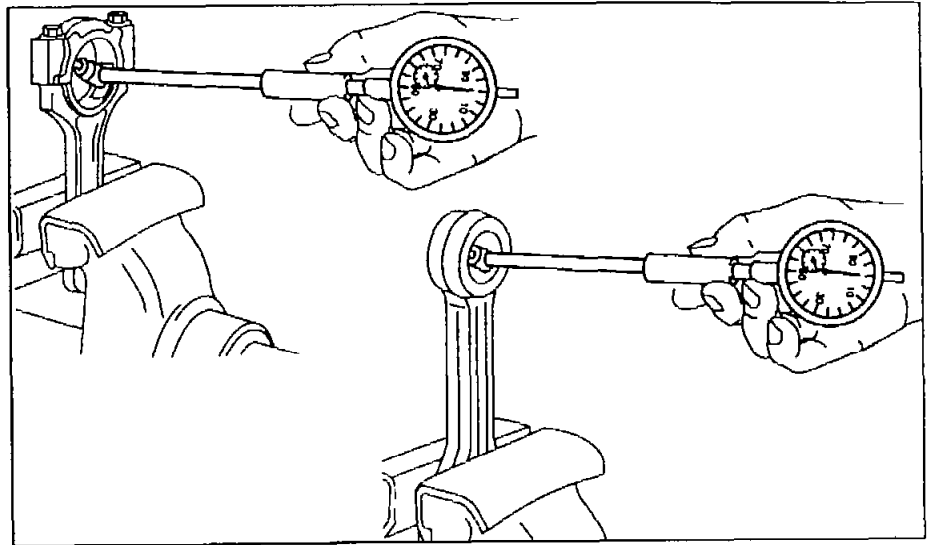


ENGINE 601, 602, 603 (except, 602.98)

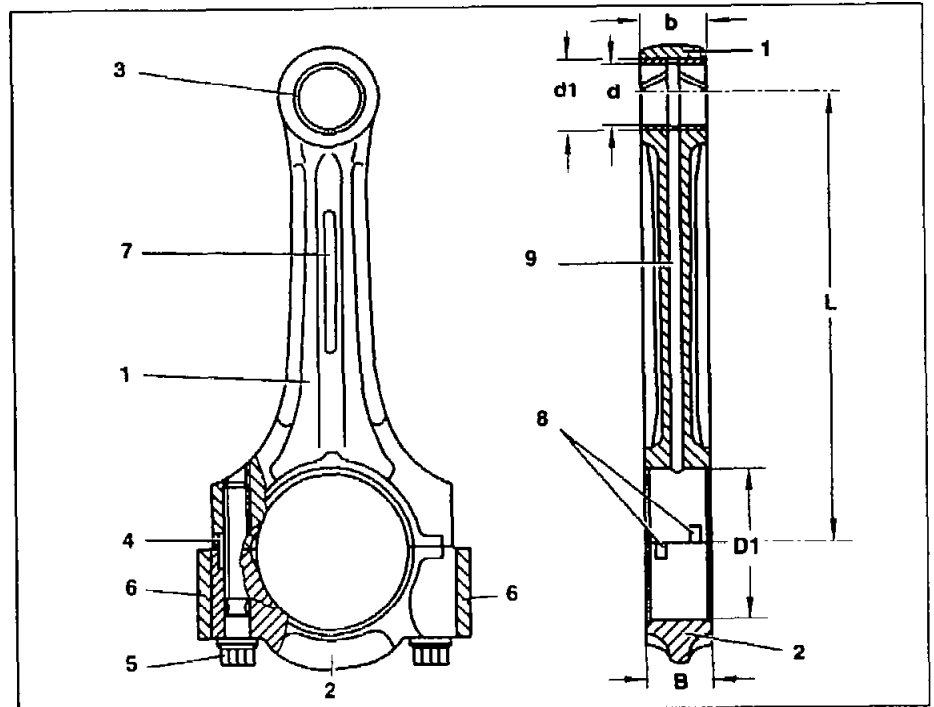


P03.10-0200-05

Conrod arrangement naturally aspirated engine 601, 602, 603

- 1 Conrod
- 2 Conrod bearing cap
- 3 Conrod bush
- 4 Dowel sleeve
- 5 Conrod bolt
- 6 Balancing weight
- 7 Area for identification
- 8 Slots for locating conrod bearing shells
- 9 Oil drilling

- "b" Width at conrod bush bore
 "B" Width at conrod bearing bore
 "d" Conrod bush inner \varnothing
 "d1" Conrod bush basic bore \varnothing
 "D1" Conrod bearing shell basic bore \varnothing
 "L" Distance from center of conrod bearing bore to conrod bush bore



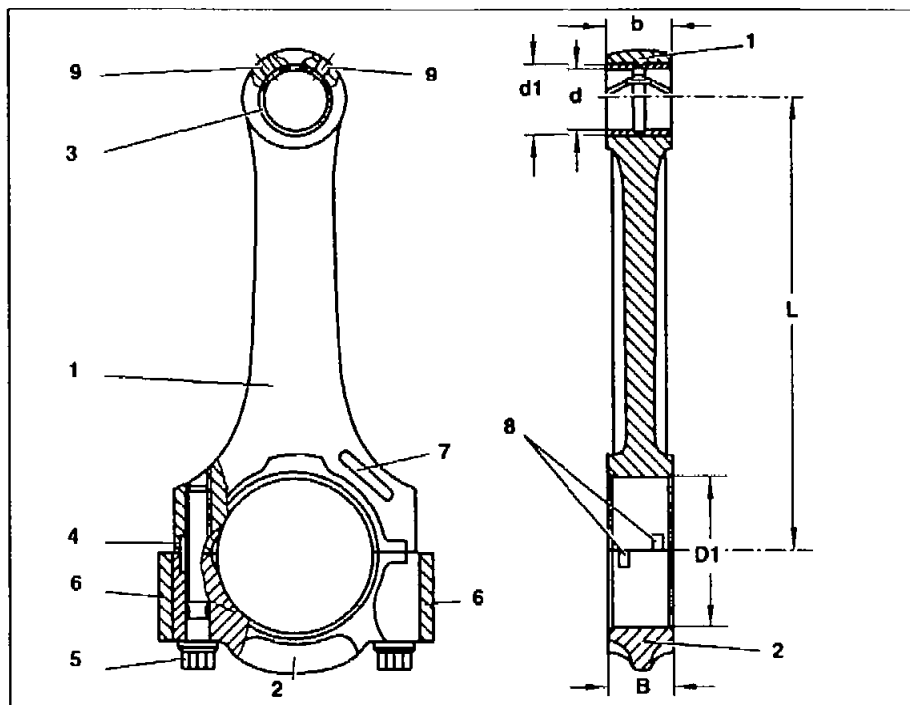
D03.10-0006-06



Conrod shown on engine 602.96, 603.96 and 603.97 (USA) (turbo engines)

- 1 Conrod
 - 2 Conrod bearing cap
 - 3 Conrod bush
 - 4 Dowel sleeve
 - 5 Conrod bolt
 - 6 Balancing weight
 - 7 Area for identification
 - 8 Slots for locating conrod bearing shells
 - 9 Oil spray drillings
- Ⓜ Engine 602.96, 603.96 as of 01/88 up to 08/88: 3 drillings for lubricating piston pins
 Engine 602.96, 603.96 and 603.97 (USA) as of 09/88: 2 drillings for lubricating piston pins





- "b" Width at conrod bush bore
- "B" Width at conrod bearing bore
- "d" Conrod bush inner Ø
- "d1" Conrod bush basic bore Ø
- "D1" Conrod bearing shell basic bore Ø
- "L" Distance from center of conrod bearing bore to conrod bush bore



D03.10-0007-06

🔧 🛠	Removing, installing		
1	Remove pistons		AR03.10-P-7021AW AR03.10-P-7021AW
🔍	Inspecting		
2	Inspect conrods for blue discoloration, cross-scoring and notches	<p>Ⓜ Conrods with blue discoloration (caused by a bearing damage), with cross-scoring and notches must not be reused. ↓</p> <p>Replace conrod and compensate for different conrod weights by milling off the balancing weight.</p>	BE03.10-P-1005-01C
3	Bolt conrod bearing cap to conrod	<p>Ⓜ Conrod and conrod bearing cap are marked together and fixed in position with two dowel sleeves.</p> <p>Tighten conrod bolts to initial torque. ↓</p> <p>Tightening conrod bolts.</p> <p>Nm</p> <p>Nm</p>	AR03.10-P-6111-02AW AR03.10-P-6111AW/7 BA03.10-P-1001-01C BA03.10-P-1002-01C
4	Measure conrod bearing basic bore, repair	<p>If the maximum permissible diameter is exceeded, grind off conrod bearing cap at its contact surface by max. 0.02 mm.</p> <p>🔧</p> <p>🔧</p> <p>🔧</p>	BE03.10-P-1002-01C 001 589 32 21 00 WH58.30-Z-1004-12A WH58.30-Z-1006-12A
5	Inspect conrod bush inner diameter	🔧	BE03.10-P-1006-01C 001 589 32 21 00



		  If excessive wear ↓ Press-fit new conrod bush.	WH58.30-Z-1003-12A WH58.30-Z-1005-12A AR03.10-P-6111-03AW AR03.10-P-6111AW/7 BE03.10-P-1006-01C BE03.10-P-1007-01C BE03.10-P-1008-01C BE03.10-P-1009-01C BE03.10-P-1010-01C
6	Align conrod	 	AR03.10-P-6111-04AW AR03.10-P-6111AW/9 WH58.30-Z-1017-05A WH58.30-Z-1018-05A BE03.10-P-1003-01C BE03.10-P-1004-01C BE03.10-P-1001-01C
7	Install in the reverse order		

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-1001-01C	Dimension	Distance from center of conrod bearing bore to conrod bush bore (L)	mm	144.97-145.03	144.97-145.03
		Width of conrod at conrod bearing bore (B) and at conrod bush bore (b)	mm	23.974-24.026	21.948-22.000
		Fig. see		AR03.10-P-6111AW	AR03.10-P-6111AW
BE03.10-P-1002-01C		Conrod bearing shell basic bore \varnothing (D1)	mm	51.600-51.619	51.600-51.614
		Permissible out-of-roundness and conicity of basic bore	mm	0.02	0.02
		Fig. see		AR03.10-P-6111AW	AR03.10-P-6111AW
BE03.10-P-1003-01C		Permissible twist of conrod bearing bore to conrod bush bore over length of 100 mm	mm	0.1	0.1
BE03.10-P-1004-01C		Permissible variation of axial parallelism of conrod bearing bore to conrod bush bore over length of 100 mm	mm	0.045	0.045
BE03.10-P-1005-01C		Permissible difference in weight of complete conrod of an engine	g	2	2
BE03.10-P-1006-01C		Conrod bush inner \varnothing (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 \varnothing	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 \varnothing (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-1001-01C	Dimension	Distance from center of conrod bearing bore to conrod bush bore (L)	mm	148.97-149.03	148.97-149.03
		Width of conrod at conrod bearing bore (B) and at conrod bush bore (b)	mm	23.974-24.026	21.948-22.000
		Fig. see		AR03.10-P-6111AW	AR03.10-P-6111AW
BE03.10-P-1002-01C		Conrod bearing shell basic bore \varnothing (D1)	mm	51.600-51.619	51.600-51.614
		Permissible out-of-roundness and conicity of basic bore	mm	0.02	0.02
		Fig. see		AR03.10-P-6111AW	AR03.10-P-6111AW
BE03.10-P-1003-01C		Permissible twist of conrod bearing bore to conrod bush bore over length of 100 mm	mm	0.1	0.1



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-1004-01C	Permissible variation of axial parallelism of conrod bearing bore to conrod bush bore over length of 100 mm	mm 0,045	0,045
BE03.10-P-1005-01C	Permissible difference in weight of complete conrod of an engine	g 2	2
BE03.10-P-1006-01C	Conrod bush inner \varnothing (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 \varnothing	mm 29.560–29.600	28.575–28.600
BE03.10-P-1008-01C	Conrod bush basic bore \varnothing (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	μ m 5	5

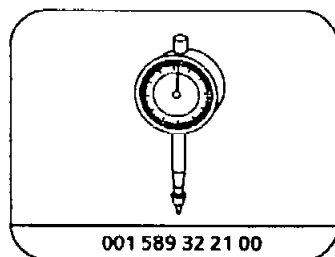
Test data of conrod

Number	Designation	Engine 602.96, 603.96	Engine 603.97
BE03.10-P-1001-01C	Dimension Distance from center of conrod bearing bore to conrod bush bore (L)	mm 148.97-149.03	144.97-145.03
	Width of conrod at conrod bearing bore (B) and at conrod bush bore (b)	mm 21.948-22.000	21.948-22.000
	Fig. see	AR03.10-P-6111AW	AR03.10-P-6111AW
BE03.10-P-1002-01C	Conrod bearing shell basic bore \varnothing (D1)	mm 51.600–51.619	51.600–51.614
	Permissible out-of-roundness and conicity of basic bore	mm 0.02	0.02
	Fig. see	AR03.10-P-6111AW	AR03.10-P-6111AW
BE03.10-P-1003-01C	Permissible twist of conrod bearing bore to conrod bush bore over length of 100 mm	mm 0,1	0,1
BE03.10-P-1004-01C	Permissible variation of axial parallelism of conrod bearing bore to conrod bush bore over length of 100 mm	mm 0,045	0,045
BE03.10-P-1005-01C	Permissible difference in weight of complete conrod of an engine	g 2	2
BE03.10-P-1006-01C	Conrod bush inner \varnothing (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 \varnothing	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 \varnothing (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	μ m 5	5



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		



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Dial gage

Commercially available tools (see Workshop Equipment Manual)

Number	Designation	Make (e.g.)	Order number
WH58.30-Z-1017-05A	Conrod inspection equipment	Model BC 501 KWT D-63128 Dietzenbach	
WH58.30-Z-1018-05A	Conrod aligning equipment	Model BC 503 KWT D-63128 Dietzenbach	
WH58.30-Z-1003-12A	Quick calipers for internal measurements, Ø 20 – 40 mm		
WH58.30-Z-1004-12A	Quick calipers for internal measurements, Ø 40 – 60 mm		
WH58.30-Z-1005-12A	Micrometer 0 – 25 mm		
WH58.30-Z-1006-12A	Micrometer 50 – 75 mm		

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

Number	Designation	Engine 601, 602 except 602.98, 603 except 603.970 up to 11/90	Engine 601, 602 except 602.98, 603 except 603.970 as of 12/90 – 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 Δ°	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	–	–
		2nd stage Δ°	–	–
		Fig. see	AR03.10-P-6111-01AW	

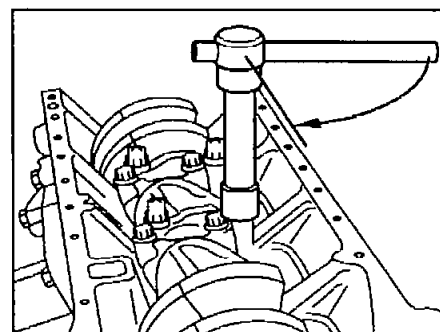
1 Moisten bolt thread and bolt head contact surface with engine oil.

2 **Min** Tighten conrod bolts initially to specified torque.

3 Tighten conrod bolts with a torquing angle wrench.

i 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-6111-03AW	Press-fitting new connecting rod bush		
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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 \varnothing (d)	mm	27.018-27.024
	Fig. see		AR03.10-P-6111AW
BE03.10-P-1007-01C	Conrod bush outer \varnothing	mm	29.560-29.600
	Fig. see		AR03.10-P-6111AW
BE03.10-P-1008-01C	Conrod bush basic bore \varnothing (d1)	mm	29.500-29.521
	Fig. see		AR03.10-P-6111AW
BE03.10-P-1009-01C	Piston pin play in conrod bush	mm	0.007-0.018
BE03.10-P-1010-01C	Peak-to-valley height (R_z) of conrod bush on inside	μm	5



Test data of conrod

Number	Designation	Unit	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 \varnothing (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 \varnothing	mm	29.560-29.600	28.575-28.600
BE03.10-P-1008-01C	Conrod bush basic bore \varnothing (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

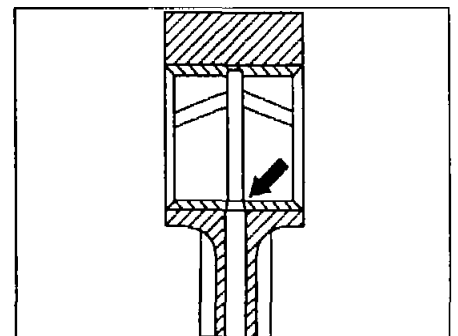
Number	Designation	Unit	Engine 602.96, 603.96	Engine 603.97
BE03.10-P-1006-01C	Conrod bush inner \varnothing (d)	mm	28.012-28.024	28.018-28.024
	Fig. see		AR03.10-P-6111AW	AR03.10-P-6111AW
BE03.10-P-1007-01C	Conrod bush outer \varnothing	mm	30.575-30.600	30.575-30.600
	Fig. see		AR03.10-P-6111AW	AR03.10-P-6111AW
BE03.10-P-1008-01C	Conrod bush basic bore \varnothing (d1)	mm	30.500-30.521	30.500-30.525
	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.

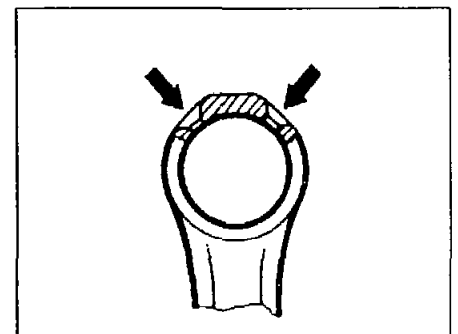
3 Dress side faces of the conrod on a dressing plate.

Turbo engine 602, 603

(Arrows) Oil drillings

⊥ Engines 603.960/963 as of 01/1988 up to 08/1988 have 3 drillings \varnothing 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 \varnothing 4.5 mm for lubricating the piston pins.



D03.10-0005-01



AR03.10-P-6111-04AW	Aligning connecting rod		
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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-1003-01C	Permissible twist of conrod bearing bore to conrod bush bore over length of 100 mm	mm 0.1	0.1
BE03.10-P-1004-01C	Permissible variation of axial parallelism of conrod bearing bore to conrod bush bore over length of 100 mm	mm 0.045	0.045

Test data of conrod

Number	Designation	Engine 601 except 601.921 USA up to 09/84	Engine 601 except 601.921 USA as of 10/84 Engine 602.91, 603.91
BE03.10-P-1003-01C	Permissible twist of conrod bearing bore to conrod bush bore over length of 100 mm	mm 0.1	0.1
BE03.10-P-1004-01C	Permissible variation of axial parallelism of conrod bearing bore to conrod bush bore over length of 100 mm	mm 0.045	0.045

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 Δ°	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 Δ°	90	–
		Fig. see	AR03.10-P-6111-01AW	

Test data of conrod

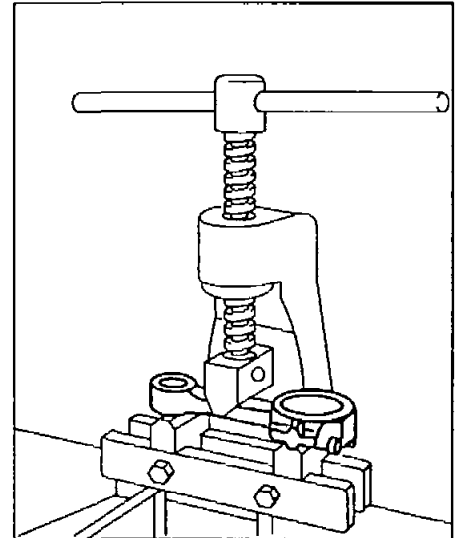
Number	Designation	Engine 602.96, 603.96	Engine 603.97
BE03.10-P-1003-01C	Permissible twist of conrod bearing bore to conrod bush bore over length of 100 mm	mm 0.1	0.1
BE03.10-P-1004-01C	Permissible variation of axial parallelism of conrod bearing bore to conrod bush bore over length of 100 mm	mm 0.045	0.045



Commercially available tools (see Workshop Equipment Manual)

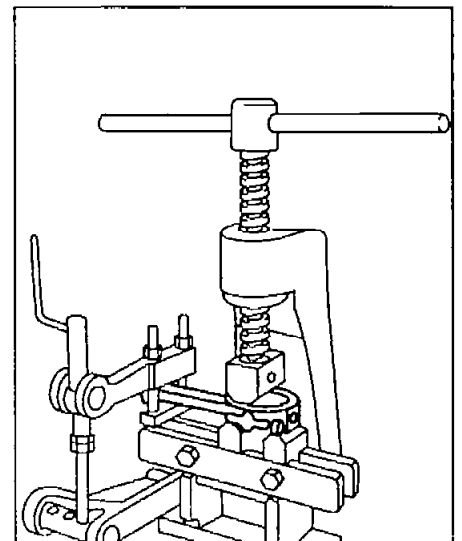
Number	Designation	Make (e.g.)	Order number
WH58.30-Z-1017-05A	Conrod inspection equipment	Modell BC 501 Firma KWT D-63128 Dietzenbach	
WH58.30-Z-1018-05A	Conrod aligning equipment	Modell BC 503 Firma KWT D-63128 Dietzenbach	

- 1 Inspect conrod with conrod inspection equipment with bearing shells and piston pins installed.
- 2 Align conrod bearing bore parallel to conrod bush bore on conrod aligning equipment.



P03.10-0204-02

- 3 Align twist of conrod bearing bore to conrod bush bore on the conrod aligning equipment.



P03.10-0205-02

