07.4—125 Checking starting device

Test values

Delivery pressure in ring line	Measuring point	in front of cold starting valve in ring line
	bar gauge pressure	2.0 + 0.1

Battery voltages

Rest potential	12.2 volts
Starting voltage	10 volts
Alternator regulating voltage	13.9—14.8 volts with contact regulator 13.7—14.5 volts with transistorized regulator

Voltages at ignition coil

Voltage at terminal 15	approx. 4.5 volts
Voltage at terminal 1	0.5—2.0 volts
Series resistance bridge (when starting)	10 volts

Conventional tools

Voltmeter and ohmmeter
Revolution counter
Pressure gauge with calibrated measuring range from 0—2.5 bar gauge pressure

Testing

1 Check battery for external condition (visual checkup).

Pay attention to contamination, in particular to battery pole oxidation.

2 Test battery voltages.

Note: During checkups a) and b), the voltmeter connection remains unchanged.

a) Rest potential

Connect voltmeter to battery at correct polarity and read voltage. Nominal value 12.2 volts.

b) Starting voltage

Pull cable 4 from ignition coil. Actuate starter for a short moment while reading voltage. Nominal value 10 volts. If the nominal value is not attained, check battery, charge or renew, if required.

c) Alternator regulating voltage

Connect voltmeter to alternator B +. Return cable 4 to ignition coil. Start engine, increase speed to 2000/min and keep constant. Load alternator by switching-on dimmer, fog lamp and windshield wiper.

Read regulating voltage within 30 seconds. Nominal value 13.9–14.8 volts with contact regulator or 13.7–14.5 volts with transistorized regulator. If the nominal value is not attained, check alternator and regulator and renew, if required.

3 Check voltage at terminal 15 of ignition coil. For this purpose, disconnect plus cable of voltmeter from battery and connect to terminal 15 of ignition coil.

Switch-on ignition and read voltage, nominal value approx. 4.5 volts.

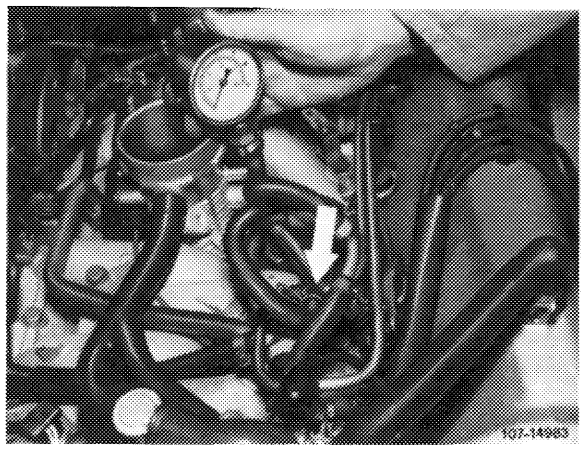
Check voltage at terminal 1 of ignition coil. For this purpose, disconnect plus cable of voltmeter from terminal 15 and connect to terminal 1 of ignition coil. Switch-on ignition and read voltage. Nominal value 0.5–2.0 volts.

4 Check series resistance bridge while starting engine and read voltage during starting sequence. Nominal value 10 volts.

Checking fuel pressure in ring line

5 Connect pressure gauge in front of cold starting valve to ring line. For this purpose, reduce fuel pressure for **safety reasons.** Pull electric plug from cold starting valve. Connect cold starting valve with separate cable to B+ and ground for approx. 20 seconds.

Then return plug connection to cold starting valve.

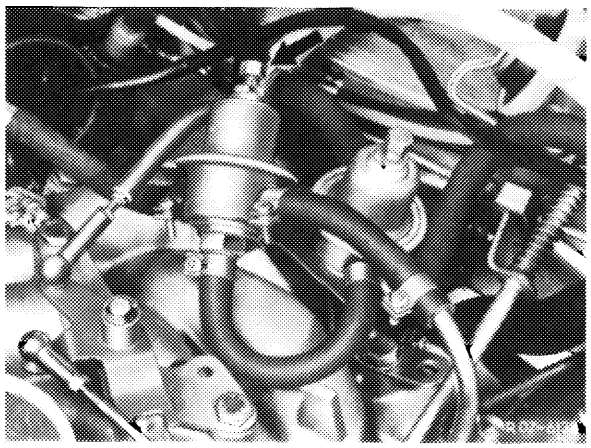


6 Switch ignition on and off several times to establish fuel pressure.

7 Read fuel pressure.

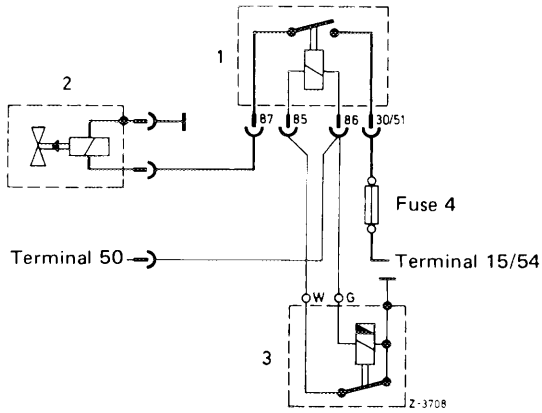
Nominal value = 2.0 + 0.1 bar gauge pressure.

Adjust by means of adjusting screw (arrow) on pressure regulator, if required.



Checking cold starting valve for function and leaks

8 Remove cold starting valve with fuel hose connected and hold into a container.



Circuit diagrm of starting device with relay

1 Relay
2 Starting valve
3 Thermo-time switch

Checking function

9 Switch-on ignition.

10 Connect cold starting valve with separate cable to B+ and ground. Cold starting valve should eject in cone shape.

Attention!
Connect cable first to cold starting valve to avoid sparking. No separate cable is required below +35°C, attach cable plug instead.

Checking for leaks

11 Release separate cable connection on cold starting valve. Dry cold starting valve at nozzle. No drops should show up.

12 Switch off ignition.

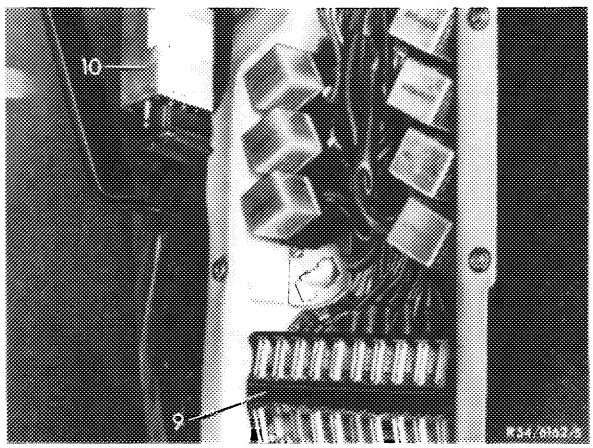
13 Mount cold starting valve with new seal.

14 Return cable plug to cold starting valve.

Checking thermo-time switch

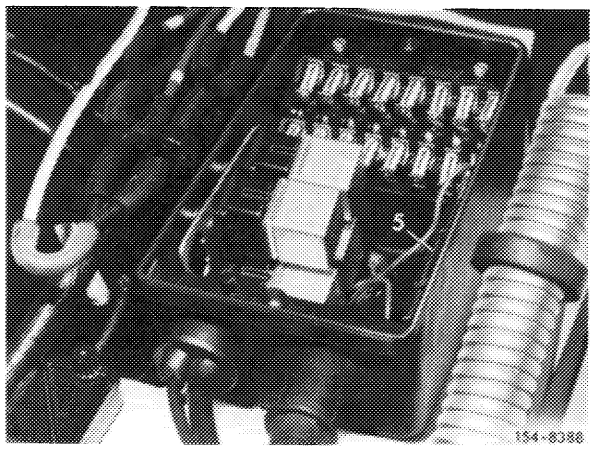
The cold starting valve is actuated only at coolant temperatures below +35°C by means of closed thermo-time switch via relay (9).

The actuating time increases with decreasing temperature and attains approx. 12 seconds at – 20°C.



Relay layout model 107

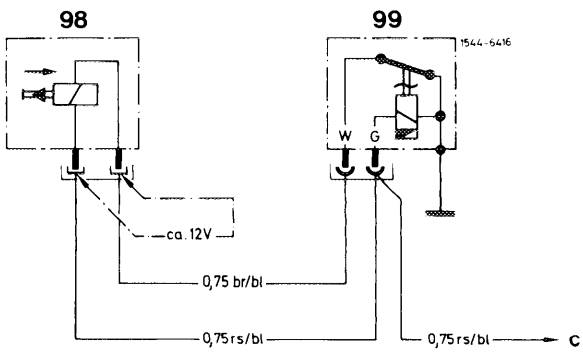
Code number 1 Relay fuel pump
Code number 2 Relay cold starting valve
Code number 3 Relay electronic injection system
Code number 4 Relay starter/air conditioner
Code number 5 Relay changeover valve ignition (19)
Code number 8 Relay separation temperature switch 62°C from 100°C
Code number 19 Relay exhaust gas return flow/advance ignition (58)
9 Fuses
10 Time switch heated rear window



Relay layout model 116

Code number 1 Relay fuel pump
Code number 2 Relay cold starting valve

Note: Starting approx. September 1975 the relay (9) for cold starting valve is no longer installed. The cold starting valve is directly contacted by thermo-time switch (refer to circuit diagram).



Circuit diagram of starting device without relay starting September 1975

98 Cold starting valve
99 Thermo-time switch
c To terminal 50

Testing below + 35°C coolant temperature

15 Connect voltmeter to connection of cold starting valve.

16 Actuate starter. Voltmeter should then indicate 10 volts for a given time (depending on coolant temperature).

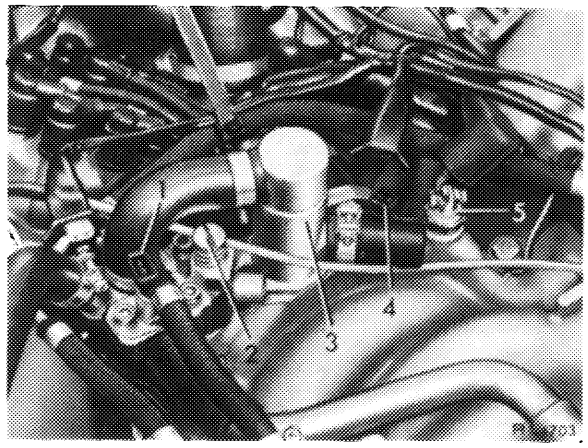
The switching time increases with decreasing temperature by approx. 1 second per 5°C.

e.g. +35°C = 0 seconds
+20°C = 3 seconds

During this test, it is recommended to check thermo-time switch (5) also with an ohmmeter.

Test value **below** +35° C:

Connection G-ground = approx. 20 ohms
Connection W-ground = approx. 0 ohm
(contacts in switch closed).



4 Cooling water temperature sensor
5 Thermo-time switch

Testing above +35°C coolant temperature

17 Above +35°C coolant temperature the thermo-time switch can be tested with an ohmmeter only. For this purpose, pull plug from thermo-time switch.

Test values **above** +35°C:

Connection G-ground = approx. 60 ohms
Connection W-ground = approx. 100 ohms
(contacts in switch opened).

Return plug.

Checking switch-off point of supplementary air valve

18 Pull contour hose from supplementary air valve. At approx. 70°C coolant temperature, the supplementary air valve should switch off (no more suction).

19 Check air and coolant temperature sensors in installed condition.

a) Without ohmmeter

Pull-off cable plugs one after the other, start engine and pay attention to speed change.

b) With ohmmeter

Pull-off connection cable and check resistance with ohmmeter.

Nominal values:

Air temperature sensor = 640 Ω at 0°C
= 400 Ω at 10°C
= 300 Ω at 20°C
= 210 Ω at 30°C
= 150 Ω at 40°C

Coolant temperature sensor = 5.9 kΩ at 0°C
= 2.5 kΩ at 20°C
= 1.2 kΩ at 40°C
= 600 Ω at 60°C
= 325 Ω at 80°C
= 190 Ω at 100°C