

Shop Manual

ENGINE

140E -6 SERIES

KOMATSU

CLICK HERE TO **DOWNLOAD** THE COMPLETE MANUAL

- Thank you very much for reading the preview of the manual.
- You can download the complete manual from: www.heydownloads.com by clicking the link below



- Please note: If there is no response to CLICKING the link, please download this PDF first and then click on it.

CLICK HERE TO **DOWNLOAD** THE COMPLETE MANUAL

Connection

- When installing the hose for the air conditioner circuit, take care not to allow invasion of dirt, dusts and water into the hose.
- Check that the O-rings are fitted to the joints when connecting the air conditioner piping.
- Once an O-ring is used, it is deformed and deteriorated. Accordingly, do not reuse it.
- When removing the O-rings, use a soft tool so that the piping is not damaged.
- Check that the O-ring is not damaged or deteriorated.
- Apply compressor oil for refrigerant (R134a) to the O-ring.

★ However, do not apply oil to the threaded part of a bolt, nut or union.

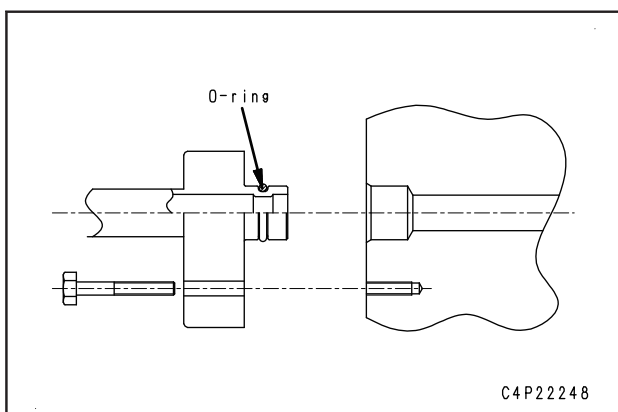
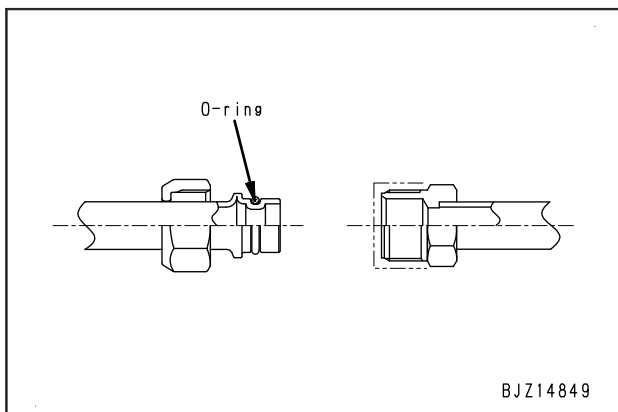
For tightening torques, see "Others", "Precautions for disconnection and connection of air conditioner piping".

Manufacturer	Part name
DENSO	ND-OIL8
VALEO THERMAL SYSTEMS	ZXL100PG (equivalent to PAG46)
SANDEN	SP-10

- When tightening nuts of the air conditioner hoses and tubes, be sure to use 2 wrenches. Use one wrench to fix and tighten the nut with the other wrench to the specified torque (Use a torque wrench for tightening).

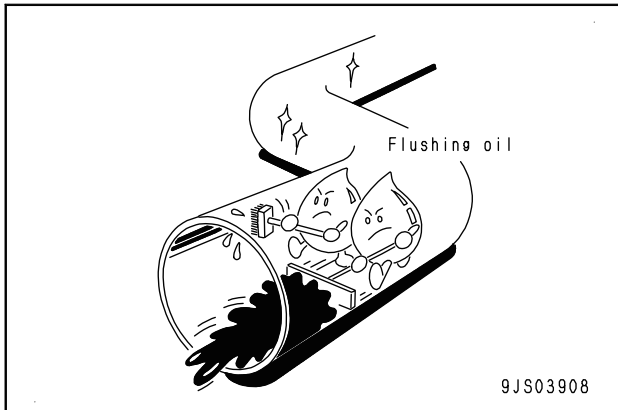
★ Example of fitting of O-ring

- An O-ring is fitted to every joint of the air conditioner piping.



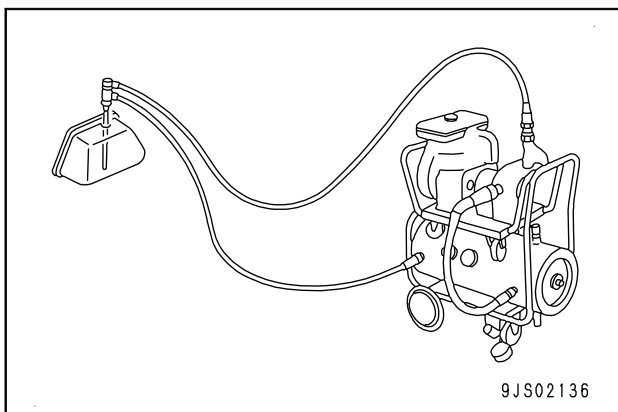
Flushing operations

- After disassembling the equipment or when changing the hydraulic oil with new one, flush the system to remove the contaminant and sludge left in the hydraulic circuit as well as the oil which includes them. Normally, flushing is performed twice. Primary flushing is performed by use of the flushing oil and the secondary flushing is performed by use of the specified hydraulic oil.



Cleaning operations

- After repairing the hydraulic equipment (pump, control valve, etc.) or when the machine is in operation, perform oil cleaning to remove the sludge or contaminant in the hydraulic oil circuit. The oil cleaning equipment can remove the ultra fine (approximately 3 μm) particles that the filter built in the hydraulic equipment can not remove. So, it is an extremely effective device.

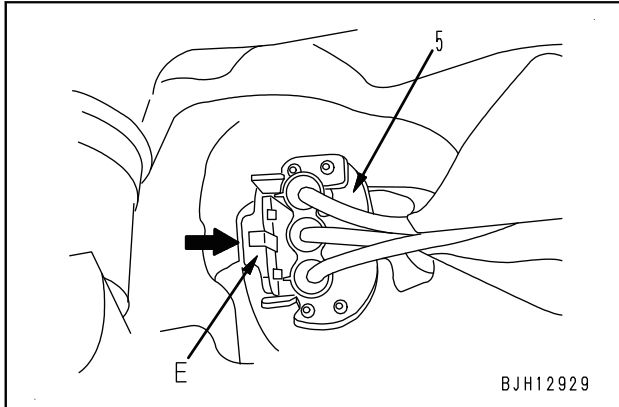


(SUMITOMO-3)

Disconnection

1. While pressing lock (E), pull out connector (5) in the direction of the arrow.

★ Pull the connector straight up.



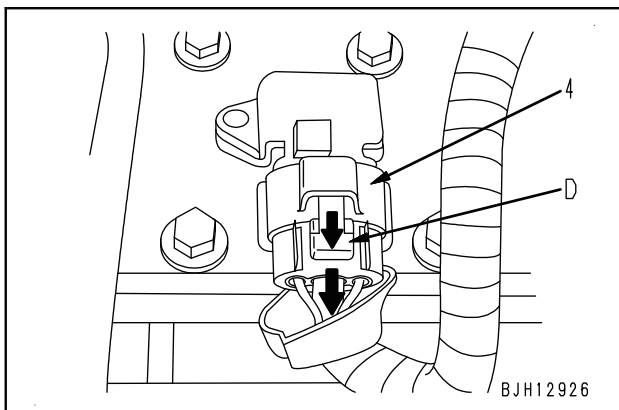
Connection

1. Insert the connector securely until a click is heard.

(SUMITOMO-4)

Disconnection

1. While pressing lock (D), pull out connector (4) in the direction of the arrow.



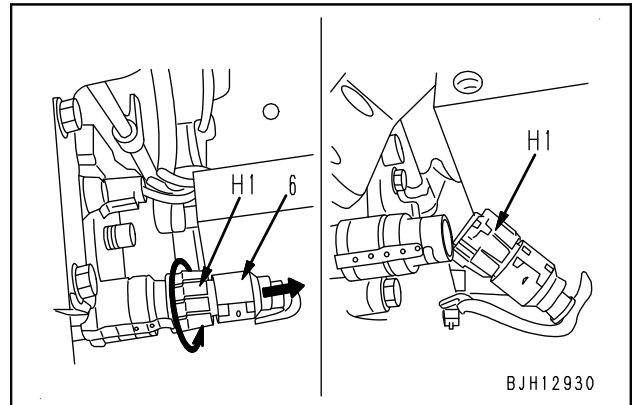
Connection

1. Insert the connector securely until a click is heard.

Turn-housing type (Round green connector) (CANNON-4)

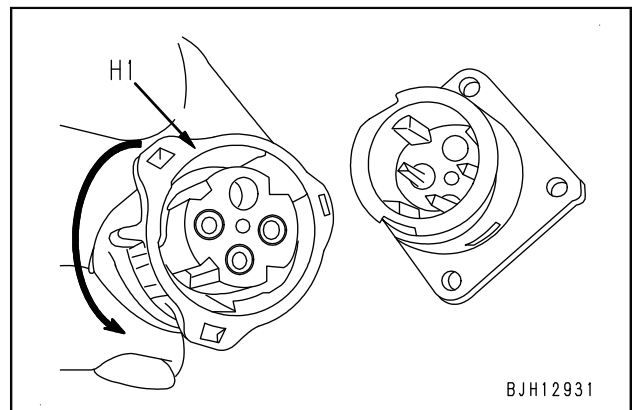
Disconnection

1. Turn housing (H1) in the direction of the arrow.
 - ★ Unlock the connector by turning housing (H1). When the lock is released, the housing is felt tight to turn.
2. Pull out housing (H1) in the direction of the arrow.
 - ★ Housing (H1) is left on the wiring harness side.



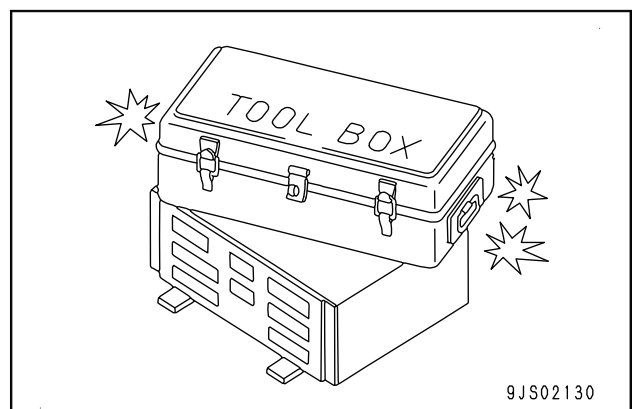
Connection

1. Insert the connector to the end while aligning its groove to the other.
2. Turn housing (H1) in the direction of the arrow until it "clicks".



Handling controller

- The electronic circuits for control including the microcomputers are assembled in the controller. These electronic circuits in the controller must be handled with care as they control the machine.
- Do not place objects on top of the controller.



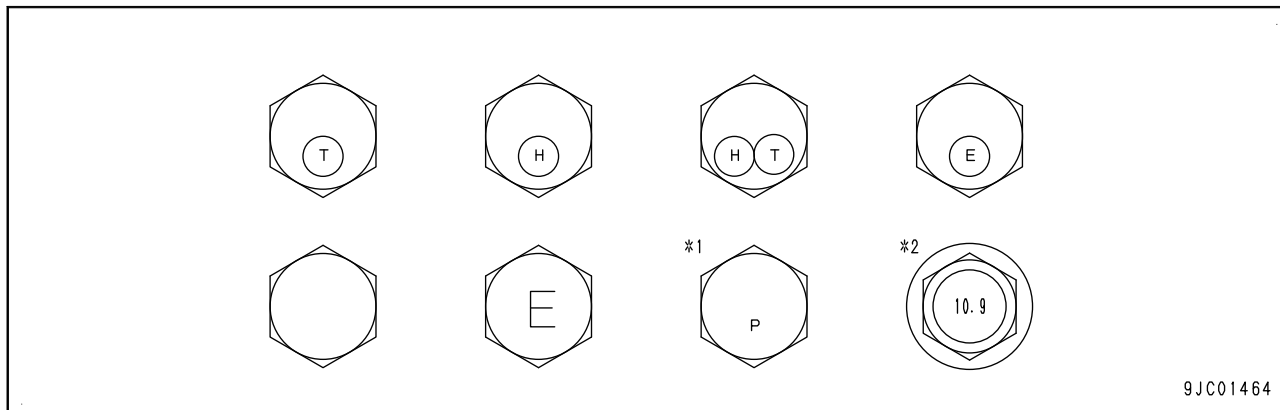
- Cover the control connectors with tape or a vinyl bag. Never touch the connector contacts.
- During rainy weather, do not leave the controller in a place where it is exposed to rain.
- Do not place the controller on oil, water, or soil, or in a place that can be heated to a high

Standard tightening torque table (ALL-M140-03B-P-01-A)

(Rev. 2012/10)

Table of tightening torque for bolts and nuts

Unless otherwise specified, tighten the metric bolts and nuts to the torque shown in the table below.



Thread diameter (mm)	Width across flats (mm)	Tightening torque (Nm {kgm})
6	10 (*2) 10	11.8 to 14.7 {1.2 to 1.5}
8	13 (*2) 12	27 to 34 {2.8 to 3.5}
10	17 (*1, *2) 14	59 to 74 {6.0 to 7.5}
12	19 (*1, *2) 17	98 to 123 {10.0 to 12.5}
14	22	157 to 196 {16 to 20}
16	24 (*1) 22	245 to 309 {25 to 31.5}
18	27	343 to 427 {35 to 43.5}
20	30	490 to 608 {50 to 62}
22	32	662 to 829 {67.5 to 84.5}
24	36	824 to 1,030 {84 to 105}
27	41	1,180 to 1,470 {120 to 150}
30	46	1,520 to 1,910 {155 to 195}
33	50	1,960 to 2,450 {200 to 250}
36	55	2,450 to 3,040 {250 to 310}
39	60	2,890 to 3,630 {295 to 370}

*1: Split flange bolt.

*2: Flanged bolt.

Abbreviation	Actual word spelled out
SIG	Signal
SOL	Solenoid
STD	Standard
OPT	Option
OP	
PRESS	Pressure
SPEC	Specification
SW	Switch
TEMP	Temperature
T/C	Torque Converter
T/M	Transmission

EGRV: EGR valve

MAF: Mass air flow and temperature sensor

PAMB: Ambient pressure sensor

PCCV: Crankcase pressure sensor

PIM: Charge pressure sensor

REV: KVGT speed sensor

SEGR: EGR valve lift sensor

SVGT: KVGT position sensor

T: KDPF inside temperature sensor

TIM: Charge temperature sensor

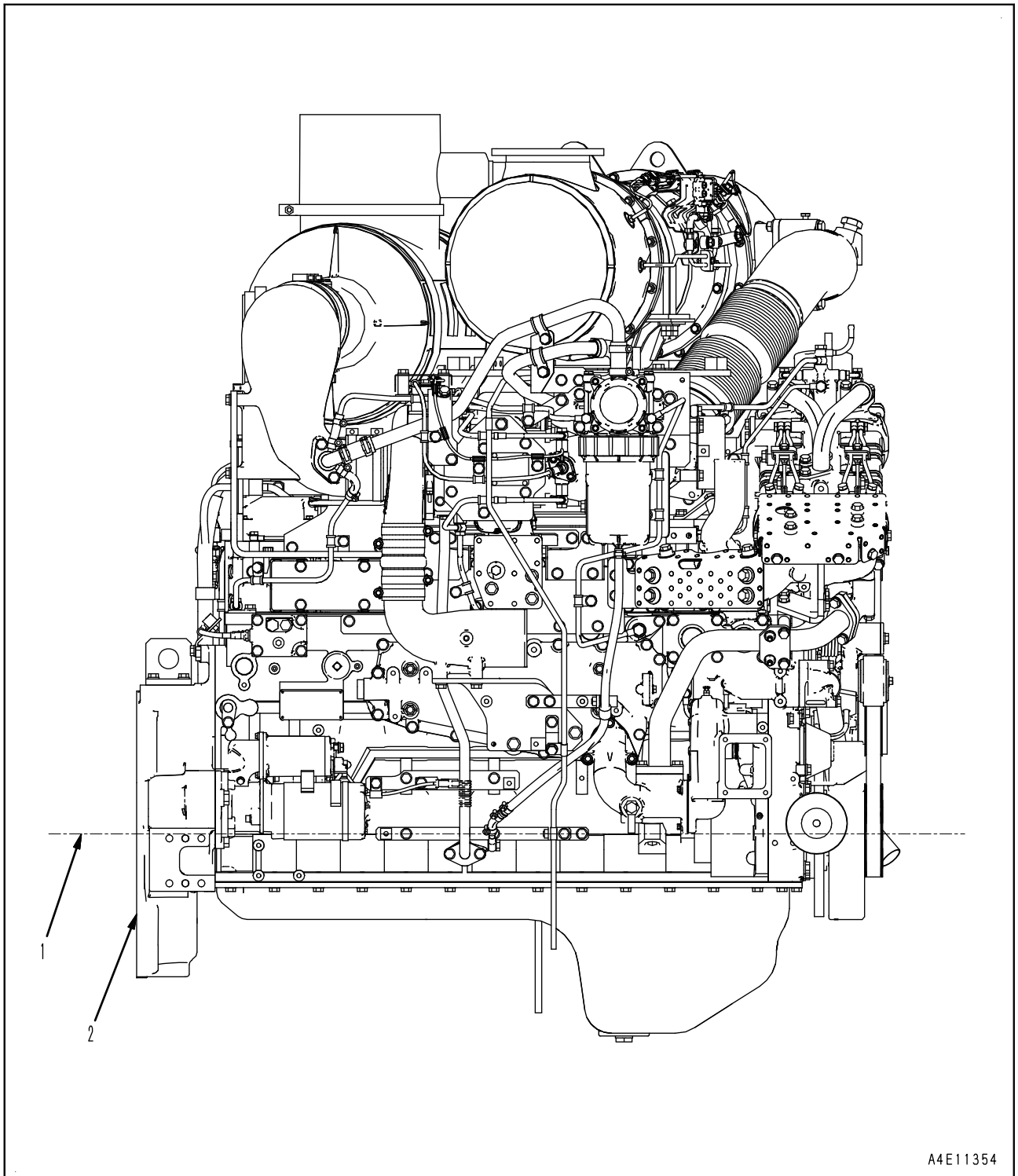
VGTSOL: EPC valve (for KVGT)

- The following describes our major improvements done in Tier 4 over Tier 3.
 1. Efficiency of EGR (Exhaust Gas Recirculation) cooler (4) has been increased (NOx reduced).
 2. Intake air flow at low engine speeds is increased by utilizing variable speed operation of the turbocharger (KVGT) (PM reduced).
 3. Employment of the high-precision EGR valve Oxygen density control is optimized for each driving condition by using a high precision EGR valve (EGRV), mass air flow (MAF) and temperature sensor, engine controller, and by monitoring each part of the EGR circuit (NOx and PM reduced).
 4. Common rail pressure is raised to increase fuel injection pressure and microparticulate the fuel spray (PM reduced).
 5. Blowby gas reduction system (KCCV) is introduced to perform internal circulation of blowby gas (HC reduced).
 6. Soot collecting filter (KCSF) is introduced (PM reduced).
 7. Variations between injectors are averaged by engine controller (CM2250).
 8. Combustion chamber is improved (NOx and PM reduced)
 9. Fuel injection and KVGT are automatically controlled by recognition of high altitude with ambient pressure sensor (PAMB) (NOx and PM reduced at a high altitude).
 10. KVGT speed (REV) is monitored (to protect the KVGT).
 11. When clogging of the soot collecting filter (KCSF) is detected by the differential pressure (dP) across the KDPF, the engine controller performs automatic regeneration(*), or prompts the operator to perform manual stationary regeneration on the machine monitor (to maintain the KDPF function).

*: A new feature to clean (oxidize) the soot accumulated in the soot collecting filter (KCSF) inside the KDPF.

Right side

★ The shape is subject to machine models.



A4E11354

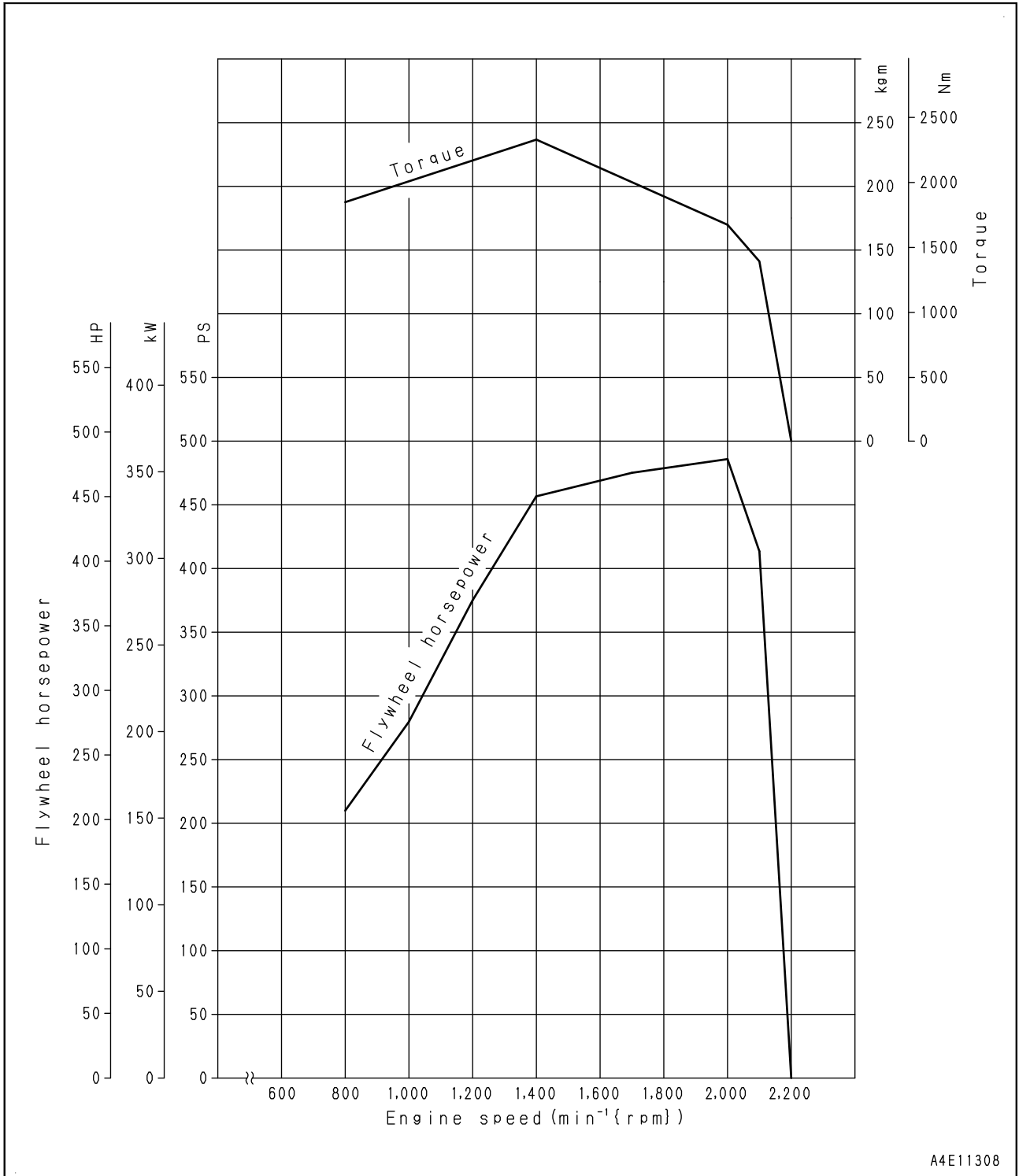
1. Center of crankshaft
2. Rear side of flywheel housing

Engine performance curve (ENG107-2170-001-A-01-A)

<Applicable machine> HM400-3 (ENG140-2170-34E-A-00-A)

Rated horsepower: 353 ± 10.5 kW {473 ± 14.1 HP}/2,000 rpm (GROSS)

Maximum torque: 2,275 ± 68 Nm {232 ± 6.9 kgm}/1,400 rpm (GROSS)

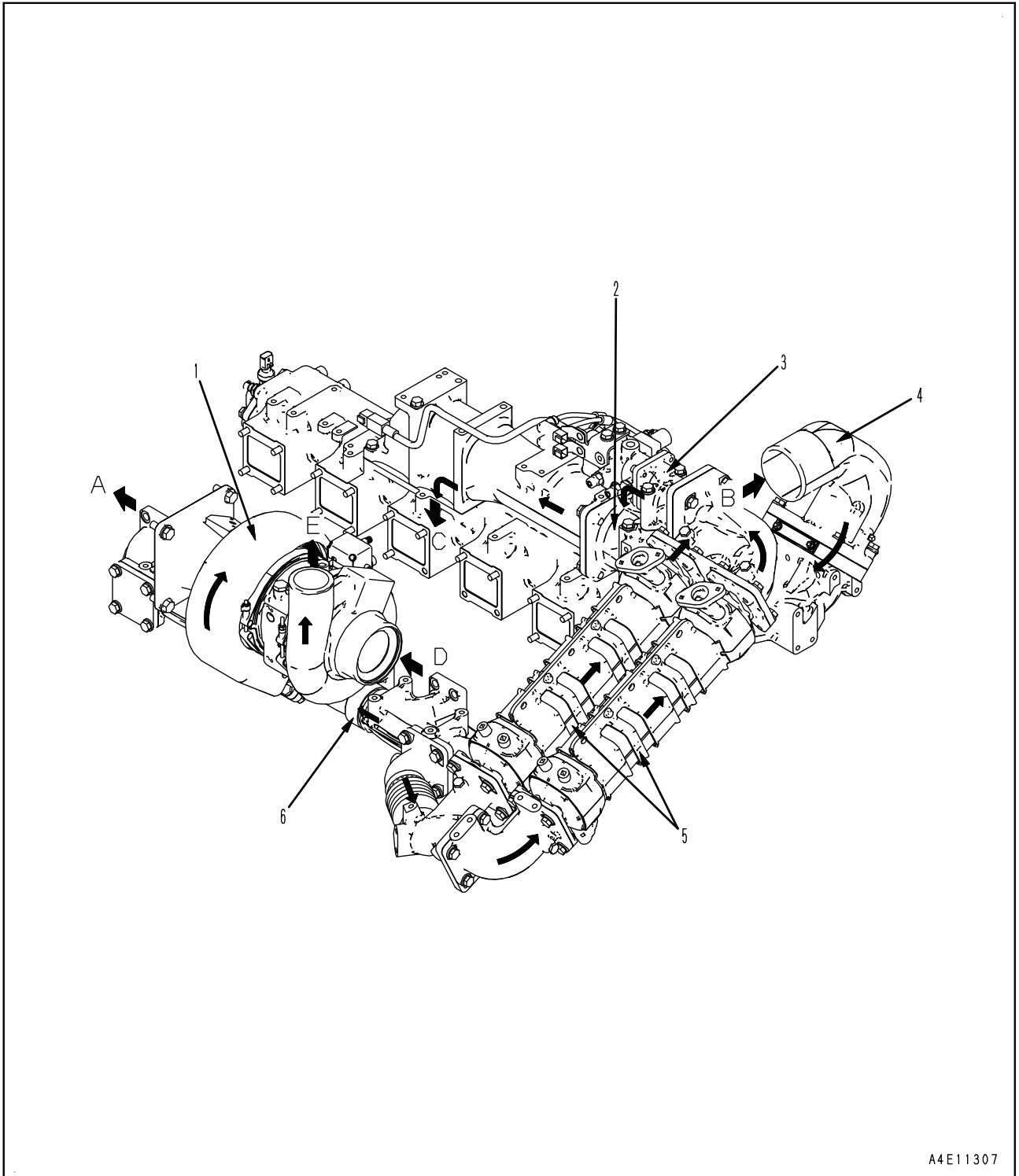


A4E11308

Intake and exhaust system parts (ENG107-A900-001-K-00-A)

Intake and exhaust system layout drawing (ENG140-A900-04D-K-00-A)

★ The shape is subject to machine models.



1. KVGT
2. Mixing connector
3. EGR valve
4. Intake connector
5. EGR cooler
- 6.

3. KVG
 4. KVG speed sensor
 5. KVG position sensor
 6. Hydraulic actuator
 7. Engine controller
 8. EPC valve (for KVG)
 9. KDPF
 10. EGR system (EGR cooler and EGR valve)
- C: Blower impeller
T: Turbine impeller

KVG control system

- Based on information from KVG position sensor (5), mass air flow and temperature sensor (2), and KVG speed sensor (4), etc., the engine controller (7) moves hydraulic actuator (6) by using the oil pressure controlled by EPC valve (8), to move the piston.
- A good response at high altitudes is maintained by sensing high elevations with the ambient pressure sensor, and automatically controlling the fuel injection and the KVG.

Lubrication

- Cooled oil from the engine oil cooler is sent through the supply pipe to the KVG for lubrication
- Oil is sent to the bearing housing to lubricate the shaft bearing and thrust bearing.
- Return oil is drained from the return pipe connected to the bottom of the bearing housing and falls to the oil pan.

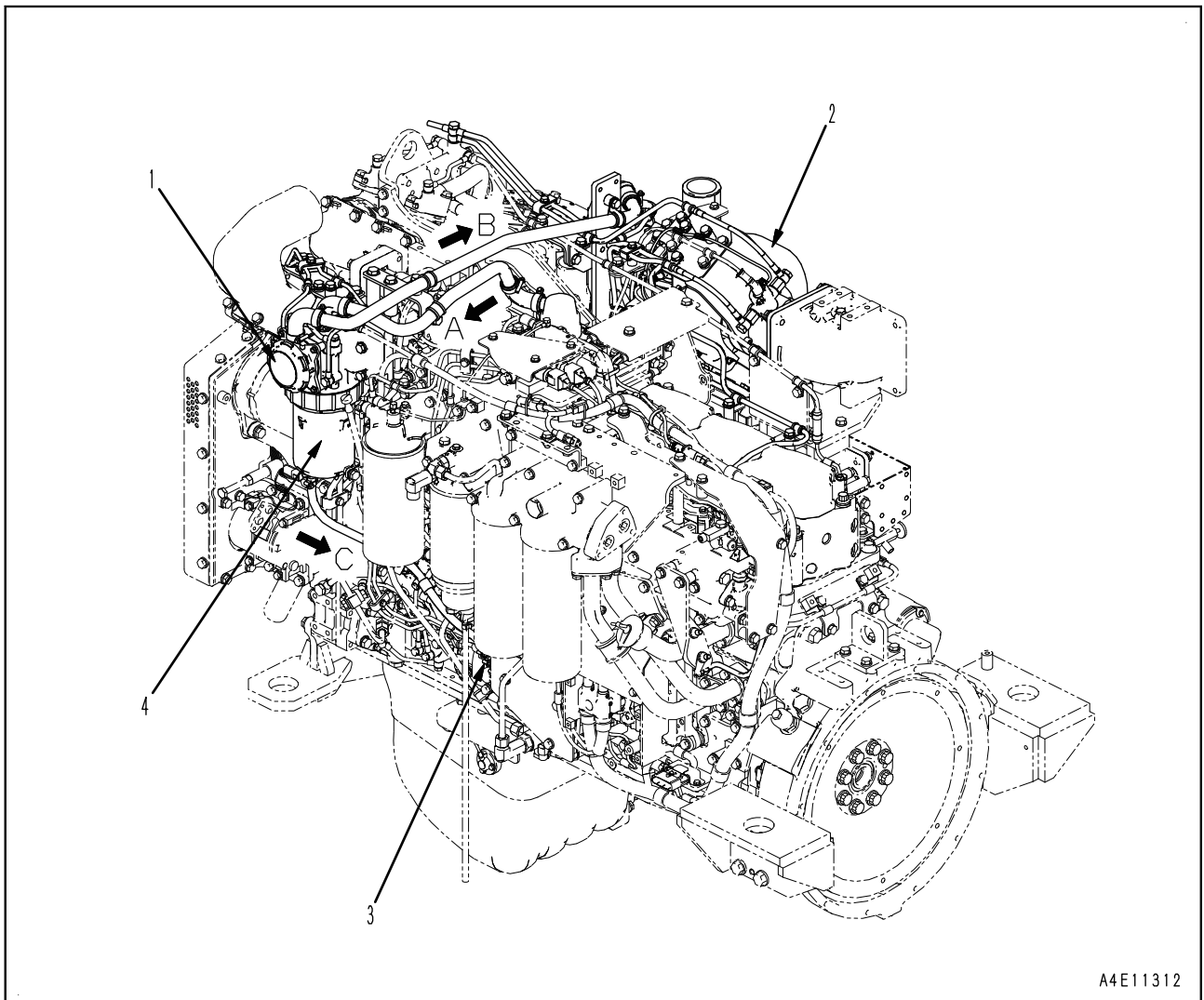
Cooling

- Coolant from the cylinder block enters the center housing to cool the KVG.
- Coolant return flows from the center housing and joins the flow at the EGR cooler air bent piping.

KCCV layout drawing (ENG140-A180-04D-K-00-A)

KCCV: Abbreviation for KOMATSU Closed Crankcase Ventilation

★ The shape is subject to machine models.



A4E11312

1. KCCV ventilator

2. KVGT

3. Check valve

4. CDR valve

A: Blowby gas

B: Engine oil-free blowby gas (to KVGT intake side)

C: Engine oil mist separated from the blowby gas by the ventilator KCCV (to oil pan)

- Formerly blowby gas (A) was discharged to the atmosphere as is. However, the tightened exhaust gas regulation no longer permits releasing blowby gas to the atmosphere.
- Since blowby gas (A) contains engine oil components, which may cause the following problems when recirculated to KVGT (2), a filter is provided at KCCV ventilator (1) to remove the oil.

1. Degraded performance of turbocharger and aftercooler due to adherence of engine oil

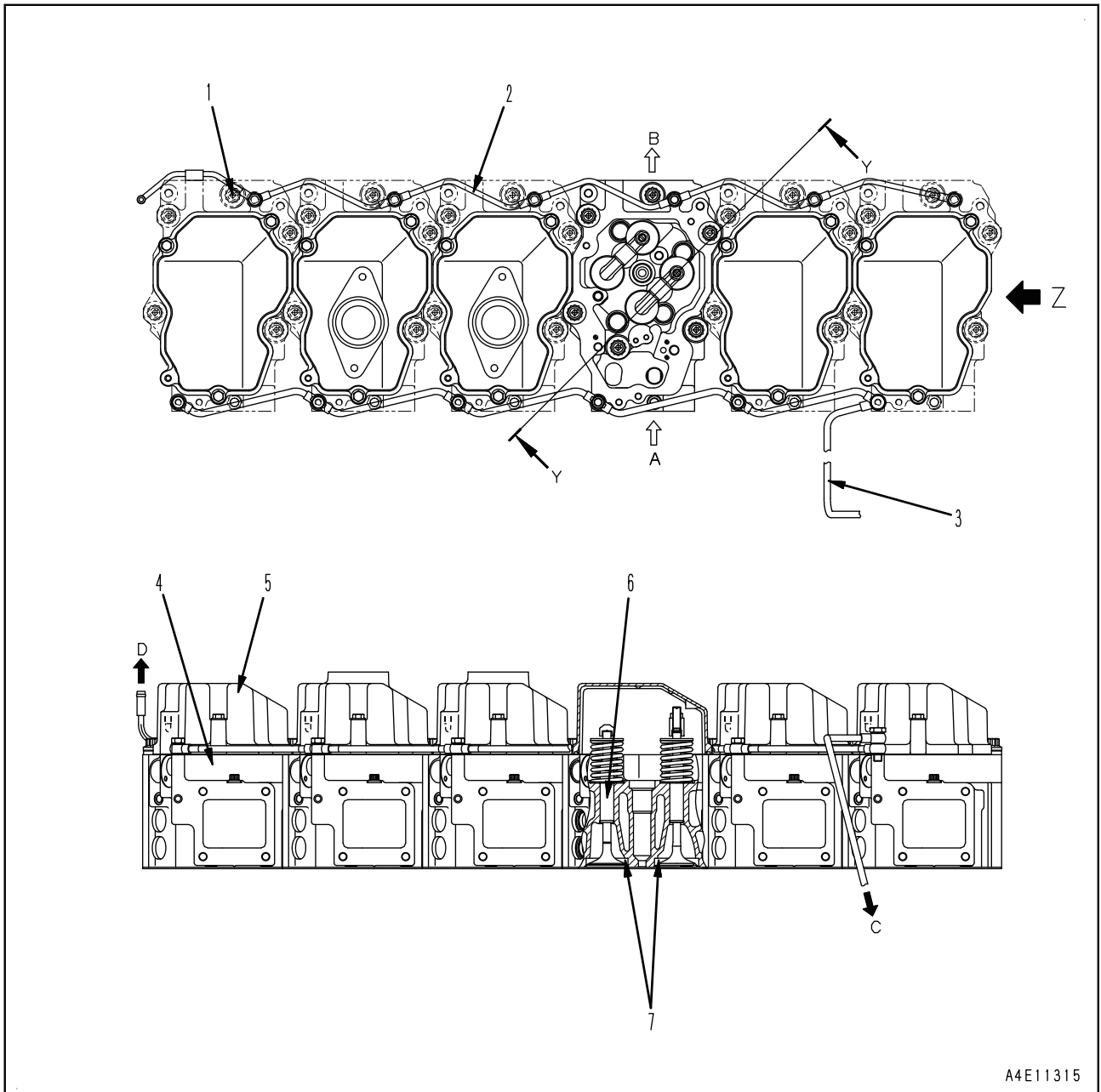
2. Abnormal engine combustion

3. Malfunction of sensors due to adherence of engine oil

Engine main body parts (ENG107-R402-001-K-00-A)

Cylinder head (ENG140-A100-041-K-00-A)

The shape is subject to change depending the machine model.

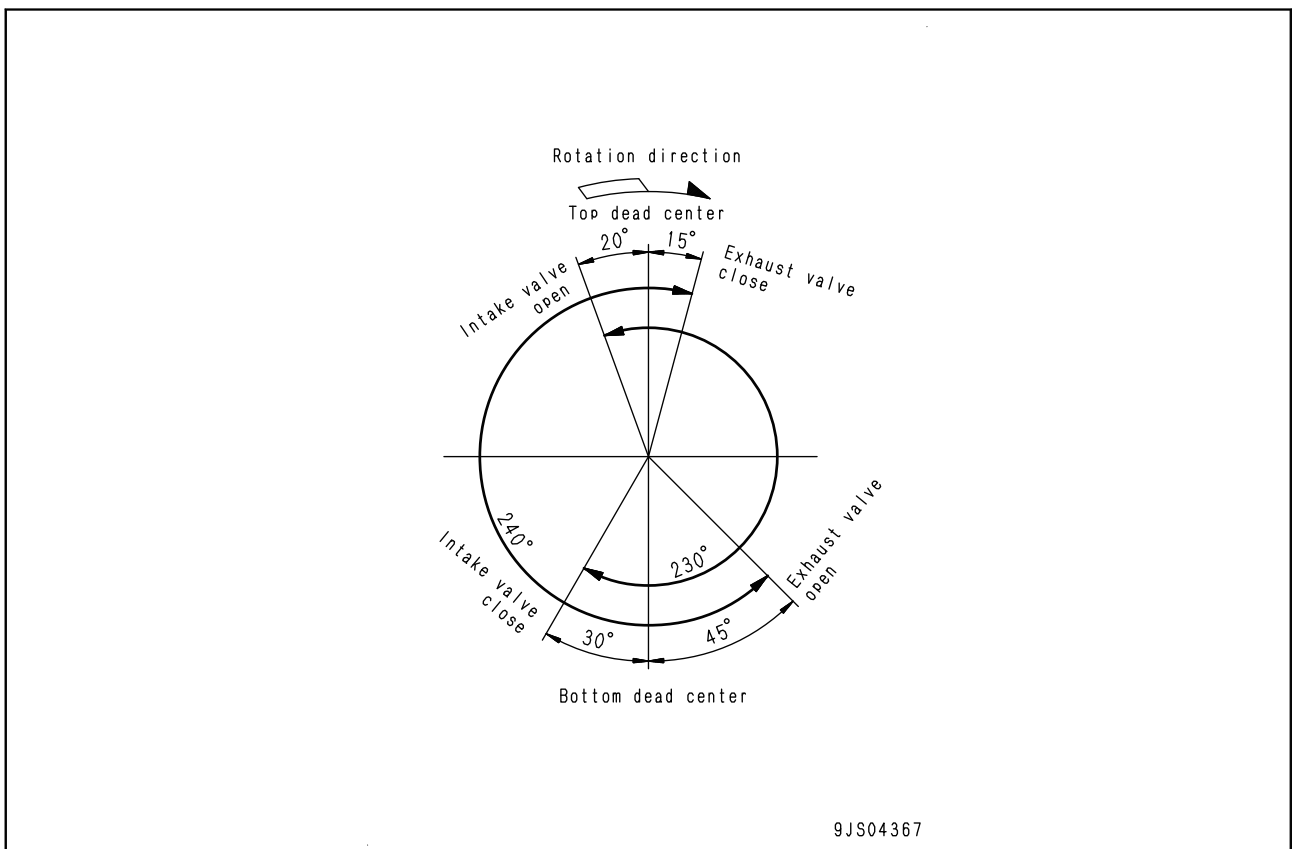


- 1. Cylinder head bolt
- 2. Air bleeding pipe from coolant
- 3. Fuel spill pipe
- 4. Cylinder head
- 5. Cylinder head cover
- 6. Valve guide
- 7. Valve seat insert
- 8. Injector
- A: Intake air
- B: Exhaust gas
- C: To fuel tank

3. Camshaft
4. Cam roller
5. Cam roller pin
6. Cam follower shaft
7. Cam follower
8. Push rod
9. Rocker arm shaft
10. Locknut
11. Rocker arm adjustment screw
12. Rocker arm
13. Crosshead adjustment screw
14. Locknut
15. Crosshead
16. Valve retainer
17. Outer valve spring
18. Inner valve spring
19. Air intake valve
20. Valve guide
21. Spring seat
22. Exhaust valve

Specifications (ENG140-A700-030-K-00-A)

Valve timing



Camshaft: Drawn steel bar (Turning)
Journal and cam sections: Induction hardening

5. Thermo-valve cover

Specifications (ENG140-B810-030-K-00-A)

Oil cooler

- Heat dissipation surface area
SAA6D140E-6: 1.23 m²
- Heat exchange rate
SAA6D140E-6: Min. 39,800 kcal/h

CLICK HERE TO **DOWNLOAD** THE COMPLETE MANUAL

- Thank you very much for reading the preview of the manual.
- You can download the complete manual from: www.heydownloads.com by clicking the link below



- Please note: If there is no response to CLICKING the link, please download this PDF first and then click on it.

CLICK HERE TO **DOWNLOAD** THE COMPLETE MANUAL

Fuel injection rate control function (ENG125-AG12-042-K-00-A)

- The fuel injection rate control function, which replaces the function of the conventional governor, controls the fuel injection rate to an optimum one according to the signals of engine speed and accelerator throttle position.

Fuel injection timing control function (ENG125-AG13-042-K-00-A)

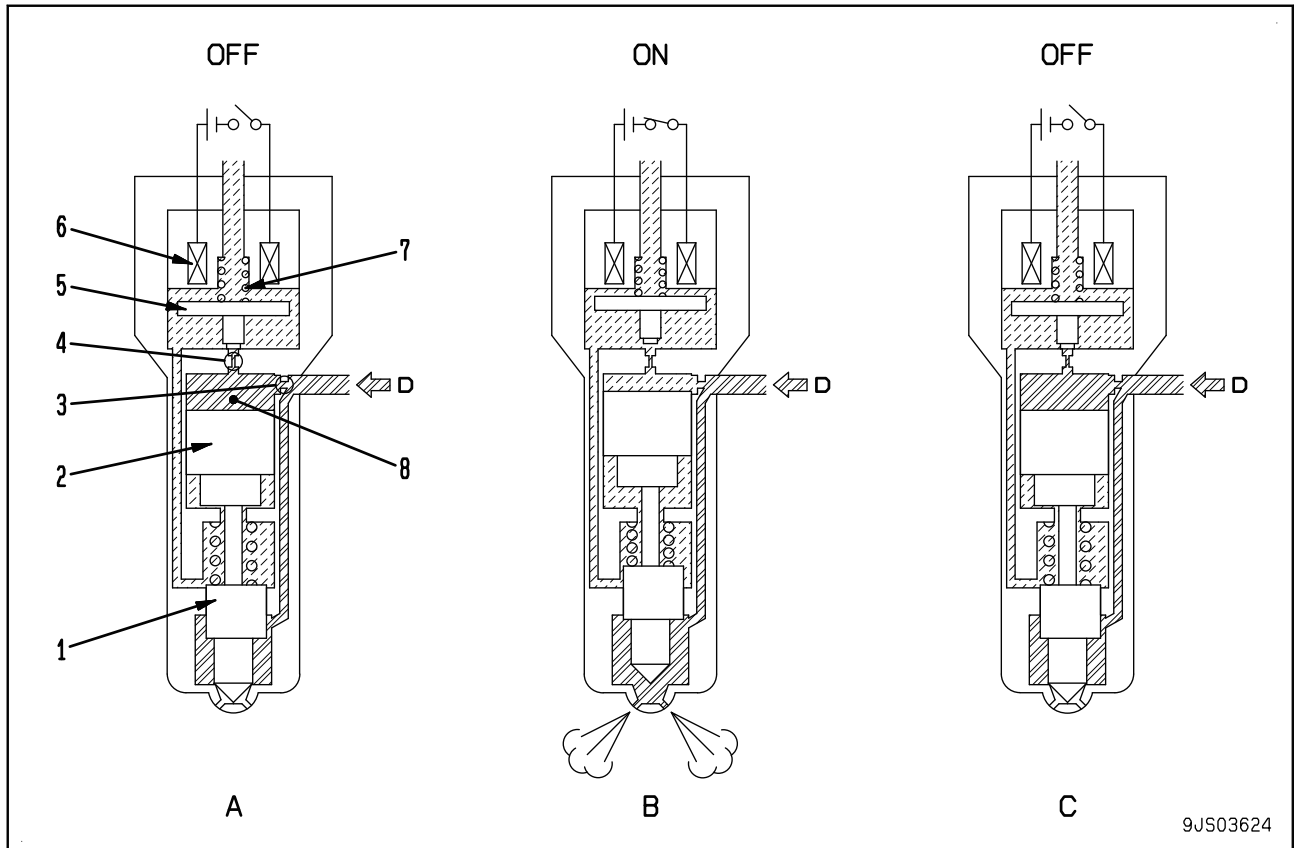
- The fuel injection timing control function, which replaces the conventional timer function, controls the fuel injection timing to an optimum one according to the signals of engine speed and fuel injection rate.

Fuel injection pressure control function (ENG125-AG14-042-K-00-A)

(Common rail fuel pressure control function)

- The fuel injection control function (common rail fuel pressure control function) controls the fuel delivery rate of the supply pump by measuring the fuel pressure using the common rail fuel pressure sensor and feeding it back to the engine controller.
- This function performs pressure feedback control so that the fuel injection pressure will be the same as the optimum value (command value) set according to the engine speed and fuel injection rate.

- The injector consists of the traditional nozzle section, orifice to control the fuel injection rate, hydraulic piston, and 2-way solenoid valve.



- A: When fuel is not injected
 B: When fuel injection is started
 C: When fuel injection is finished
 D: From common rail

1. Nozzle
2. Control piston
3. Orifice (IN)
4. Orifice (OUT)
5. Valve body
6. Solenoid
7. Spring
8. Pressure control chamber

Operation (ENG125-AE60-044-K-00-A)

1) When fuel is not injected (A)

- When solenoid (6) is not energized, valve body (5) is pushed down by spring (7).
- Since the high-pressure fuel is applied from the common rail to pressure control chamber (8), nozzle (1) is closed and the fuel is not injected.

2) When fuel injection is started (B)

- When solenoid (6) is energized, valve body (5) is pulled up by the electromagnetic force and the fuel passage opens.
- Since the fuel in pressure control chamber (8) flows out through orifices (3) and (4), nozzle (1) rises and fuel injection pump starts.
- The fuel injection rate is gradually increased by the function of orifices (3) and (4).
- If energization of solenoid (6) is continued, injection rate is set to the maximum.

4. Water pump drive gear (Number of teeth: 23)
5. Pump body
6. Water seal
7. Impeller
8. Pump cover

Specifications (ENG140-BA10-030-K-00-A)

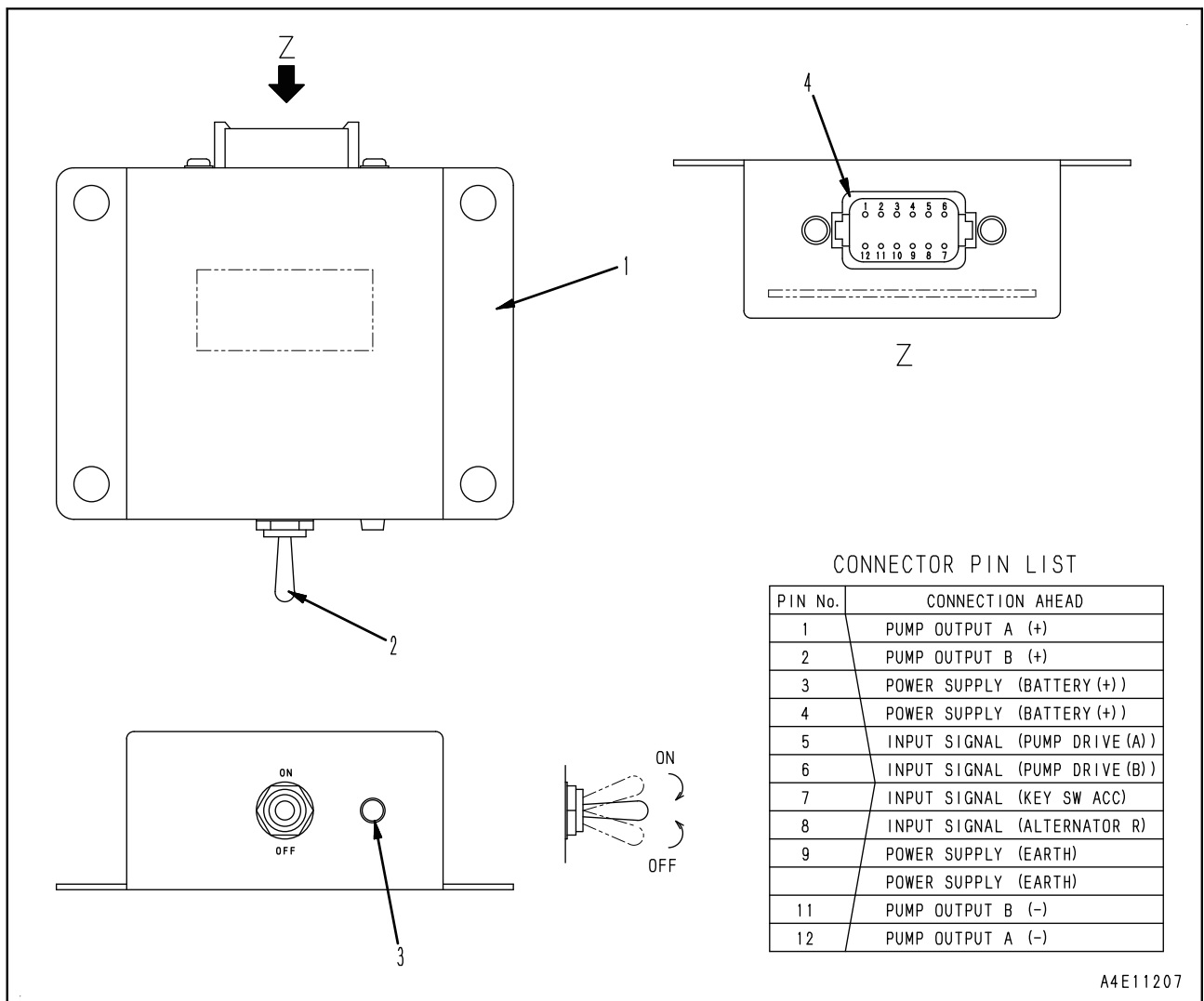
Type: Centrifugal type driven with gear

Speed: Engine speed × 1.56

Delivery: 785 ℓ/min

Total head : Min. 18.5 m

Fuel feed pump switch (PC400-AEH5-041-K-00-A)



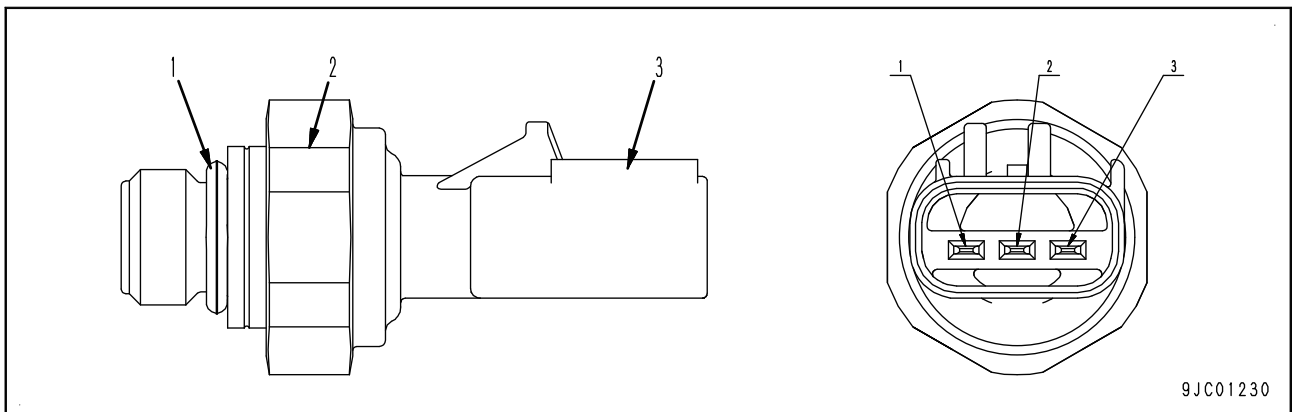
1. Body
2. Toggle switch
3. LED lamp
4. Connector

Function (PC400-AEH5-042-K-00-A)

- Receives signals from the engine controller and drives the fuel feed pump.
- Drives the fuel feed pump by operating the toggle switch to bleed air from the fuel route after replacement of the fuel filter etc.
- The air in the fuel route is bled by driving the fuel feed pump according to the setting of the built-in timer.
- Drive pattern of fuel feed pump:
Perform the cycle of "Drive pump (30 sec) → Stop pump (10 sec)" 10 times, and then stop automatically

6	Coolant temperature sensor	TWTR
7	Engine oil level sensor	P44
8	Air cleaner clogging sensor	E26[TOUT]
9	KDOC outlet temperature sensor	TEMP2
10	KDPF outlet temperature sensor	TEMP3
11	Common rail pressure sensor	PFUEL
12	Ambient pressure sensor	PAMB
13	Ne (crankshaft) speed sensor	NE
14	Bkup (camshaft) speed sensor	G
15	Engine oil pressure switch	POIL
16	Mass air flow and temperature sensor	MAF
17	EGR valve lift sensor	SEGR
18	Charge temperature sensor	TIM
19	Doser fuel pressure sensor	HC

Engine oil pressure sensor (PC400-ABK5-041-K-00-A)



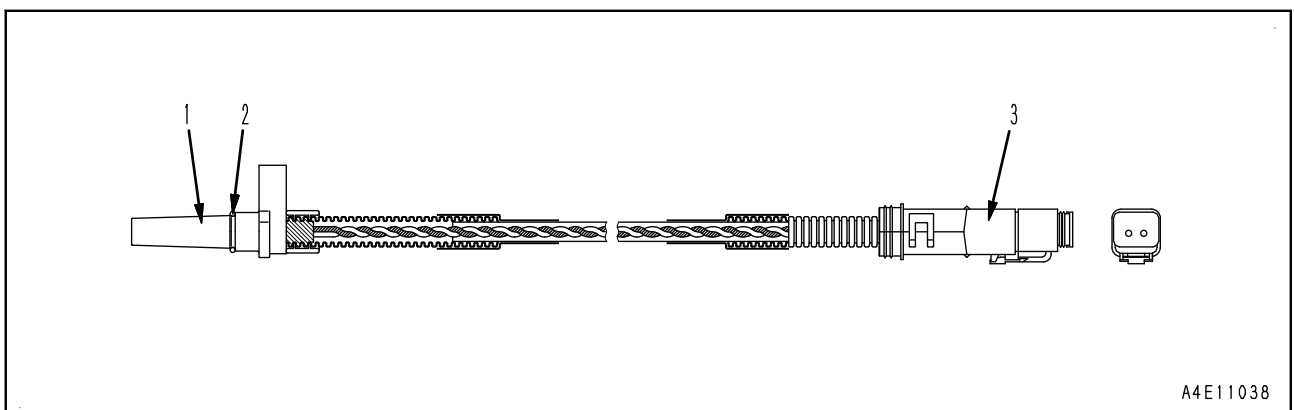
1. Connector
2. Sensor
3. O-ring

Function (PC400-ABK5-042-K-00-A)

- This oil pressure sensor, installed in the cylinder block, It detects engine oil pressure to output variable voltage.

KVGT speed sensor (ENG125-AAQ4-041-K-00-A)

KVGT: Abbreviation for KOMATSU Variable Geometry Turbocharger

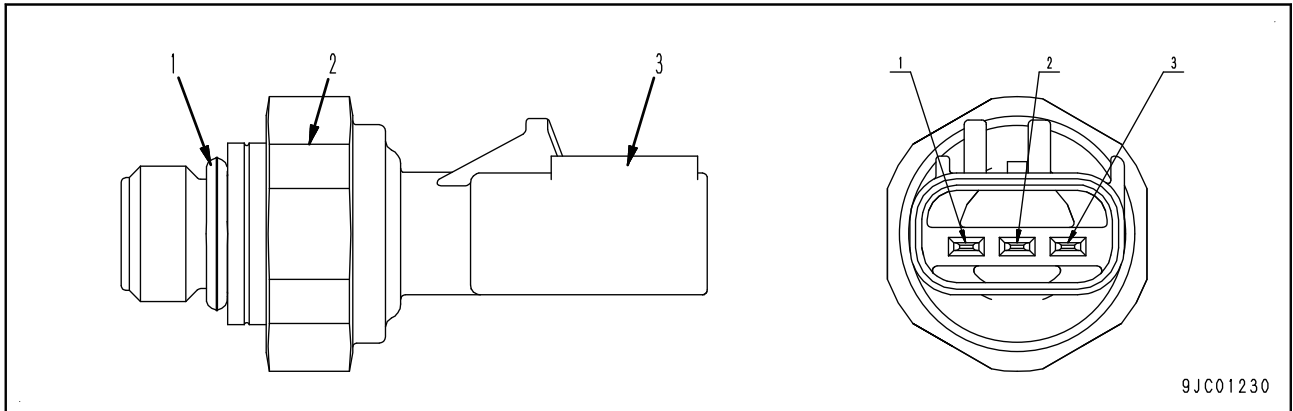


1. Sensor
2. O-ring
3. Connector

Function (PC-A968-042-K-00-A)

- This sensor is installed on the air cleaner outlet side. The switch is turned to "ON" position, if the air cleaner is clogged and the pressure level drops to the specified level (negative pressure).

Dosing fuel pressure sensor (PC400-A9JC-041-K-00-A)



1. O-ring
2. Sensor
3. Connector

Function (PC400-A9JC-042-K-00-A)

- This sensor, which is installed to the dosing fuel solenoid valve assembly, detects the pressure of the fuel supplied to output the corresponding variable voltage.

Running-in standard and performance test standard (ENG125-A000-034-K-00-A)

<Applicable machines> HM400-3 (ENG140-A000-034-K-00-A)

Running-in standard

Engine		SAA6D140E-6				
Item		Procedure				
		1	2	3	4	5
Running time	min.	1	3	6	8	2
Engine speed	rpm	725	1,260	1,580	1,820	2,000
Dynamometer load	N {kg}	0 {0}	934 {95}	1,490 {152}	1,940 {198}	2,354 {240}
Output	kW {HP}	0 {0}	88 {118}	177 {237}	265 {355}	353 {473}

★ The dynamometer load in this table shows the value when the dynamometer arm is 716 mm long.

Performance test standard

Engine		SAA6D140E-6			
Test item		Rated horsepower	Max. torque	Max. speed with no load	Min. speed with no load
Specification value (Gross)	–	353 kW / 2,000 rpm {473 HP / 2,000 rpm}	2,275 Nm / 1,400 rpm {232 kgm / 1,400 rpm}	2,200(+50 / 0)rpm	725±25rpm
Engine speed	rpm	2,000	1,400	2,200(+50 / 0)	725±25
Dynamometer load	N {kg}	2,283 to 2,424 {233 to 247}	3,082 to 3,273 {314 to 334}	–	–
Output (Gross)	kW {HP}	343 to 363 {460 to 487}	–	–	–
Torque (Gross)	Nm {kgm}	–	2,206 to 2,343 {225 to 239}	–	–
Fuel consumption	sec/300 cc	27.5	–	–	–
Coolant temperature	°C	70 to 90	70 to 90	70 to 90	70 to 90
Lubricating oil temperature	°C	90 to 110	90 to 110	90 to 110	80 to 110
Lubricating oil pressure	kPa {kg/cm ² }	340 to 490 {3.5 to 5.0}	340 to 490 {3.5 to 5.0}	340 to 490 {3.5 to 5.0}	Min. 120 {Min. 1.2}
Exhaust temperature	°C	Max. 620	Max. 670	–	–

★ This table shows the standard values obtained by using the JIS correction coefficients.

★ This table shows the standard values when the air cleaner and the KDPF are installed and no load is applied to the alternator.

★ The dynamometer load in this table shows the value when the dynamometer arm is 716 mm long.

★ Use ASTM Grade No.2 diesel fuel for the fuel.


★ Use SAE15W-40LA as lubricating oil.

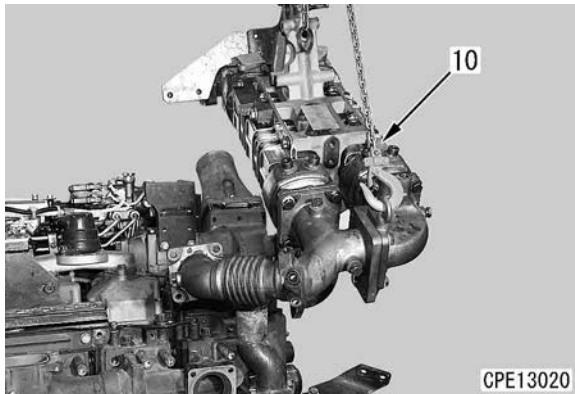
Seizure prevention compound

Komatsu code	Part No.	Capacity	Container	Main features and applications
LC-G NEVER-SEEZ	—	—	Can	<ul style="list-style-type: none"> • Feature: Seizure and galling prevention compound with metallic super-fine-grain, etc. • Use for the mounting bolt in the high temperature area of the exhaust manifold and the turbocharger, etc.

Grease

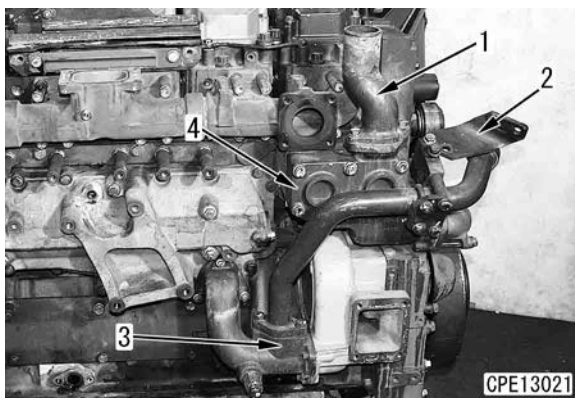
Komatsu code	Part No.	Capacity	Container	Main features and applications
G2-LI G0-LI(*) *: For cold districts	SYG2-400LI-A SYGA-16CNLI SYG0-400LI-A (*) SYG0-16CNLI (*)	Various	Various	<ul style="list-style-type: none"> • Lithium grease with extreme pressure lubrication performance, general purpose type.
Molybdenum disulfide grease LM-G(G2-M)	SYG2-400M SYG2-400M-A SYGA-16CNM	400 g x 10 400 g x 20 16 kg	Bellows-type container Can	<ul style="list-style-type: none"> • Use for parts under heavy load. Caution: <ul style="list-style-type: none"> • Do not use this grease for rolling bearings like swing circle bearings, etc. and spline. • Use this grease for work equipment pins only when installing them, but do not use it afterward.
Hyper white grease G2-T G0-T(*) *: For cold districts	SYG2-400T SYG2-16CNT SYG0-400T(*) SYG0-16CNT(*)	400 g 16 kg	Bellows-type container Can	<ul style="list-style-type: none"> • Higher seizure resistance, heat resistance, and waterproof than molybdenum disulfide grease • Not conspicuous on machine since color is white.
Biogrease G2-B G2-BT(*) *: For use at high temperature and under high load	SYG2-400B SYGA-16CNB SYG2-400BT(*) SYGA-16CNBT (*)	400 g 16 kg	Bellows-type container Can	<ul style="list-style-type: none"> • Since this grease is biodegradable in short period, it has less impact on microorganisms, animals, and plants.
G2-S ThreeBond 1855	—	200 g	Tube	<ul style="list-style-type: none"> • Feature: Silicon-based grease with wider operating temperature range and superior thermal oxidative stability to prevent deterioration of rubber and plastic. • Use for oil seals of the transmission, etc.
G2-U-S ENS grease	427-12-11871	2 kg	Can	<ul style="list-style-type: none"> • Feature: Urea (organic) grease with heat resistance and long life, inclusion type. • Use for rubber, bearing and oil seal in damper. Caution: Do not mix with lithium grease.

 **EGR cooler (10):**
80 kg




7. Thermostat housing and water pump tube

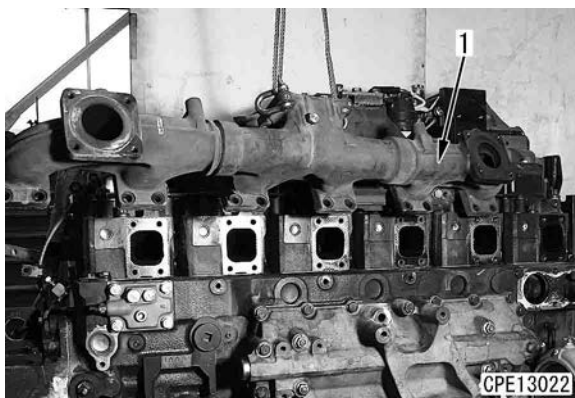
- 1) Remove thermostat pipe (1).
- 2) Remove EGR cooler mounting bracket (2).
- 3) Remove water pump tube (3).
- 4) Remove thermostat housing (4).



8. Exhaust manifold


Sling and remove exhaust manifold (1).

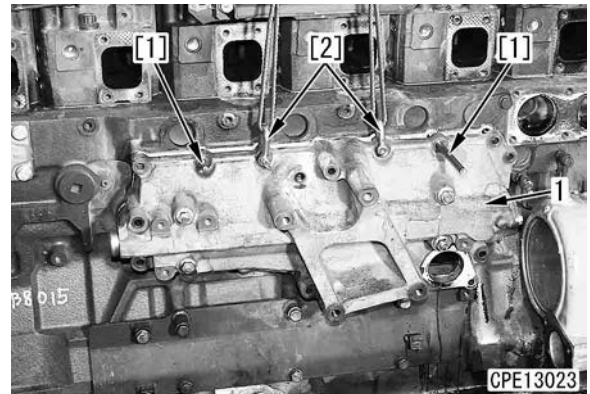
 **Exhaust manifold (1):**
25 kg



9. Oil cooler

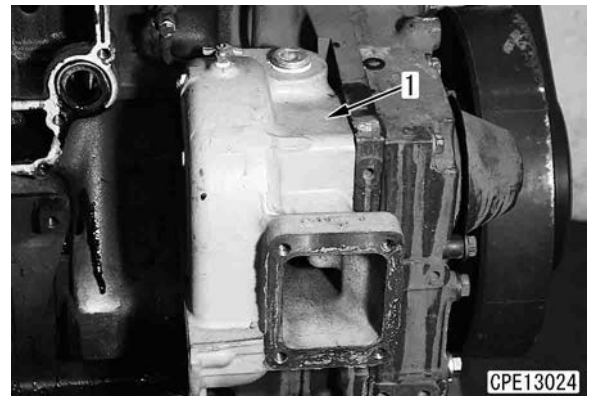
- 1) Using guide bolts [1] and eyebolts [2], sling oil cooler (1).
- 2) Remove the mounting bolts to remove oil cooler (1).

 **Oil cooler (1):**
40 kg



10. Water pump

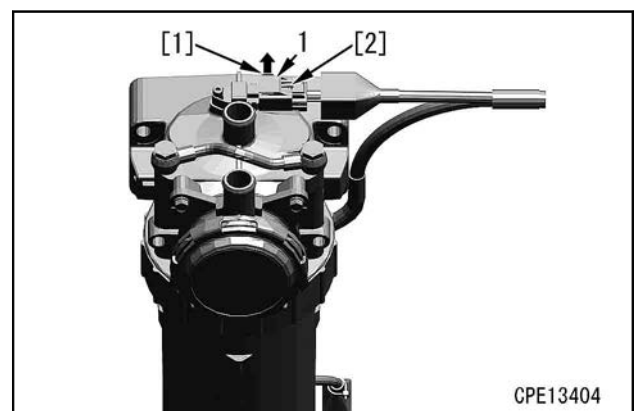
Remove the mounting bolts to remove water pump (1).



11. KCCV

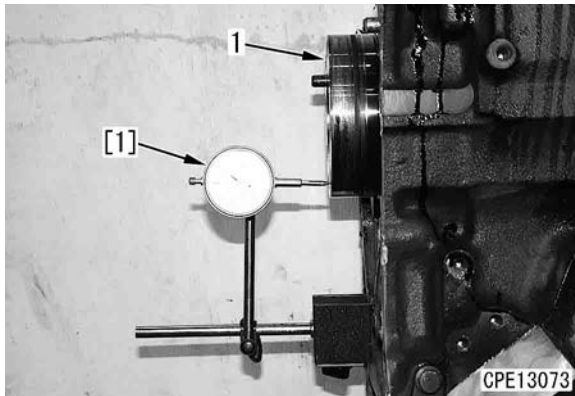
- 1) Disconnect connector PCCV (1).

★ To disconnect locked connector (1), move lock [1] of the housing in the direction of the arrow and push down lock [2] and pull out.

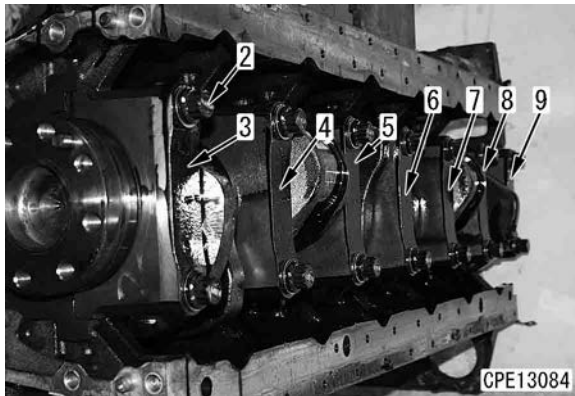


- 2) Disconnect drain hose (2).
- 3) Remove KCCV (3).

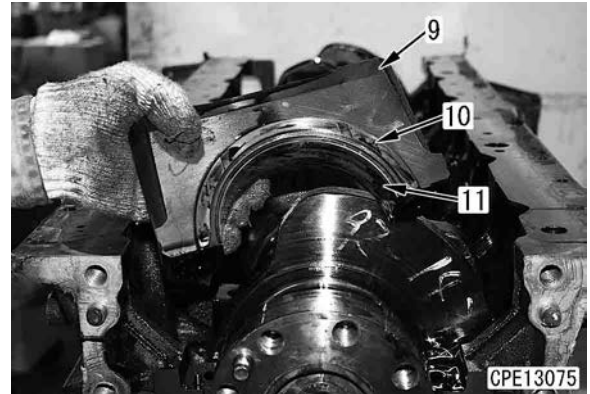
- ★ Before removing crankshaft (1), measure its end play with dial gauge [1].



- 1) Remove two each of the main cap mounting bolts (2) to remove main caps (3) to (9).
- 2) Insert mounting bolts (2) into the bolt holes of the main cap, and shake and remove the main cap.



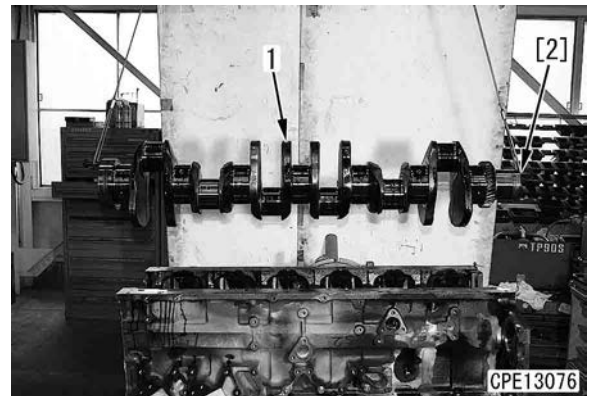
- 3) Remove lower thrust bearing (10). (Only main cap No. 7 (9))
- ★ Check and record the mounting position of lower thrust bearing (10).
- 4) Remove lower main bearing (11) from each main cap.



- 5) Using bolts [2], sling and remove crankshaft (1).

- ★ When removing crankshaft (1), take care not to damage its journal portions.

 **Crankshaft (1):**
140 kg

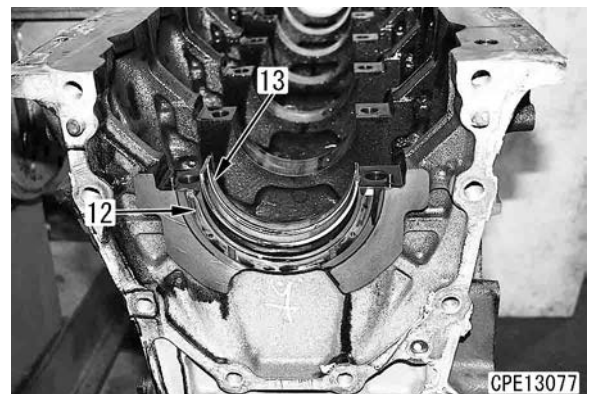


- 6) Remove upper thrust bearing (12). (Only journal No. 7)

- ★ Check and record the mounting position of upper thrust bearing (12).

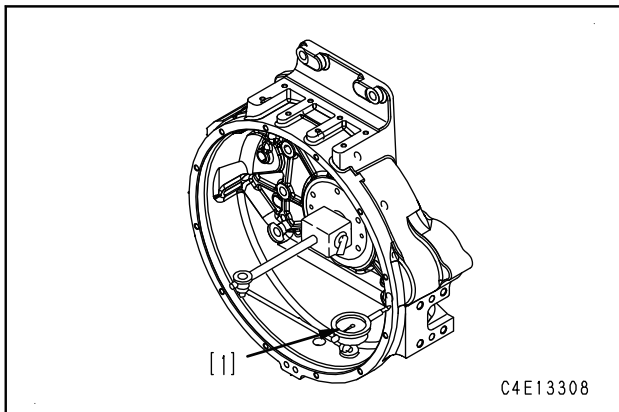
- 7) Remove upper main bearing (13) from each main journal.

- ★ Identify the locations of the parts (main cap, main bearing, and thrust bearing) and store them by the cylinder No.



42. Cylinder liner

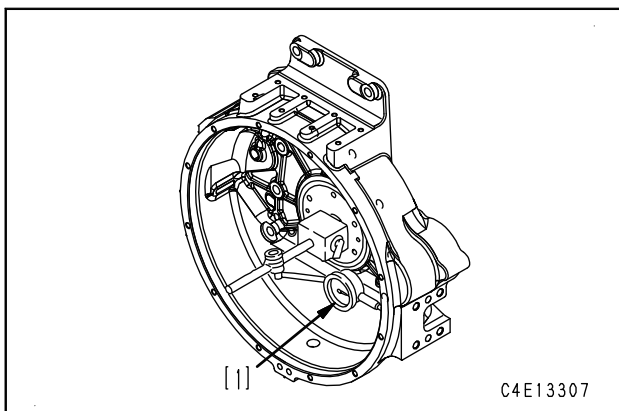
- ★ Move the crankshaft to either front or rear end to eliminate error caused by the end play.
- ★ After rotating the crankshaft by one turn, check that the pointer of the dial gauge reads the value at the start of rotation.
- ★ Since the gauge pointer moves to both right and left, take care not to mistake the runout direction when the gauge point is at the top, bottom, right, or left.
- ★ Facial runout: Max. 0.30 mm



4) Measurement of radial runout of flywheel housing

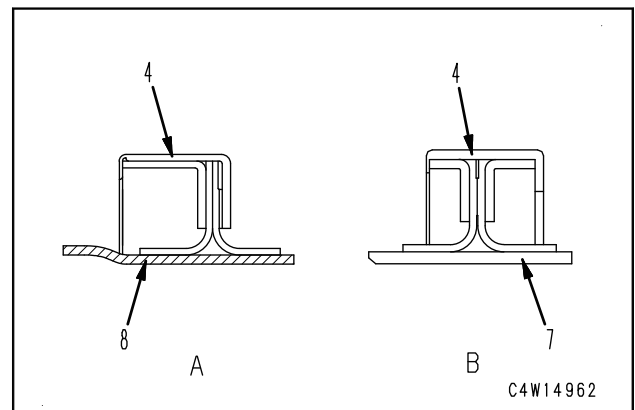
Similarly to the measurement of the facial runout, set dial gauge [1] so that its probe is at right angle to the spigot joint portion of the flywheel housing.

- ★ No error is caused by the end play of the crankshaft in measurement of the radial runout. However, observe other precautions for measurement of the facial runout.
- ★ Radial runout: Max. 0.30 mm

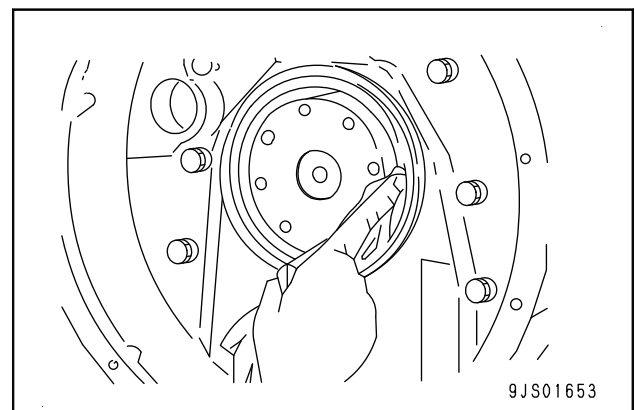


7. Rear oil seal

- ★ Check the wear of the shaft and select either a "standard seal" or a "sleeved seal". If the wear condition of the shaft is glossy and no scratch (when touched by a finger, wear depth is 10 μm or less), install a "standard seal A". Otherwise, install a "sleeved seal B".
- ★ (8): Shows the inner plastic tube/installation guide.
- ★ (7): Shows the sleeve.
- ★ Do not remove installation guide (8) from rear seal (4) before installing it.
- ★ Left: standard seal, Right: sleeved seal



- ★ Clean, degrease, and dry the contacting surface against the flywheel housing.
- ★ Clean, degrease, and dry the seal lip sliding surface (peripheral surface of the crankshaft).
- ★ Check that the housing, the end corner of the crankshaft and lip sliding surface are free from flaw, burr, sharp edge, rust, etc.



1) Procedure for installing standard seal

- ★ When installing rear seal (4), do not apply oil or grease to the shaft and seal lip.
- 1] Put the large inside diameter side (b) of installation guide (8) of rear seal (4) to the end face of crankshaft (6).

pressure pipe does not lean. (Lightly tighten in the order of No. 1, No. 6, No. 5, No. 4, No. 3, and No. 2.)

 **O-ring:**

Engine oil (EO30)

- 6) Lightly tighten sleeve nuts (10) and (11) on the common rail side and fuel supply pump side.
- 7) Tighten holder (3) to the specified torque.
 - ★ While taking care that the high-pressure pipe and injector do not move, tighten bolt (6).

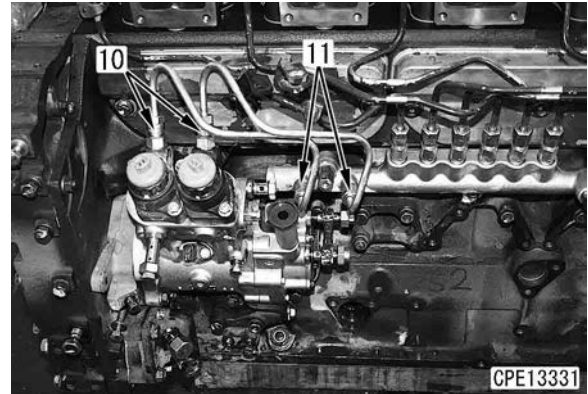
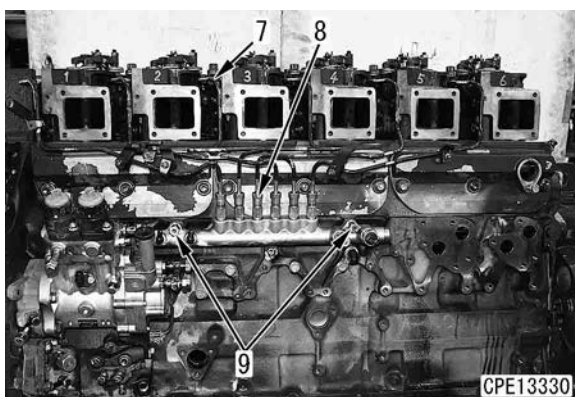
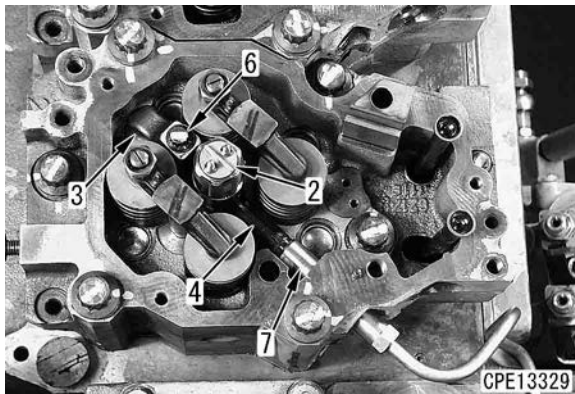
 **Holder mounting bolt:**

59.0 to 74.0 Nm {6.0 to 7.5 kgm}

- 8) Tighten special nuts (9) of the common rail to the specified torque.
 - ★ Loosen the special nuts and check that an excessive force is not applied to the high-pressure pipe, and then tighten them to the specified torque.

 **Special bolt:**

59.0 to 74.0 Nm {6.0 to 7.5 kgm}



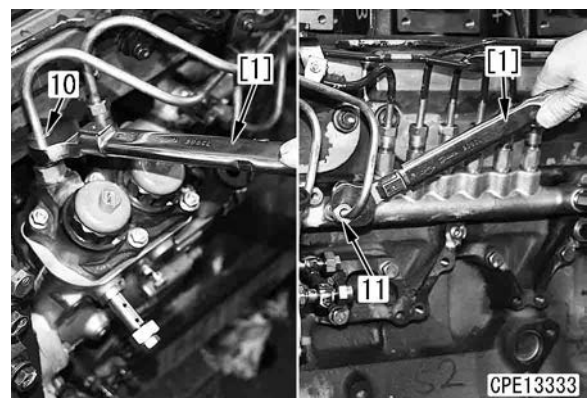
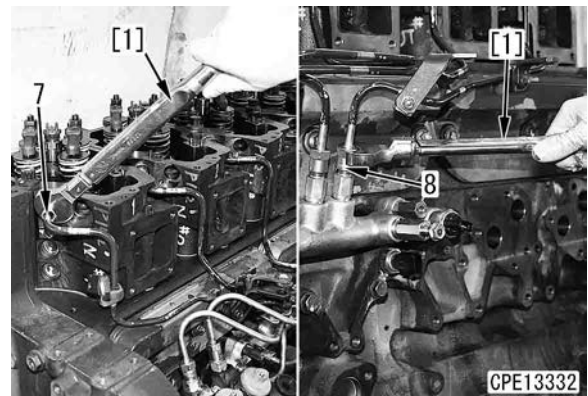
- 9) Using spanner-type torque wrench [1], tighten high-pressure pipe sleeve nuts (7), (8), (10), and (11) to the specified torque.

- ★ Loosen the sleeve nuts and check that an excessive force is not applied to the high-pressure pipe, and then tighten them to the specified torque.

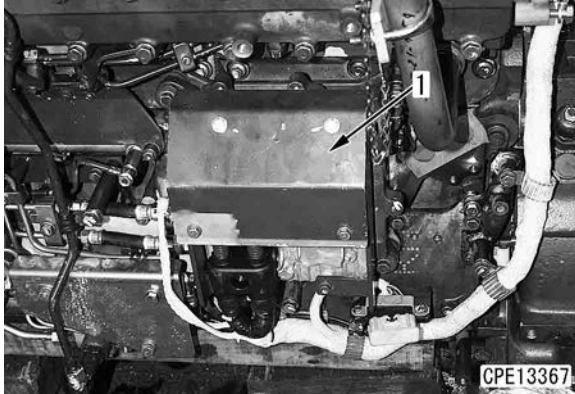
- ★ Check that the O-ring is not forced out.

 **Sleeve nut:**

39.2 to 44.1 Nm {4 to 4.5 kgm}

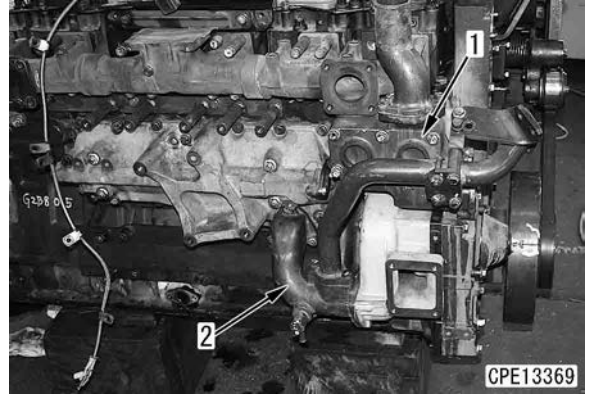


- 10) Tighten clamp (12).
- 11) Install fuel spray prevention caps (13), (14), (15), and (16) to the sleeve nuts at both ends of the high-pressure pipe.




40. Oil filter

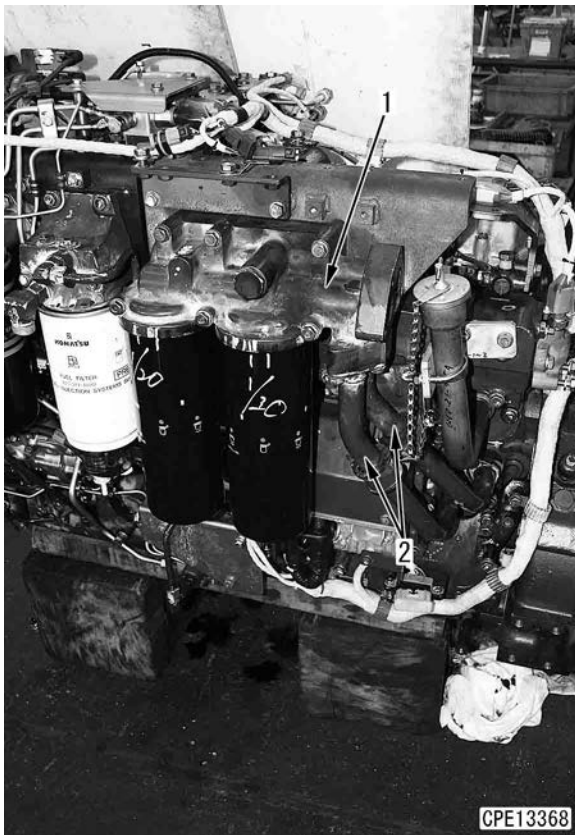
- 1) Install oil filter head (1).
- 2) Install oil tube (2).



42. EGR cooler and bracket

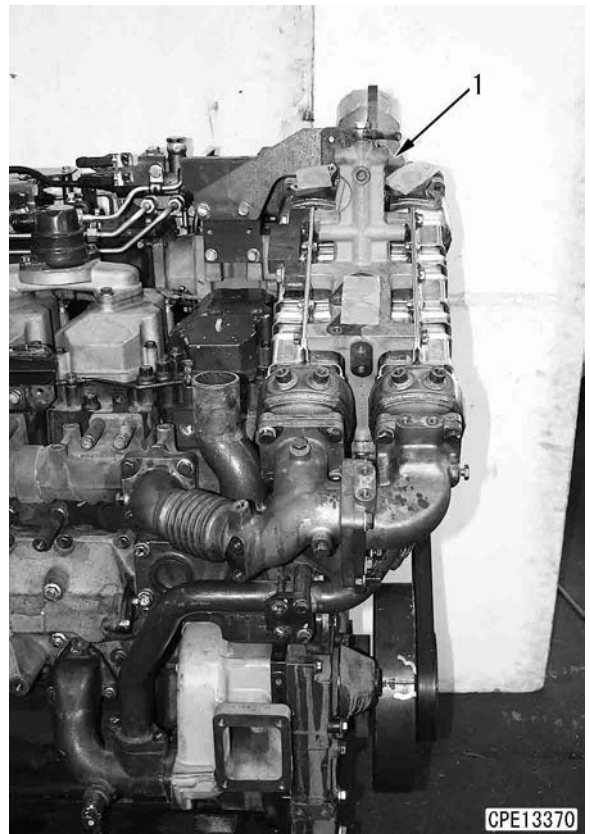
- 1) Sling and install EGR cooler and bracket (1).

 **EGR cooler and bracket (1):**
80 kg

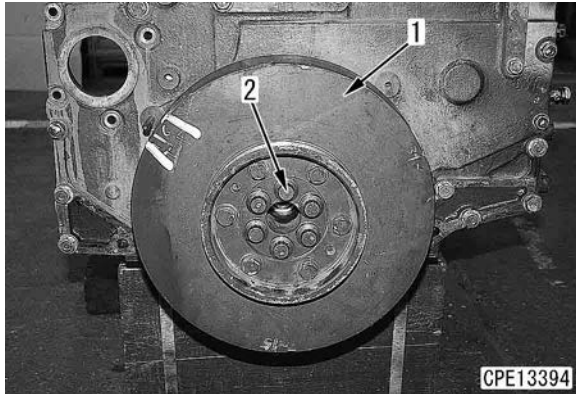


41. Thermostat and water tube

- 1) Install thermostat (1).
- 2) Install water tube (2).

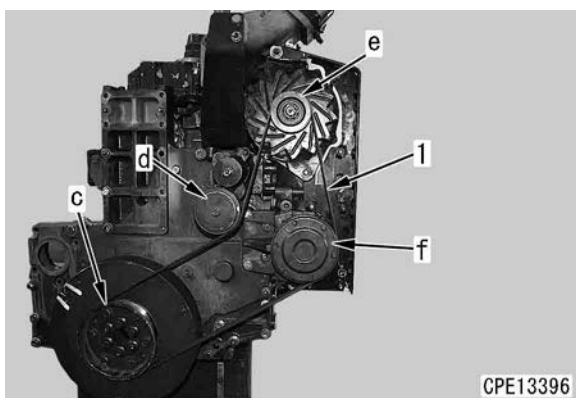
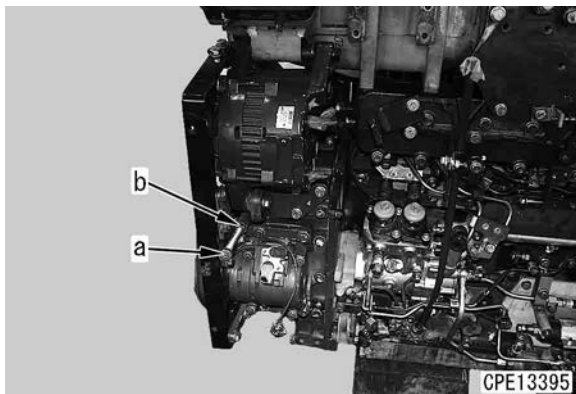


- 2) Install EGR coolant tubes (2), (3), (4), (5), and (8).
- 3) Install EGR air vent tubes (6) and (7).

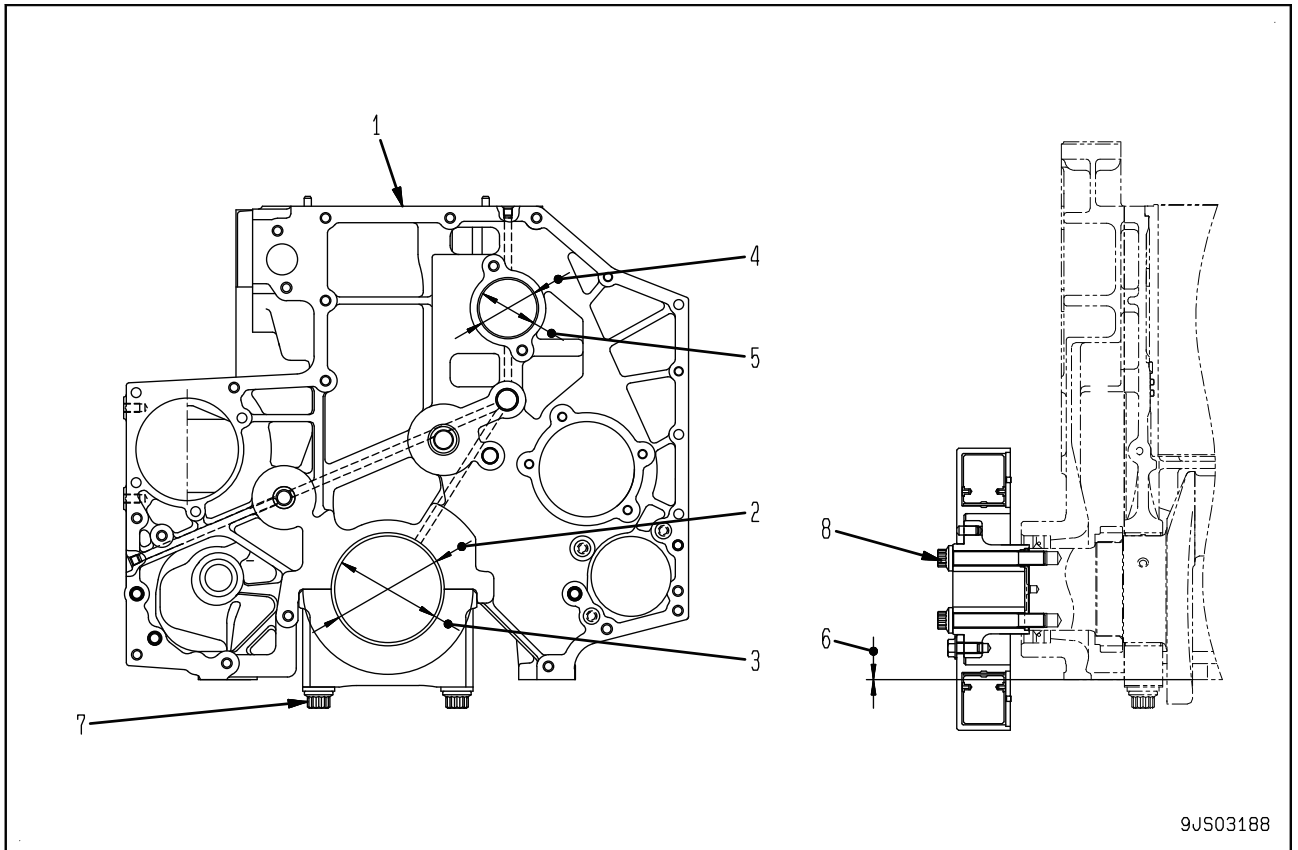


3. Install belt (1).

- 1) Push pulley (d) inward with bolt (a).
- 2) Install belt (1) to pulleys (c), (e), and (f).
- 3) Return bolt (a) and apply pulley (d) to the belt.
- 4) After installing the belt, return bolt (a) until the threaded portion from the bolt seat to the nut is 70 mm, and then tighten locknut (b).
- 5) Check that the belt is fitted to the corresponding pulley groove.



Cylinder block (ENG140-A300-034-K-00-A)



9JS03188

Unit: mm						
No.	Item	Criteria			Remedy	
3	End play of main idler gear	Standard		Repair limit	Replace thrust bearing	
		0.06 to 0.24		0.4		
4	End play of sub idler gear	0.11 to 0.23		0.4		
–	Backlash of each gear	Po- si- tion	Measuring point	Standard	Repair limit	Replace
		5	Crank gear and main idler gear (large)	0.141 to 0.425	0.6	
		6	Main idler gear (small) and fuel supply pump gear	0.129 to 0.391		
		7	Main idler gear (small) and cam gear	0.129 to 0.391		
		8	Main idler gear (large) and sub idler gear	0.141 to 0.425		
		9	Sub idler gear and oil pump drive gear	0.080 to 0.417		
		10	Sub idler gear and water pump drive gear	0.095 to 0.346		
		11	Fuel supply pump gear and EGR oil pump drive gear	0.118 to 0.369		

CLICK HERE TO **DOWNLOAD** THE COMPLETE MANUAL

- Thank you very much for reading the preview of the manual.
- You can download the complete manual from: www.heydownloads.com by clicking the link below



- Please note: If there is no response to CLICKING the link, please download this PDF first and then click on it.

CLICK HERE TO **DOWNLOAD** THE COMPLETE MANUAL