



Contents

01 - Self-diagnosis	1
1 General to self-diagnosis	1
1.1 General to self-diagnosis	1
1.2 Features of self-diagnosis	1
1.3 Technical data of self-diagnosis	1
1.4 Significance of the exhaust gas warning lamp	3
1.5 Significance of EPC warning lamp (fault lamp for electronic accelerator) in dash panel insert	4
1.6 Connecting fault reader	5
2 Fault memory	8
2.1 Fault memory	8
2.2 Automatic test sequence for interrogating all fault memories	8
2.3 Interrogating and erasing engine control unit fault memory	9
3 Fault table: SAE P0 and P2 codes	10
3.1 Fault table: SAE P0 and P2 codes	10
4 Fault table: SAE P1 and P3 codes	14
4.1 Fault table: SAE P1 and P3 codes	14
5 Final control diagnosis	22
5.1 Final control diagnosis	22
5.2 Performing final control diagnosis	22
6 Readiness code	34
6.1 Readiness code	34
6.2 Reading readiness code	34
6.3 Generating readiness code	35
7 Measured value blocks	45
7.1 Measured value blocks	45
7.2 Safety precautions	45
7.3 Read measured value block	45
8 Evaluating measured value blocks, display groups 0...9 -Basic functions-	46
8.1 Evaluating measured value blocks, display groups 0...9 -Basic functions-	46
9 Evaluating measured value blocks, display groups 10...29 -Ignition-	50
9.1 Evaluating measured value blocks, display groups 10...29 -Ignition-	50
10 Evaluating measured value blocks, display groups 30...49, 99 -Lambda regulation-	54
10.1 Evaluating measured value blocks, display groups 30...49, 99 -Lambda regulation-	54
11 Evaluating measured value blocks, display groups 50...69 -Speed regulation-	59
11.1 Evaluating measured value blocks, display groups 50...69 -Speed regulation-	59
12 Evaluating measured value blocks, display groups 70...89 -Reducing emissions-	65
12.1 Evaluating measured value blocks, display groups 70...89 -Reducing emissions-	65
12.2 Evaluating measured value blocks, display groups 90...95 -Variable valve timing/variable intake manifold-	67
13 Evaluating measured value blocks, display group 100 -Readiness code-	67
13.1 Evaluating measured value blocks, display group 100 -Readiness code-	67
14 Evaluating measured value blocks, display groups 120...129 -Communication-	68
14.1 Evaluating measured value blocks, display groups 120...129 -Communication-	68
14.2 Evaluating measured value blocks, display groups 130...132 -Cooling-	69
24 - Mixture preparation, Injection	72
1 Servicing injection system	72
1.1 Servicing injection system	72
1.2 Fitting locations overview	72
1.3 General notes on injection	80
1.4 Removing and installing parts of the injection system	82



1.5	Dismantling and assembling intake manifold - Upper part	89
1.6	Dismantling and assembling air cleaner	91
1.7	Dismantling and assembling fuel rail with injectors	92
1.8	Safety precautions	93
1.9	Rules for cleanliness	94
1.10	Technical data	94
2	Checking components	94
2.1	Checking components	94
2.2	Checking Lambda probe heating for Lambda probe before catalyst	94
2.3	Checking Lambda probe heating for Lambda probe after catalyst	98
2.4	Checking air mass meter	101
2.5	Checking intake air temperature sender	103
2.6	Checking throttle valve control part	106
2.7	Checking coolant temperature sender	109
2.8	Checking engine speed sender	112
2.9	Checking injectors	114
2.10	Checking fuel pressure regulator and holding pressure	119
2.11	Checking intake air system for leaks (unmetered air)	121
3	Checking functions	122
3.1	Checking functions	122
3.2	Idling check	122
3.3	Checking Lambda probe and Lambda regulation before catalyst	124
3.4	Checking Lambda probe and Lambda regulation after catalyst	128
3.5	Checking Lambda probe ageing, Lambda probe before catalyst	132
3.6	Checking engine operating mode	134
3.7	Checking intake manifold change-over	135
4	Engine control unit	138
4.1	Engine control unit	138
4.2	Function	138
4.3	Checking control unit voltage supply	138
4.4	Replacing engine control unit	142
4.5	Coding engine control unit	143
4.6	Coding variations of engine control unit	144
4.7	Erasing learnt values and adapting engine control unit to throttle valve control part and exhaust gas recirculation valve	145
4.8	Learning kick-down point	147
4.9	Checking matching resistor for data bus	148
5	Checking additional signals	149
5.1	Checking additional signals	149
5.2	Checking speed signal	149
5.3	Checking signal from/to air conditioning system	151
5.4	Checking signal from clutch pedal switch	155
5.5	Checking signal from brake light switch and brake pedal switch	156
5.6	Checking signal from power steering pressure switch	157
5.7	Checking driving range signal	158
28 - Ignition system		160
1	Servicing ignition system	160
1.1	Servicing ignition system	160
1.2	General notes on ignition system	160
1.3	Removing and installing parts of the ignition system	161
1.4	Safety precautions	164
1.5	Test data, spark plugs	164
1.6	Checking Hall sender	165
1.7	Checking ignition transformer	166
1.8	Checking knock sensor	169
1.9	Check misfiring recognition	172