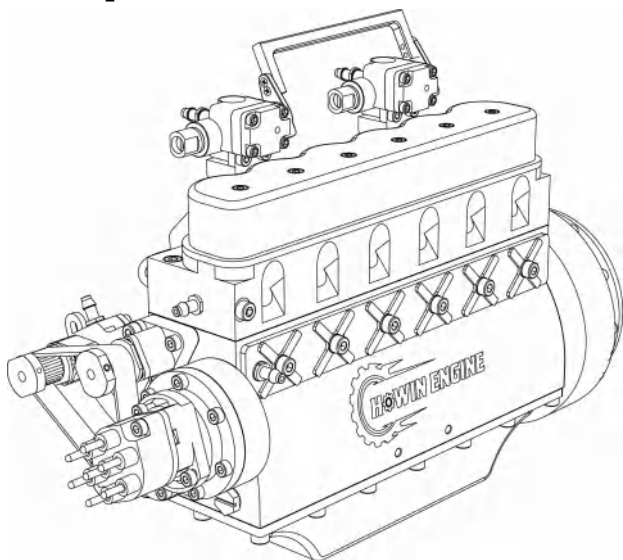




# L6-210 Operation Manual



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#3443342 printed in CHINA

Thank you for choosing our products. The Model L6-210 is a precision assembly kit with a six-cylinder, four-stroke engine model. Before you assemble and operate the engine, please read the “Safety Instructions and Warnings” section on page 1 of the booklet and strictly adhere to the advice and contents of the assembly accessories.

Also, please study the entire contents of this instruction manual to familiarize yourself with engine controls and other functions.

Furthermore, keep these instructions in a safe place so that you can readily refer to them whenever necessary.

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# Safety Instructions And Warnings

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Remember that your engine is not a “toy”, but a high-efficiency internal combustion engine. The output power may cause harm or other effects. Do not change or disassemble it. As a professional user, please make sure the engine runs safely and carefully. If your HOWIN engine is acquired by another person in the future, we respectfully request that these instructions be passed on to its new owner.

The advice that follows is for all production engines. Incorrect operation or ignoring safety can lead to engine damage or danger.

**Warning: These events might involve serious (in extreme circumstances, even fatal) injury.**

Model engine fuel is poisonous. Do not allow it to come into contact with your eyes or mouth. Always store it in a clearly marked container and out of reach of children.

Model engine fuel is also highly flammable. Keep it away from open flames, excessive heat, sources of sparks, or anything else that might ignite it. Do not smoke or allow anyone else to smoke near it.

Never operate your engine in an enclosed space. Model engines, like automobile engines, produce deadly carbon monoxide. Run your engine only in an open area.

Model engines generate considerable heat. Do not touch any part of your engine until it has cooled. Contact with the muffler, cylinder head, or exhaust header pipe, in particular, may result in a serious burn.

## **Attention:**

This engine was designed for science experiments, model demonstrations, and model car drives. Do not attempt to use it for any other purpose.

Mount the engine securely in your model, following the manufacturer's recommendations, using appropriate screws and locknuts.

When starting, some noise will occur. To mitigate this, you can either purchase a matching muffler exhaust pipe from us, or place the engine away from any inhabited areas as the noise of operation may disturb others.

Safety glasses are strongly recommended. Please note that the electric plug or battery wire should not come into contact with the rotating parts. Also, ensure that the connection of the throttle rocker arm is secure.

To ensure safety, keep all spectators, particularly children, at least 3 meters away from the engine when starting it.

To stop the engine, completely shut off the throttle. In an emergency, you can clamp the fuel line in front of the carburetor to cut off the fuel supply. Do not attempt to remove the flywheel or start the synchronous pulley.

## Product Descriptions

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After half a year of research, development, design, and testing, HOWIN will release this classic I6 engine into history.

As we all know, due to its unique features, the I6 engine has become one of the most popular and iconic engines in the world. Its reliability and outstanding reputation have provided faithful service to millions of truck and van owners.

The HOWIN team has carefully selected this engine from many iconic options and has launched a scale model based on it. We believe that its reemergence will receive a positive response from the majority of model engine enthusiasts and will create excitement and celebration among fans.

We have put great effort and sincerity into this engine and have made major breakthroughs and upgrades.

For example, while retaining the classic appearance elements of the I6 engine, we have adopted our self-developed distributor ignition design, upgraded the independent lubrication system, added a new air intake system, and implemented water-cooled cooling. The use of gasoline fuel will be more user and player-friendly.

## Basic Parameters

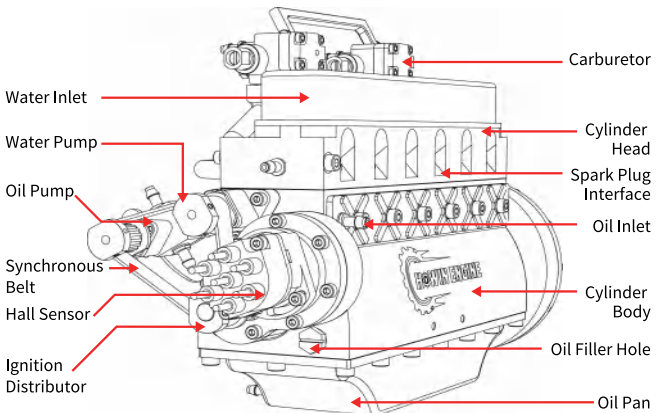
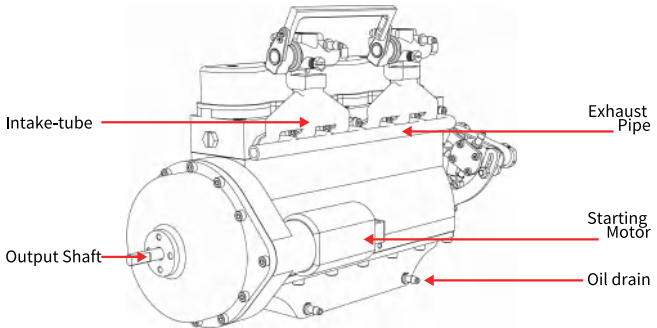
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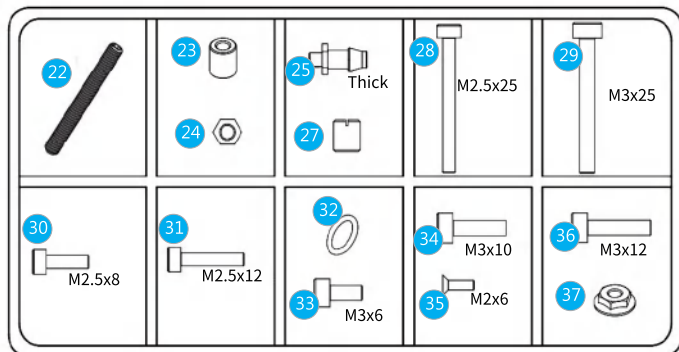
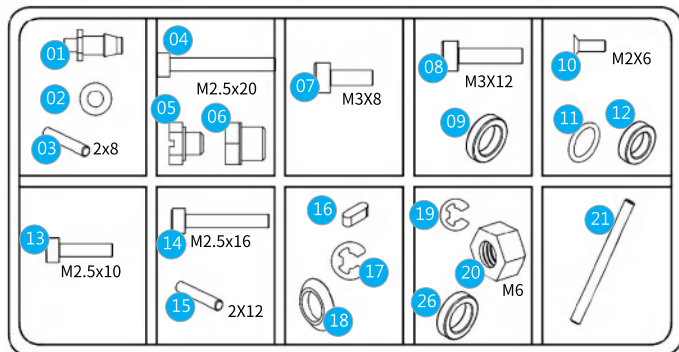
Brand: HOWIN ENGINE  
Model: L6-210  
Form: KIT version  
Size: 252.05 \* 88.56 \* 144.48mm  
Color: blue + silver  
Material: metal  
Weight: 2.4kg  
Engine Type: gasoline internal combustion engine  
Valve Train Type: OHV  
Displacement: 21.0 (3.5 \* 6) cc  
Cylinder: in-line six-cylinder  
Stroke: four-stroke  
Cylinder Diameter: 16.6mm  
Stroke: 17.0mm  
Speed: 3200-13500 rpm  
Power: 3.05 ps  
Cooling Mode: water cooling  
Lubrication Mode: independent lubrication system (including oil pump)  
Start Mode: electric start  
Ignition Mode:  
Distributor + CDI control ignition (not included)  
Spark Plug Type: British thread 3/16-40 spark plug (not included)  
Starting Power Supply: 7.4V 2S lithium battery (not included)  
Fuel: 95 # and above gasoline (excluding)  
Suitable Ages: 14+  
Packaging Method: color box  
Packing List:  
Engine kit \* 1 set,  
Tool kit \* 1 set,  
Instruction manual \* 1

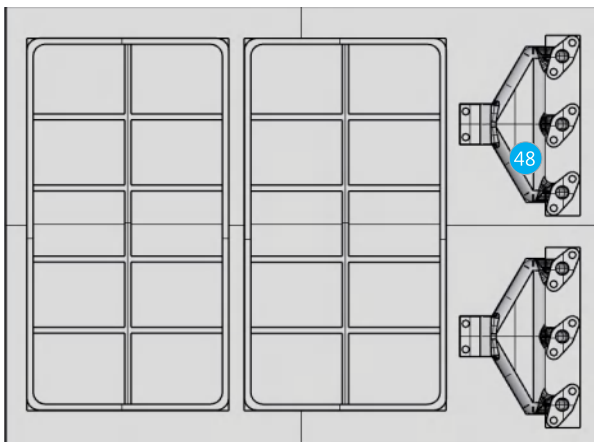
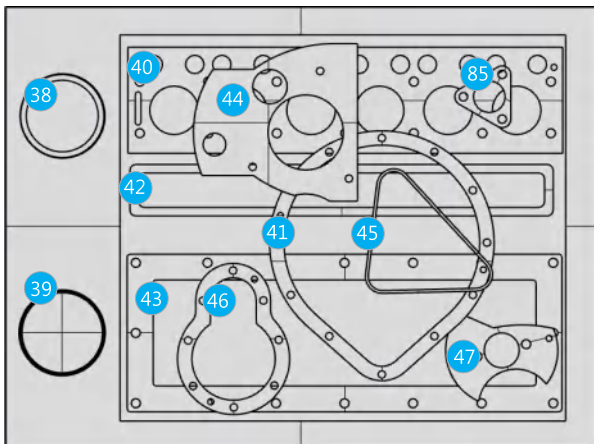
# Structure And Parts

## Engine Structure And Components

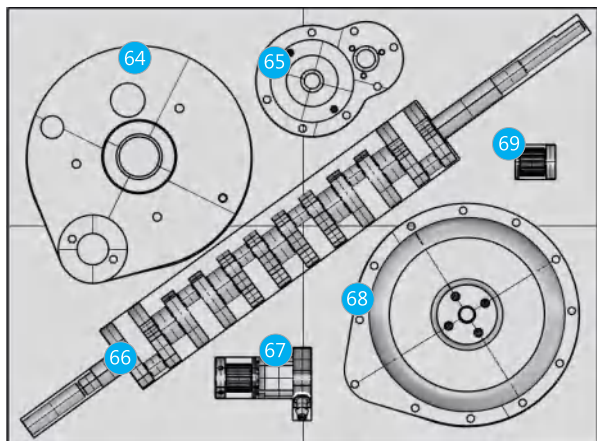
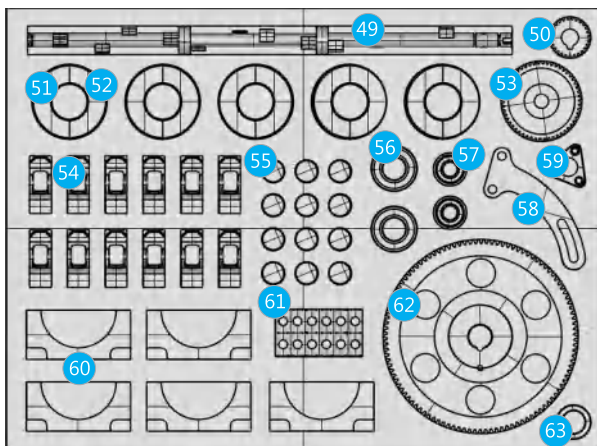


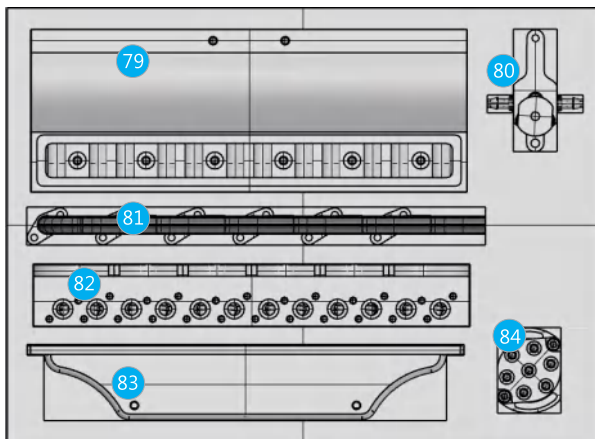
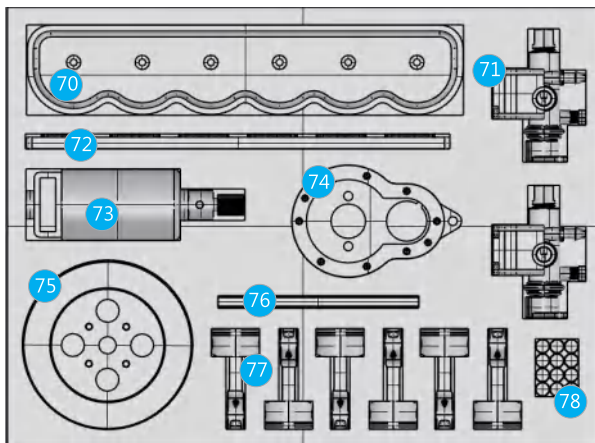
# Part Packaging Distribution Diagram







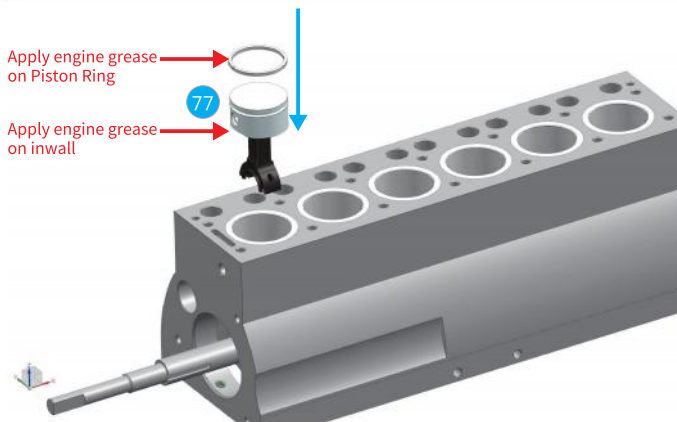
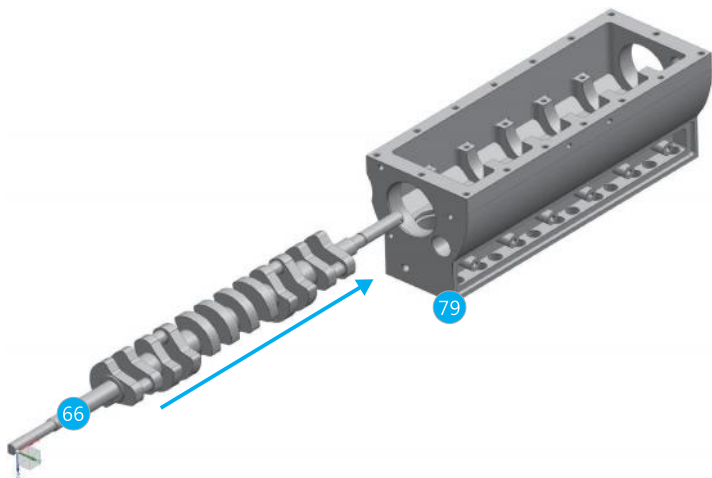


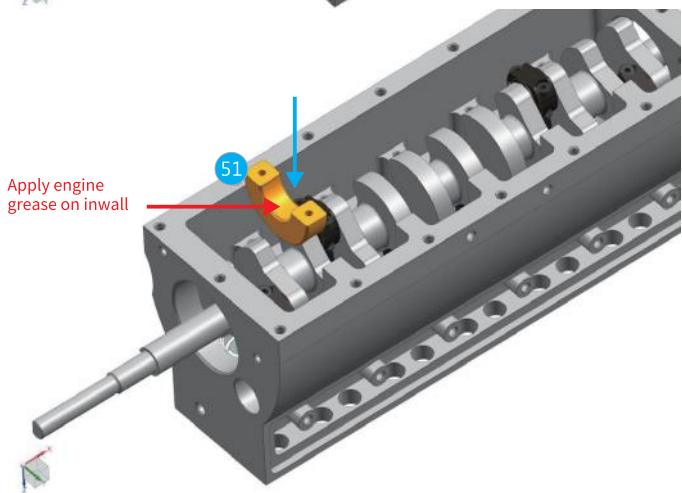
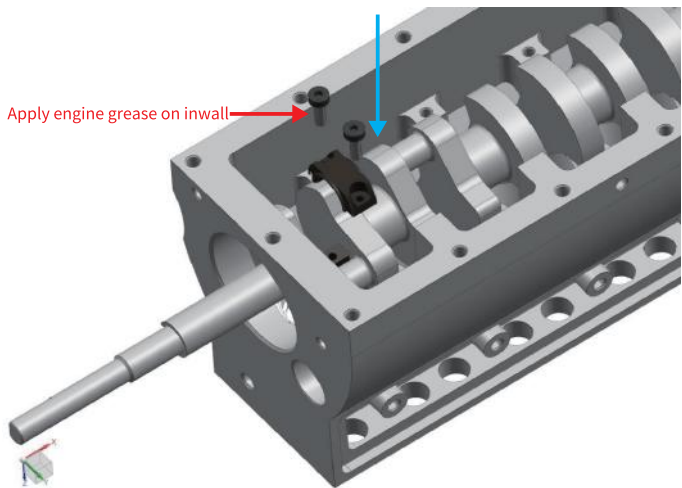


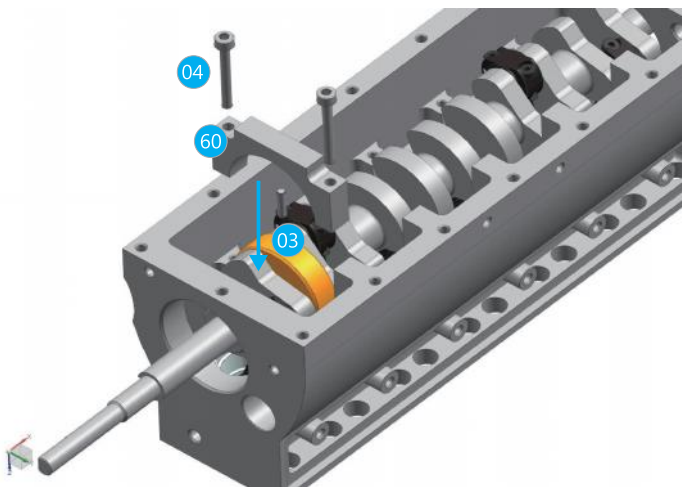
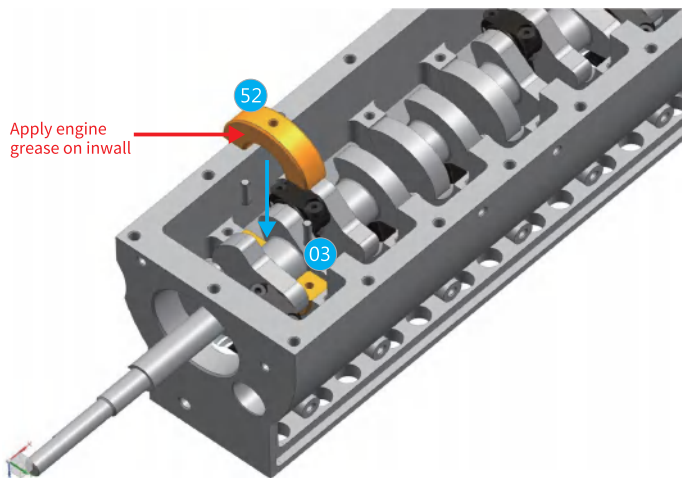
# Assembly Steps

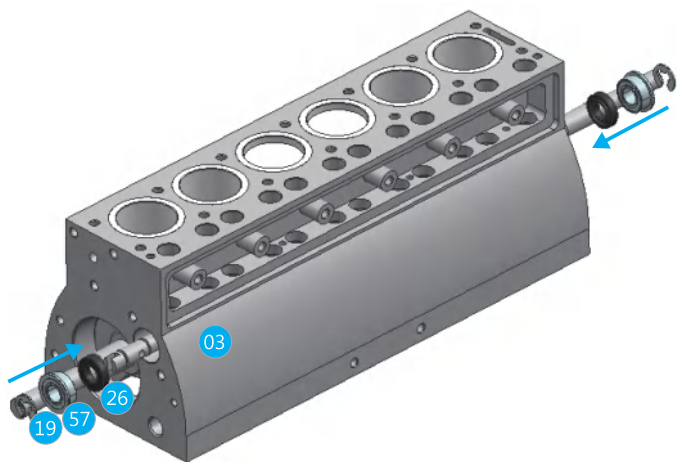
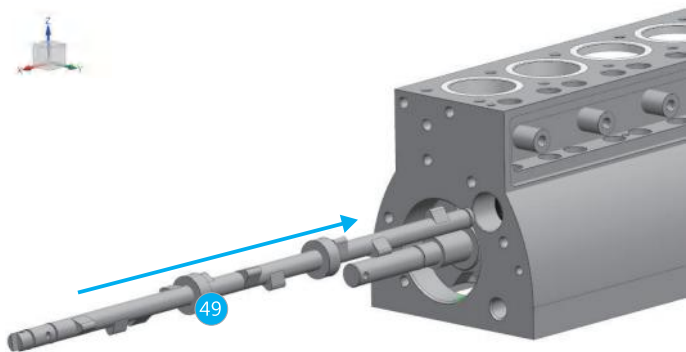
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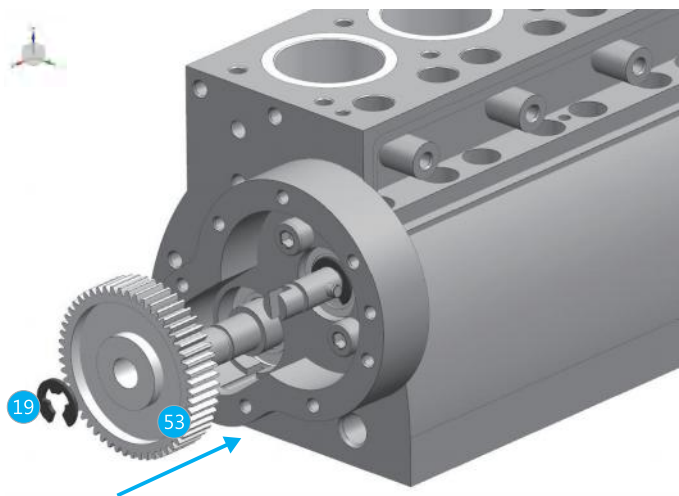
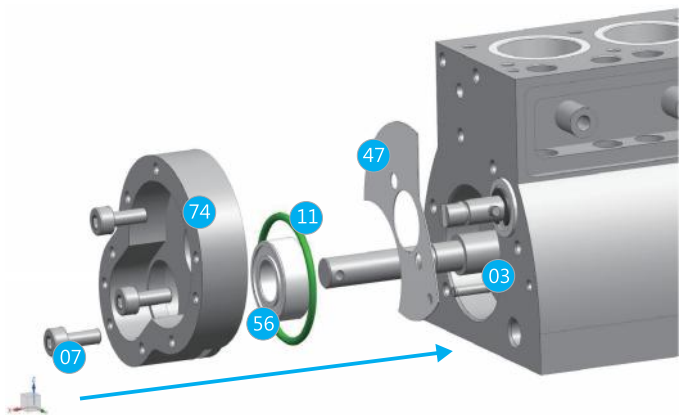
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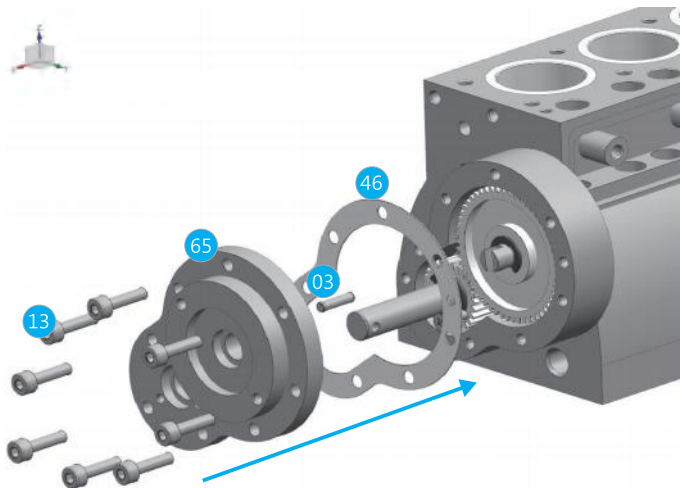
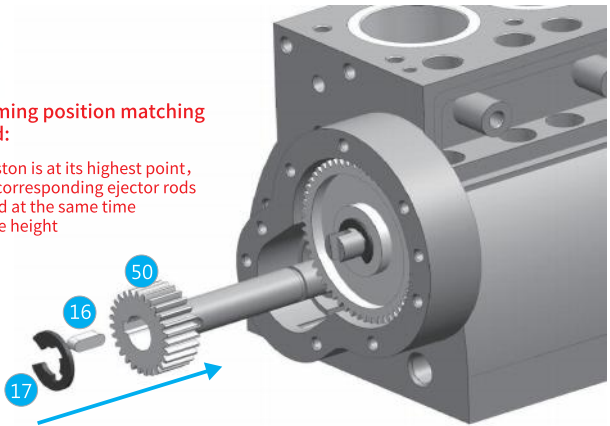




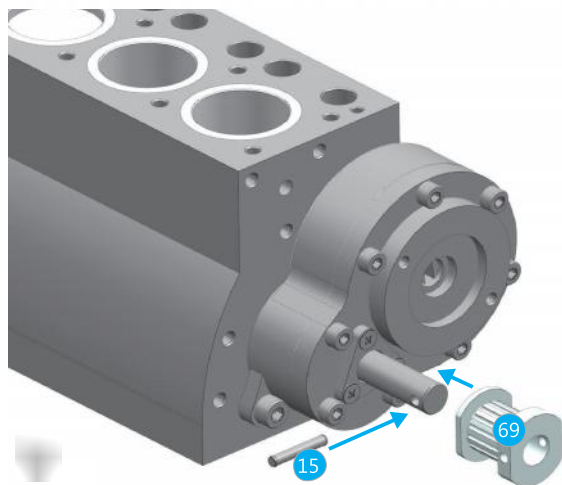
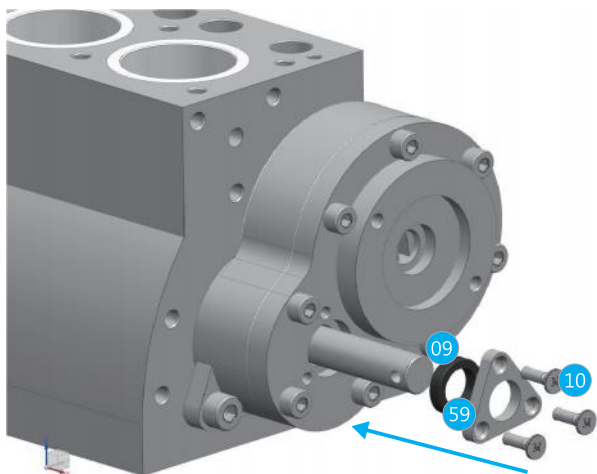


### Gear timing position matching method:

When piston is at its highest point, the two corresponding ejector rods are raised at the same time and same height



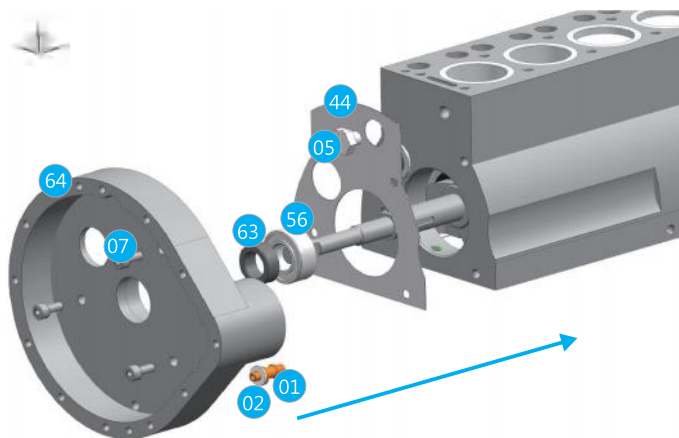
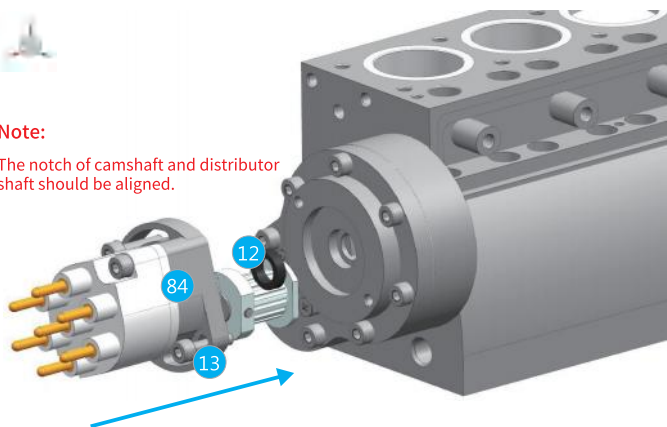


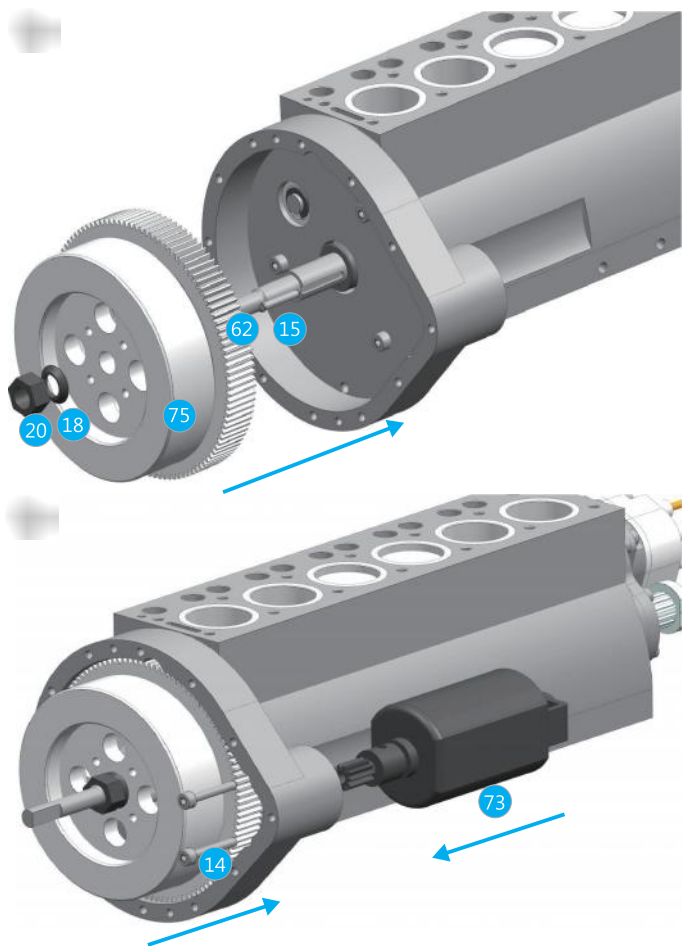


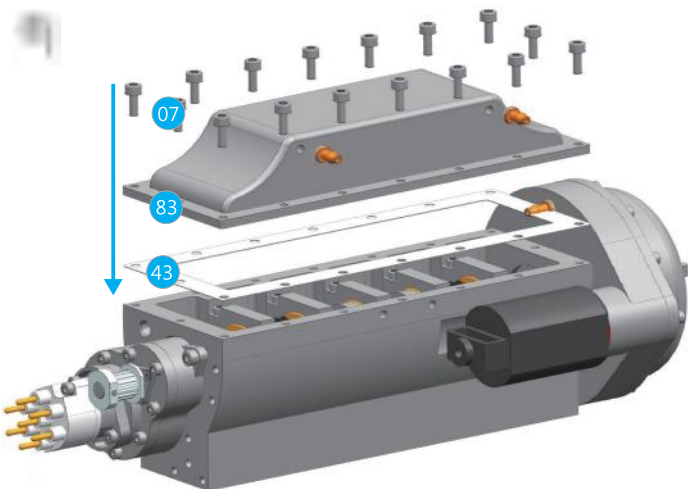
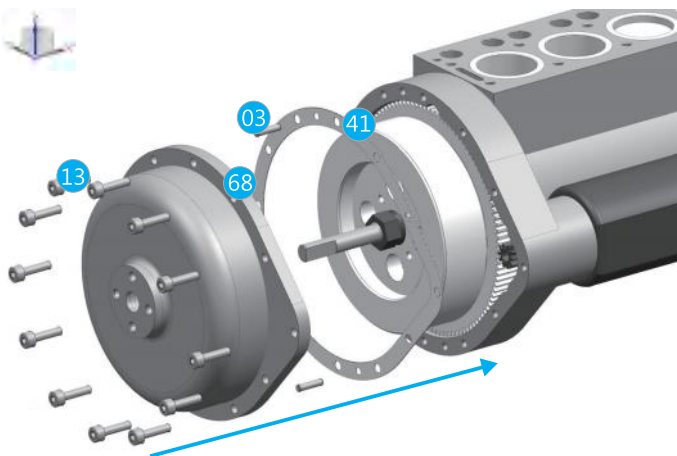


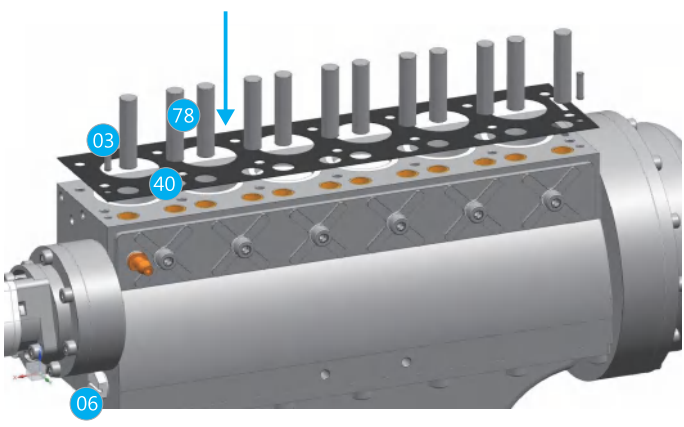
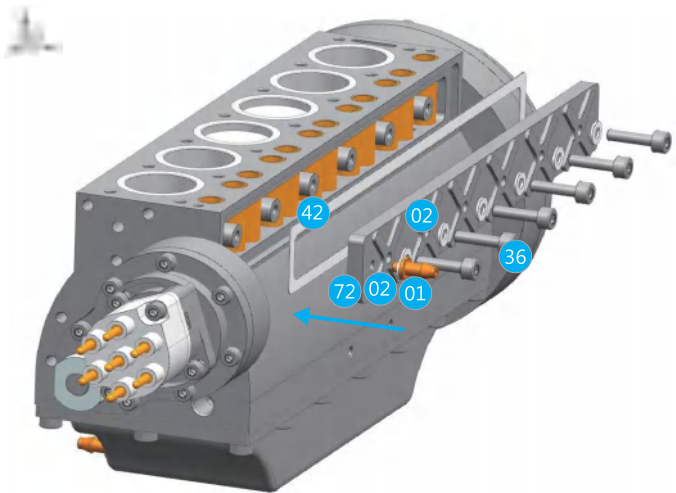
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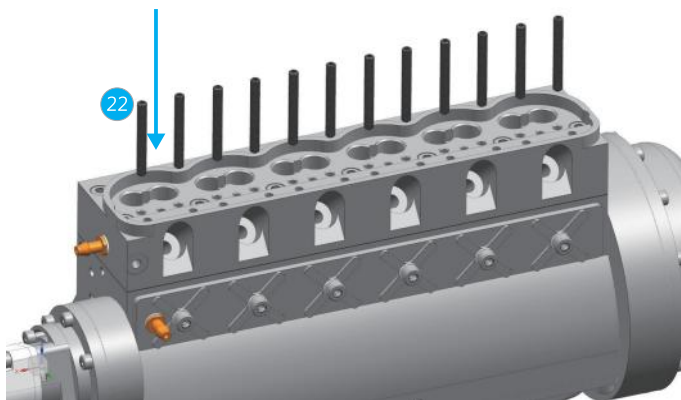
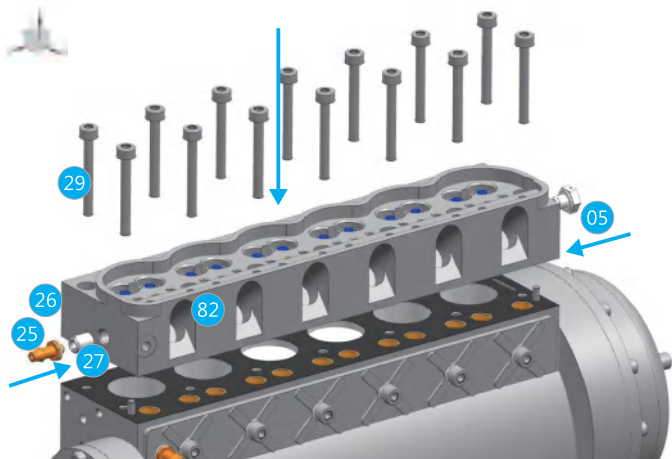
The notch of camshaft and distributor shaft should be aligned.

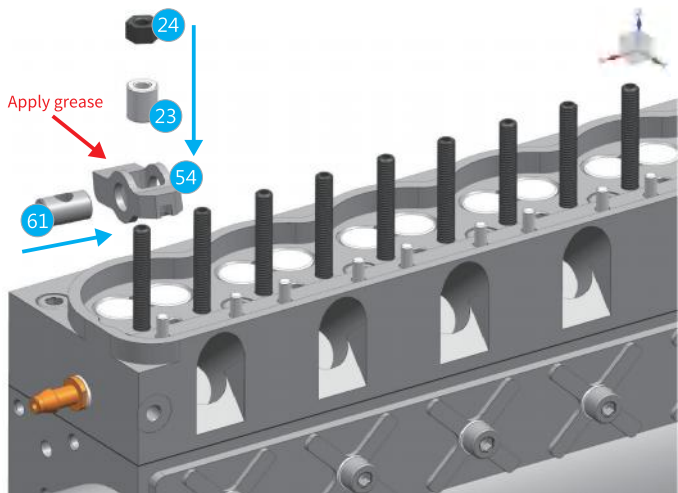
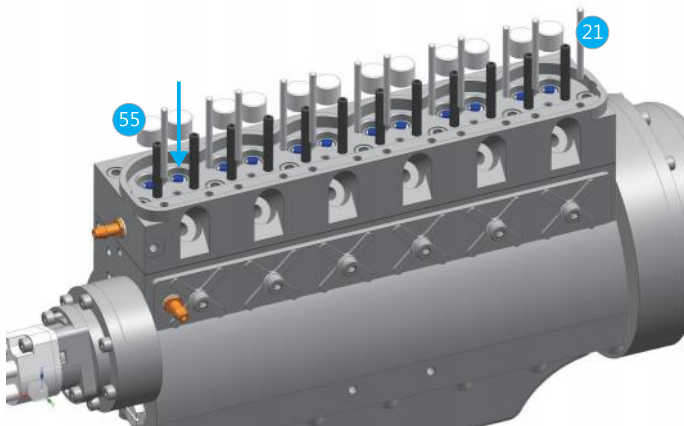






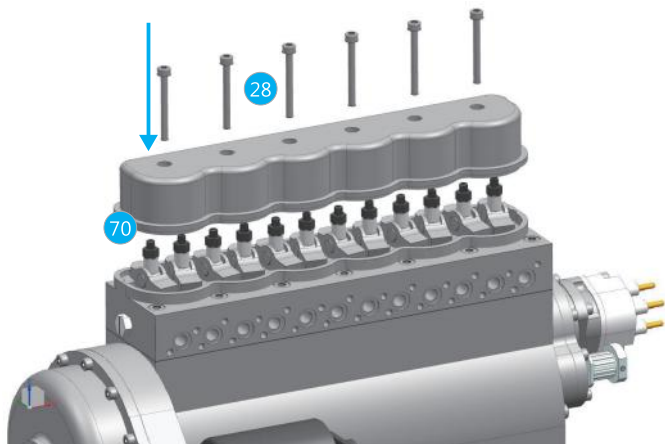
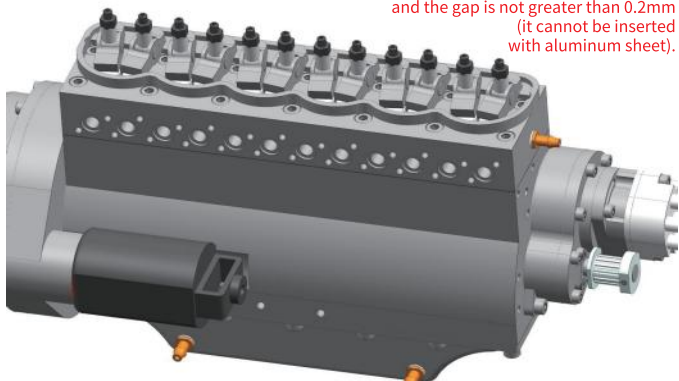




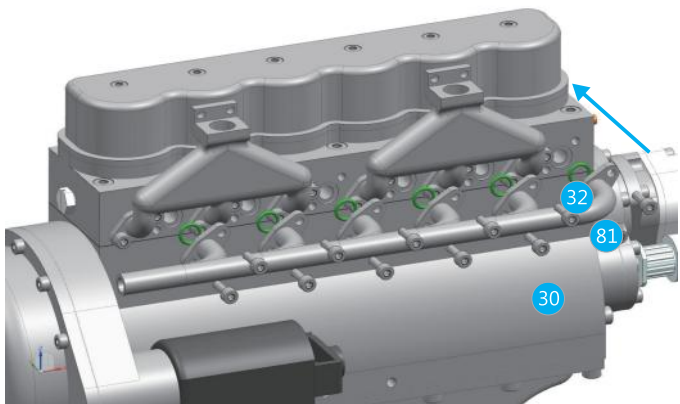
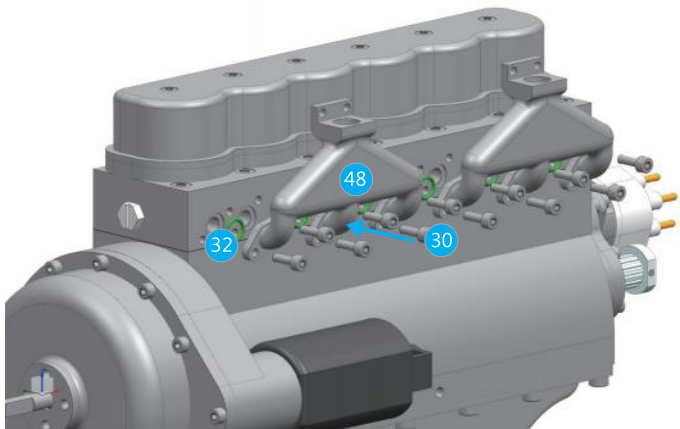


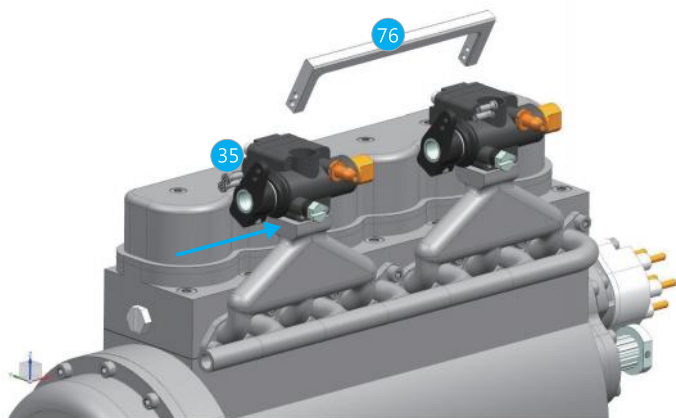
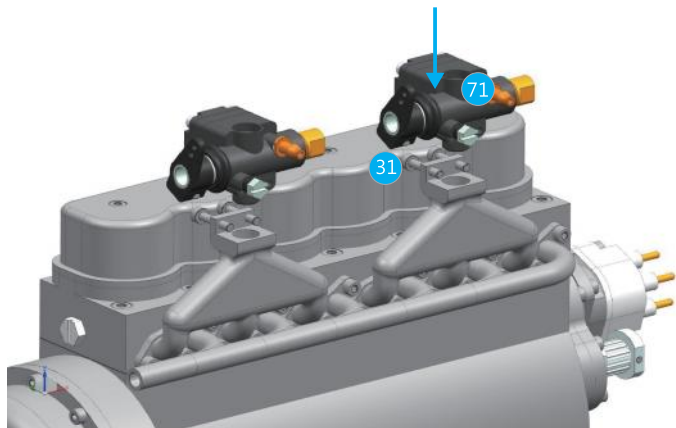
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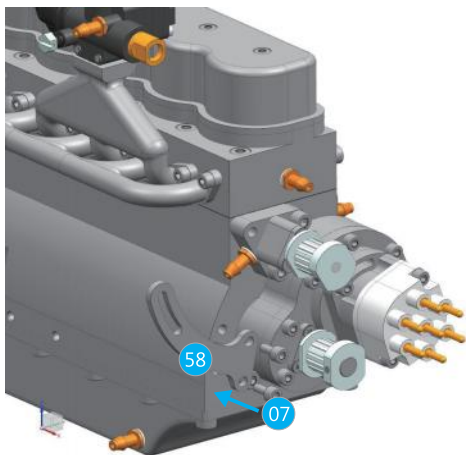
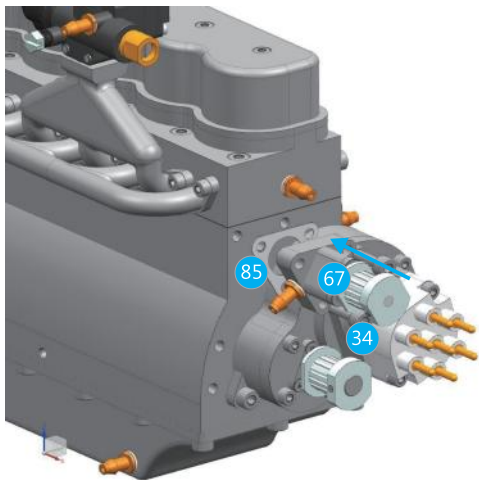
Turn the nut to adjust the height of the rocker arm until there is a gap between the valve cover and the rocker arm and the gap is not greater than 0.2mm (it cannot be inserted with aluminum sheet).

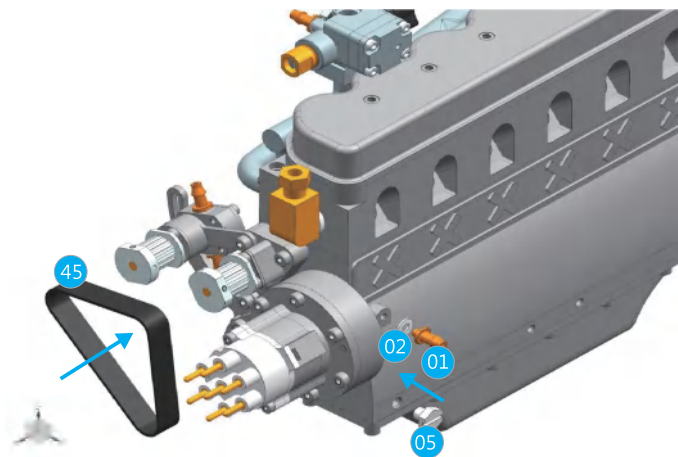
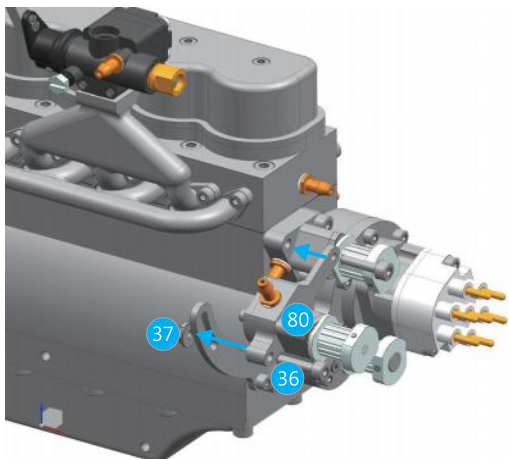


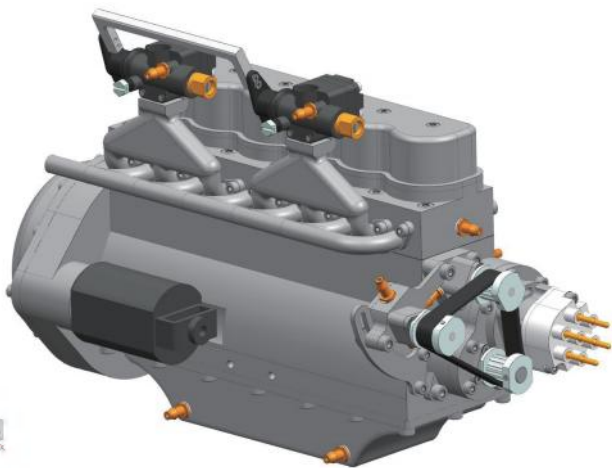




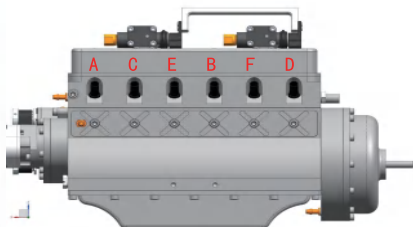
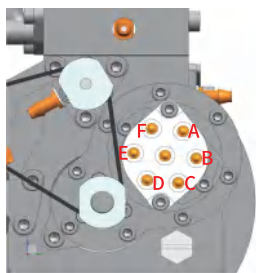


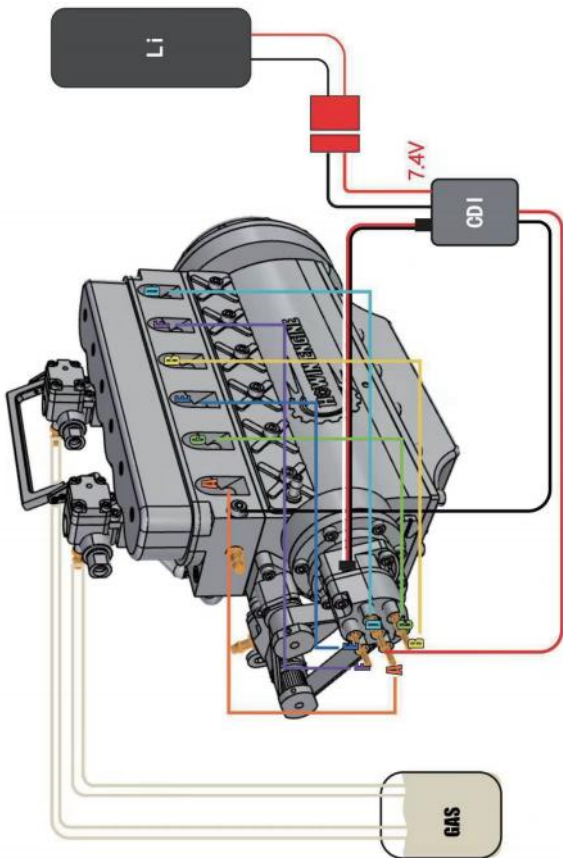






### Spark Plug Wiring Diagram





## Install the Base

Ensure that the surface of the engine mount is flush and level. Improper installation can result in deformation of the crankcase, bearings, and other components. This can cause instability during operation and lead to performance degradation. Use 3.0mm hex socket screws when fixing the engine. If the engine is being installed on a different platform, purchase adjustment pads to fit between the engine bracket and the engine.

## Attention About Starting

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For safety reasons, it is strongly recommended not to disassemble the engine or attempt to start the mechanism. If there are any starting problems, please contact your local dealer or a HOWIN technician for assistance. If you need to return the engine to the factory for testing, HOWIN will provide high-quality after-sales service. However, if any issues arise as a result of unauthorized disassembly, you will be responsible for any corresponding liabilities and expenses.

### 1. Spark plug

The L6-210 requires six special 3/16-40 inch threaded spark plugs for four-stroke gasoline engines. It starts by using a 12V power supply. When the battery is disconnected, the heat retained in the chamber is still sufficient to heat the filament and keep the engine running. When the top center compression position is reached, an “automatic” ignition burst occurs while the spark plug remains at a high temperature, allowing for higher rotational speeds with reduced load.

However, if the RPM is low, the spark plug will cool and if it drops too low, the ignition will stop, causing the engine to stop.

### 2. Fuel

Please use gasoline as the fuel for the engine with guaranteed quality. Self-matching or fake and inferior fuel will greatly reduce the performance and lifespan of the engine. As it is a four-stroke engine, in order to ensure normal operation, we recommend using gasoline with a 95# rating or higher. Please adjust the gasoline-to-oil ratio to be between 1:25 to 1:30, and use 2T internal combustion engine oil.

When attempting to use nitro fuel, it is recommended to use fuel that contains 20-25% nitromethane. If high nitro fuel is used, the engine's ignition timing and cylinder pressure will be significantly affected, leading to an inability to maintain normal and stable operation. If the nitro content of the fuel increases or the fuel brand changes, it is recommended to adjust the oil-rich needle to run the engine, so that the optimal setting for the new fuel can be rechecked.

### Remind!

If the engine is running at very high speeds using high-octane gasoline, the lifespan of the spark plug will be reduced. Please note that engine fuel is toxic and should be kept away from contact with eyes and mouth. Always store it in a clearly marked container in a safe place, out of reach of children. The fuel is highly flammable and should be kept away from open flames, overheating, or any other sources of ignition.

### 3. Fuel Tank

It is recommended to use a 100cc tank which should be installed on the same level as the engine. The distance between the fuel inlet and outlet of the tank and the carburetor should be kept within 1 cm, with the carburetor being higher than the fuel inlet and outlet. If the gap is too high, the efficiency of the carburetor will be reduced and starting the engine will become difficult. To ensure a clean fuel supply, please use standard 5mm silicone tubing and properly install oil filters.

Since the engine relies on negative pressure to draw fuel, it is recommended that the muffler exhaust pipe be used to pressurize the fuel tank.

### 4. Start power supply

The L6-210 series engine is equipped with a starter motor that can be started with the push of a button. All you need to purchase is a standard 12V 25C lithium battery to achieve quick starting. Using a starting battery with too low or too high voltage will not ensure the longevity of the starter motor, so be sure to not use an incorrect voltage starting battery.

### 5. Environment for Starting

Please start the engine in a well-ventilated area to avoid inhaling harmful fumes.

### 6. Platform for Starting

After starting the engine, it may produce some vibration, so be sure to place it on a stable and level surface.

### 7. Heat Dissipation

The engine is cooled by a fan, so be aware that the high-speed rotating fan blades can be dangerous and should not be touched. If you notice any cracks in the blades during use, please replace them promptly.

### Remind!

Every time you start the engine, please thoroughly inspect the blades for cracks. If you find any cracks, it is necessary to replace them to prevent the danger of blade fragmentation during high-speed operation.

## Operation And Adjustment

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### Note

Four-stroke engines have a stronger torque output compared to two-stroke engines, so appropriate measures should be taken during operation.

To extend the service life and improve performance, each engine has undergone testing at the factory. After receiving the engine, it's important to properly run it in and clean it. With continuous running, the cylinder pressure will gradually increase. Because this engine has a high degree of simulation and a large number of parts, we do not recommend disassembling it fully. Instead, we will provide effective sales support to assist with maintenance and stable use.

### 1. Check the Timing Belt and CAM Axle Box

Please make sure that the marking points on the two pulleys can be aligned at the same time. To do this, open the hood and add grease as per instructions on page 25. Since a mounted CAM is used, be sure to use solid grease to ensure stable operation and prevent dry friction of the CAM.

### 2. Check the Power Supply

Please confirm that the voltage of the 12V universal ignition power supply is normal and fully charged.



### 3. Initial Oil Needle Setting

Adequate lubrication and cooling are essential prerequisites. The engine should be run with carefully set oil needle settings. The excess oil not only provides ample lubrication but also helps to dissipate heat from surrounding metal, assisted by the fuel gasoline. In the case of two-stroke model engines, pre-heating the cylinder is accomplished through the crankcase on longer trips.

However, in the case of four-stroke engines, with their intake pipe and carburetor mounted high on the cylinder cap, a rich mixture of cooling fuel and air flows directly into the cylinder. With the aid of fan cooling, this provides an excellent operating experience for enthusiasts. You can also purchase the HOWIN series of water cooling accessories to help ensure stable operation for an extended period of time.

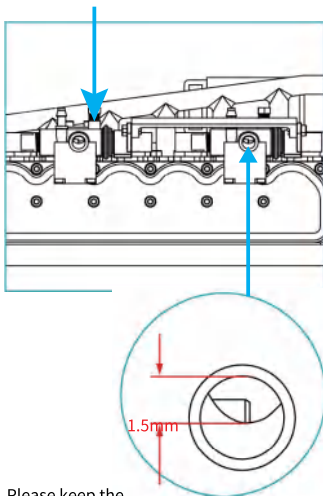
#### Remind!

**Each engine leaving the factory has had its oil needle setting completed. If the oil needle is misadjusted during use, it is recommended to adjust the main oil needle to 2.0 turns and the auxiliary oil needle to 1.5 turns. The methanol engine requires a certain temperature of the spark plug filament to achieve ignition. If the engine operates in an oil-rich state at low speeds for a prolonged period, the filament temperature will gradually decrease, leading to difficulties with ignition. To avoid this, it is necessary to increase speed at intervals to clean the oil and avoid oil enrichment at low speed.**

In a four-stroke engine, a large amount of air intake is crucial, so it's important to set the throttle screws appropriately. The minimum throttle opening (idling setting) should be about 1.5mm for all types of engine enthusiasts. When adjusting the size of the throttle door opening, do not

use excessive force to twist the throttle valve screws. Instead, use the valve screws to loosen the throttle, and then pull the throttle rocker arm to adjust as shown in the figure.

Loosen the throttle screw and adjust the size of the throttle.



Please keep the throttle opening larger than 1.5mm.

### 4. Start

#### Remind!

Before starting the engine, it is important to place the throttle in the correct position. It is recommended to open the throttle to 30% to start. Do not open the throttle too far under "no load" conditions, as this can cause the engine to overheat quickly and seriously damage the piston ring and cylinder sleeve.

To start the engine, connect the battery of the spark plug and press the start button. Once the engine starts, disconnect the spark plug battery and keep the engine running slowly under the oil-rich needle setting. (If necessary, gently adjust the throttle lever to keep the engine idling steadily.)

If the engine stops, let it cool for 15 seconds before restarting. To protect the starter motor, hold down the start key for no more than 5 seconds for each start. After starting, allow the engine to warm up for 30 seconds so that the oil in the fuel can fully lubricate each working part. If the engine experiences instability or slow or flashover throttle control when rapidly decreasing from high speed to low speed or rapidly increasing from low speed to high speed, check the carburetor for proper functioning.

### **Rich Oil**

When the engine has too much fuel and emits smoke or accelerates slowly, it indicates that the engine has excessive oil. To fix this, turn the main oil needle clockwise, by 15 degrees as a unit, gradually reducing the main oil needle until the engine exhaust sound is soft and strong and the exhaust pipe slightly smokes and the lubricating fuel sprays out.

### **Lean Oil**

If the engine sounds too sharp, like the sound of dry friction between metals, and the temperature rises rapidly, and the engine stops immediately after acceleration, it indicates that the engine has low oil. To fix this, turn the main oil needle counterclockwise, by 15 degrees as a unit, gradually reducing the main oil needle until the engine exhaust sound is soft and strong and the exhaust pipe slightly smokes and the lubricating fuel sprays out.

### **Idling Stop**

When the engine speed changes rapidly, such as suddenly adjusting from high speed to low speed, causing the engine to stall, please confirm whether the throttle is closed less than 1.5mm, or gradually reduce the auxiliary oil needle by turning it clockwise, by 20 degrees as a unit, until the engine maintains a steady idle speed. During the debugging process, it is important not to excessively reduce the auxiliary oil needle to avoid engine lean oil symptoms. We recommend that the minimum value of the auxiliary oil needle should not be less than 1 turn.

## **Care And Maintenance**

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The L6-210 series is a highly precise machine that requires regular cleaning. Due to the impact of the environment and fuel during use, the engine parts can experience wear and corrosion. HOWIN will provide long-term maintenance services, but you can also perform basic cleaning and maintenance.

To keep the carburetor in good condition, it's important to carefully clean it and remove dirt and grease from the inlet.

If an air filter is used, make sure it's clean and free from blockages

If the air filter has been used for more than one hour, it should be replaced promptly to ensure proper functioning. When removing a contaminated air filter element, be careful to avoid letting dirt enter the carburetor.

Do not remove the timing synchronous belt, instead clean it with alcohol as a cleaning agent. Do not use corrosive detergents as they may cause damage. Spark plugs are considered consumables and must be treated as such. Running the spark plug for a long time will not ensure normal engine operation, but you can extend its life and maintain engine performance by using it carefully.

Use appropriate tools when disassembling the engine.

Use the proper amount of 95# gasoline.

Do not overtilt the engine and do not connect the battery while making adjustments.

The spark plug should be replaced if it is burned or no longer provides optimal performance. For example,

a. If the filament surface becomes rough and white.

b. The filament curls and deforms.

c. There is external material adhered to the filament or plug corrosion.

d. The engine power decreases when idling.

e. The power goes out after starting the engine.

At the end of each operation, empty the fuel tank, energize the spark plug, and try to restart the engine to burn the possible left fuel in the fuel tank. Repeat this process until the fuel is cleared from the engine.

Inject antiseptic oil and briefly start the motor to distribute the oil to the working parts. Do not inject this oil into the lubricator nozzles, as this may cause the O-ring of the carburetor to deteriorate. Add a solid lubricant to the camshaft and

valve tappet to ensure that the camshaft has sufficient lubrication for each operation.

### **Note!**

**These maintenance procedures should be performed regularly. After a period of time, there may be a risk of corrosion or difficulty starting the engine. If you need assistance, please contact us.**

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## Replacement Of Running Parts

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After prolonged use, the friction between engine components will result in wear and an excessive gap. Replacing the relevant parts will help improve your engine's performance.

In the event of inflexible starting, power reduction, unstable idle speed, or other issues during use, please share your experience and report the poor performance of the engine to your local dealer or HOWIN. We are dedicated to providing you with outstanding service.

For parts replacement, we offer professional equipment and a skilled team. Do not attempt to disassemble the engine without professional tools, as it may result in uncontrollable damage.

# Bug Checking

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If the engine fails to start, please carefully inspect the following:

a. Check the power and circuit. Both the starter motor and engine are not rotating. First, check the battery charge and wire connection, if the battery is normal, then check the power start circuit, fuses, and ignition switch are normal.

b. Check high-voltage spark. If high-voltage spark is abnormal, check the spark plug, distributor, CDI ignition system, Hall sensor, etc. for malfunction.

c. Check fuel supply. Whether the fuel is capable of smoothly reaching the carburetor. Confirm that there is oil in the tank, then check the fuel pressure in the fuel line.

d. Check for leaks. Check if the air intake pipe for leaks, check the pipes and connections among pipes for integrity, and check the crankshaft ventilation system for leaks. With the throttle in a moderate open position, try to start the engine. If the engine can start at this time, it indicates a fault in the idle control valve and its circuit or an air intake leak.

e. Check the needle valve. If the needle valve setting is confused, please restore the factory setting first, then fine-tune it based on the actual operation of the engine. Different regions, altitudes, temperatures, and humidities will all have an impact on needle valve settings. Please adjust it patiently based on local real conditions.

f. Flooding. Do not start forcibly at this time. Remove the spark plug, close the needle valve, and press the start button to discharge excess fuel. (Cover the spark plug hole with a rag, so that the fuel does not splash on you). If you start forcibly

without discharging excess fuel, it may cause irreparable damage to the start system and pull the connecting rod and crankshaft.

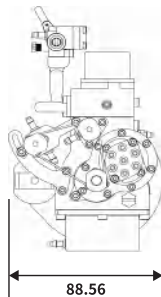
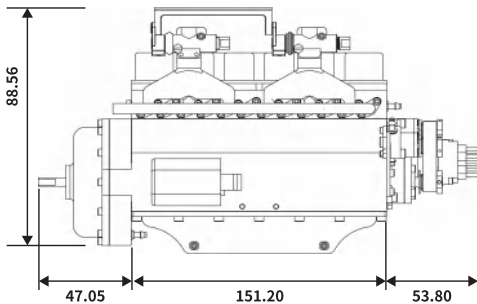
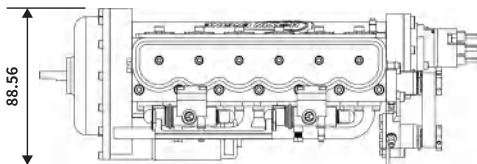
g. Low speed stall. Please do not maintain at a low RPM for an extended period of time. The engine requires the spark plug to maintain its temperature in order to ignite. When the engine is running at low speeds for an extended period, it enters a rich state, causing the temperature of the spark plug filament to gradually decrease, resulting in a stall. To prevent this, it is necessary to periodically increase speed to clear the oil and maintain the filament temperature.

h. Timing inspection. Check the ignition timing and firing order for each cylinder.

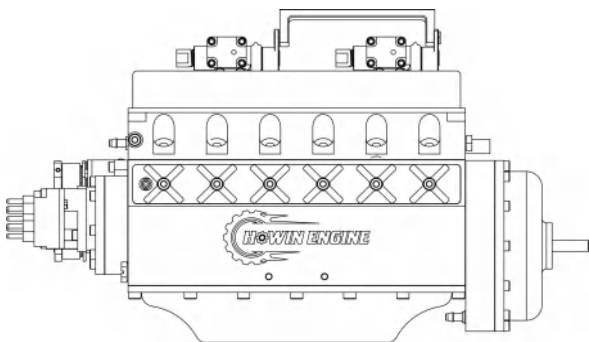
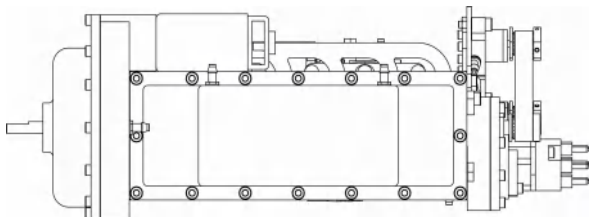
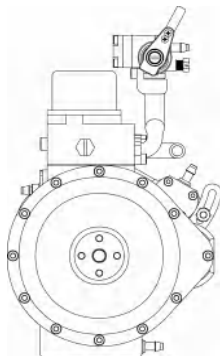
i. Loss inspection. Check for damage or wear on all components. If any parts are found to be damaged or worn, purchase new parts and replace them immediately (it is recommended to not disassemble the engine without professional guidance or without a professional's guidance).

# Three Views / Multiple Views

## Three Views



**Multiple Views**





# Commitment

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Please contact a HOWIN dealer in your area or location. If you purchase through the internet, you can also obtain various parts and complete services online. You can obtain detailed information about each part from the dealer.

During the use, we have a professional team to answer your technical or usage questions online, free of charge.

If your distributor is unable to provide technical services, we will offer you direct technical support.



# Bom List

Number	Part Name	Quantity
01	Oil nozzle (fine tooth)	4
02	Nylon gasket	10
03	Cylindrical pin( $\phi 2 \times 8$ )	23
04	Screw(M2.5 $\times$ 20)	10
05	Hexagon plug(M4 $\times$ 4)	2
06	Hexagon plug(M6 $\times$ 5)	1
07	Screw(M3 $\times$ 8)	24
08	Screw(M3 $\times$ 12)	6
09	Oil seal(6 $\times$ 9 $\times$ 2.1)	1
10	Countersunk screw(M2 $\times$ 6)	3
11	O-ring(26 $\times$ 1.5)	1
12	Oil seal (5 $\times$ 8 $\times$ 2.1)	2
13	Screw(M2.5 $\times$ 10)	22
14	Screw(M2.5 $\times$ 16)	2
15	Cylindrical pin( $\phi 2 \times 12$ )	2
16	Flat key (2 $\times$ 2 $\times$ 6)	1
17	E-type circlip(5 $\times$ 10 $\times$ 0.8)	1
18	Butterfly gasket	1
19	E-type circlip( $\phi 3.5$ )	3
20	Nut (M6)	1
21	2 $\times$ 25 Ejector pin	12
22	Tighten the socket head cap screws	12
23	Cylindrical nut(M3 $\times$ 5 $\times$ 6)	12
24	Anti-slip nut(M3)	12
25	Oil nozzle (coarse tooth)	1
26	Oil seal (5 $\times$ 10 $\times$ 2.1)	2
27	Internal and external conversion nuts	1
28	Screw(M2.5 $\times$ 25)	6
29	Screw(M3 $\times$ 25)	14
30	Screw(M2.5 $\times$ 8)	24
31	Screw(M2.5 $\times$ 12)	4
32	O-ring(5 $\times$ 1)	12
33	Screw(M3 $\times$ 6)	1
34	Screw(M3 $\times$ 10)	2
35	Small diameter countersunk head screw(M3 $\times$ 6)	4
36	Screw(M3 $\times$ 12)	1
37	Flange nut (M3)	1

Number	Part Name	Quantity
38	Piston ring sleeve	1
39	grease	1
40	Cylinder head gasket	1
41	Rear chamber cover gasket	1
42	Side cover gasket	1
43	Oil pan gasket	1
44	Rear cavity gasket	1
45	Synchronous belt	1
46	Front chamber cover gasket	1
47	Front chamber gasket	1
48	Intake pipe	2
49	Camshaft	1
50	Gear A	1
51	Bearing shell B	5
52	Bearing shell A	5
53	Gear B	1
54	rocker arm	12
55	Valve cover	12
56	Bearing 8*16*6	2
57	Flange bearing 5*10*4	2
58	Oil pump bracket	1
59	Triangle B	1
60	Tile cover	5
61	Rocker shaft	12
62	Driven gear	1
63	axle sleeve	1
64	Rear chamber	1
65	Front chamber cover	1
66	crankshaft	1
67	Water pump assembly	1
68	Rear chamber cover	1
69	Pulley A	1
70	cover	1
71	Valve cover	1
72	Side cover	1
73	Starting motor assembly	1
74	Anterior chamber	1
75	free wheel	1
76	Synchronizing lever	1
77	Piston connecting rod assembly	6

Number	Part Name	Quantity
78	5×22 Ejector pin	12
79	Cylinder block	1
80	Oil pump assembly	1
81	exhaust pipe	1
82	The cylinder cover	1
83	Oil pan	1
84	Distributor assembly	1
85	Water pump gasket	1



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