷油器Check or change the delivery valves of the fuel pump and injectors.
	3）供油时间太迟，后燃严重3) Delayed fuel supply and excess post–combustion	调整供油提前角Adjust the fuel supply advance angle
	4）气门间隙不对或气门密封性不好4) Incorrect valve clearance or bad valve sealing	检查气门间隙和气门密封性Check the valve clearance and valve sealing.
	5）空气滤清器堵塞5) Air filter jammed	清理空滤芯Clean the air filter element.
	6）燃油质量差6)Poor fuel quality	更换优质燃油Use high quality fuel.

9.7柴油机突然自动停车
Sudden stop

序号 No	可能的原因 Cause	排除方法 Remedy
1	停车后曲轴转不动 Crankshaft is unable to rotate after diesel engine stopped.	
	1）曲轴与轴瓦抱死 Crankshaft and bearing shell locked together	检修，更换零件 Check and change parts.
	2）活塞与缸套抱死 Pistons and cylinder liners locked together	检修，更换活塞、活塞环、气缸套 Check and change the pistons, piston rings and cylinder liners.
2	停车后曲轴能轻松转动 Crankshaft is able to rotate easily after diesel stopped.	
	1）燃油系统内进入空气 Air in fuel system	排除空气，检查管路的密封性 Exhaust the air and check the sealing of lines.
	2）燃油系统堵塞 Fuel system jammed	清洗、更换燃油滤芯 Clean or change the fuel filter element.
	3）喷油泵齿条或柱塞卡死 Racks or plungers of injection pump jammed.	检修喷油泵 Check and repair the injection pump.
	4）进气管或空气滤清器堵塞 Inlet air pipe or air filter jammed	检查、清理空气滤清器 Check and clear the air filter.
	5）柴油用完 Lack of fuel	添加柴油 Add fuel.

9.8柴油机运转时有不正常响声
Unusual sounds

序号 No	可能的原因 Cause	排除方法 Remedy
1	喷油时间过早，气缸内发出有节奏的清脆的金属敲击声Premature fuel injection and rhythmic tinkling knock in cylinders	检查调整喷油时间Check and adjust the fuel injecting time.
2	供油时间过晚，气缸内发出低沉的不太清晰的敲击声Delayed fuel supply and hollow rapping sound in cylinders	检查调整喷油时间Check and adjust the fuel injecting time.
3	气门与摇臂间隙过大，气门机构中有金属敲击声Excess clearance between valves and valve arms and metallic beating sound in valve structures	检查调整气门间隙Check and adjust the valve clearance
4	活塞与气缸间隙过大Excess clearance between pistons and cylinders	检查配缸间隙，更换活塞或缸套Check the cylinder liners fit clearance. Change the pistons and cylinders.
5	活塞销与连杆小头轴承间隙过大，有响亮的金属敲击声，低速和高速时，尤其显著。Excess clearance between the piston pin and small rod connecting bearing, pealing with a metallic beating sound, especially at high or low speed	更换连杆衬套保证规定间隙Change the connecting rod bushing to satisfy the clearance requirement.
6	连杆轴承间隙大，有钝哑的撞击声Big clearance between connecting rods and muffled raucous beating sound	更换轴承Change the bearings.
7	主轴承间隙过大，与连杆轴承敲击声相似Excess clearance of main bearing, the sound resembling the connecting rod beating sound	更换主轴承Change the main bearings.
8	活塞碰气门，低速时在气缸盖附近可听到金属敲击声Piston bumps the valve, tinkling near the cylinder head at low speed	检查配气定时Check the valve timing.
9	齿轮间隙过大，突然降低转速时在齿轮室处可听到撞击声Excess gear clearance and bumping sound at sudden deceleration	检查并调整齿轮间隙，必要时更换齿轮Check and adjust the gear clearance. Change the gears if necessary.

⚠ 特 别 提 示
Special Attention

1. 柴油机的操作人员在操作之前，必须认真阅读柴油机的使用保养说明书，严格遵守使用保养说明书规定的操作与保养规程；

Before operating the engine, the operator must read the *Operation and Maintenance Manual of the Diesel Engine* carefully and comply strictly with the operating rules for maintenance specified in the instructions；

2. 为使用户的合法权益得到保护，禁止用户自行拆开喷油泵油量锁定铅封；

In order to protect the lawful right and interests of users, it is forbidden to dismantle lead seal of fuel injection pump privately；

3. 增压器转子为高速旋转部件，在机器运转时，严禁任何可移动物体（例如手、工具、棉纱等）接近涡轮增压器的进口，以免对人身或机器造成损害；对转子组件，除涡轮增压器专业维修人员或经潍柴特许的专业维修站点不得拆卸；

Rotator shaft of supercharger is of precision high-speed rotating parts. Any movable objects, such as hand, tool and cotton yarn, are never close to the rotator shaft of supercharger while the engine is running, in order to avoid damage to the engine and an injury to the person. The rotator assembly may not be dismantled by anybody but those service personnel specialized in maintenance of supercharger or from the service stations designated by Weifang Weichai；

4. 连杆螺栓为一次性使用螺栓，不得重复使用；

Connecting rod bolts can only be used one time；

5. 向柴油机添加的机油或燃油，其牌号必须符合使用保养说明书的规定，并经专用的清洁过滤清器过滤，燃油要经过 72 小时以上沉淀；在每次开车前，必须确认冷却液和机油的加入量是否符合要求；

The oil or fuel added to diesel engine shall conform to the regulations of brand and number sign in the Operation and Maintenance Manual and they shall be filtered through a special filter. The fuel should be settled for more than 72 hours. Before the engine is started every time, it is necessary to confirm whether the addition of coolant

and oil could meet the requirements or not;

6. 用户在使用新机时，应进行 50 小时试运转；

The new engine to be used shall be put into trial operation by the user for 50 hours;

7. 柴油机冷车启动后应徐徐提高转速，不应猛然使其高速运转，也不宜长期怠速；大负荷运转后，不应立即停车（特殊情况除外），应低速运转 5 ~ 10 分钟后停车；

The revolution of diesel engine shall increase slowly after cold start-up. Both high-speed rotation and long-time idle speed may not be permitted. After running with a heavy load, do not stop running immediately (except for emergency), but do so after keeping low-speed revolution for 5 ~ 10 minutes

8. 停车后如果运转环境有可能低于 0℃，而且机器中未使用防冻添加剂的冷却液时，应将水箱和柴油机中的冷却液放净；

If the ambient temperature is under 0 ℃ after stopping and the coolant for antifreezing additive was not used in the engine, the coolant in the water tank and diesel engine shall be drained off;

9. 电气系统各部件的检修必须由电气专业技术人员进行。

The work of inspection and repair of parts in electric system must be made by the professional electric technicians.

前　言
FOREWORDS

226B 系列柴油机是潍坊柴油机厂与德国道依茨公司合资组建的潍坊潍柴道依茨柴油机有限公司生产制造的高速柴油机。该系列柴油机具有结构紧凑，使用可靠，动力性、经济性技术指标优良，起动迅速，操作简单和维护方便等特点，排放指标先进。是长途客车、城市公交客车、载货汽车工程机械、拖拉机、农机、建筑机械、发电机组、船用主辅机的理想动力。

The diesel engine in 226B series is of high-speed one manufactured by Weifang Weichai Deutz Diesel Engine Co., Ltd (WWDDE), a joint venture together established by Weifang Diesel Engine Works in China and Deutz GmbH in Germany. This series of engine is featured of compact structure, reliable performance, good technical features in dynamics and economy, prompt start, simple handling, convenient for maintenance and advanced emission figures etc. and are widely used as an ideal power in the fields of coach,bus,truck,engineering machinery, tractor, agricultural implement, construction machinery, generating set and marine main/auxiliary engine.

本手册介绍了 226B 系列柴油机的结构特点、操作保养方法、检修要点，供用户参阅。用户在使用本机时如能切实按照本维修保养手册指出的各项要求执行，一定可以大大延长柴油机的使用寿命。

Structural characteristics, operation and maintenance methods, and points of inspection for 226B series diesel engine are introduced in this manual, which is applicable for diesel engines produced by our company.If the consumers could carry out the instructions listed in the maintenance manual in reality when they operate this diesel engine, they must greatly extend the service lifetime of diesel engine.

如果用户维护、拆装柴油机，还应仔细参阅 “道依茨 226B 系列工程机械 / 拖拉机柴油机零件图册”。

When the user wants to maintain, disassemble and reassemble diesel engine, he shall also refer to “Parts Catalogue of Deutz 226B Series Diesel Engines for Construction Machinery and Tractor”.

本说明书所介绍的是226B系列柴油机基本机型。对于未列入基本机型的其他机型的有关信息，用户可按“用户信息反馈意见卡”上的联系电话、传真等进行咨询。随着产品的不断发展，其结构还会有所改进，希望用户及时关注我公司发布的各种技术信息。所作更改恕不再另行通知用户。

This instruction only describes the basic model of diesel engines in 226B series. For the relative information about other models that have not been stated here, the users can make a consultation by telephone and fax etc. on the“Card for Users’Feedback of Opinions”. With the continuous development of products, the structure of which will uninterruptedly be improved. We hope that the users could pay timely attention to all kinds of related information from us and forgive us any alteration without notification in advance.

本公司欢迎用户对产品提出进一步改进的意见和建议。来信请将本说明书后附的“用户信息反馈意见卡”寄潍坊潍柴道依茨柴油机有限公司市场部收。

You, as our clients, are always welcome to make opinions and suggestions for our improving products. Please send your letters to Marketing Department, together with the“Card for Users’Feedback of Opinions”enclosed to this maintenance instructions.

226B系列柴油机进气方式一般分为自然吸气、增压、增压中冷型，缸数有3、4、6缸各种形式，是四冲程、水冷、直列、直喷高速柴油机。其转速范围一般为1500 ~ 2500r/min，功率范围为30kW ~ 176kW。

The 226B series diesel engine is of high-speed diesel engine with the structure of four-strokes, water cooling, in-line and direct injection, which air-intake ways are divided into natural aspirated, turbocharged and turbocharged and inter-cooled, which number of cylinder is 3, 4, 6 respectively according to the various types, which revolution is between 1,500 and 2,500 r/min and which power is in the range of 30 ~ 176kW.

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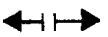
图 示 标 记 说 明

Description Of The Illustration Marks

	拆卸(组合件) Dismounting (assembly parts)		涂润滑油 Oil coating
	装配(组合件) Fitting (assembly parts)		专用工具，如S K……， KUKKO,……，TS……W Special tools, such as K––– –––, KUKKO, ––– –––, TS––– –––W
	打记号（分解前打上，重新装配时注意对正） Marking (do before disassemble, adjust when assemble)		注意装配方向 Pay attention to assembly direction
	注入 – 充满（如润滑油，冷却水等） Filling– full charge (such as lubricating oil, cooling water etc.)		放气 Deflating
	排出（例如润滑油、冷却水等） Draining off (lubricating oil or cooling water)		松开（例如：夹紧装置的松开） Unloosing (such as: unloose clamping equipment)
	（防松 – 粘固）涂液态密封剂 (loose–proof–fixed) Coat fluid sealant		夹紧（例如：夹紧装置的紧固） Clamping (such as: reinforcing clamp equipment)
	防止人身事故（危险场合标记） Accident preventing (marks for dangerous occasion)		检测 – 调整（例如：拧紧力矩，尺寸，压力，间隙等） Inspecting–adjusting (such as: tightening torque, dimension pressure and clearance)
	每次装配都要更换 Replacement when re–assembly		检查 Inspecting