

ENGINES 646.951 in MODEL 211.004
ENGINES 646.961 in MODELS 211.006 /206 /606
ENGINES 647.961 in MODEL 211.016 /216 /616
ENGINES 648.961 in MODEL 211.023 /026 /223 /226
ENGINES 648.960 in MODEL 220.025 /125
ENGINES 646.821 in MODEL 211.007 /008 /207 /208 /608
ENGINES 646.820 in MODEL 211.007

Modification notes

18.9.07	Notes on avoiding damage through contamination and foreign objects, added The vehicle must be horizontal, note added	Step 2	
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	Remove		
Danger!	Risk of death caused by vehicle slipping or toppling off of the lifting platform.	Align vehicle between columns of vehicle lift and position four support plates at vehicle lift support points specified by vehicle manufacturer.	AS00.00-Z-0010-01A
Danger!	Risk of injury to skin and eyes caused by handling hot or glowing objects.	Wear safety gloves, protective clothing and safety glasses, if necessary.	AS00.00-Z-0002-01A
Danger!	Risk of accident caused by vehicle starting off by itself when engine is running. Risk of injury caused by contusions and burns during starting procedure or when working near the engine as it is running	Secure vehicle to prevent it from moving by itself. Wear closed and snug-fitting work clothes. Do not touch hot or rotating parts.	AS00.00-Z-0005-01A
	Notes on avoiding damage through contamination and foreign objects		AH00.00-P-5000-01A
1	Start engine	Allow engine to warm up until coolant and engine oil have reached operating temperature.	
2	Turn off engine	The vehicle must be horizontal otherwise all the engine oil cannot be extracted or drained which can lead to an incorrect oil filling with consequential damage.	
3	Remove trim panel for cylinder head cover and for charge air manifold Remove/install cylinder head cover trim	Engines 646, 647 Engine 648	AR01.20-P-5014-02A AR01.20-P-5014-02C
4	Empty oil filter housing and replace oil filter element	 Socket	AP18.00-P-0101-06EG *BA18.20-P-1002-01G *103589020900
5	Pull out oil dipstick and suction off engine oil using engine oil extractor	Only required, if the engine oil is not drained by unscrewing the oil drain screw. Change engine oil only when engine is at normal operating temperature. For engine oil extractor see GOTIS http://gotis.aftersales.mercedes-benz.com	AP18.00-P-0101-02Z
6	Remove bottom part of noise encapsulation Remove/install bottom parts of soundproofing	Only required if the engine oil is not removed by means of extraction. Model 211 Only remove the rear section. Model 220 Only remove middle section.	AR94.30-P-5300T AR94.30-P-5300M
7	Remove oil drain screw from oil pan and drain engine oil	Only required if the engine oil is not removed by means of extraction. Change engine oil only when engine is at normal operating temperature. Box wrench	*117589020700
	Install		
8	Detach engine oil extractor and insert oil dipstick in the oil dipstick guide tube	After suctioning off the engine oil.	
9	Screw in oil drain screw	Only required if the engine oil is not removed by means of extraction. Replace seal	

			*BA01.45-P-1003-01G
10	Pour in engine oil	Use only approved engine oils.	
	Specified and approved quality grades and viscosity classes conforming to SAE at enduring low outside temperatures		AH18.00-P-1000-01BA
	Notes concerning extension of the oil change interval		AH18.00-P-0102-01A
		Engine 646.951 /961 without particulate filter, engine 647	*BF18.00-P-1001-01A
		Engine 648.960 /961 without particulate filter	*BF18.00-P-1001-01Y
		Engine 646.820 /821 /951 /961, 648.960 with particulate filter	*BF18.00-P-1001-01S
		Engine 648.961 with particulate filter	*BF18.00-P-1001-01X
	Service Information: Engine oil change	For vehicles with fixed maintenance intervals. * Not for USA, Japan	SI18.00-P-0011A
	Service Information: Engine oil change	For vehicles with variable maintenance intervals. * Not for USA, Japan	SI18.00-P-0011B
	Specified engine oils (service) - survey		BB00.40-P-0223-02A
	Approved engine oils (service)		BB00.40-P-0226A
	Checking		
11	Conduct engine test run and check engine for leaks	Only raise rpm 10 seconds after engine start.	
12	Install bottom part of noise encapsulation	After the engine oil is drained by removing the oil drain screw. Install lower noise encapsulation only after all maintenance operations have been completed.	
	Remove/install bottom parts of soundproofing	Model 211	AR94.30-P-5300T
		Model 220	AR94.30-P-5300M
13.1	Using the dipstick check the engine oil level approx. 5 minutes after switching off the engine which is at operating temperature, correct if necessary	The vehicle must be on a level surface otherwise false measurements will occur. Vehicles without oil dipstick Engine 646.951 without Lanchester in model 211 Oil level check Oil level Oil dipstick reading from 108 mm to 140 mm (oil level too low) Oil dipstick reading from 142 mm to 144 mm (oil level correct) Oil dipstick reading from 146 mm to 154 mm (oil level too high) Dipstick Engine 646.8 with Lanchester in model 211 Engine 646.961 with Lanchester in model 211 Oil level check 646.8 with Lanchester in model 211: Oil level Oil dipstick reading from 115 mm to 151 mm (oil level too low) Oil dipstick reading from 153 mm to 155 mm (oil level correct) Oil dipstick reading from 157 mm to 165 mm (oil level too high) Dipstick Oil level check 646.961 with Lanchester in model 211: Oil level Oil dipstick reading from 132 mm to 160 mm (oil level too low) Oil dipstick reading from 162 mm to 164 mm (oil level correct) Oil dipstick reading from 166 mm to 174 mm (oil level too high)	AR18.00-P-3035-01Q *BF18.00-P-1001-03L *BF18.00-P-1002-03L *BF18.00-P-1003-03L *BF18.00-P-1004-03L *120589072100 AR18.00-P-3035-01T *BF18.00-P-1001-03LB *BF18.00-P-1002-03LB *BF18.00-P-1003-03LB *BF18.00-P-1004-03LB *120589072100 *BF18.00-P-1001-03OA *BF18.00-P-1002-03OA *BF18.00-P-1003-03OA *BF18.00-P-1004-03OA

<p>AR</p> <p>AR</p> <p>AR</p>		<p> Dipstick Engine 647 in model 211</p> <p> Oil level check: Oil level Oil dipstick reading from 108 mm to 136 mm (oil level too low) Oil dipstick reading from 138 mm to 140 mm (oil level correct) Oil dipstick reading from 142 mm to 152 mm (oil level too high)</p> <p> Dipstick</p> <p> Dipstick Engine 648 in model 211</p> <p> Oil level check: Oil level Oil dipstick reading from 107 mm to 131 mm (oil level too low) Oil dipstick reading from 133 mm to 135 mm (oil level correct) Oil dipstick reading from 137 mm to 138 mm (oil level too high)</p> <p> Dipstick</p> <p> Dipstick Engine 648 in model 220</p> <p> Oil level check: Oil level Oil dipstick reading from 114 mm to 142 mm (oil level too low) Oil dipstick reading from 144 mm to 146 mm (oil level correct) Oil dipstick reading from 148 mm to 154 mm (oil level too high)</p> <p> Dipstick</p> <p> Dipstick</p>	<p>*120589072100 AR18.00-P-3035-01S</p> <p>*BF18.00-P-1001-03N *BF18.00-P-1002-03N *BF18.00-P-1003-03N *BF18.00-P-1004-03N</p> <p>*120589062100 *120589072100 AR18.00-P-3035-01BD</p> <p>*BF18.00-P-1001-03S *BF18.00-P-1002-03S *BF18.00-P-1003-03S *BF18.00-P-1004-03S</p> <p>*120589062100 *120589072100 AR18.00-P-3035-01B</p> <p>*BF18.00-P-1001-03Q *BF18.00-P-1002-03Q *BF18.00-P-1003-03Q *BF18.00-P-1004-03Q</p> <p>*120589062100 *120589072100</p>
13.2	Check engine oil level with the oil dipstick approx. 5 minutes after switching off the engine at operating temperature, correct if necessary	<p> The vehicle must be on a level surface otherwise false measurements will occur.</p> <p> Vehicles with oil dipstick.</p>	
13.3	Using the control system check the engine oil level approx. 5 minutes after switching off the engine which is at operating temperature, correct if necessary	<p> The vehicle must be on a level surface otherwise false measurements will occur.</p> <p> Vehicles without oil dipstick Model 211, see: ↓ Perform adjustments to the control system Model 220, see: ↓ Perform adjustments to the control system</p>	<p>AR54.30-P-1000-02OPT</p> <p>AR54.30-P-1000-02OPM</p>
14	<p>Reset service indicator</p> <p> Notes concerning extension of the oil change interval Service Information: Engine oil change</p> <p> Service Information: Engine oil change</p>	<p>Model 211 up to 31.8.03 Model 211 as of 1.9.03 Model 220</p> <p> For vehicles with fixed maintenance intervals. * Not for USA, Japan</p> <p> For vehicles with variable maintenance intervals. * Not for USA, Japan</p>	<p>AP00.20-P-0042T AP00.20-P-0042TA AP00.20-P-0042M AH18.00-P-0102-01A</p> <p>SI18.00-P-0011A</p> <p>SI18.00-P-0011B</p>
15	<p>Install cylinder head cover and charge air manifold Remove/install cylinder head cover trim</p>	<p>Engines 646, 647</p> <p></p> <p></p> <p>Engine 648</p> <p></p> <p></p>	<p>AR01.20-P-5014-02A</p> <p>*BA01.20-P-1002-01G *BA01.20-P-1003-01G AR01.20-P-5014-02C *BA01.20-P-1002-01G *BA01.20-P-1003-01G</p>

Nm Crankcase ventilation, cylinder head cover

Number	Designation	Engine 646.951/961, 647.961	Engine 648
BA01.20-P-1002-01G	Bolt, cylinder head cover trim to cylinder head	Nm 9	9
BA01.20-P-1003-01G	Bolt, cover to charge air manifold.	Nm 9	9

Nm Engine lubrication, oil filter

Number	Designation	Engine 646.8	Engine 646.951/961/ 962/963/966, Engine 647, 648
BA18.20-P-1002-01G	Threaded cap to oil filter	Nm 25	25

Nm Oil pan

Number	Designation	Engine 646.951/ 961/962/ 963/966	Engine 646.8	Engine 647	Engine 648
BA01.45-P-1003-01G	Oil drain screw to oil pan	M12 Nm	-	-	-
		M14 Nm	30	30	30

Engine lubrication system

Number	Designation	Engine 646.8 without particulate filter	Engine 646.951/961/ 962/963/966 without particulate filter	Engine 647.961	
BF18.00-P-1001-01A	Engine oil Filling capacity (oil and filter change)	Liters 6.5	6.5	6.5	
	Specifications for Operating Fluids	Sheet	BB00.40-P-0228-03A	BB00.40-P-0228-03A	BB00.40-P-0228-03A
		Sheet	BB00.40-P-0228-05A	BB00.40-P-0228-05A	BB00.40-P-0228-05A
		Sheet	BB00.40-P-0228-51A	BB00.40-P-0228-51A	BB00.40-P-0228-51A
		Sheet	BB00.40-P-0229-03A	BB00.40-P-0229-03A	BB00.40-P-0229-03A
		Sheet	BB00.40-P-0229-31A	BB00.40-P-0229-31A	BB00.40-P-0229-31A

	Sheet	BB00.40-P-0229-05A	BB00.40-P-0229-05A	BB00.40-P-0229-05A
	Sheet	BB00.40-P-0229-51A	BB00.40-P-0229-51A	BB00.40-P-0229-51A

 Engine lubrication system

Number	Designation		Engine 648.960 without particulate filter	Engine 648.961 without particulate filter	
BF18.00-P-1001-01Y	Engine oil	Filling capacity (oil and filter change)	Liters	8.5	7.3
		Specifications for Operating Fluids	Sheet	BB00.40-P-0228-03A	BB00.40-P-0228-03A
			Sheet	BB00.40-P-0228-05A	BB00.40-P-0228-05A
			Sheet	BB00.40-P-0228-51A	BB00.40-P-0228-51A
			Sheet	BB00.40-P-0229-03A	BB00.40-P-0229-03A
			Sheet	BB00.40-P-0229-31A	BB00.40-P-0229-31A
			Sheet	BB00.40-P-0229-05A	BB00.40-P-0229-05A
			Sheet	BB00.40-P-0229-51A	BB00.40-P-0229-51A

 Engine lubrication system

Number	Designation		Engine 646.8 with particulate filter	Engine 646.951 with particulate filter	Engine 646.961 with particulate filter	
BF18.00-P-1001-01S	Engine oil	Filling capacity (oil and filter change)	Liters	6.5	6.5	6.5
		Specifications for Operating Fluids	Sheet	BB00.40-P-0228-51A	BB00.40-P-0228-51A	BB00.40-P-0228-51A
			Sheet	BB00.40-P-0229-31A	BB00.40-P-0229-31A	BB00.40-P-0229-31A
			Sheet	BB00.40-P-0229-51A	BB00.40-P-0229-51A	BB00.40-P-0229-51A

 Engine lubrication system

Number	Designation		Engine 648.960 with particulate filter	
BF18.00-P-1001-01S	Engine oil	Filling capacity (oil and filter change)	Liters	8.5
		Specifications for Operating Fluids	Sheet	BB00.40-P-0228-51A
			Sheet	BB00.40-P-0229-31A
			Sheet	BB00.40-P-0229-51A

 Engine lubrication system

Number	Designation	Engine 648.961 with particulate filter
BF18.00-P-1001-01X	Engine oil Capacity (oil and filter change)	Lowering Liters 7.3
		Suctioning off Liters 6.5
	Specifications for Operating Fluids	Sheet BB00.40-P-0228-51A
		Sheet BB00.40-P-0229-31A
		Sheet BB00.40-P-0229-51A

Oil level check

Number	Designation	Engine 646.8
BF18.00-P-1001-03LB	Oil level	Maximum mm 154
		Minimum mm 124
BF18.00-P-1002-03LB	Oil dipstick reading from 115 mm to 151 mm (oil level too low)	115 mm Replenish oil quantity in liters 2,7
		117 mm Replenish oil quantity in liters 2,5
		119 mm Replenish oil quantity in liters 2,4
		121 mm Replenish oil quantity in liters 2,2
		123 mm Replenish oil quantity in liters 2,1
		125 mm Replenish oil quantity in liters 2,0
		127 mm Replenish oil quantity in liters 1,9
		129 mm Replenish oil quantity in liters 1,7
		131 mm Replenish oil quantity in liters 1,5
		133 mm Replenish oil quantity in liters 1,4
		135 mm Replenish oil quantity in liters 1,2
		137 mm Replenish oil quantity in liters 1,1
		139 mm Replenish oil quantity in liters 1,0
		141 mm Replenish oil quantity in liters 0,9
		143 mm Replenish oil quantity in liters 0,7
		145 mm Replenish oil quantity in liters 0,6
147 mm Replenish oil quantity in liters 0,5		
149 mm Replenish oil quantity in liters 0,3		
151 mm Replenish oil quantity in liters 0,2		
BF18.00-P-1003-03LB	Oil dipstick reading from 153 mm to 155 mm (oil level correct)	153 mm Oil quantity in liters 0,0

		154 mm	Oil quantity in liters	0.0
		155 mm	Oil quantity in liters	0.0
BF18.00-P-1004-03LB	Oil dipstick reading from 157 mm to 165 mm (oil level too high)	157 mm	Extract oil quantity in liters	0.2
		159 mm	Extract oil quantity in liters	0.4
		161 mm	Extract oil quantity in liters	0.5
		163 mm	Extract oil quantity in liters	0.7
		165 mm	Extract oil quantity in liters	0.8

 Oil level check

Number	Designation	Engine 646.951/962		
BF18.00-P-1001-03L	Oil level	Maximum	mm	143
		Minimum	mm	118
BF18.00-P-1002-03L	Oil dipstick reading from 108 mm to 140 mm (oil level too low)	108 mm	Replenish oil quantity in liters	+2.8
		110 mm	Replenish oil quantity in liters	+2,7
		112 mm	Replenish oil quantity in liters	+2.5
		114 mm	Replenish oil quantity in liters	+2.4
		116 mm	Replenish oil quantity in liters	+2.2
		118 mm	Replenish oil quantity in liters	+2.1
		120 mm	Replenish oil quantity in liters	+2.0
		122 mm	Replenish oil quantity in liters	+1.8
		124 mm	Replenish oil quantity in liters	+1.6
		126 mm	Replenish oil quantity in liters	+1.5
		128 mm	Replenish oil quantity in liters	+1.3
		130 mm	Replenish oil quantity in liters	+1.1
		132 mm	Replenish oil quantity in liters	+0.9
		134 mm	Replenish oil quantity in liters	+0.7
		136 mm	Replenish oil quantity in liters	+0.6
138 mm	Replenish oil quantity in liters	+0.4		
140 mm	Replenish oil quantity in liters	+0.2		
BF18.00-P-1003-03L	Oil dipstick reading from 142 mm to 144 mm (oil level correct)	142 mm	Oil quantity in liters	0.0
		143 mm	Oil quantity in liters	0.0

		144 mm	Oil quantity in liters	0.0
BF18.00-P-1004-03L	Oil dipstick reading from 146 mm to 154 mm (oil level too high)	146 mm	Extract oil quantity in liters	-0.2
		148 mm	Extract oil quantity in liters	-0.4
		150 mm	Extract oil quantity in liters	-0.5
		152 mm	Extract oil quantity in liters	-0.7
		154 mm	Extract oil quantity in liters	-0.9

Oil level check

Number	Designation	Engine 646.961/963/966		
BF18.00-P-1001-03OA	Oil level	Maximum	mm	163
		Minimum	mm	139
BF18.00-P-1002-03OA	Oil dipstick reading from 132 mm to 160 mm (oil level too low)	132 mm	Replenish oil quantity in liters	+2.8
		134 mm	Replenish oil quantity in liters	+2.6
		136 mm	Replenish oil quantity in liters	+2.4
		138 mm	Replenish oil quantity in liters	+2.2
		140 mm	Replenish oil quantity in liters	+2.0
		142 mm	Replenish oil quantity in liters	+1.8
		144 mm	Replenish oil quantity in liters	+1.6
		146 mm	Replenish oil quantity in liters	+1.4
		148 mm	Replenish oil quantity in liters	+1.3
		150 mm	Replenish oil quantity in liters	+1.1
		152 mm	Replenish oil quantity in liters	+0.9
		154 mm	Replenish oil quantity in liters	+0.8
		156 mm	Replenish oil quantity in liters	+0.6
BF18.00-P-1003-03OA	Oil dipstick reading from 162 mm to 164 mm (oil level correct)	162 mm	Oil quantity in liters	0.0
		163 mm	Oil quantity in liters	0.0
		164 mm	Oil quantity in liters	0.0
BF18.00-P-1004-03OA	Oil dipstick reading from 166 mm to 174 mm (oil level too high)	166 mm	Extract oil quantity in liters	-0.3

	168 mm	Extract oil quantity in liters	-0.4
	170 mm	Extract oil quantity in liters	-0.5
	172 mm	Extract oil quantity in liters	-0.6
	174 mm	Extract oil quantity in liters	-0.7

Oil level check

Number	Designation			Engine 647 in model 211
BF18.00-P-1001-03N	Oil level	Maximum	mm	139
		Minimum	mm	116
BF18.00-P-1002-03N	Oil dipstick reading from 108 mm to 136 mm (oil level too low)	108 mm	Replenish oil quantity in liters	+2,7
		110 mm	Replenish oil quantity in liters	+2.5
		112 mm	Replenish oil quantity in liters	+2.4
		114 mm	Replenish oil quantity in liters	+2.2
		116 mm	Replenish oil quantity in liters	+2.1
		118 mm	Replenish oil quantity in liters	+1.9
		120 mm	Replenish oil quantity in liters	+1.8
		122 mm	Replenish oil quantity in liters	+1.6
		124 mm	Replenish oil quantity in liters	+1.4
		126 mm	Replenish oil quantity in liters	+1.3
		128 mm	Replenish oil quantity in liters	+1.1
		130 mm	Replenish oil quantity in liters	+0.9
		132 mm	Replenish oil quantity in liters	+0.7
		134 mm	Replenish oil quantity in liters	+0.5
136 mm	Replenish oil quantity in liters	+0.3		
BF18.00-P-1003-03N	Oil dipstick reading from 138 mm to 140 mm (oil level correct)	138 mm	Oil quantity in liters	0.0
		139 mm	Oil quantity in liters	0.0
		140 mm	Oil quantity in liters	0.0
BF18.00-P-1004-03N	Oil dipstick indication 142 mm to 152 mm (oil level too high)	142 mm	Extract oil quantity in liters	-0.3
		144 mm	Extract oil quantity in liters	-0.6
		146 mm	Extract oil quantity in liters	-0.7
		148 mm	Extract oil quantity in liters	-0.9
		150 mm	Extract oil quantity in liters	-1.1

		152 mm	Extract oil quantity in liters	-1,3
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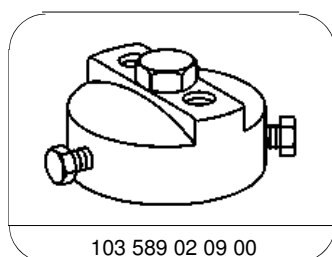
 Oil level check

Number	Designation			Engine 648 in model 211
BF18.00-P-1001-03S	Oil level	Maximum	mm	134
		Minimum	mm	114
BF18.00-P-1002-03S	Oil dipstick reading from 107 mm to 131 mm (oil level too low)	107 mm	Replenish oil quantity in liters	+2.8
		109 mm	Replenish oil quantity in liters	+2.6
		111 mm	Replenish oil quantity in liters	+2.4
		113 mm	Replenish oil quantity in liters	+2.2
		115 mm	Replenish oil quantity in liters	+2.0
		117 mm	Replenish oil quantity in liters	+1.8
		119 mm	Replenish oil quantity in liters	+1.6
		121 mm	Replenish oil quantity in liters	+1.4
		123 mm	Replenish oil quantity in liters	+1.2
		125 mm	Replenish oil quantity in liters	+1.0
		127 mm	Replenish oil quantity in liters	+0.8
		129 mm	Replenish oil quantity in liters	+0.6
BF18.00-P-1003-03S	Oil dipstick reading from 133 mm to 135 mm (oil level correct)	133 mm	Oil quantity in liters	0.0
		134 mm	Oil quantity in liters	0.0
		135 mm	Oil quantity in liters	0.0
BF18.00-P-1004-03S	Oil dipstick reading from 137 mm to 138 mm (oil level too high)	137 mm	Extract oil quantity in liters	-0.4
		138 mm	Extract oil quantity in liters	-0.5

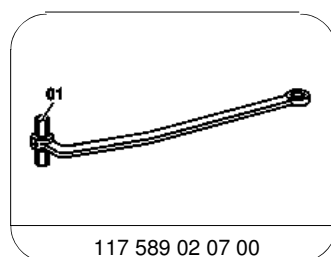
 Oil level check

Number	Designation			Engine 648 in model 220
BF18.00-P-1001-03Q	Oil level	Maximum	mm	145

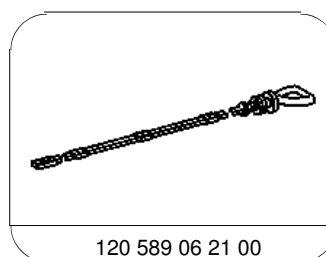
		Minimum	mm	123
BF18.00-P-1002-03Q	Oil dipstick reading from 114 mm to 142 mm (oil level too low)	114 mm	Replenish oil quantity in liters	+3,1
		116 mm	Replenish oil quantity in liters	+2.8
		118 mm	Replenish oil quantity in liters	+2.6
		120 mm	Replenish oil quantity in liters	+2.4
		122 mm	Replenish oil quantity in liters	+2.2
		124 mm	Replenish oil quantity in liters	+2.0
		126 mm	Replenish oil quantity in liters	+1.9
		128 mm	Replenish oil quantity in liters	+1.7
		130 mm	Replenish oil quantity in liters	+1.5
		132 mm	Replenish oil quantity in liters	+1.3
		134 mm	Replenish oil quantity in liters	+1.1
		136 mm	Replenish oil quantity in liters	+0.9
		138 mm	Replenish oil quantity in liters	+0.7
		140 mm	Replenish oil quantity in liters	+0.5
142 mm	Replenish oil quantity in liters	+0.3		
BF18.00-P-1003-03Q	Oil dipstick reading from 144 mm to 146 mm (oil level correct)	144 mm	Oil quantity in liters	0.0
		145 mm	Oil quantity in liters	0.0
		146 mm	Oil quantity in liters	0.0
BF18.00-P-1004-03Q	Oil dipstick reading from 148 mm to 154 mm (oil level too high)	148 mm	Extract oil quantity in liters	-0.3
		150 mm	Extract oil quantity in liters	-0.5
		152 mm	Extract oil quantity in liters	-0.8
		154 mm	Extract oil quantity in liters	-1.0



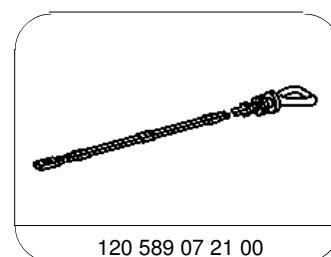
Wrench socket



Box wrench



Dipstick



Dipstick