

P46.20-2178-09

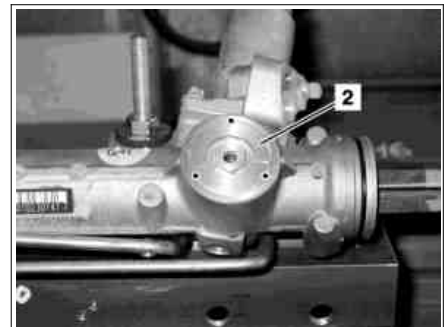
1 Stop plate

2 Adjusting screw

3 Thrust piece

4 Rack

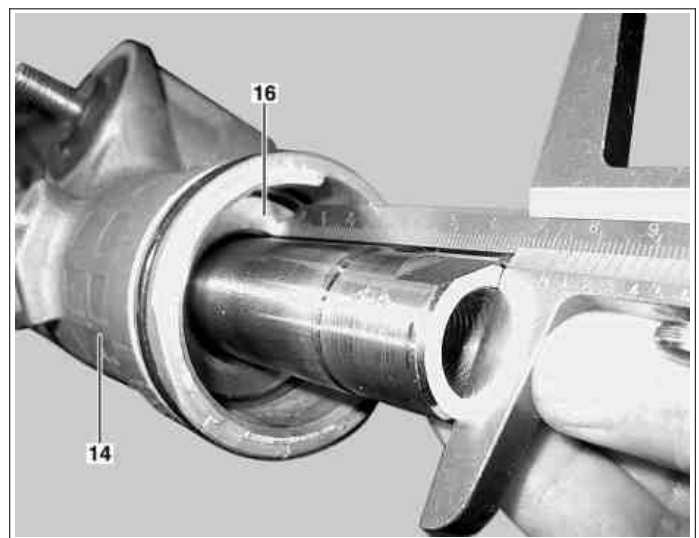
2 Adjusting screw



P46.20-2181-01

14 Steering gear housing

16 Stop ring



P46.20-2199-11

Modification notes

10.10.06	The thrust piece can still only be replaced on model 203, 209		
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☒	Removing		
i	Only one adjustment procedure for the rack-and-pinion steering is permissible. Should several caulking (center punch marks) be visible on the adjustment screw (2), it is assumed that an adjustment procedure has already been performed, in this case the rack-and-pinion steering should be replaced		
1	Remove rack-and-pinion steering	Model 203 with 4-MATIC Model 203 without 4-MATIC, 209 Model 211 without 4-MATIC Model 211 and model 220 with 4-MATIC Model 215, 220 without 4-MATIC except model 220.176/ 179 Model 220.176/ 179	AR46.20-P-0600PW AR46.20-P-0600P AR46.20-P-0600T AR46.20-P-0600IW AR46.20-P-0600I AR46.20-P-0600M
2	Mount the rack-and-pinion steering on the steering gear housing support	i Ensure that the workplace is scrupulously clean when carrying out the work described below and while performing repairs! i Only the specified tool may be used! Before the start of repair remove loose contamination without using cleaning agent on the steering gear housing (14)! ☒	*203589043100
3	Remove inner clamps from both bellows		
4	Press together the outer clamps of the two bellows and move bellows outwards towards the tie rod ends		
5	Detach both inner tie rods with axial joints	⚠ Do not use force (hammer blows, excessive leverage) otherwise the inner tie rod with axial joint will be damaged. i Secure the gear rack (4) with an open wrench to prevent twisting. ☒	*201589000100
6	Screw the stop plates (1) on the left and right into the gear rack (4)		
7	Grease steering rack (4)	Renolit JP1619 special grease	*BR00.45-Z-1067-06A
8	Crank gear rack (4) several times using socket wrench	☒	*203589043103
9	Move steering rack (4) to center position	i The gear rack must be exactly in the center position, to avoid falsifying the test result. i Detach the stop plates (1) on both sides of the gear rack. Find the middle position using a depth gauge. Balance out the gaps from the end of the steering rack to the stop ring (16) in the steer jacket (14) on both sides of the steering rack.	
10	Pull rubber plug carefully out of the adjusting screw (2)	⚠ Do not damage rubber plug when pulling out.	
☐	Checking		
11	Mount bracket and dial indicator on the steering gear housing (14) over the adjustment screw (2)	☒ ☒	*203589033100 *001589532100
12	Using the dial indicator, check the play between the gear rack (4) and thrust piece (3)	⚠ To do this, crank the gear rack in the direction of the arrow. In the process the specified test torque of the toothed rack must not be exceeded, otherwise the inner compression spring will be damaged. Test torque: Nm Model 203, 209, 211 Nm Model 215, 220 i The gear rack must be exactly in the center position, to avoid falsifying the test result. i Further procedure after determining an unacceptable play between the toothed rack and thrust piece on model 211, 215, 220:	*BE46.20-P-1001-01C *BA46.20-P-1006-01F *BA46.20-P-1010-01E

		<ul style="list-style-type: none"> ● Play less than 0.04 mm: Adjust play. ● Play 0.09 to 0.6 mm: Adjust Play. ● Play greater than 0.6 mm: Replace rack-and-pinion steering. <p>Further procedure after determining an unacceptable play between the toothed rack and thrust piece on model 203, 209:</p> <ul style="list-style-type: none"> ● Play less than 0.04 mm: Adjust play. ● Play 0.09 to 0.3 mm: Adjust Play. ● Play 0.3 to 0.6 mm: Replace thrust piece. ● Play greater than 0.6 mm: Replace rack-and-pinion steering. 	
13	Detach bracket and dial indicator from steering gear housing (14)		
	Adjust play between rack-and-pinion steering and thrust piece (3)	i Perform work steps 14 to 21 only if necessary.	
14	Move steering rack (4) to center position	i The gear rack must be exactly in the center position, to avoid falsifying the test results and any associated incorrect adjustment. i Detach the stop plates (1) on both sides of the gear rack. Find the middle position using a depth gauge. Balance out the gaps from the end of the steering rack to the stop ring (16) in the steer jacket (14) on both sides of the steering rack.	
15	Tighten adjusting screw (2) on block		
16	Slacken adjusting screw (2) approx. 1/8 turn		
17	Mount bracket and dial indicator on the steering gear housing (14) over the adjustment screw (2)		
18	Using the dial indicator, check the play between the gear rack (4) and thrust piece (3)	! To do this, crank the gear rack in the direction of the arrow. In the process the specified test torque of the toothed rack must not be exceeded, otherwise the inner compression spring will be damaged. Test torque: Nm Model 203, 209, 211 Nm Model 215, 220 <ul style="list-style-type: none"> ● If the play is smaller than the specified tolerance, loosen the adjustment screw (2) again slightly (in order to prevent the thrust piece digging into the toothed rack) and check play again. ● If the play is then still within the tolerance, then the play is OK. ● If the play is then outside the permissible tolerance, the adjustment must be repeated. Should the play still be outside the specified tolerance after being adjusted again, the rack-and-pinion steering (model 211, 215, 220) or thrust piece (model 203, 209) must be replaced. 	*BE46.20-P-1001-01C *BA46.20-P-1006-01F *BA46.20-P-1010-01E
19	Detach bracket and dial indicator from steering gear housing (14)		
20	Secure the adjusting screw (2) with three center punch marks	i Center punch marks see items, second picture.	
21	Press rubber plug carefully into the adjusting screw (2)	i Check rubber plug for damage and replace if necessary.	
	Replace thrust piece (3)	Only model 203, 209 i Perform work steps 22 to 31 only if necessary.	
22	Unscrew adjusting screw (2)		
23	Remove inner compression spring		
24	Take out thrust piece (3) carefully using pliers	! The slide blocks can stick in the gear rack (4) and damage it	
25	Insert new thrust piece (3)	i Grease slide blocks and outer edge of thrust piece Renolit JP1619 special grease	*BR00.45-Z-1067-06A
26	Grease inner compression spring	Renolit JP1619 special grease	*BR00.45-Z-1067-06A
27	Insert inner compression spring		
28	Grease thread of adjusting screw (2)	Renolit JP1619 special grease	*BR00.45-Z-1067-06A
29	Screw in adjusting screw (2)		

30	Crank gear rack (4) several times using socket wrench	It must be possible to crank the gear rack easily. 	*203589043103
31	Adjust play between rack-and-pinion steering and thrust piece (3)	See work steps 14 to 21	
	Install		
32	Mount both inner tie rods with axial joints on gear rack (4)	Secure steering rack to prevent it from twisting with open end wrench. 	*BA46.40-P-1003-01E *201589000100
33	Mount the bellows	Check bellows for leaktightness and damage, replace bellows if necessary Perfect bellows sealing is required for the function of the rack-and-pinion steering. By turning the rack-and-pinion steering onto left or right lock stretch the boots and in the process check for damage (cracks, chafe marks etc.) and replace if necessary.	
34	Mount bellows clamps	Replace clamps.	
35	Detach rack-and-pinion steering from steering gear housing support		
36	Install rack-and-pinion steering	Model 203 with 4-MATIC Model 203 without 4-MATIC, 209 Model 211 without 4-MATIC Model 211 and 220 with 4-MATIC Model 215, 220 without 4-MATIC, except model 220.176/ 179 Model 220.176/ 179	AR46.20-P-0600PW AR46.20-P-0600P AR46.20-P-0600T AR46.20-P-0600IW AR46.20-P-0600I AR46.20-P-0600M

Test values for steering gear

Number	Designation		Model 203	Model 209	Model 211
BE46.20-P-1001-01C	Play between thrust piece and steering rack	mm	0,04 to 0,08	0,04 to 0,08	0,04 to 0,08

Test values for steering gear

Number	Designation		Model 215	Model 220
BE46.20-P-1001-01C	Play between thrust piece and steering rack	mm	0,04 to 0,08	0,04 to 0,08

Steering gear

Number	Designation		Model 215
BA46.20-P-1010-01E	Rack	Test torque	Nm 12 (±2)

Steering gear

Number	Designation	Model	Model
		220.025/026/ 028/063/065/ 067/070/073/ 074/075/125/ 126/128/163/ 165/167/170/ 173/174/175/ 176/178/179/ 875/878	220.083/084/ 087/183/184/ 187
BA46.20-P-1010-01E	Rack	Test torque Nm	12 (±2)

Nm Steering gear

Number	Designation	Model	Model
		203	209
BA46.20-P-1006-01F	Rack	Test torque Nm	12 (±2)

Nm Steering gear

Number	Designation	Model	Model
		211 except 211.08/09/ 28/29	211.08/ 09/28/29
BA46.20-P-1006-01F	Rack	Test torque Nm	12 (±2)

Nm Tie rod

Number	Designation	Model	Model	Model
		203 except model 203.081/084/ 087/092/281/ 284/287/292	203.081/084/ 087/092/281/ 284/287/292	209
BA46.40-P-1003-01E	Inner track rod with axial joint to rack-and-pinion joint	Nm	110	110

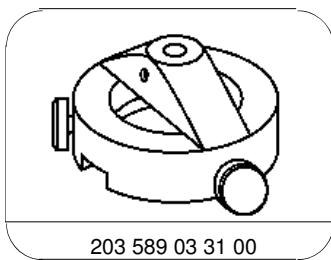
Nm Tie rod

Number	Designation	Model	Model
		211 except 211.08/09/ 28/29	211.08/09/ 28/29

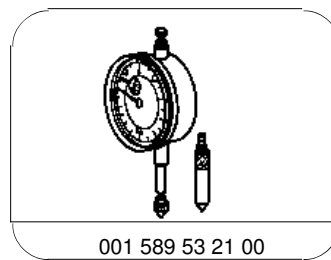
BA46.40-P-1003-01E	Inner track rod with axial joint to rack-and-pinion joint	Nm	110	110
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Nm Tie rod

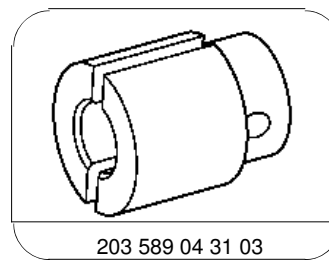
Number	Designation	Model 215	Model 220 except model 220.083/084/087/183/184/187	Model 220.083/084/087/183/184/187
BA46.40-P-1003-01E	Inner track rod with axial joint to rack-and-pinion joint	Nm	110	110



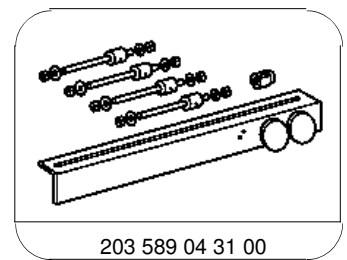
Bracket



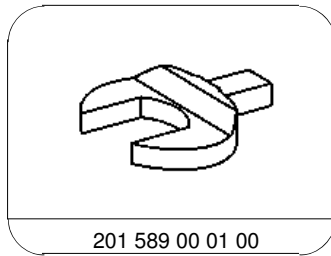
Dial indicator



Socket wrench



Steering gear housing support



Open end wrench

Auxiliary repair materials

Number	Designation	Order number
BR00.45-Z-1067-06A	Renolit JP1619 special grease	A 001 989 38 51 10