

**ENGINE ASSEMBLY****1118-01****GENERAL INFORMATION****1. SPECIFICATIONS**

Category	Items		Specified value	Remarks
Cylinder head	Cylinder head height		132 ± 0.1 mm	
	Cylinder head weight		11.5 kg	
	Bottom (combustion chamber surface) flatness	All	0.075 mm	
		Range	0.05 mm (100 x 100 mm)	
	Spark plug installation angle		8° to intake side	
Head gasket thickness		0.55 mm		
Camshaft	Camshaft axial end play	Intake side	0.08 to 0.18 mm	
		Exhaust side		
Connecting rod	End play		0.100 to 0.300 mm	
Cylinder block assembly	Weight		21.5 kg	
	Bore		Ø76 mm	
	Stroke		Ø88 mm	
	Bore pitch		85 mm	
	Bed plate height		63.5 mm	
	Cylinder block + Bed plate height		274.36 mm (210.86 mm to 63.5 mm)	
Crankshaft	Crankshaft axial end play		0.100 to 0.266 mm	
Piston ring	End gap	No. 1 compression ring	0.15 to 0.30 mm	
		No. 2 compression ring	0.30 to 0.50 mm	
		No. 3 oil ring	0.20 to 0.70 mm	

Modification basis	
Application basis	
Affected VIN	

## 2. TIGHTENING TORQUE

Components	Tool dimensions	Bolt quantity	Specified torque (Nm)	Remarks	
Belt tensioner	17 mm	1	61 ± 2.0 Nm	-	
Crankshaft pulley	27 mm	1	220 Nm 90°		
Engine ground cable	10 mm	2	10 ± 1.0 Nm		
Alternator	15 mm	1	61 ± 6.1 Nm		
	17 mm	1			
A/C compressor	13 mm	4	25 ± 2.5 Nm		
Water pump pulley	10 mm	3	10 ± 1.0 Nm		
Water pump	5 mm hexagon wrench	5	10 ± 1.0 Nm		
Exhaust manifold heat protector	10 mm	4	10 ± 1.0 Nm		
Exhaust manifold	12 mm	7	40 ± 5.0 Nm	Non-reusable	
	13 mm	3	25 ± 2.5 Nm	-	
TOC coolant return pipe (vehicle with A/T)	10 mm	2	10 ± 1.0 Nm		
Coolant return pipe (vehicle with M/T)	10 mm	3	10 ± 1.0 Nm		
TOC coolant supply pipe (vehicle with A/T)	10 mm	2	10 ± 1.0 Nm		
Cylinder head outlet port	10 mm	2	10 ± 1.0 Nm		
Cylinder block outlet port	5 mm hexagon wrench	2	10 ± 1.0 Nm		
Oil filter module	13 mm	1	25 ± 2.5 Nm	Bolt length: 60 mm	
		1		Bolt length: 105 mm	
		3		Bolt length: 40 mm	
Thermostat	5 mm hexagon wrench	2	10 ± 1.0 Nm	-	
Electronic throttle body	10 mm	4	10 ± 1.0 Nm		
Fuel rail	13 mm	2	25 ± 2.5 Nm		
Intake manifold	13 mm	3 bolts 1 nut	25 ± 2.5 Nm		

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Components	Tool dimensions	Bolt Quantity	Specified torque (Nm)	Remarks
Knock sensor	13 mm	1	20 ± 5.0 Nm	-
OCV	8 mm	2	8 ± 1.0 Nm	
Cam position sensor	10 mm	2	10 ± 1.0 Nm	
Ignition coil	10 mm	4	10 ± 1.0 Nm	
Spark plug	16 mm	4	20 ± 2.5 Nm	
Cylinder head cover	10 mm	16	10 ± 1.0 Nm	
Cylinder head	E16	10	30 ± 3.0 Nm 90° X 2 times	Non-reusable
Camshaft sprocket	M14 (12-point bit socket)	2	110 ± 10 Nm	-
Camshaft front bearing cap	10 mm	4	10 ± 1.0 Nm	
Camshaft bearing cap	10 mm	16	10 ± 1.0 Nm	
Oil pan	10 mm	2	10 ± 1.0 Nm	Bolt length: 115 mm
		2	10 ± 1.0 Nm	Bolt length: 105 mm
		16	10 ± 1.0 Nm	Bolt length: 25 mm
	13 mm	2	25 ± 2.5 Nm	Bolt length: 80 mm
Timing gear case cover	15 mm	4	58 ± 5.8 Nm	Bolt length: 80 mm
		1	58 ± 5.8 Nm	Bolt length: 50 mm
	13 mm	1	25 ± 2.5 Nm	Bolt length: 45 mm
		9	25 ± 2.5 Nm	Bolt length: 30 mm
Timing chain tensioner	5 mm hexagon wrench	2	10 ± 1.0 Nm	-
Tensioner rail	T40	1	25 ± 2.5 Nm	
Guide rail	T40	3	25 ± 2.5 Nm	
Sliding upper rail	5 mm hexagon wrench	2	10 ± 1.0 Nm	
Baffle plate	10 mm	6	10 ± 1.0 Nm	
Oil pump chain tensioner	T40	1	25 ± 2.5 Nm	
VOP extension wiring	5 mm hexagon wrench	1	10 ± 1.0 Nm	

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Components	Tool dimensions	Bolt Quantity	Specified torque (Nm)	Remarks
Oil pump	6 mm hexagon	4	25 ± 2.5 Nm	-
Connecting rod cap	12 point socket 8 mm	8	20 ± 5.0 Nm 80° + 10°	
Crankshaft position sensor	5 mm hexagon wrench	1	5 ± 1.0 Nm	
Drive plate	T55	8	45 ± 5.0 Nm 45° ± 5°	Non-reusable
Crankshaft rear seal	10 mm	7	10 ± 1.0 Nm	-
Bed plate	E10	10	25 ± 5.0 Nm	Non-reusable
Main journal	12 point socket 13 mm	10	55 ± 5.0 Nm 100° ± 5°	
Starting motor	14 mm	2	45 ± 5.0 Nm	-
Oil filter	Oil filter installation/ removal cup	-	12 to 16 Nm	
Cylinder block coolant screw plug	19 mm	1	30 Nm	
Flywheel	T55	8	45 ± 5.0 Nm 90° ± 5°	Non-reusable

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### 3. PRECAUTIONS

#### 1) When Lifting the Vehicle

- Pay close attention to the safety precautions when lifting the vehicle on a jack lift as the vehicle might slip off the jack lift.
- When working with a 4-column vehicle lift, use the center of the vehicle as a support point and chock the wheels to prevent the vehicle from rolling.
- When work with a 2-column vehicle lift, use the jack point as a support point.
- Take care not to spill the battery electrolyte and wear protective clothing when handling the battery.

#### 2) When Working on the Exhaust System

- Wear protective gloves when removing the exhaust pipe.
- Make sure that the exhaust pipe has sufficiently cooled down before working on the exhaust pipe, because the temperature of the exhaust pipe is very hot right after the engine has been stopped.

#### 3) When Working on the Fuel System

- Disconnect the negative battery terminal and prepare the service plug grip before working on the fuel system.
- Do not smoke and avoid flames nearby when working on the fuel system.
- Keep gasoline away from the parts made of rubber or leather.
- Be sure to avoid sputtering of the fuel when removing the pipe between the high-pressure side fuel pump and the fuel injector.
- Never remove any part of the fuel system before releasing the pressure in the fuel system.
- Even after the fuel pressure has been released, wrap a cloth or equivalent around the mountings to reduce the potential risk of fuel sputtering to a worker or engine compartment.
- Let the engine is cooled down sufficiently before proceeding to the next procedure since the fuel pressure on the high-pressure side will not drop until the engine is cooled down.

#### 4) When Working on the Cooling System

- Do not remove the radiator reservoir cap while the engine or radiator is hot since high-pressure hot coolant or steam may cause severe burn.

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## 5) When Working on the Lubrication System

- Repeated contact with the engine oil for an extended period of time may cause skin irritation.
- Take special care when changing the engine oil to minimize possible skin contact with the used engine oil because hazardous materials that may cause skin cancer are contained in the used engine oil.
- Always wear the oil-resistant protective clothing and gloves when handling the engine oil, and completely remove the used engine oil from the skin with a lot of water or waterless hand cleaner. Never use gasoline, dilute solution or solvent to wash your skin.
- Discard the used oil and used oil filter only in the designated area to protect environment.

## 6) When Tightening Bolts

Angle tighten the components of engine in a so-called final tightening operation. The tightening procedure is as follows:

- ① Clean the contact surface and threads before tightening bolts and nuts.
- ② When angle tightening without a torque wrench tighten the bolt to the specified angle, marking its position. (paint mark to assist the work)

### NOTE

The location and left/right position of components are based on the direction when viewed from the rear side.

The cylinder block is made of aluminum and can be deformed and broken easily when excessive force is applied. Therefore, always observe the specified torque when tightening the cylinder block to prevent its thread from being damaged.

Do not over-tighten a self tapping screw bolt as it creates threads itself.

Never reuse the used bolt if it is a angle-tightened one.

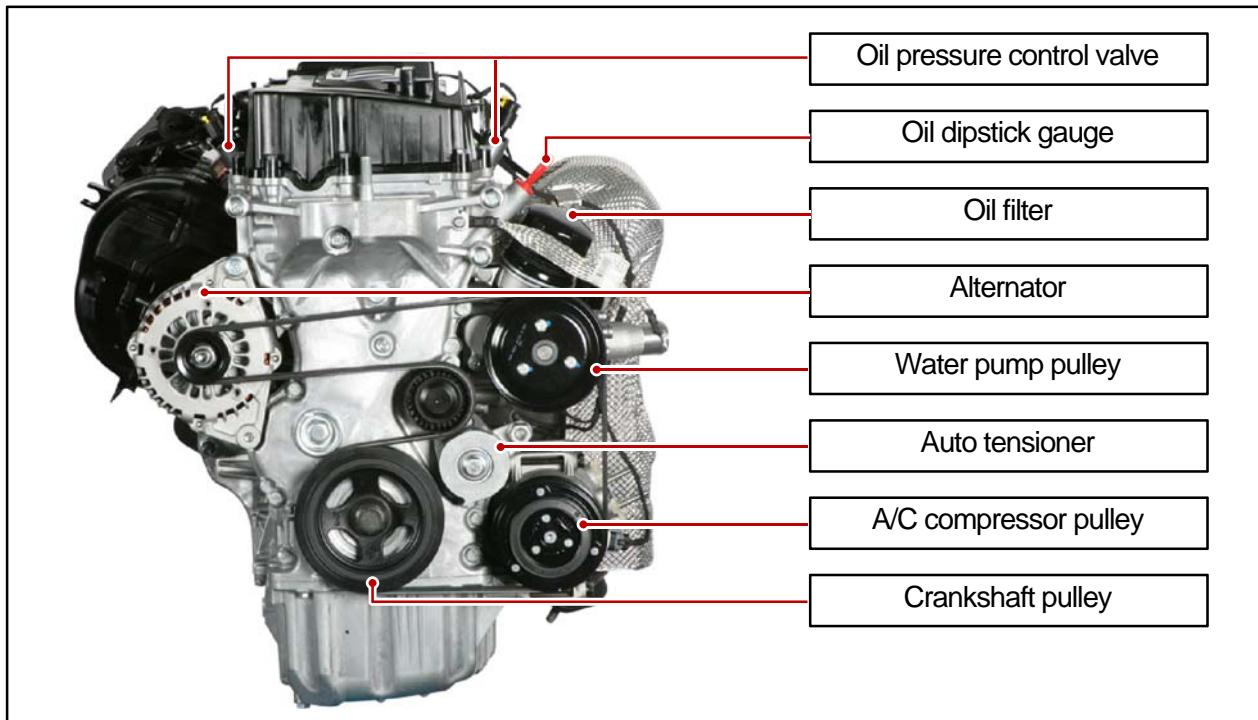
(However, a bolt with specified reuse number with the specified torque is reusable.)

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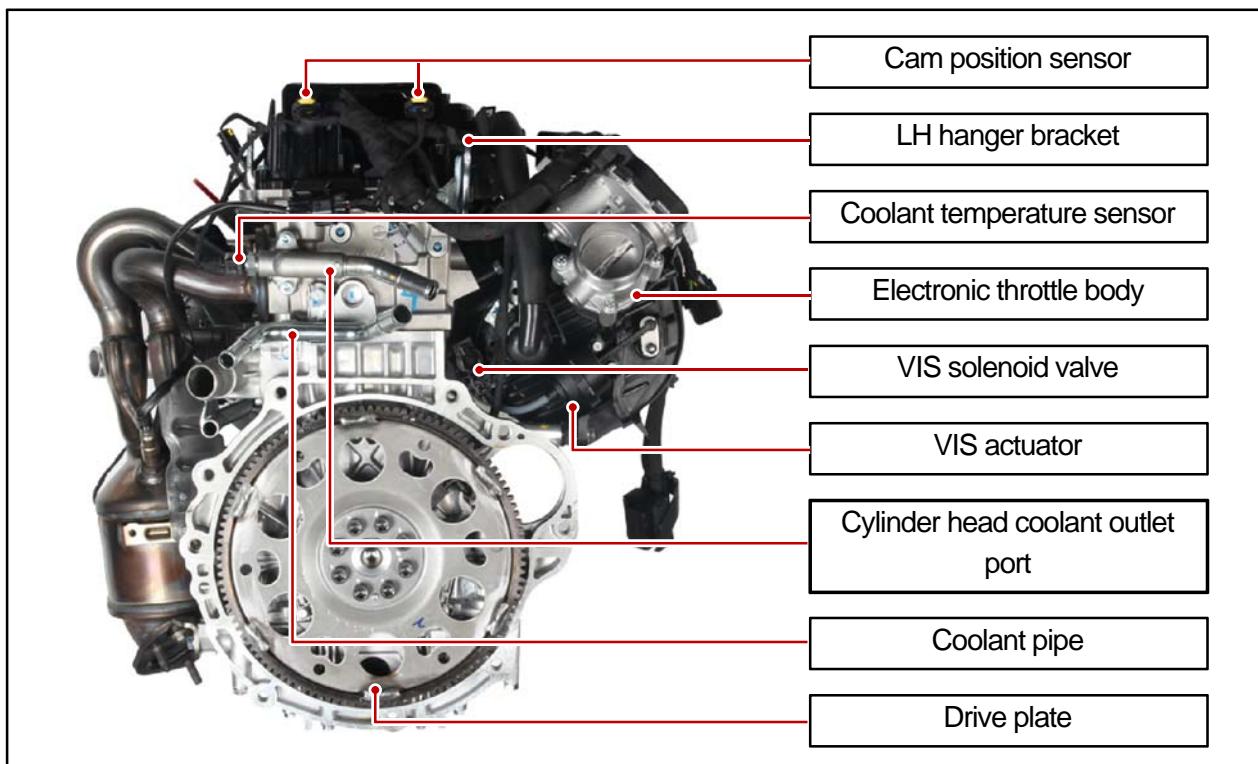
## OVERVIEW AND OPERATING PROCESS

### 1. APPEARANCE

#### ► Front view

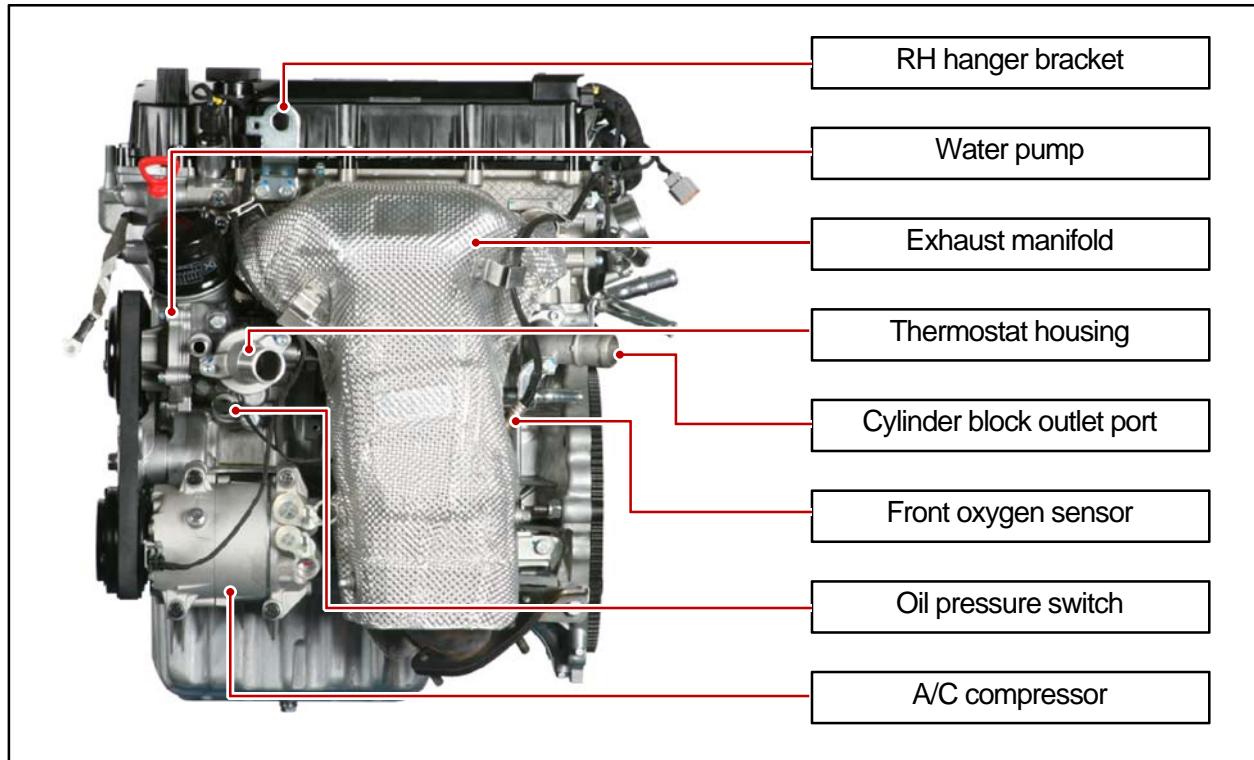


#### ► Rear view



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## ► Left view



## ► Right view

