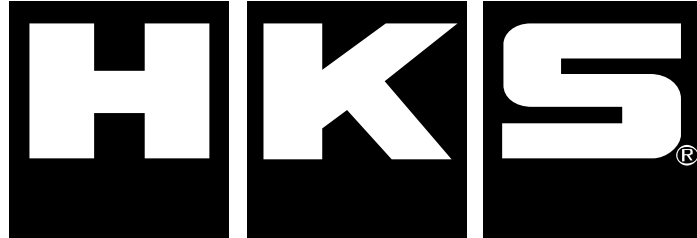


# CRANKSHAFT

## INSTRUCTION MANUAL



Read this manual before use.

Installation must be done by a professional.

Keep this manual after installation.

|                 |  |
|-----------------|--|
| NAME OF PRODUCT | CRANKSHAFT 4B11 2.2L (The dedication product of HKS 2.2L)  |
| USAGE           | AUTOMOBILE PART  |
| PART NUMBER     | 23006-AM003  |
| MANUAL NUMBER   | E13411-M40010-00   |
| APPLICATION     | MITSUBISHI LANCER EVOLUTION X (GZ4A)   |
| ENGINE          | 4B11 TURBO   |
| YEAR            | 2007/10 ~  |
| REMARKS         | <ul style="list-style-type: none"><li>• The following HKS Piston Kit and Conrod are required to use HKS 2.2L Kit.<br/>21003-AM004 PISTON KIT 4B11 2.2L (Only for HKS 2.2L Kit)<br/>23004-AM002 CONROD SET 4B11 I-BEAM (Only for HKS 2.2L Kit)<br/>23004-AM003 CONROD SET 4B11 H-BEAM (Possible to assemble with this kit)</li><li>• Boring and honing of the cylinder bore are required.</li><li>• It's recommended to use the following head gasket.<br/>t1.0 23001-AM006 / t1.2 23001-AM007 / t1.5 23001-AM008</li></ul> |

## PREFIX

- Thank you for purchasing the HKS CRANKSHAFT 4B11 2.2L.
- Installation must be done by a professional installer.
- After installation, follow the instructions in this manual.
- Please read this manual before installation.





## NOTICE

- This manual assumes that you have and know how to use the tools and equipment necessary to safely perform service operations on your vehicle.
- This manual assumes that you are familiar with typical automotive systems and basic service and repair procedures.
- Do not attempt to carry out the operations shown in this manual unless these assumptions are correct.
- Always have access to a factory repair manual.
- To avoid injury, follow the safety precautions contained in the factory repair manual.

## REVISION OF MANUAL

| Rev. Number | Date    | Details        |
|-------------|---------|----------------|
| 3-3.01      | 2010/05 | ・First edition |
|             |         |                |
|             |         |                |

## PARTS LIST

| No. | Parts name                   | QTY | Fig   | Remarks          |
|-----|------------------------------|-----|---|------------------|
| 1   | CRANKSHAFT 2.2L              | 1   |   | Stroke 91.0mm    |
| 2   | SENSOR PLATE                 | 1   |   | STD + Drilling   |
| 3   | BOLT (of plate installation) | 4   |  | Flush M6 x 20 mm |
| 4   | MANUAL OF HKS                | 1   |  | JP + EN          |
|     |                              |     |   |                  |
|     |                              |     |   |                  |
|     |                              |     |   |                  |

## SPECIFICATIONS

| HKS Kit                |                                      | HKS CRANK (2.2L) | MITSUBISHI                          |                        |
|------------------------|--------------------------------------|------------------|-------------------------------------|------------------------|
| CRANK                  | Stroke length                        | mm               | 91.0                                | 86.0                   |
|                        | Pin dia.                             | mm               | 52.0                                | 52.0                   |
|                        | Main journal dia.                    | mm               | 52.0                                | 52.0                   |
|                        | Thrust width                         | mm               | 24.0                                | 24.0                   |
|                        | Axis deflection                      | mm               | 0.02 以下                             | -                      |
|                        | Dynamic balance<br>(on sensor plate) | g·cm             | Less than 15 以下<br>(FRONT and REAR) | -                      |
| Prate sensor           | Type                                 | STD + Drilling   | STD                                 |                        |
| Bolt of mounting plate | Size                                 | mm               | flush M6 x 20 mm 4pcs.              | flush M6 x 14 mm 4pcs. |

| Other HKS Kit                               |                               | HKS Kit (2.2L) | MITSUBISHI            |                   |
|---|-------------------------------|----------------|-----------------------|-------------------|
| PISTON<br>21003-AM004<br>(2.2L)             | Cylinder bore dia.            | mm             | φ86.5                 | φ86.0             |
|   | Overall height                | mm             | 48.8                  | 55.0              |
|   | Compression height            | mm             | 30.80                 | 33.35             |
|   | Pin DIA. x Length             | mm             | φ23 x 60 Light weight | φ23 x 60          |
|   | Snap ring Type                |                | Dedication of HKS     | -                 |
|   | Ring TOP B x T                | mm             | 1.2 x 3.1             | 1.2 x -           |
|   | SECOND B x T                  | mm             | 1.2 x 3.1             | 1.5 x -           |
| OIL B x T                                   | mm                            | 2.0 x 2.0      | 2.0 x -               |                   |
| CONROD<br>I-BEAM<br>23004-AM002<br>(2.2L)   | Small end Inside dia. / Width | mm             | φ23.0 / 20.0~20.5     | φ23.0 / 20.0      |
|   | Big end Inside dia. / Width   | mm             | φ55.0 / 21.9          | φ55.0 / 21.9      |
|   | Center-distance               | mm             | 143.75                | 143.75            |
|   | Size of bolt                  |                | M8 x P1.0 x 42 mm     | M8 x P1.0 x 42 mm |
| CONROD<br>H-BEAM<br>23004-AM003<br>(Option) | Small end Inside dia. / Width | mm             | φ23.0 / 20.0          | /                 |
|   | Big end Inside dia. / Width   | mm             | φ55.0 / 21.9          |                   |
|   | Center-distance               | mm             | 143.75                |                   |
|   | Size of bolt                  |                | 3/8-24 UNF x 41 mm    |                   |

## COMPRESSION

※ HKS HEAD GASKET is not included in this kit.

| COMP.          | (HKS GKT)                 | HKS kit (2.2L) | MITSUBISHI      |               |
|----------------|---------------------------|----------------|-----------------|---------------|
| COMP. Ratio    | 23001-AM006 t1.0          | 8.7            | 9.0 STD t1.2    |               |
|                | 23001-AM007 t1.2 ε        | 8.6            |                 |               |
|                | 23001-AM008 t1.5          | 8.4            |                 |               |
| Prosess-vol.   | cc                        | 534.8          | 499.6           |               |
|                | Cylinder bore dia.        | φ              | 86.5            | 86.0          |
|                | Stroke length             | mm             | 91.0            | 86.0          |
| Clearance-vol. | t1.0                      | 69.5           | 62.5            |               |
|                | t1.2 cc                   | 70.4           |                 |               |
|                | t1.5                      | 72.2           |                 |               |
|                | Comb. chamber-vol.        | cc             | 50.8            | 50.8          |
|                | Vol. of top (凹)           | cc             | 12.1 凹          | 4.5 凹         |
|                | Vol. of piston down (TDC) | cc             | 0.3 0.05mm down | 0.0 None down |
|                | COMP. height              | mm             | 30.80           | 33.35         |
|                | Vol. GKT                  | t1.0           | 6.3             | 7.1 STD t1.2  |
|                |                           | t1.2 cc        | 7.2             |               |
| GKT bore dia.  | t1.5                      | 9.0            | 87.0            |               |
|                | φ                         | 87.5           |                 |               |

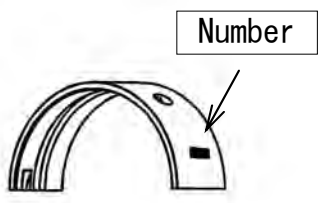
## INSTALLATION

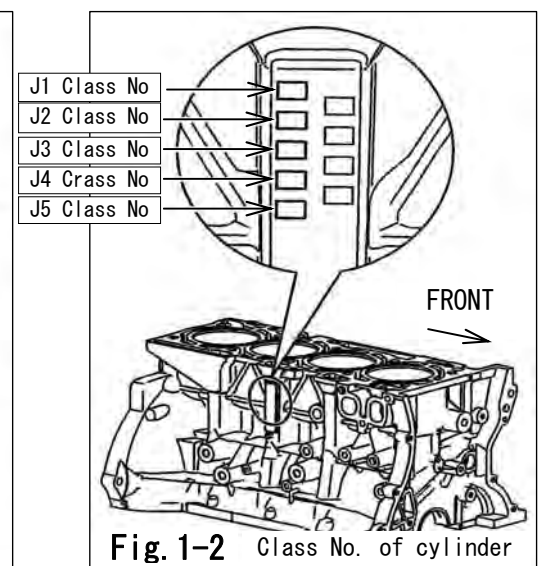
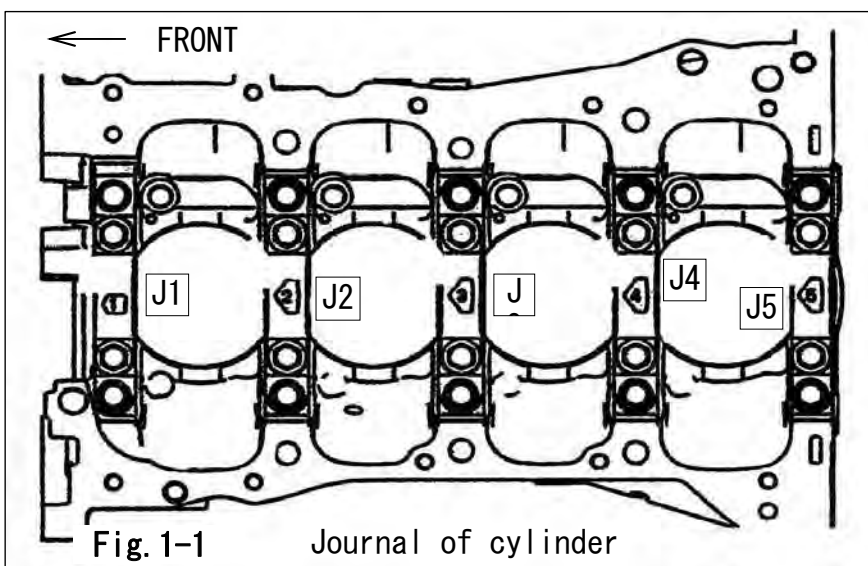
1. Removal of factory parts.  
Remove factory parts referring to the factory service manual.
2. Boring and honing Cylinder.  
This crank must be used with HKS 2.2L Piston Kit (21003-AM004).  
Boring and honing are required since the cylinder bore is modified to 0.5mm over the factory size.  
Modification must be done referring to the manual of HKS Piston Kit.
3. Oil clearance alignment of main journal.  
Select one of the following 2 methods of the oil clearance alignment:
  - (Select.1) Select the main bearing based on the size class number of the cylinder and crankshaft to check the oil clearance with the PLASTIGAGE.
  - (Select.2) Calculate the oil clearance with the actual measurement.

|                                 |             |               |             |
|---------------------------------|-------------|---------------|-------------|
| Main bearing oil clearance (mm) | J1、J2、J4、J5 | 0.039 ~ 0.065 | Limit 0.100 |
|                                 | J3          | 0.051 ~ 0.077 | Limit 0.100 |
| Crankshaft end play (mm)        |             | 0.05 ~ 0.25   | Limit 0.40  |

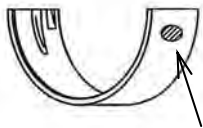
- 3.1 (Select.1) Use the size class number of the cylinder and crankshaft.

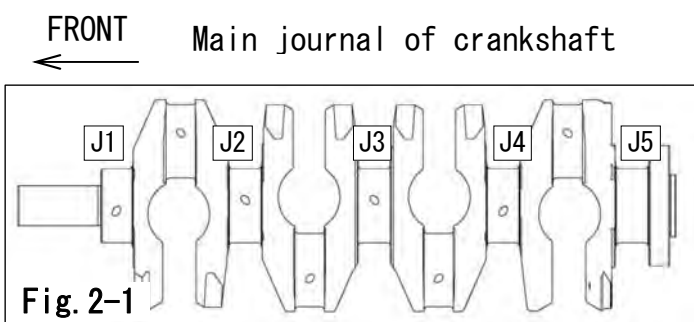
Use the size class number of the cylinder (Fig.1) , and select the upper bearing of the main journal from the table below. Install the selected bearing.

| Class no. of cylinder |    | Cylinder journal          | No. of upper bearing |    | Upper bearing No.<br> |
|-----------------------|----|---------------------------|----------------------|----|--|
| J1、J2、J4、J5           | J3 |                           | J1、J2、J4、J5          | J3 |  |
| 1                     | 0  | $\phi 56.000 \sim 56.006$ | 1                    | 0  |  |
| 2                     | 1  | $\phi 56.007 \sim 56.012$ | 2                    | 1  |  |
| 3                     | 2  | $\phi 56.013 \sim 56.018$ | 3                    | 2  |  |

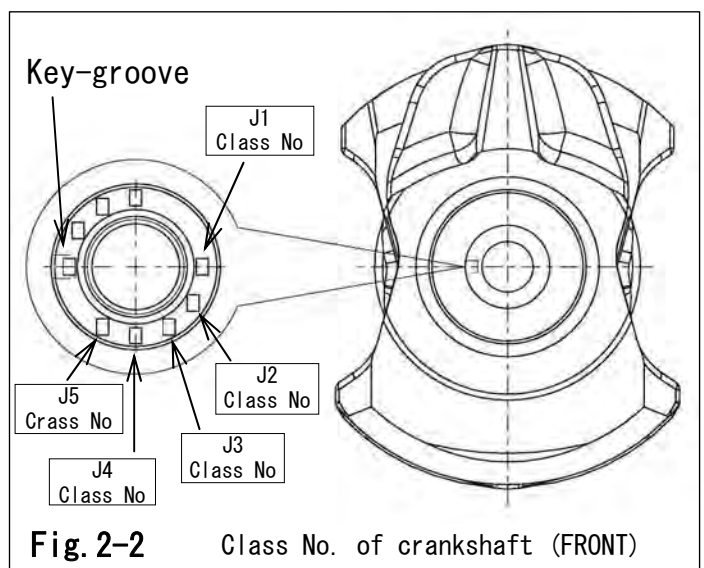


Use the size class number of the cylinder (Fig. 2) , and select the lower bearing of the main journal from the table below. Install the selected bearing.

| Class no. of crankshaft |    | Crankshaft<br>main journal | No. of lower bearing |    | Lower bearing No.  |
|-------------------------|----|----------------------------|----------------------|----|--|
| J1, J2, J4, J5          | J3 |                            | J1, J2, J4, J5       | J3 |  |
| 0                       | 8  | $\phi 51.986 \sim 51.988$  | 0                    | 8  | <br><div style="border: 1px solid black; padding: 2px; display: inline-block;">Number</div> |
| 1                       | 9  | $\phi 51.983 \sim 51.985$  | 1                    | 9  |  |
| 2                       | 0  | $\phi 51.980 \sim 51.982$  | 2                    | 0  |  |
| 3                       | 1  | $\phi 51.977 \sim 51.979$  | 3                    | 1  |  |
| 4                       | 2  | $\phi 51.974 \sim 51.976$  | 4                    | 2  |  |



Assemble the selected upper and lower bearing and thrust bearing; then, measure the oil clearance of each journal and the crankshaft's end play with PLASTIGAGE to make sure the clearance and end play are within the designated value range.  
(Please refer to the factory service manual)



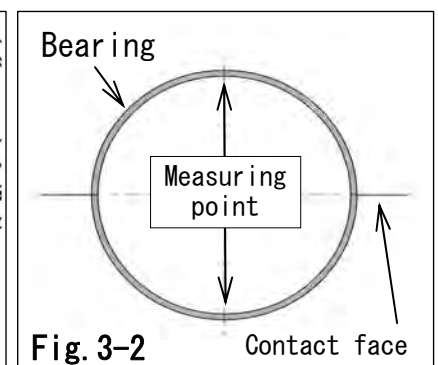
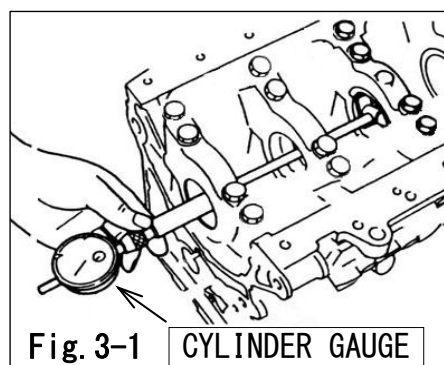
## CAUTION

- Please adjust the oil clearance to the designated value.  
If the clearance is beyond the designated value, the oil film cannot be made, and it may cause the engine damage.

### 3.2 (Select. 2) Calculating the oil clearance in size verification by the actual measurement

Install the main bearing of an arbitrary size in the cylinder, and mount the bearing cap, and please tighten the bolt in the designated torque.  
(When tightening the bolt, please refer to the factory service manual,)

Please measure the journal's inside diameter of the cylinder with CYLINDER GAUGE.  
(Measure the points shown in Fig. 3.)



Please measure the main journal's outside diameter of the crankshaft with MICROMETER.

(Measure the points as shown in Fig. 4)

Fig. 4-1 shows the measurement of the pin diameter.

Please measure the main journal diameter instead.

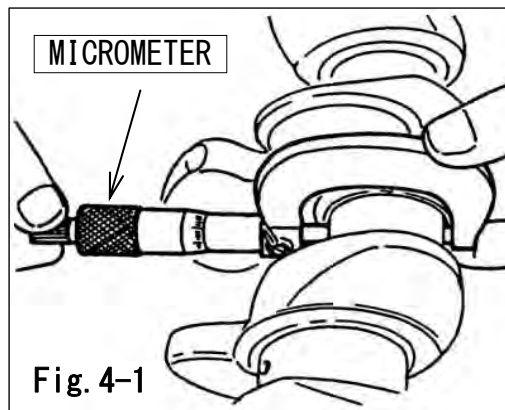


Fig. 4-1

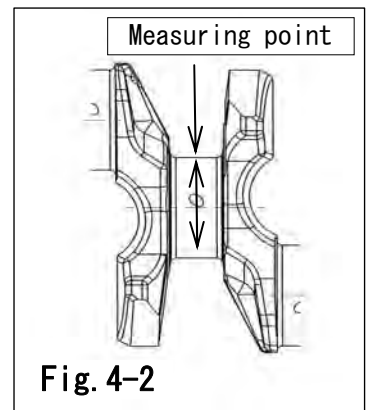


Fig. 4-2

Calculate the each journal's oil clearance using the following formula, and please select the bearing thickness so the oil clearance can be the designated value.

Measure the end play of crankshaft to make sure the clearance is the designated value.

Measure the bearing thickness, and make sure the thickness is the designated value.

**Main bearing oil clearance (mm) =**

**Journal on bearing inside dia. of cylinder (mm) - Main journal outside dia. of crankshaft (mm)**

**※ Oil clearance target value J1 = J2 = J4 = J5 < J3 (Δ +0.012 mm)**

#### 4. Oil clearance alignment of pin (conrod).

Select one of the following 2 methods of the oil clearance alignment:

(Please refer to the HKS manual of 23004-AM002 CONROD SET I-BEAM)

(Select. 1) Select the Pin (Conrod) bearing based on the size class number of the crankshaft to check the oil clearance with the PLASTIGAGE.

(Select. 2) Calculate the oil clearance with the actual measurement.

|  |               |       |       |
|--|---------------|-------|-------|
| Pin (conrod) bearing oil clearance (mm)  | 0.038 ~ 0.069 | Limit | 0.100 |
| Conrod big end thrust oil clearance (mm) | 0.10 ~ 0.25   | Limit | 0.40  |

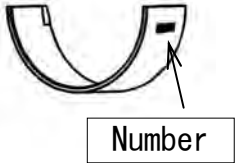
#### 4.1 (Select. 1) Use the size class number of the crankshaft.

Loosen the conrod bolt and remove it; then, disassemble the big end of the conrod..

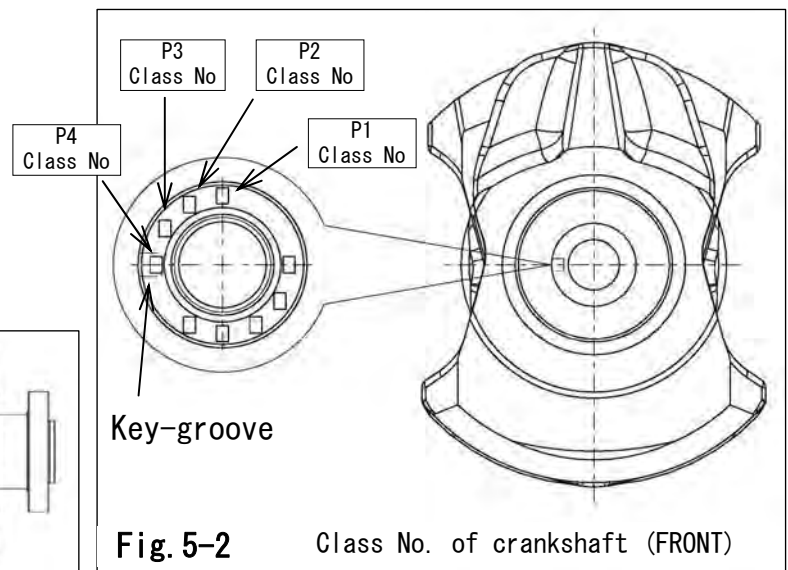
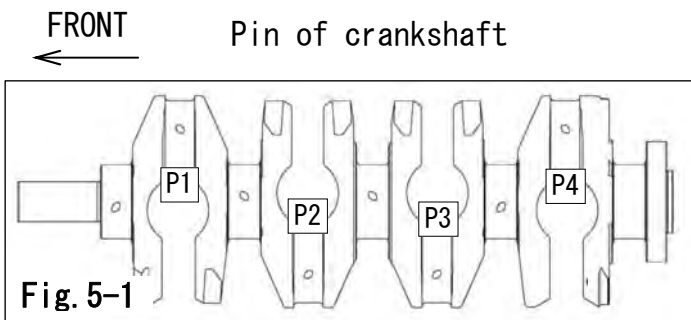
## CAUTION

- The HKS Conrod Set I-BEAM (23004-AM002) includes the conrod bolt that is looser than the designated tightening torque. (The bolt was loosened for the inspection.)

Refer to the size class number of the crankshaft in Fig.5, select the bearing of pin(conrod) from the following table; then install the selected bearing to the big end of the conrod.

| Class no. of crankshaft | Crankshaft pin            | No. of bearing | Bearing No.   |
|-------------------------|---------------------------|----------------|---|
| 1                       | $\phi 51.967 \sim 51.972$ | 1              |  |
| 2                       | $\phi 51.961 \sim 51.966$ | 2              |   |
| 3                       | $\phi 51.955 \sim 51.960$ | 3              |   |

Select the same bearing of the same size both upper and lower bearings.



Please install the selected bearing, and measure the oil clearance of each pin and the thrust clearance using PLASTIGAGE. Make sure the clearance is within the range of the designated value.

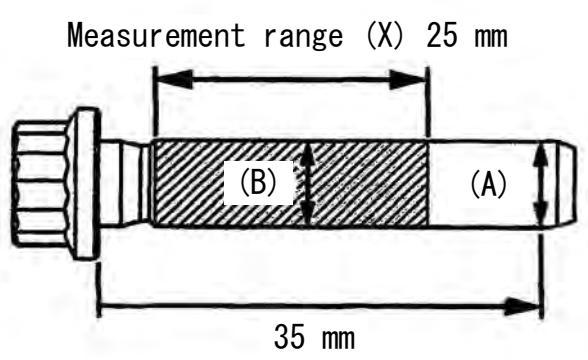
(Please refer to the factory service manual)

## CAUTION

- Clean and air-blow the cracking surface and the big end of the conrod before assembling. Make sure no foreign object remains on the conrod. If there is any foreign object remained, the inner diameter cannot be accurate even if the bolt is tighten with the designated torque.

The tightening torque spec and the product life of HKS conrod bolt are the same as the factory bolt.

(It is described in the manual of HKS 23004-AM002 CONROD SET I-BEAM.)

|   |   |
|---|---|
| <p><b>Conrod bolt tighten value</b></p>   | <p><b>TORQUE 20 N·m (2.0 kgf·m) + ANGLE 90 deg</b></p>  |
| <p><b>Bolt lubricant</b></p>  | <p><b>Engine oil (Bearing surface and thread of bolt)</b></p>   |
| <p><b>The symptom of bolt life</b></p> <ol style="list-style-type: none"> <li>1. Measurement large dia. (A)</li> <li>2. Measurement small dia. (B)<br/>Measurement is (X) limits</li> <li>3. Limit = (A) - (B)<br/>More then limit ⇒<br/>Change bolt for new article</li> </ol> <p><b>Limit 0.10 mm</b></p> |  <p style="text-align: center;">Measurement range (X) 25 mm</p> <p style="text-align: center;">35 mm</p> <p style="text-align: center;"><b>Fig. 6</b></p> |

## CAUTION

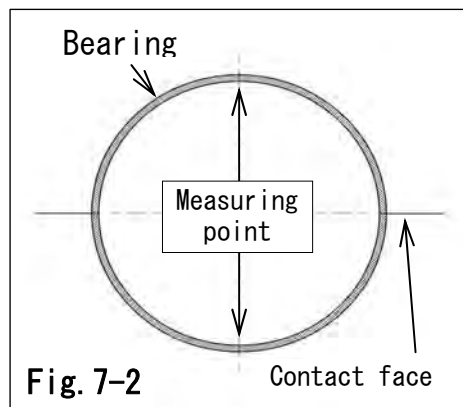
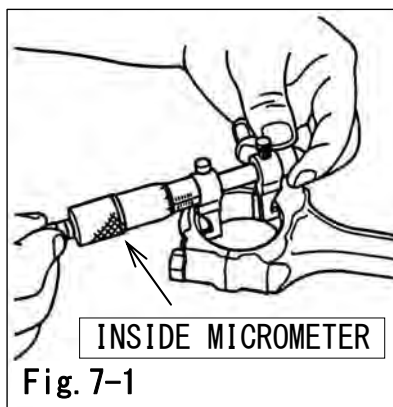
- Please adjust the oil clearance to the designated value.  
If the clearance is beyond the designated value, the oil film cannot be made, and it may cause the engine damage.

### 4.2 (Select.2) Calculating the oil clearance in size verification by the actual measurement

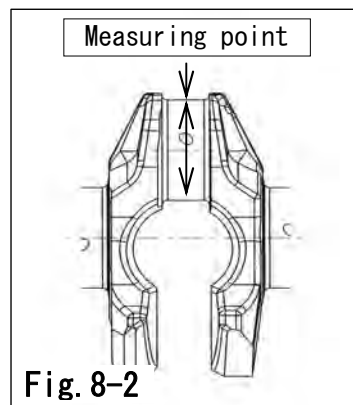
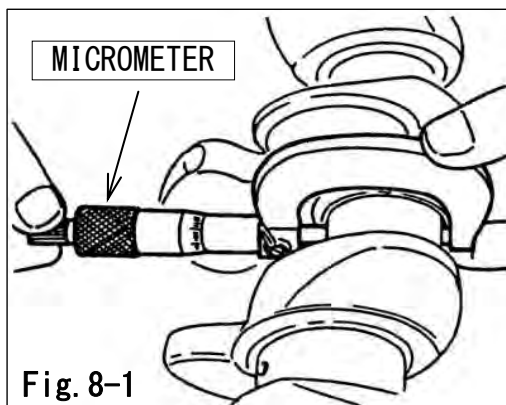
Install the main bearing of an arbitrary size in the conrod, and tighten the bolt in the designated torque.

(When tightening the bolt, please refer to 4.1.)

Please measure the conrod's big end inside diameter using **INSIDE MICROMETER**.  
(Measure the points shown in Fig. 7.)



Please measure the pin's outside diameter with **MICROMETER**.  
(Measure the points as shown in Fig. 8)





Calculate each pin's (conrod) oil clearance using the following formula, and please select the bearing thickness so the oil clearance can be the designated value.

Measure the thrust clearance, and make sure the clearance is the designated value.

Measure the bearing thickness using MICROMETER.

Pin(conrod) bearing oil clearance(mm) =

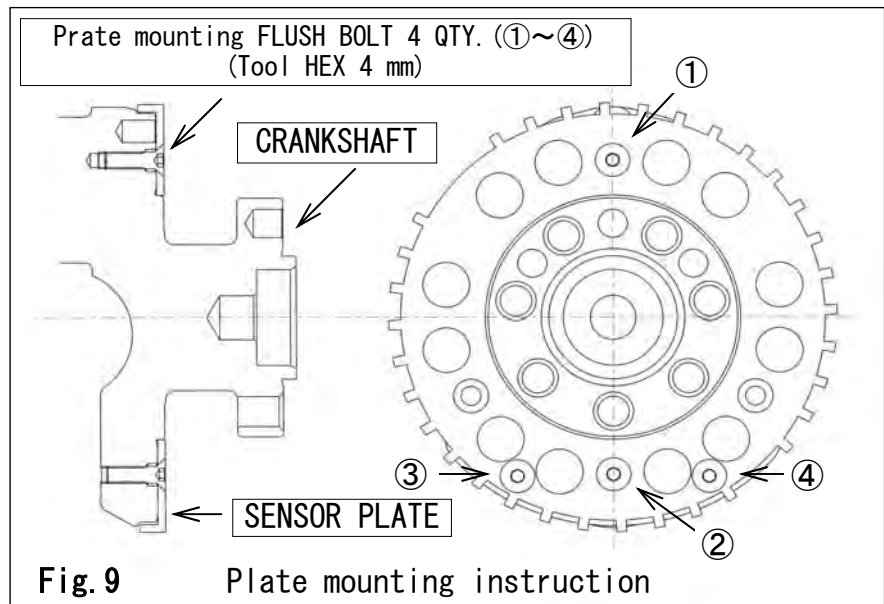
Big end(pin) on bearing inside dia. of conrod(mm) - pin outside dia. of crankshaft(mm)

※ Oil clearance aim value P1 = P2 = P3 = P4

5. Installation of sensor plate  
Please install sensor plate as follows:

Use the provided sensor plate and bolts with this kit.  
The factory parts cannot be installed.

Insert the center plate to the crankshaft's back end; then, tighten the flash bolt from ① to ④ in Fig. 9.



Please tighten the bolt with the following designated torque.

|   |  |
|---|--|
| <b>Bolt tighten value</b>                                   | Apply SCREW LOCK (EX. LOCTITE 271) to thread + TORQUE 11 N·m (1.1 kgf·m) |
| ※ Plate contour appears if may turn, and please be careful. |  |

6. Installation of crankshaft

Assemble the crankshaft referring to the factory service manual.

## CAUTION

- Two types of bearing cap bolt and conrod bolt are consumable parts. Replace them if necessary to prevent the bolts from being damaged and causing serious damage to the engine during driving. When replacing bolts, refer to the factory service manual.

## Confirmation after Installation.

- Check the following before starting the engine.

| Check item  | Result |
|---|--------|
| • Make sure pipes and hoses are routed and connected correctly.               |        |
| • Make sure hoses are not twisted or bent.                                    |        |
| • Make sure the negative cable terminal is securely attached to the battery.  |        |
| • Make sure the level gauge for the engine oil is between H (F) - L.          |        |
| • Make sure all bolts and nuts are tightened.                                 |        |
| • Make sure all installed components do not come in contact with other parts. |        |

- Start the engine and check the following.

Do not raise the engine rpm when the engine reaches the normal operation temperature.

(Let it idle.)

| Check item  | Result |
|---|--------|
| • Make sure oil is not leaking.   |        |
| • Make sure air is not leaking.   |        |
| • Make sure fuel, traction oil, coolant, and air are not leaking after revving the engine 2-3 times while in neutral. |        |
| • Make sure the installed parts are not hitting each other.   |        |
| • Make sure the level gauge for the engine oil is between H (F) - L.  |        |

## Maintenance

Make sure to properly maintain the operation of the vehicle.

- Maintenance of the vehicle is the driver's responsibility.
- Ask a professional installer for procedures not mentioned in this Users Manual.

## Troubleshooting

- If any problems should occur, consult a professional installer.
- In case of any abnormal noise, smell or vibration, refer to the Mitsubishi Service Manual.



HKS CO., LTD.

7181 Kitayama, Fujinomiya, Shizuoka  
418-0192 JAPAN  
<http://www.hks-power.co.jp>

Published in May, 2010 by HKS Co., Ltd.  
(Unauthorized reproduction is strictly prohibited.)