



KOLBENSCHMIDT

PRODUCT **RANGE**

CAMSHAFT ADJUSTERS

Spare parts. Anywhere. Anytime.



MOTORSERVICE

CAMSHAFT ADJUSTERS

CENTRAL CONTROL ELEMENT

Camshaft adjusters are a central actuator in efficient combustion engines with variable valve timing (VVT). They work quickly, precisely and smoothly. The main task of the camshaft adjuster is to dynamically adapt the valve timing – i.e. the time when the valves are opened and closed – to the current operating conditions of the engine.

The valve opening times are fixed in a conventional engine without a variable control system.

The use of camshaft adjusters enables continuous and smooth twisting of the camshaft relative to the crankshaft.

This is usually actuated via a hydraulic system.

The camshaft adjuster consists of a static component [1] and a rotor [2], which is adjusted by means of oil pressure.

The targeted supply of oil into the corresponding chambers (see figure) causes the rotor to rotate against the stator. This changes according to the phase angle of the camshaft.

Control is performed by the engine control unit (ECU). It evaluates various parameters such as speed, load condition, temperature and air mass and therefore determines the ideal phase angle of the camshaft.

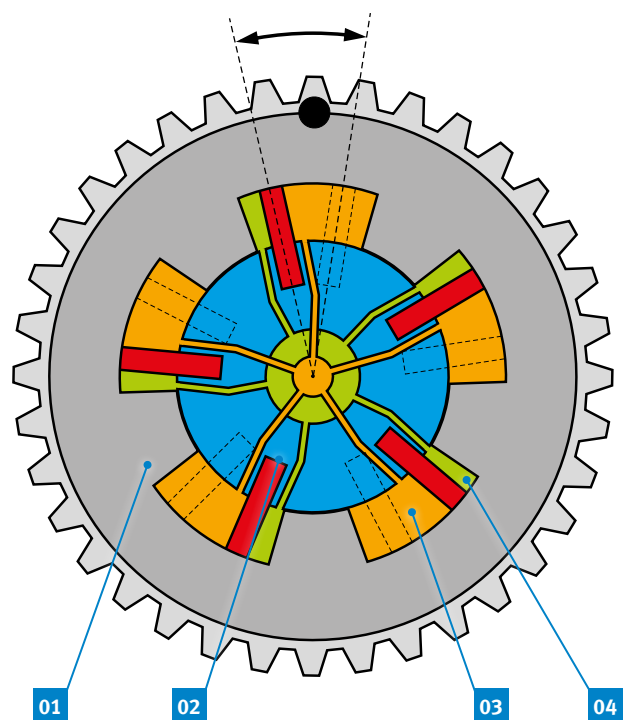
This opens or closes the intake and exhaust valves earlier or later depending on the operating state of the engine.

The valve timing directly affects the charge exchange process in the cylinder. Adjusting the valve timing therefore increases the efficiency of the engine:

- Early adjustment: Valves open earlier
 - ▶ improved cylinder filling at low engine speeds.
- Late adjustment: Valves open later
 - ▶ optimised charge exchange process at high engine speeds.

Adjustment enables more efficient operation of the engine over a larger engine speed range.

In addition, the optimum air mass in the cylinder improves combustion quality.

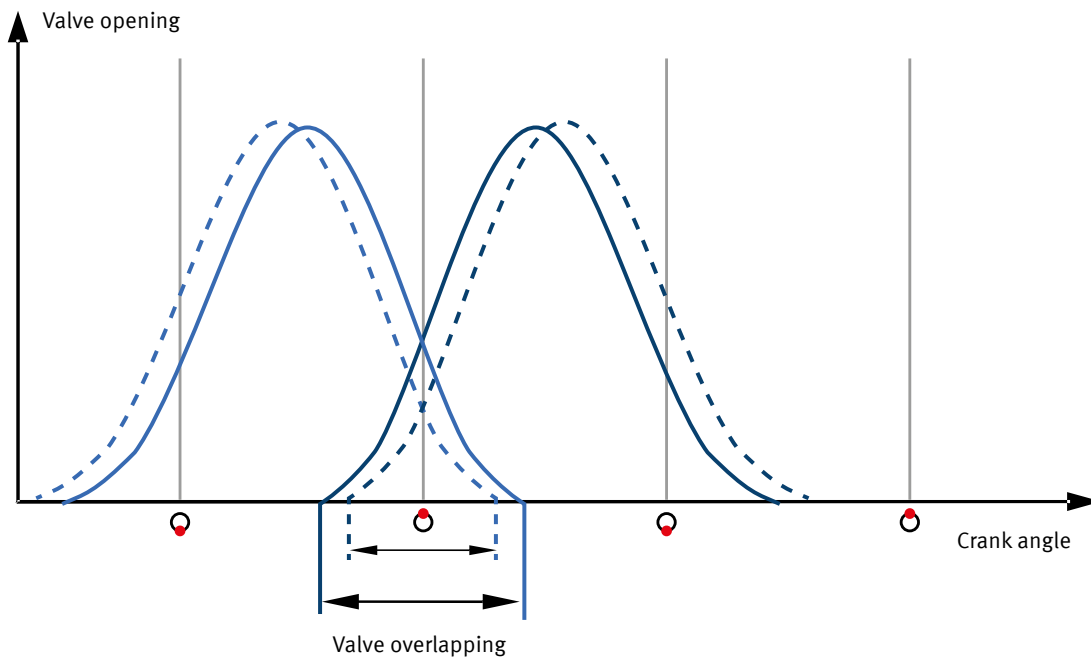


01 Stator: connected to the timing chain

02 Rotor: connected to the camshaft and the oil channels to A and B

03 Chamber A

04 Chamber B



Valve opening time diagram: Shifting the valve timing enables greater or smaller valve overlapping

Another special feature is that the variable control system can be used to achieve internal exhaust gas recirculation. Exhaust gas that has already been discharged is pulled back into the cylinder by the still open exhaust valves. This results in reduced nitrogen oxides during the subsequent combustion.

In order to increase or reduce valve overlapping accordingly, at least one camshaft must be adjustable.

The advantages of dynamic adaptation of the valve timing are:

- Increased performance thanks to optimised cylinder filling
- Improved even running due to adaptation of the combustion conditions
- Lower NO_x and CO₂ emissions due to more efficient combustion
- Flexibility during operation thanks to optimisation of the engine in terms of efficiency or performance



Variable camshaft adjustment enables the engine to be operated closer to its optimum operating point over a wider speed range. Charge exchange losses are reduced and more complete combustion is achieved by adjusting the cylinder filling, reducing fuel consumption.

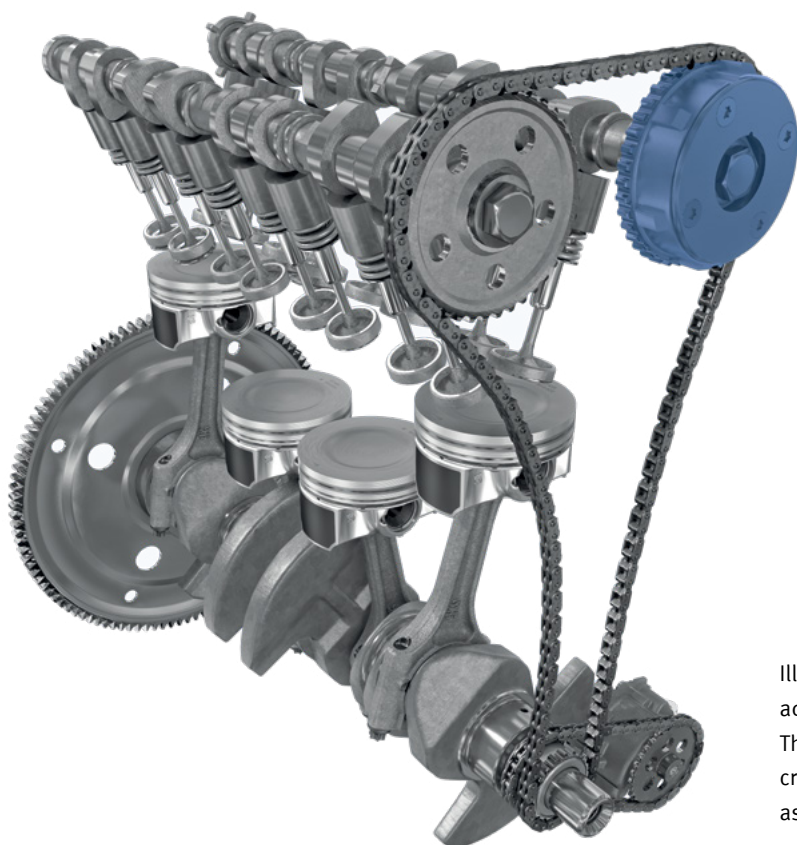


Illustration of the primary drive with a camshaft adjuster on the intake camshaft:

The timing chain transfers the movement of the crankshaft to the camshafts, which actuate the associated valves.

The table shows an extract from the current product portfolio. Motorservice is continuously working on expanding its range of camshaft adjusters in OE quality.

Manufacturer	Ref. no.*	Installation position	Item no.
Alfa Romeo, Buick SGM, Chevrolet, Fiat, Lancia, Opel, Pontiac, Saab, Vauxhall	55567048	Outlet side	50 056 124
	55567049	Intake side	50 056 125
	55568386	Intake side	50 056 126
Alfa Romeo, Chrysler, Fiat, Lancia	46341520	Intake/outlet side	50 056 127
Alfa Romeo, Buick, Opel	12578515	Intake side	50 056 027
	12621505	Outlet side	50 056 028
	1305047011	Intake side	50 056 159
Aston Martin, Daihatsu, Scion, Subaru, Toyota	1307047010	Outlet side	50 056 160
	06E109083P	Intake side	50 056 105
Audi	06E 109 083G	Intake side	50 056 002
	06E 109 084G	Outlet side	50 056 003
	06E 109 084N	Outlet side	50 056 005
	06E109083R	Intake side	50 056 103

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Manufacturer	Ref. no.*	Installation position	Item no.
Audi, Audi FAW, Volkswagen	06E109084P	Outlet side	50 056 104
	06E 109 083Q	Intake side	50 056 004
Audi, Audi FAW, Ford USA, Seat, Škoda, Volkswagen	06F 109 088J	Outlet side	50 007 987
Audi, Bentley, Porsche, Volkswagen	06M109087K 9A7109087	Intake side	50 056 162
	06M109088K 9A7109088	Outlet side	50 056 163
Audi, Seat, Škoda, Volkswagen	04E 109 088AD	Intake side	50 007 998
	04E 109 088AE	Outlet side	50 056 014
	04C109088D	Outlet side	50 056 053
	04C109088 C	Intake side	50 056 054
	03C 109 088E	Intake side	50 007 804
Audi, Volkswagen	06B109088D	Intake side	50 056 052
	11 36 7 540 348	Outlet side	50 007 985
	11 36 7 540 346	Intake side	50 007 986
	11367600085	Intake side	50 056 118
	11367600086	Outlet side	50 056 119
	11367598001	Intake side	50 056 120
	11367598002	Outlet side	50 056 121
	11 36 7 583 208	Outlet side	50 007 991
	11 36 7 583 207	Intake side	50 007 992
	11 36 7 583 818	Intake side	50 056 033
	11 36 7 583 819	Outlet side	50 056 034
	11 36 7 540 347	Intake side	50 056 035
	11 36 7 506 775	Intake side	50 056 036
	11 36 7 512 182	Outlet side	50 056 037
	11 36 7 534 718	Outlet side	50 056 038
	11 36 1 707 315	Outlet side	50 056 039
	11 36 7 500 032	Intake side	50 056 040
	11 36 8 684 920	Intake side	50 056 041
	11 36 8 684 921	Outlet side	50 056 042
	11 36 8 617 692	Intake side	50 056 043
	11 36 8 617 693	Outlet side	50 056 044
BMW	11 36 7 545 862	Intake side	50 007 805
	11 36 7 536 085	Outlet side	50 007 806
BMW, Mini	11368629906	Intake side	50 056 122
	11368629907	Outlet side	50 056 123
Brabus, Mercedes-Benz	A2760501447	Outlet side	50 056 108
Buick, Cadillac	12684832	Outlet side	50 056 165
Buick, Cadillac, Chevrolet	12588272	Outlet side	50 056 169
	12588273	Intake side	50 056 170
Buick, Buick SGM, Cadillac, Chevrolet	25203205	Outlet side	50 056 168
Chevrolet, Opel, Saab, Vauxhall	12684830	Intake side	50 056 031
	12684831	Intake side	50 056 030
Chevrolet, Opel, Vauxhall	636 304	Intake/outlet side	50 007 979

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Chrysler, Dodge, Fiat, Jeep, Lancia, RAM	00K05184369AH	Outlet side	50 056 166
	00K05184370AI	Intake side	50 056 167
Citroën, Peugeot	0805.G4	Intake side	50 056 032
	0805.H8		50 007 918
Citroën, Daihatsu, Peugeot, Subaru	13520-0 Q0100805.G9	Intake side	50 007 978
Dacia, Nissan, Renault, Smart	130252372R	Intake side	50 056 101
Ford, Land Rover, Volvo	LR033733	Outlet side	50 007 996
	LR095897	Intake side	50 007 997
Ford Australia, Ford USA	3R2Z6A257DA	Intake side	50 056 164
Ford, Ford Australia, Westfield	5179873 AG9G6C524AE	Outlet side	50 056 171
Hyundai, Kia	24350-2B010	Intake side	50 007 975
	24350-03001	Intake side	50 007 989
	24370-03000	Outlet side	50 007 990
	24350-23800	Intake/outlet side	50 056 128
	24370-2G000	Outlet side	50 056 129
	24350-2E001	Intake side	50 056 130
	24370-2E000	Outlet side	50 056 131
	24350-2B700	Intake side	50 056 137
	24370-2B700	Outlet side	50 056 138
	24350-2G750	Intake side	50 056 139
	24370-2G750	Outlet side	50 056 140
	24370-2E200	Outlet side	50 056 141
	24350-2E201	Intake side	50 056 142
Land Rover	LR060396	Outlet side	50 056 172
	LR060395	Intake side	50 056 173
	LR061551	Intake side	50 056 174
	LR061550	Outlet side	50 056 175
Mazda	ZJ40-12-4X0A	Intake/outlet side	50 056 143
	L3K9124X0C	Intake side	50 056 029
Mercedes-Benz	A272 050 68 47	Outlet side	50 007 993
	A272 050 52 47	Intake side	50 007 994
	A272 050 53 47	Intake side	50 007 995
	A 271 050 14 47	Intake side	50 007 981
	A 271 050 12 47	Outlet side	50 007 982
	A 271 050 33 47	Intake side	50 007 808
	A 271 050 34 47	Outlet side	50 007 870
	A 276 050 36 00	Intake side	50 007 912
	A 276 050 37 00	Intake side	50 007 913
	A 276 050 38 00	Outlet side	50 007 914
	A 276 050 39 00	Outlet side	50 007 915
	A 260 050 06 00	Outlet side	50 007 916

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Mercedes-Benz	A 260 050 09 00	Intake side	50 007 917
	130259835R	Outlet side	50 056 102
	A2760501547	Intake side	50 056 109
	A2780501347	Outlet side	50 056 110
	A2780501447	Outlet side	50 056 111
	A2780501547	Intake side	50 056 112
	A2780501647	Intake side	50 056 113
	A2780504900	Intake side	50 056 114
	A2780505000	Intake side	50 056 115
	A2780505100	Outlet side	50 056 116
	A2780505200	Outlet side	50 056 117
Nissan	13025-AX010	Intake side	50 007 983
	13025-4BB0A	Intake side	50 056 145
	13025-4BB0C	Outlet side	50 056 146
Nissan, Renault	13025-CK81A	Intake side	50 056 144
Opel, Vauxhall	55598573	Intake/outlet side	50 056 147
Porsche	94810505123	Intake side	50 056 148
	94610505177	Intake side	50 056 149
	94610505277	Outlet side	50 056 150
Renault	8200782671	Intake side	50 056 151
	7701478459	Intake side	50 056 152
Renault, Dacia, Mercedes-Benz	130253326R A200 050 10 00	Intake side	50 056 100
Seat, Volkswagen	03C 109 088G	Intake side	50 007 807
Smart	A1320340210	Intake side	50 056 106
	A1350500047	Intake side	50 056 107
	1147A046 A 132 034 03 10	Intake side	50 007 984
Toyota	13070-37010	Outlet side	50 056 154
	1305031141	Intake/outlet side	50 056 155
	13050-31010	Intake/outlet side	50 056 156
	13050-31190	Intake/outlet side	50 056 157
	1305037040	Intake side	50 056 158
	13050-28021	Intake side	50 007 976
	13520-23021	Intake side	50 007 977
	13050-22011	Intake side	50 007 980
	13050-21041	Intake side	50 007 988
	1305037012	Intake side	50 056 153
Toyota, Suzuki	1305037060	Intake side	50 056 161

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