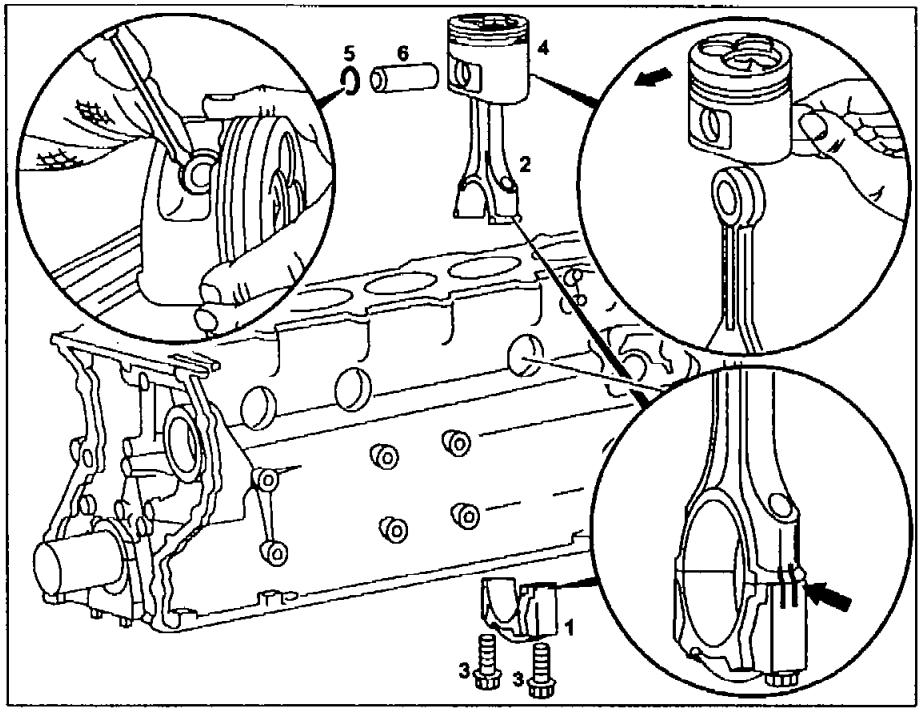
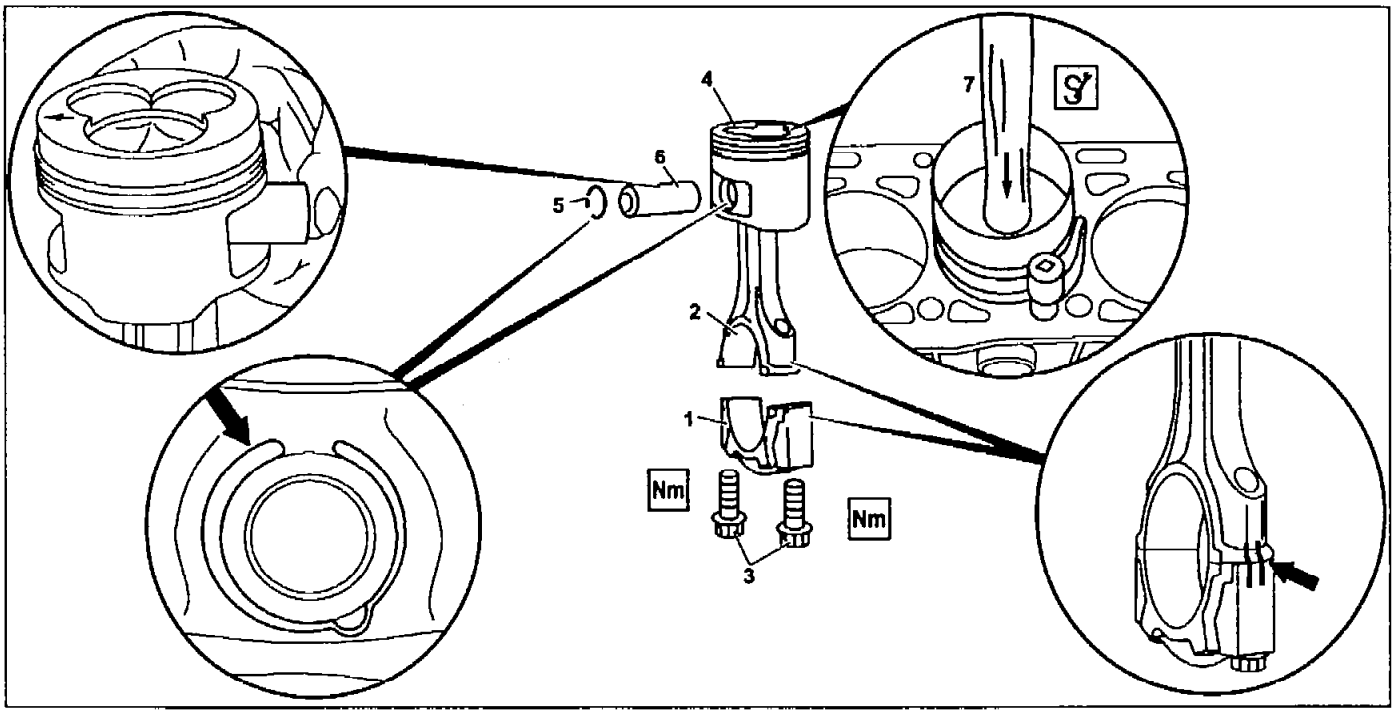
*ENGINE 601, 602, 603 (except , 602.98)*




D03.10-0001-06




D03.10-0002-09

| | Removing | | |
|---|---|---|---|
| 1 | Remove engine | Models 124, 126, 140, 201, 202<br>Model 124 4MATIC | AR01.10-P-2400HX<br>AR01.10-P-2400HY |
| 2 | Remove cylinder head | | AR01.30-P-5800HX |
| 3 | Remove oil pan | Engine 603.913/963 in model 124 with 4MATIC | AR01.45-P-7500HX |

| | | | |
|---|---|---|---|
| | | Engine 603.971 in model 140<br>Engine 601, 602 in model 124, 201<br>Engine 603 (except 603.913/963) in model 124<br>Engine 603 in model 126<br>Engine 601 in model 202 | AR01.45-P-7500HY<br>AR01.45-P-7500HZ<br>AR01.45-P-7500HA |
| 4 | Remove oil pump | | 18-210 |
| 5 | Unbolt conrod bearing cap (1) | ℹ Conrod (2) and conrod bearing cap (1) are marked together (arrow). | |
| 6 | Lift conrod (2) up and out together with piston (4) | ℹ If the pistons are worn, the direction of travel arrows may no longer be visible because of carbon deposits; for this reason, remove carbon deposits to reveal direction of travel arrow. | |
| 7 | Use a screwdriver to press out piston pin circlip (5) | Ⓟ Do not damage piston; use a clean cloth as a base. | |
| 8 | Press out piston pin (6) and take off piston (4) | | |
| ☒ | **Installing** | | |
| 9 | Inspect conrod bush inner diameter | if excessive wear present ↓<br>Press in new conrod bush. | AR03.10-P-6111-03AW<br>**AR03.10-P-7021AW/5**<br>BE03.10-P-1006-01C<br>BE03.10-P-1007-01C<br>BE03.10-P-1008-01C<br>BE03.10-P-1009-01C<br>BE03.10-P-1010-01C |
| 10 | Oil piston pin (6) and conrod bush | | |
| 11 | Assemble piston (4) and conrod (2) | Ⓟ Install piston with arrow pointing in direction of travel.<br>ℹ The identification and the retaining slots in the conrod are located on the left (at the inlet side) | |
| 12 | Push in piston pin (6) by hand | | |
| 13 | Insert piston pin circlip (5) into the groove (arrow) of the piston | | |
| 14 | Oil cleaned cylinder bores, conrod bearing journals, conrod bearing shells and pistons (4) | | |
| 15 | Fit on tensioning strap (7) for piston rings and tension | ☒ | 000 589 04 14 00 |
| 16 | Install piston (4) with arrow pointing in direction of travel | ℹ Reinstall piston at the same point. Pay attention to piston assignment. | |
| 17 | Inspect conrod bolts | Replace if necessary. | AR03.10-P-6111-01AW<br>**AR03.10-P-7021AW/7**<br>BE03.10-P-1001-03C<br>BE03.10-P-1002-03C |

| | | | |
|---|---|---|---|
| 18 | Install conrod bearing cap (1) | ⓘ Install conrod bearing cap (1) and conrod (2) with the markings (arrows) pointing toward each other. | |
| 19 | Tighten conrod bolts | | AR03.10-P-6111-02AW<br>**AR03.10-P-7021AW/8** |
| | | Nm | BA03.10-P-1001-01C |
| | | Nm | BA03.10-P-1002-01C |
| 20 | Rotate crankshaft and inspect ease of movement | | |
| 21 | Install oil pump | | 18-210 |
| 22 | Install oil pan | Engine 603.913/963 in model 124 | AR01.45-P-7500HX |
| | | Engine 603.971 in model 140 | AR01.45-P-7500HY |
| | | Engine 601, 602 in model 124, 201<br>Engine 603 (except 603.913/963) in model 124<br>Engine 603 in model 126 | AR01.45-P-7500HZ |
| | | Engine 601 in model 202 | AR01.45-P-7500HA |
| 23 | Measure piston projection | ⓘ Depending on piston projection, install cylinder head gasket of normal thickness or cylinder head gasket of repair thickness (1.85 mm thick). | AR03.10-P-7041-01AW<br>**AR03.10-P-7021AW/9** |
| | | | BE03.10-P-1001-02B |
| | | | BE03.10-P-1002-02B |
| | | S | 001 589 53 21 00 |
| | | S | 343 589 00 40 00 |
| 24 | Install cylinder head | | AR01.30-P-5800HX |
| 25 | Install engine | Models 124, 126, 140, 201, 202 | AR01.10-P-2400HX |
| | | Model 124 4MATIC | AR01.10-P-2400HY |

Test data of conrod

| Number | Designation | | Engine 601.921 (USA) up to 09/84 | Engine 601.921 (USA) as of 10/84 |
|---|---|---|---|---|
| BE03.10-P-1006-01C | Conrod bush inner ⌀ (d) | mm | 27.018-27.024 | 26.012-26.018 |
| | Fig. see | | AR03.10-P-6111AW | AR03.10-P-6111AW |
| BE03.10-P-1007-01C | Conrod bush outer ⌀ | mm | 29.560-29.600 | 28.575-28.600 |
| | Fig. see | | AR03.10-P-6111AW | AR03.10-P-6111AW |
| BE03.10-P-1008-01C | Conrod bush basic bore ⌀ (d1) | mm | 29.500-29.521 | 28.500-28.521 |
| | Fig. see | | AR03.10-P-6111AW | AR03.10-P-6111AW |
| BE03.10-P-1009-01C | Piston pin play in conrod bush | mm | 0.007-0.018 | 0.007-0.018 |
| BE03.10-P-1010-01C | Peak-to-valley height ($R_z$) of conrod bush on inside | µm | 5 | 5 |

Test data of conrod

| Number | Designation | | Engine 601 up to 09/84 except 601.921 (USA) | Engine 601 as of 10/84 except 601.921 (USA), Engine 602.91, 603.91 |
|---|---|---|---|---|
| BE03.10-P-1006-01C | Conrod bush inner Ø (d) | mm | 27.018-27.024 | 26.012-26.018 |
| | Fig. see | | AR03.10-P-6111AW | AR03.10-P-6111AW |
| BE03.10-P-1007-01C | Conrod bush outer Ø | mm | 29.560–29.600 | 28.575–28.600 |
| BE03.10-P-1008-01C | Conrod bush basic bore Ø (d1) | mm | 29.500-29.521 | 28.500-28.521 |
| | Fig. see | | AR03.10-P-6111AW | AR03.10-P-6111AW |
| BE03.10-P-1009-01C | Piston pin play in conrod bush | mm | 0.007-0.018 | 0.007-0.018 |
| BE03.10-P-1010-01C | Peak-to-valley height ($R_z$) of conrod bush on inside | µm | 5 | 5 |

Test data of conrod

| Number | Designation | | Engine 602.96, 603.96 | Engine 603.97 |
|---|---|---|---|---|
| BE03.10-P-1006-01C | Conrod bush inner Ø (d) | mm | 28.012-28.024 | 28.018-28.024 |
| | Fig. see | | AR03.10-P-6111AW | AR03.10-P-6111AW |
| BE03.10-P-1007-01C | Conrod bush outer Ø | mm | 30.575-30.600 | 30.575-30.600 |
| | Fig. see | | AR03.10-P-6111AW | AR03.10-P-6111AW |
| BE03.10-P-1008-01C | Conrod bush basic bore Ø (d1) | mm | 30.500-30.521 | 60.500-30.525 |
| | Fig. see | | AR03.10-P-6111AW | AR03.10-P-6111AW |
| BE03.10-P-1009-01C | Piston pin play in conrod bush | mm | 0.007-0.018 | 0.007-0.018 |
| BE03.10-P-1010-01C | Peak-to-valley height ($R_z$) of conrod bush on inside | µm | 5 | 5 |

Test data of conrod bolts

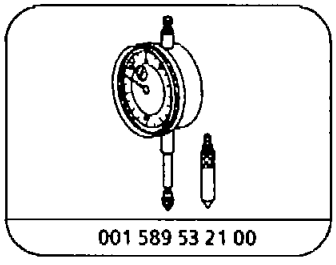
| Number | Designation | | | | Engine 601, 602 except 602.98, 603 except 603.970 up to 11/90 603.970 up to 8/90 | Engine 601, 602 except 602.98, 603 except 603.970 as of 12/90 – 10/92 603.970 as of 9/90 – 10/92 | Engine 601, 602 except 602.98, 603 as of 11/92 |
|---|---|---|---|---|---|---|---|
| BE03.10-P-1001-03C | Conrod bolt (stretch shank) | Thread Ø | | M | – | 9X1 | 9X1 |
| | | Length (L) | when new | mm | – | 51.7 | 51.7 |
| | | | max. | mm | – | 52.9 | 52.9 |
| | | Stretch shank Ø | new | mm | – | 8.5 | – |
| | | | minimum | mm | – | 8.2 | – |
| | | | Fig. see | | – | AR03.10-P-6111-01AW | AR03.10-P-6111-01AW |
| BE03.10-P-1002-03C | Conrod bolt (straight stretch shank) | Thread Ø | | M | 9X1 | – | – |
| | | Length (L) | when new | mm | 51.7 | – | – |
| | | | max. | mm | – | – | – |
| | | Stretch shank Ø | new | mm | 7.3 | – | – |
| | | | minimum | mm | 7.1 | – | – |
| | | | Fig. see | | AR03.10-P-6111-01AW | – | – |

Test data of pistons

| Number | Designation | | | Engine 601, 602 except 602.98, 603 |
|---|---|---|---|---|
| BE03.10-P-1001-02B | Piston projection (a) with new crankcase | | mm | 0.74-0.96 |
| | | Fig. see | | AR03.10-P-7041-02AW |
| BE03.10-P-1002-02B | Piston projection (a) with machined crankcase | | mm | 0.96-1.16 |
| | | Fig. see | | AR03.10-P-7041-02AW |

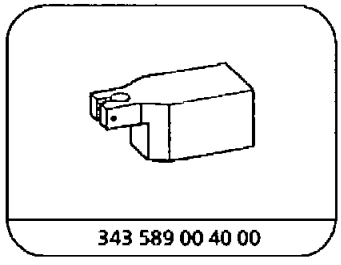
Nm Connecting rod

| Number | Designation | | | | Engine 601, 602 except 602.98, 603 except 603.970 up to 11/90 603.970 up to 8/90 | Engine 601, 602 except 602.98, 603 except 603.970 as of 12/90 – 10/92 603.970 as of 9/90 – 10/92 | Engine 601, 602 except 602.98, 603 as of 11/92 |
|---|---|---|---|---|---|---|---|
| BA03.10-P-1001-01C | Conrod bolt (stretch shank) | 1st stage | new | Nm | – | 45 | 40 |
| | | | used | Nm | – | 40 | – |
| | | 2nd stage | | ∡ ° | – | 90 | 90 |
| | | Fig. see | | | – | AR03.10-P-6111-01AW | AR03.10-P-6111-01AW |
| BA03.10-P-1002-01C | Conrod bolt (straight stretch shank) | 1st stage | | Nm | 30 | – | – |
| | | 2nd stage | | ∡ ° | 90 | – | – |
| | | Fig. see | | | AR03.10-P-6111-01AW | | |



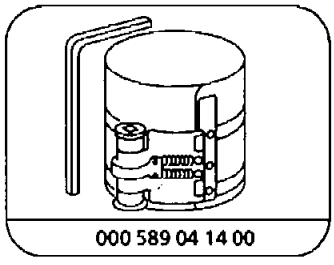
001 589 53 21 00

Dial gage



343 589 00 40 00

Dial gage holder



000 589 04 14 00

Tensioning strap

| | | | |
|---|---|---|---|
| AR03.10-P-6111-03AW | Press-fitting new connecting rod bush | | |

Test data of conrod

| Number | Designation | | | Engine 601.921 (USA) up to 09/84 | Engine 601.921 (USA) as of 10/84 |
|---|---|---|---|---|---|
| BE03.10-P-1006-01C | Conrod bush inner Ø (d) | | mm | 27.018-27.024 | 26.012-26.018 |
| | Fig. see | | | AR03.10-P-6111AW | AR03.10-P-6111AW |
| BE03.10-P-1007-01C | Conrod bush outer Ø | | mm | 29.560-29.600 | 28.575-28.600 |
| | Fig. see | | | AR03.10-P-6111AW | AR03.10-P-6111AW |
| BE03.10-P-1008-01C | Conrod bush basic bore Ø (d1) | | mm | 29.500-29.521 | 28.500-28.521 |
| | Fig. see | | | AR03.10-P-6111AW | AR03.10-P-6111AW |
| BE03.10-P-1009-01C | Piston pin play in conrod bush | | mm | 0.007-0.018 | 0.007-0.018 |
| BE03.10-P-1010-01C | Peak-to-valley height ($R_z$) of conrod bush on inside | | µm | 5 | 5 |

Test data of conrod

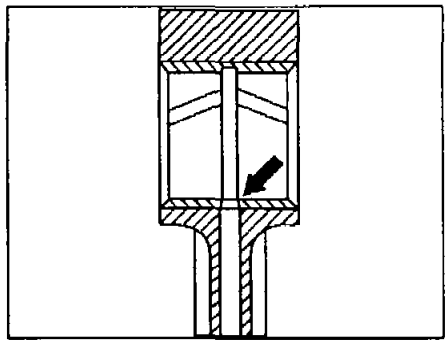
| Number | Designation | | Engine 601 up to 09/84 except 601.921 (USA) | Engine 601 ab 10/84 except 601.921 (USA), engine 602.91, 603.91 |
|---|---|---|---|---|
| BE03.10-P-1006-01C | Conrod bush inner Ø (d) | mm | 27.018-27.024 | 26.012-26.018 |
| | Fig. see | | AR03.10-P-6111AW | AR03.10-P-6111AW |
| BE03.10-P-1007-01C | Conrod bush outer Ø | mm | 29.560–29.600 | 28.575–28.600 |
| BE03.10-P-1008-01C | Conrod bush basic bore Ø (d1) | mm | 29.500-29.521 | 28.500-28.521 |
| | Fig. see | | AR03.10-P-6111AW | AR03.10-P-6111AW |
| BE03.10-P-1009-01C | Piston pin play in conrod bush | mm | 0.007-0.018 | 0.007-0.018 |
| BE03.10-P-1010-01C | Peak-to-valley height ($R_z$) of conrod bush on inside | µm | 5 | 5 |

Test data of conrod

| Number | Designation | | Engine 602.96, 603.96 | Engine 603.97 |
|---|---|---|---|---|
| BE03.10-P-1006-01C | Conrod bush inner Ø (d) | mm | 28.012-28.024 | 28.018-28.024 |
| | Fig. see | | AR03.10-P-6111AW | AR03.10-P-6111AW |
| BE03.10-P-1007-01C | Conrod bush outer Ø | mm | 30.575-30.600 | 30.575-30.600 |
| | Fig. see | | AR03.10-P-6111AW | AR03.10-P-6111AW |
| BE03.10-P-1008-01C | Conrod bush basic bore Ø (d1) | mm | 30.500-30.521 | 60.500-30.525 |
| | Fig. see | | AR03.10-P-6111AW | AR03.10-P-6111AW |
| BE03.10-P-1009-01C | Piston pin play in conrod bush | mm | 0.007-0.018 | 0.007-0.018 |
| BE03.10-P-1010-01C | Peak-to-valley height ($R_z$) of conrod bush on inside | µm | 5 | 5 |

1 Press out conrod bush; use new conrod bush to press out old conrod bush.
Ⓘ Press in new conrod bush so that the oil drilling(s) in the conrod bush is/are aligned with the drillings in the conrod (arrows).

*(Arrow) Oil drilling*
*Naturally aspirated engine 601, 602, 603,*

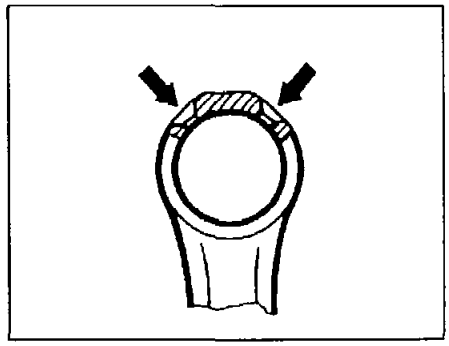


D03.10-0004-01

2 Turn out conrod bush and ream.

3 Dress side faces of the conrod on a dressing plate.

*Turbo engine 602, 603*
*(Arrows) Oil drillings*
1 *Engines 603.960/963 as of 01/1988 up to 08/1988 have 3 drillings Ø 4.5 mm for lubricating the piston pins.*
*Engines 602.96, 603.96 and 603.97 (USA) as of 09/1988 have 2 oil drillings Ø 4.5 mm for lubricating the piston pins.*



D03.10-0005-01

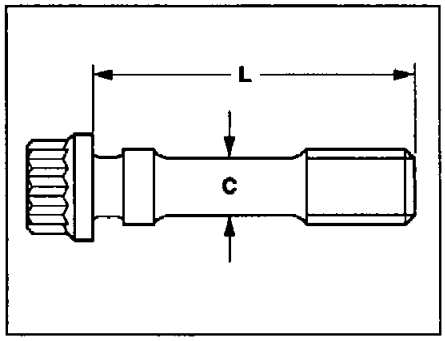
| AR03.10-P-6111-01AW | Checking connecting rod bolts | | |
|---|---|---|---|

**Test data of conrod bolts**

| Number | Designation | | | | Engine 601, 602 except 602.98, 603 except 603.970 up to 11/90 603.970 bis 8/90 | Engine 601, 602 except 602.98, 603 except 603.970 as of 12/90 – 10/92 603.970 as of 9/90 – 10/92 | Engine 601, 602 except 602.98, 603 as of 11/92 |
|---|---|---|---|---|---|---|---|
| BE03.10-P-1001-03C | Conrod bolt (stretch shank) | Thread Ø | | M | – | 9X1 | 9X1 |
| | | Length (L) | when new | mm | – | 51.7 | 51.7 |
| | | | max. | mm | – | 52.9 | 52.9 |
| | | Stretch shank Ø | when new | mm | – | 8.5 | – |
| | | | minimum | mm | – | 8.2 | – |
| | | | Bild siehe | | – | AR03.10-P-6111-01AW | AR03.10-P-6111-01AW |
| BE03.10-P-1002-03C | Conrod bolt (straight stretch shank) | Thread Ø | | M | 9X1 | – | – |
| | | Length (L) | when new | mm | 51.7 | – | – |
| | | | max. | mm | – | – | – |
| | | Stretch shank Ø | when new | mm | 7.3 | – | – |
| | | | minimum | mm | 7.1 | – | – |
| | | | Fig. see | | AR03.10-P-6111-01AW | – | – |

1 Inspect minimum stretch shank Ø (c) or length (L). If the Ø is less than the minimum stretch shank Ø or if the maximum length is exceeded, replace conrod bolt.

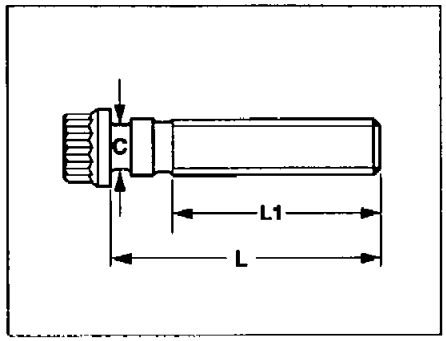
⑬ Only identical conrod bolts may be fitted in an engine because of the different weight.




P03.10-0258-01

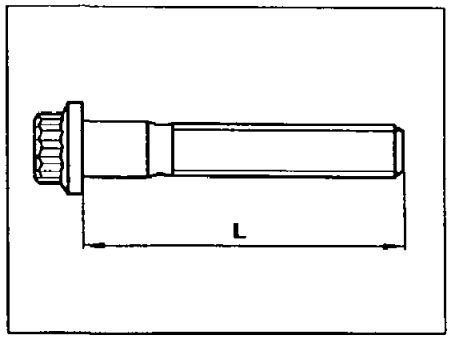
*Stretch shank bolt installed, engine 603.970 up to 08/1990,*
*Engine 601, 602, 603 except 603.970 up to 11/1990*

*Straight stretch shank bolt installed*
*as of 09/1990 on engine 603.970 up to 10/1992*
*as of 12/1990 on engines 601, 602, 603 except 603.970 up to 10/1992*




P03.10-0259-01

*Straight stretch shank bolt installed as of 11/1992*




P03.10-0225-01

| AR03.10-P-6111-02AW | Tightening connecting rod bolts | | |
|---|---|---|---|

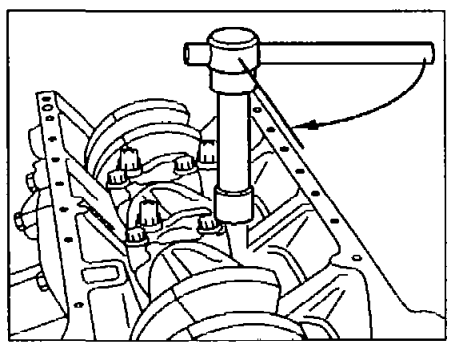
Nm Connecting rod

| Number | Designation | | | | Engine 601, 602 except 602.98, 603 except 603.970 up to 11/90 603.970 up to 8/90 | Engine 601, 602 except 602.98, 603 except 603.970 as of 12/90 – 10/92 603.970 as of 9/90 – 10/92 | Engine 601, 602 except 602.98, 603 as of 11/92 |
|---|---|---|---|---|---|---|---|
| BA03.10-P-1001-01C | Conrod bolt (stretch shank) | 1st stage | new | Nm | – | 45 | 40 |
| | | | used | Nm | – | 40 | – |
| | | 2nd stage | | ∠ ° | – | 90 | 90 |
| | | Fig. see | | | – | AR03.10-P-6111-01AW | AR03.10-P-6111-01AW |
| BA03.10-P-1002-01C | Conrod bolt (straight stretch shank) | 1st stage | | Nm | 30 | – | – |
| | | 2nd stage | | ∠ ° | 90 | – | – |
| | | Fig. see | | | AR03.10-P-6111-01AW | | |

1 Moisten bolt thread and bolt head contact surface with engine oil.

2 Nm Tighten concrod bolts initially to specified torque.

3 Tighten conrod bolts with a torquing angle wrench.
1 If no torquing angle wrench is available, tighten conrod bolt further by the specified angle using a wrench socket and T arm in a single stroke.
Do not use flexi-torque wrenches when tightening in order to eliminate the risk of angle errors.



P03.10-2012-01

| | | | |
|---|---|---|---|
| AR03.10-P-7041-01AW | Measuring piston projection | 343 589 00 40 00 Dial gauge holder<br>001 589 53 21 00 Dial gage | |

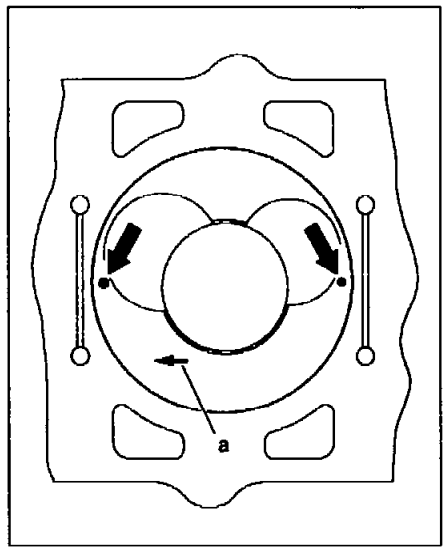
**Test data of pistons**

| Number | Designation | | Engine<br>601, 602 except 602.982<br>603 |
|---|---|---|---|
| BE03.10-P-1001-02B | Piston projection (a) with new crankcase | mm | 0.74-0.96 |
| | | Fig. see | AR03.10-P-7041-02AW |
| BE03.10-P-1002-02B | Piston projection (a) with machined crankcase | mm | 0.96-1.16 |
| | | Fig. see | AR03.10-P-7041-02AW |

1 After replacing the pistons/conrod or after machining the crankcase contact surface, it is necessary to measure the piston projection.
Measure projection between piston crown and contact surface of crankcase without the cylinder head gasket fitted. The measurement should be carried out in the direction of the piston pin in order to eliminate the piston rock.

1 Position piston at TDC

2 Measure piston projection between piston crown and crankcase contact surface at the two measuring points (arrows).




D03.10-0003-02