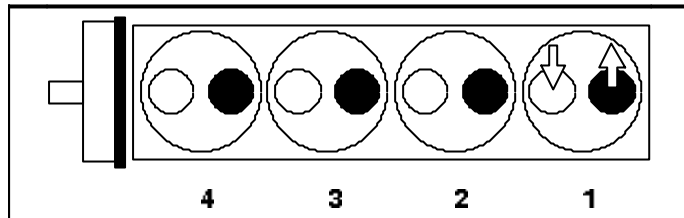


Fuel system / pre-glow system

Fuel system



injection sequence	1 - 3 - 4 - 2
--------------------	---------------

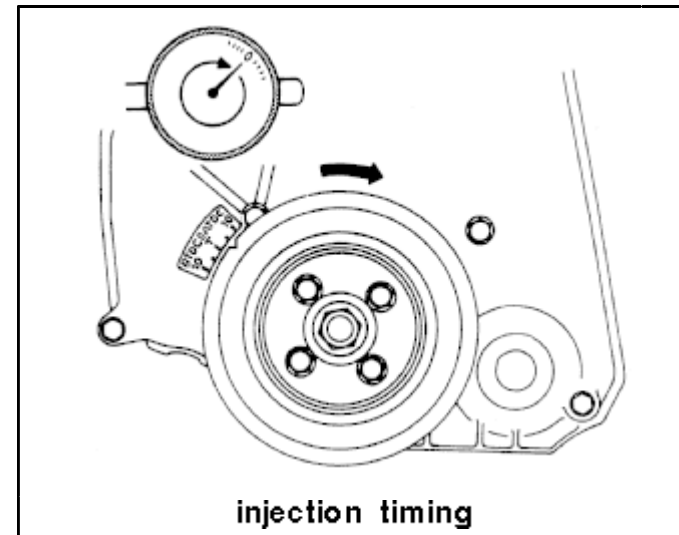
This is a diesel engine with indirect injection equipped with a rotary injection pump.

technical specifications

injectors break pressure	120 - 130 bar
--------------------------	---------------

Adjustments

Injection timing



injection timing

special tools

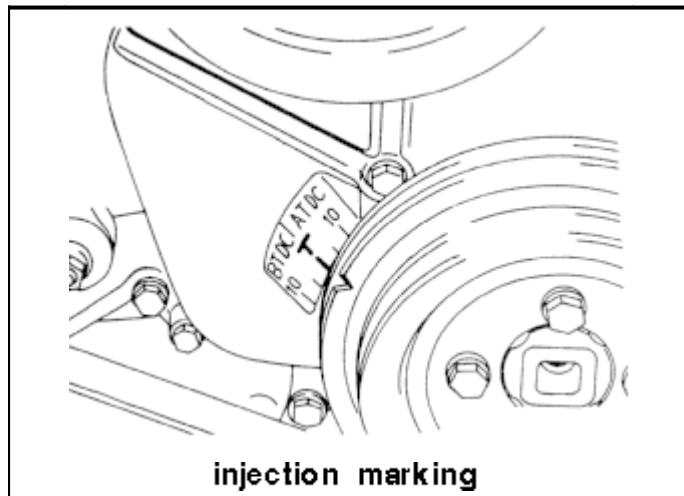
dial holder	MD 998720
-------------	-----------

Check the injection timing with engine warm. The fast idle speed control must be inoperative. Undo the injection pump mounting and injector lines so that the pump can be turned. Place the piston of cylinder No. 1 in TDC at the end of the compression stroke. Fit dial holder MD 998720 to the injection pump. Rotate the crankshaft to approx. 30° BTDC. Zero the dial. Check that the dial indicator remains at zero when the crankshaft is turned backwards and forwards. Again check the position.

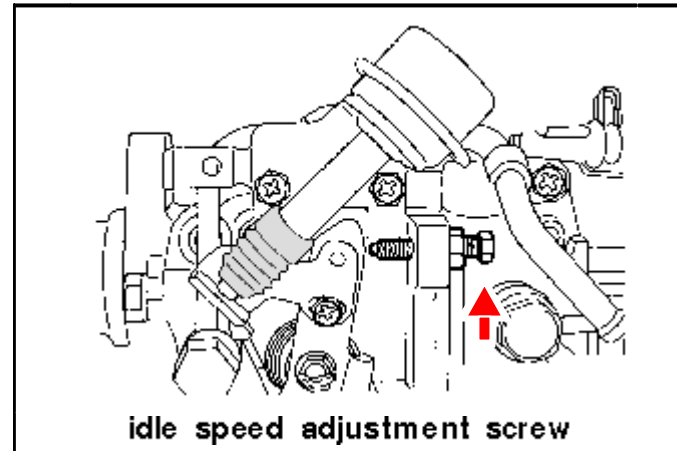
Rotate the crankshaft clockwise until the pulley marking is 7° after TDC. Check the dial indicator reading:

static injection timing	
crankshaft position	7°ATDC
plunger height	1,0 ± 0,03 mm

Turn the Injection pump if the reading is incorrect. After tightening the pump; check that the setting hasn't changed.



Idle speed



idle speed	800 ± 30/min
------------	--------------

Run the engine to operating temperature. Switch off all electrical consumers. On versions with power steering; the wheels must be straight ahead. The injection timing and valve clearance settings must be correct. Check the idle speed. If necessary; adjust with the adjustment screw.

Fast idle speed

The fast idle speed is non-adjustable.

Max. rpm

The max. rpm is non-adjustable.

Pre-glow system

The pre-glow system consists of control unit, various sensors, glow plugs and pre-glow relay. The glow time depends on the coolant temperature and battery voltage.

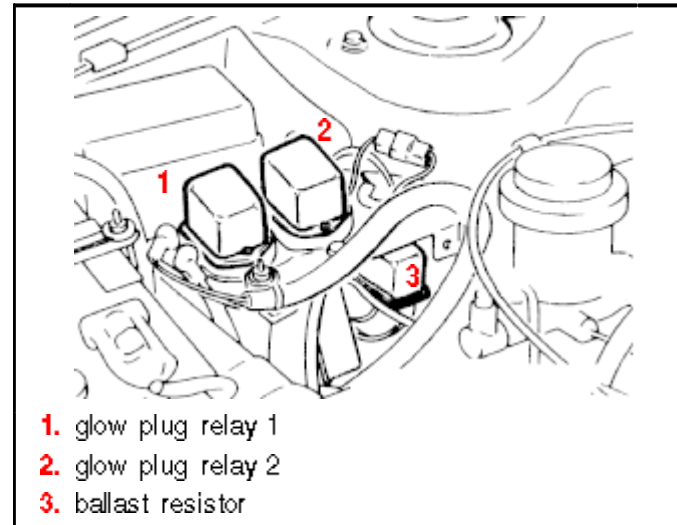
On versions with exhaust gas recirculation: the EGR valves are controlled by the pre-glow control unit.

technical specifications

coolant temperature sensor; resistance	2,93 - 3,58 k Ω
ballast resistor	155 -165 m Ω
glow plug; resistance	235 m Ω

torque settings

glow plug	15 - 20 Nm
coolant temperature sensor	30 - 40 Nm



1. glow plug relay 1
2. glow plug relay 2
3. ballast resistor

Fault finding

Check the pre-glow system operation by connecting a voltmeter to the glow plug feed rail. Carry out the test with engine cold, or remove the temperature sensor connector. Switch the ignition on. Check that for 3 seconds battery voltage is measured. Turn the ignition key to the start position. With a system operating properly: for approx. 30 seconds after starting the engine, there will be supply voltage on the glow plugs.

Test measurements

The various pre-glow system components can be checked with the multiplug disconnected from the control unit. Check the wiring and earth connection before a part is renewed.

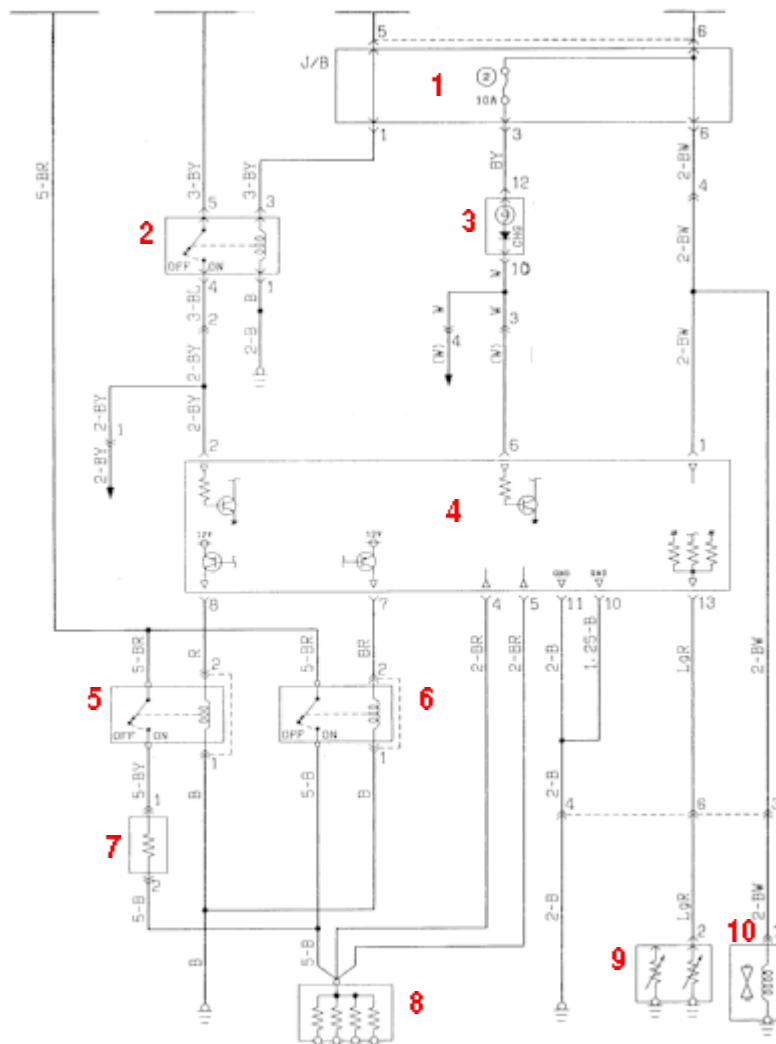
ignition switch	
feed signal; ignition on	
<i>connection</i>	<i>test value</i>
terminal 1 in connector	battery voltage
earth-1	
feed signal; start engine	
<i>connection</i>	<i>test value</i>
terminal 2 in connector	8 - 10 V
earth-2	

glow plug relay	
resistance relay coil; ignition off	
<i>connection</i>	<i>test value</i>
terminal 7 in connector	20 Ω
earth	
<i>connection</i>	<i>test value</i>
terminal 8 in connector	20 Ω
earth	

coolant temperature sensor	
sensor signal; ignition on	
<i>connection</i>	<i>test value</i>
terminal 13 in connector	-20°C: 24,8 \pm 2,5 k Ω
	0 °C: 8,6 k Ω
earth	20°C: 3,25 \pm 0,33 k Ω
	40°C: 1,5 k Ω

earth connection	
resistance; ignition off	
<i>connection</i>	<i>test value</i>
terminal 10 in connector	continuity
earth-1	
terminal 11 in connector	continuity
earth-1	

dashboard connection	
feed signal; ignition on	
<i>connection</i>	<i>test value</i>
terminal 6 in connector	1 - 4 V
earth	



B = black; Br = brown; G = green; Gr = grey; L = blue; Sb = silver; Lg = light green; L = light blue; O = orange; P = pink; R = red; Y = yellow; W = white

1. ignition switch
2. start relay
3. dashboard light
4. pre-glow control unit
5. glow plug relay 2
6. glow plug relay 1
7. ballast resistor
8. glow plugs
9. coolant temperature sensor
10. fuel cut-off valve

versions without EGR system

