HELLA GUTMANN SOLUTIONS

Low-Pressure Diagnostic Kit

Operating Instructions

US

BD0047V0004US1014S0

Legal Notice

Operating Instructions for Low-Pressure Diagnostic Kit (LPD Kit)

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A Safety Notes

1 General safety notes

- The LPD kit is exclusively intended for use on a vehicle. It is a precondition for the use of the tool that you have knowledge of automotive technology and are therefore aware of the sources of danger and risks of working on motor vehicles.
- Please read the entire operating instructions carefully before using the LPD kit.
- All notes given in the individual sections of the instructions apply. The following steps and safety notes have to be observed.
- Furthermore, pay attention to all general instructions from labour inspectorates, trade associations, vehicle manufacturers as well as all laws, legal ordinances and instructions, which have to be commonly obeyed by a workshop.

The following points are merely an abridgement, which shall not restrict all other safety precautions.

2 Safety notes regarding the LPD kit

In order to avoid incorrect handling and injury of the user or destruction of the LPD kit arising from this, pay attention to the following:

- As part of their training, trainees may operate the LPD kit only under the supervision of an experienced person.
- The LPD kit is intended for use on gasoline and Diesel engines only.
- Take connections only when engine is not running.
- Only connect the pressure transmitter according to operating instructions.
- Protect the connecting cable from hot components.

- Protect the pressure transmitter and the connecting cable from rotating components.
- Regularly check the pressure transmitter and all components for damage.
- If there is a leak shut down the engine instantly and repair the leak.

3 Hazard warnings regarding fuel types

Regard the following when dealing with fuels:

- Fuels are irritating to skin, eyes and respiratory system
- Keep fuel away from ignition sources - do not smoke.
- Do not inhale gases/smoke/damp/aerosols.
- High danger of explosion.
- Fuel systems is under (high) pressure.
- Fuel escaping under high pressure may be injected under the skin or damage the eye irreparably. Therefore, always use protective cloths and protective goggles.
- Instantly remove escaped fuel with an absorbent cloth and dispose it accordingly.
- Open the fuel system only with engine shut down and first after a rest time of at least 1 min.

B Product Description

1 Correct use

Thanks to latest electronics, modern gasoline and Diesel engines are working very efficient and energy-saving. However, despite their high reliability these systems may fail too.

Use the **LPD kit** to perform the following measurements on gasoline and Diesel engines:

- Fuel pressure (max. 60 bar)
- Oil pressure
- Pressure drop at engine
- Compression measurement

Connect the **LPD kit** directly to the fuel or oil system or the engine using various adapters. Max. 16 or 60 bar pressure respectively is allowed otherwise there is a risk of destruction of LPD kit components.

The **LPD kit** can be exclusively operated in combination with a Hella Gutmann device. Diagnostic devices from other manufacturers will not be supported.

2 Delivery contents

The delivery contents include:

Description	Pieces
Pressure transmitter -1 to 16 bar (see engraving) with various adapters	1
Pressure transmitter 0 to 60 bar (see engraving) with various adapters	1
Adapter set 1 (optional)	1
Adapter set 2 (optional)	1
Adapter set 3 (optional)	1
Adapter template It is used to quickly compare the size of adapters for heater or sparking plugs. For that simply put the heater or sparking plug onto the adapter template.	1
Valve core tool	1
Pressure valve	1
Operating Instructions	1

3 Adapter list

The following chart merely serves as an example. The adapters are also suitable for vehicles not specified on the list.

You can quickly find the appropriate adapter by simply putting the uninstalled heater or sparking plug onto the adapter template.

CAUTION!

Damage of components through wrong adapter.

Damage of engine block and vehicle components.

Therefore, always compare the thread and dimensions of the adapter to the relevant component of the vehicle.

Vehicles with gasoline engine	Thread	Adapters
• Test adapter flexible, length 200 mm	M10 x 1.25 M11 x 1.5	10 11
Vehicles with Diesel engine	**Thread**	**Adapters**
Alfa Romeo • 145, 146, 147, 156 JTD	M10 x 1	ZKD 42 [1]
• 147, 156, 159, 166, GT, JTD	M9 x 1	ZKD 43 [1]
Audi • Common rail	M10 x 1	ZKD 47
• Pump-nozzle engines	M10 x 1	ZKD 66
BMW • 318, 324, 325, 524, 525, 725	M12 x 1.25	ZKD 01.1
• 320, 330, 520, X5	M10 x 1	ZKD 66
Citroen • C5	M10 x 1	ZKD 26 [2]
Fiat • Brava 1.9 JTD, Bravo 1.9 JTD, Marea 1.9 JTD, Multipla 1.9 JTD, Punto 1.9 JTD	M10 x 1	ZKD 42 [1]
• Croma 1.9 D, Croma 2.4 D, Stilo 1.9 JTD	M9 x 1	ZKD 43 [1]

Vehicles with Diesel engine	Thread	Adapters
Ford • Fiesta 1.4 + 1.6 TDCi	M8 x 1	ZKD 40 [2]
• Focus, C-Max 2.0 TDCi	M10 x 1	ZKD 26 [2]
• Mondeo 3 2.0 + 2.2 TDCi	M10 x 1	ZKD 49 [2]
Isuzu • Florian, Gemini, Midi D, Pick-up D, Trooper D	M10 x 1.25	ZKD 41 [1]
Jaguar • X-Type	M10 x 1	ZKD 49 [2]
Jeep • Cherokee 2.5 VM	M10 x 1	ZKD 20
Lancia • Kappa, Lybra, Thesis	M10 x 1	ZKD 42 [1]
Land Rover • Defender TDI, Discovery TDI, Range Rover TDI	M10 x 1	ZKD 20
• Range Rover, 90, 110, Country D, Country TD, Defender TDI, Discovery TD5, Freelander TDI 2.5	M12 x 1.25	ZKD 01.1
• Freelander TDI 2.0 + TD4, Range Rover 3	M10 x 1	ZKD 66
Mazda • 323 1.7	M10 x 1.25	ZKD 41 [1]
Mercedes • CDI engines	M10 x 1	ZKD 20
• CDI engines	M12 x 1.25	ZKD 46
• CDI engines	M8 x 1	ZKD 64
Mitsubishi • Engine code F8Q	M12 x 1.25	ZKD 46

Vehicles with Diesel engine	Thread	Adapters
Opel • Astra F Isuzu engine, Corsa B 1.5, Corsa B 1.7, Vectra A, Vectra B 1.7	M10 x 1.25	ZKD 41 [1]
• Fiat engine: Astra H, Vectra C, Signum	M10 x 1	ZKD 42 [1]
• Astra H 1.9 CDTI, Vectra C 1.9 CDTI, Signum 1.9 CDTI, Zafira 1.9 CDTI	M9 x 1	ZKD 43 [1]
Peugeot • Engine code DJ5TED	M10 x 1	ZKD 26 [2]
• Engine codes DV4 + DV6	M8 x 1	ZKD 40 [2]
• Heater elements with thread size M12 x 1.25	M12 x 1.25	ZKD 46
• Engine codes DW8 + TUD 5	M10 x 1	ZKD 66
Renault • Engine codes F8M, 700, 720, 730	M12 x 1.25	ZKD 01.1
• Engine code F8Q	M10 x 1	ZKD 66
Seat • Common rail	M10 x 1	ZKD 47
• Pump-nozzle engines	M10 x 1	ZKD 66
Skoda • Felicia engine code AEF	M12 x 1.25	ZKD 46
• Common rail • Superb engine codes AYM + BDG	M10 x 1	ZKD 47
• Fabia engine codes AMF, ASZ, BNM • Octavia engine codes AEY, AGB, AQM, AGR, AHF, ASV, ALH, ATD, ASZ, BJB, BKC • Roomster engine codes AXR, BSW, BCS, BNM, BNV, BMS • Superb engine codes AVB, AVF, AWX	M10 x 1	ZKD 66

Vehicles with Diesel engine	Thread	Adapters
VW		
• Common rail	M10 x 1	ZKD 47
• Pump-nozzle engines	M10 x 1	ZKD 66

[1] Optional adapter set 1 ZKD 41, 42 + 43, art. no. 301467

[2] Optional adapter set 2 ZKD 26, 40 + 49, art. no. 301463

Optional adapter set 3[3]	Thread	Adapters
Sparking plug thread flexible, length 200 mm incl. VG5 internal thread (one-way valve is not included)	M12 x 1.25	KPA 09
Adapter for sparking plug thread	M10x1	KPA 03 (must only be used with KPA 09)
Test adapter for fuel pressure	M12x1.5	DPAK 4
Test adapter for fuel pressure • 90°-angle	Schrader 7/16“-20 UNF	DPAK 96
Test adapter for fuel pressure • 90°-angle	Schrader VG 8	DPAK 97

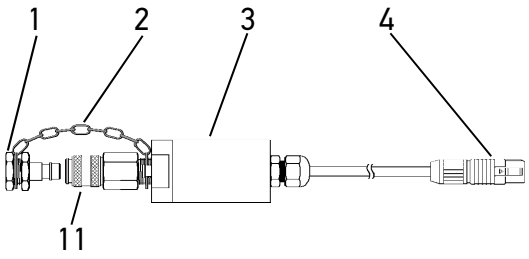
[3] Optional adapter set 3 KPA 03 + 09, DPAK 4, 96 + 97, art. no. 301499

C Tool Description

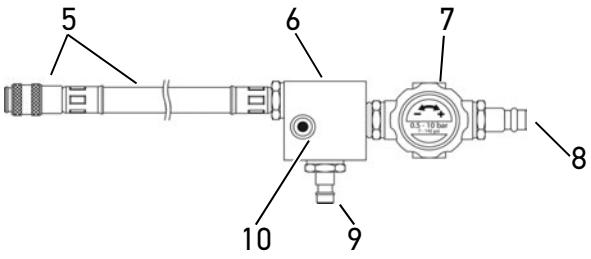
1 Pressure transmitter and pressure regulator

Pressure measurements require the pressure transmitter. Among others it is used for fuel and oil pressure measurements as well as for pressure-drop tests. The pressure transmitter includes a sensor that converts the mechanical pressure into an electric signal and forwards it to the device.

Pressure-drop tests additionally require the pressure regulator. Here the corresponding system is applied with a defined air pressure. Use the pressure regulator to adjust the compressed air from the workshop system to the required air pressure.



Pressure transmitter



Pressure regulator

	Description	Pieces
1	Barb nipple for opening the pressure chamber so that it can be cleaned from inside	1
2	Fixing chain for barb nipple	1
3	Pressure transmitter -1 to 16 bar (see engraving) Pressure transmitter 0 to 60 bar (see engraving)	1 1
4	Electric receptacle strip with quick release coupling for ST3 connection to the tool	1
5	Test hose with quick release coupling	1
6	Aluminium distributor block	1

	Description	Pieces
7	Knob for regulating the outlet pressure	1
8	Connecting nipple for cylinder-compressed air	1
9	Connecting nipple for pressure transmitter	1
10	Connecting nipple of calibration jet	1
11	Quick release coupling for fast and secure connection and disconnection of the barb nipple or of the adapters	1

D Connection and Measurement

1 Various pressure measurements

The LPD kit adapters can be used in various combinations. The following schemes provide merely an overview. A complete list of all adapter combinations would be too extensive.

CAUTION!

Damage of engine and vehicle components.

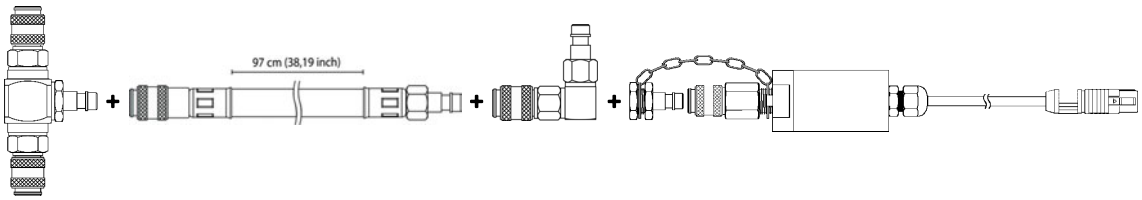
Mixing different types of fluid such as coolant and oil or gasoline with Diesel can cause vehicle damages.

Therefore, thoroughly clean all components of the LPD kit upon every measurement.

1.1 General connection

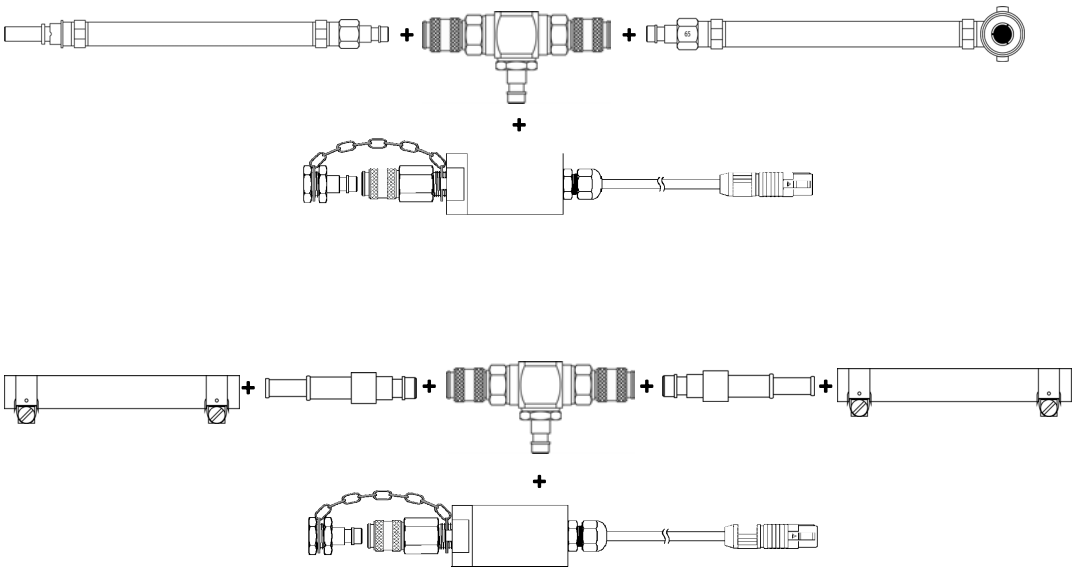
The elbow joints and hoses can be combined for extension or as adaptation parts for special circumstances. All adapters are equipped with quick-release couplings.

Example for an adapter combination for general adaptation:



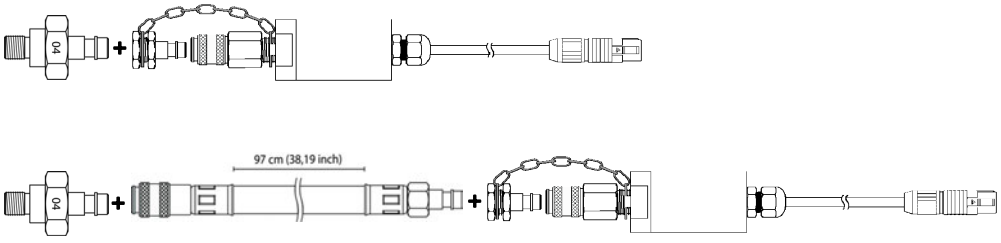
1.2 Connection for fuel pressure measurement

Examples for adapter combinations for fuel pressure measurement:



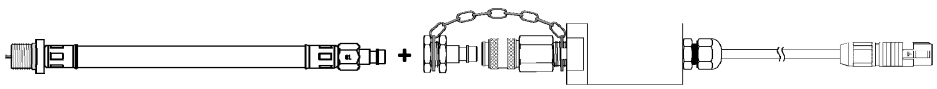
1.3 Connection for oil pressure measurement

Examples for adapter combinations for oil pressure measurement:



1.4 Connection for compression test

Example for adapter combinations for connection to sparking plugs:



2 Pressure-drop test

Pressure-drop tests at the vehicle require the following:

- Pressure transmitter -1 to 16 bar
- Pressure regulator
- Suitable adapter
- Cylinder-compressed air

The pressure regulator is used to apply the engine cylinder with a certain amount of compressed air.

In case of pressure drop air escapes at the damaged spot. The reason for that can mostly be detected quickly by hearing or sensing. If the pressure drop exceeds 23 % of if the drop values between the cylinders deviate by 10 %, the engine is possibly defective and makes exact troubleshooting necessary.

CAUTION!

Danger of excess pressure when connecting cylinder-compressed air.

Danger of destruction of the pressure regulator.

Allowed cylinder-compressed air: 6 to 10 bar

2.1 Preconditions for pressure-drop test

Proceed as follows to perform the pressure-drop test:

- Engine is at operating temperature.
- Ignition key is withdrawn and kept in a safe place
- Parking brake is applied.
- Park position of automatic transmission is engaged.
- Idle position is engaged on manual transmissions.

2.2 Carrying out calibration

NOTE

For device description see 12.

Calibrate the pressure regulator to the max. pressure drop tolerance of 23 % before every measurement.

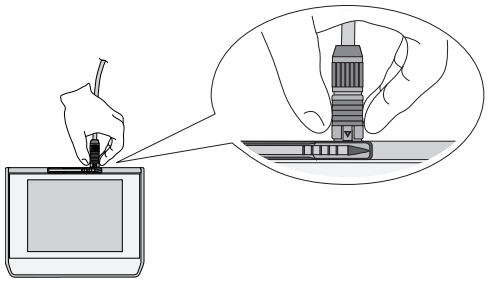
Proceed as follows to carry out the calibration:

1. Plug on the test hose with quick release coupling (5) to the connecting nipple of the calibration jet (10).
2. Plug on the quick release coupling (11) to the connecting nipple for the calibration jet (10) of the pressure regulator.

NOTE

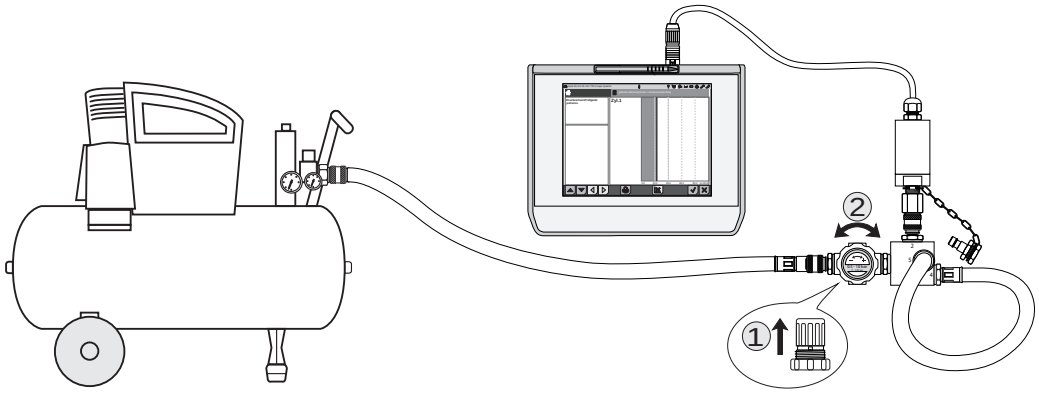
If the barb nipple (1) is still on the quick release coupling (11) then pull it off by pulling back the quick release coupling.

3. Insert the electrical plug connection (4) with the arrow pointing up into the ST3 connection of the device.



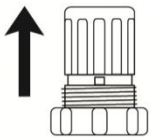
Connection on ST3 port of the device

4. Insert the connecting nipple for cylinder-compressed air (8) into the cylinder-compressed air connection.



Connection for calibration procedure

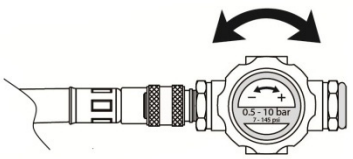
5. Call up the **pressure-drop test** programme in the device.
6. Follow the programme operation up to the calibration step.
7. Pull the knob (7) of the pressure regulator upwards.



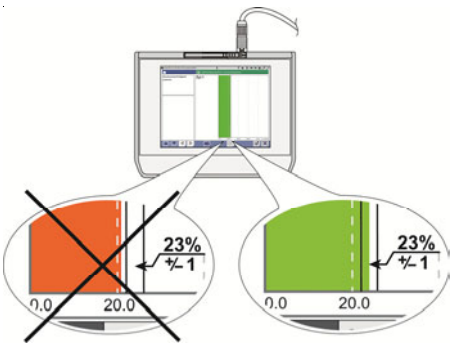
Pull the knob upwards

Now the knob is no longer fixed and can be turned.

8. Turn the knob until the green calibration bar (23 %) appears.

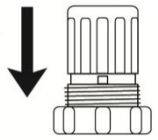


Turn the knob



Indication in device

9. Press the knob downwards to fix it.If the knob is fix the pressure cannot be changed until it is pulled upwards again.



Press the knob downwards

Calibration is hence finished.

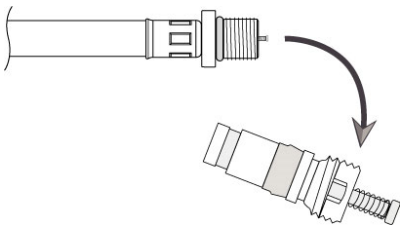
2.3 Performing pressure-drop tests

NOTE

Unscrew the one-way valve before connecting the sparking-plug adapter.

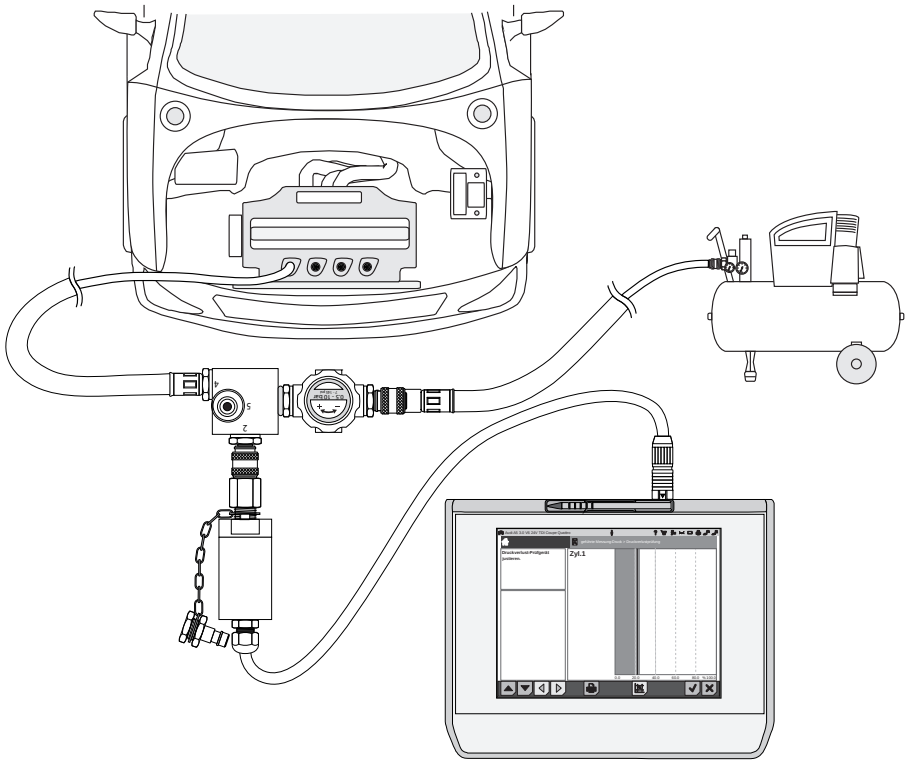
A pressure-drop test is not possible otherwise.

1. Carefully screw out the one-way valve from the sparking-plug adapter with the appropriate valve core tool.



Screw out the one-way valve

2. For vehicle connection follow the instructions of the tool.



Connection to the vehicle

3. Carry out the measurement.

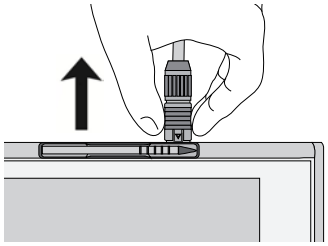
NOTE

In comparison to run-in engines, new or not run-in engines may have higher pressure drop values as their cylinders, pistons and piston rings of still do not have reached their final smooth surface.

A pressure drop of up to 4 % is therefore normal.

4. Disconnect and clean all components afterwards and put them back into the accessory case.

5. Pull back the locking ring of the quick release coupling to disconnect the electric receptacle strip (4) from the device.



Disconnect the electric plug connection

2.4 Reasons for too high pressure drop

The following list shall help you to quickly find the faults at the vehicle.

Problem	Cause	Solution
Air escape in the intake manifold	• Leaking inlet valve	• Grind in the valve seat • Replace the valves • Replace the valve seat
Air escape in the exhaust pipe	• Leaking outlet valve	• Grind in the valve seat • Replace the valves • Replace the valve seat
Airborne sounds at the oil filler neck/oil dipstick	• Leaking cylinder-head gasket • Piston, piston rings or cylinder barrel worn	• Replace the cylinder-head gasket • Complete short block reengineering • Replace the piston • Replace the piston rings • Replace the cylinders

Problem	Cause	Solution
Blistering in the cooling system	• Leaking cylinder-head gasket • Torn cylinder head	• Replace the cylinder-head gasket • Replace the cylinder head
Airborne noise in the sparking plug opening of the adjacent cylinder	• Leaking cylinder-head gasket • Torn cylinder head	• Replace the cylinder-head gasket • Replace the cylinder head

3 Compression test on gasoline engines

Compression tests on vehicles require the following:

- Pressure transmitter -1 to 16 bar
- Suitable adapter

Here the compression pressure inside a cylinder is measured to be able to compare the compression of the individual cylinders.

For this the starter is utilized to bring the engine to starter rpm. Then the peak pressure values of each cylinder can be measured. Those values are used to evaluate the status of the individual cylinders.

The compression values of gasoline engines should be within a range of 11 and 15 bar. Values below 8 bar possibly indicate wear or a defect. Exact troubleshooting is necessary in this case.

3.1 Preconditions for compression tests on gasoline engines

- Engine is at operating temperature.
- Fuel supply is interrupted.
- Parking brake is applied.
- Park position of automatic transmission is engaged.
- Idle position is engaged on manual transmissions.
- Throttle valve is completely opened.

3.2 Performing compression tests

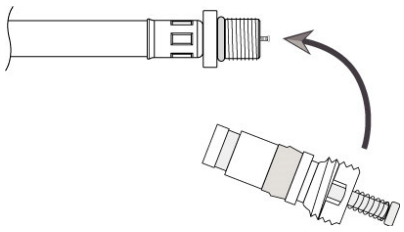
NOTE

Screw in the one-way valve before connecting the sparking-plug adapter.

Compression test is otherwise not possible.

Use the supplied one-way valve only. A wrong valve insert e.g. the one of a tire will lead to incorrect measured values.

1. Carefully screw in the one-way valve into the sparking-plug adapter with the appropriate valve core tool.



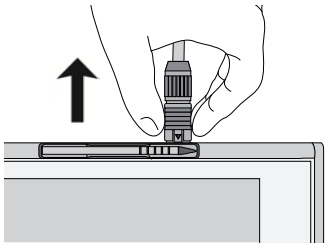
Screw in the one-way valve

NOTE

Do not use an adapter hose for the compression test as its flexible construction will lead to incorrect measurement.

2. For vehicle connection follow the instructions of the device.

3. Carry out the measurement.
4. Disconnect and clean all components afterwards and put them back into the accessory case.
5. Pull back the locking ring of the quick release coupling to disconnect the electric receptacle strip (4) from the device.



Disconnect the electric plug connection

4 Compression tests on Diesel engines

Compression tests on vehicles require the following:

- Pressure transmitter 0 to 60 bar
- Suitable adapter

Here the compression pressure inside a cylinder is measured to be able to compare the compression of the individual cylinders.

For this the starter is utilised to bring the engine to starter rpm. Then the peak pressure values of each cylinder can be measured. Those values are used to evaluate the status of the individual cylinders.

The compression values of Diesel engines should be within a range of 22 and 35 bar. Values below 20 bar possibly indicate wear or a defect. Exact troubleshooting is necessary in this case.

CAUTION!

Excess pressure when connecting to Diesel engines!

Danger of destruction of the pressure transmitter -1 to 16 bar.

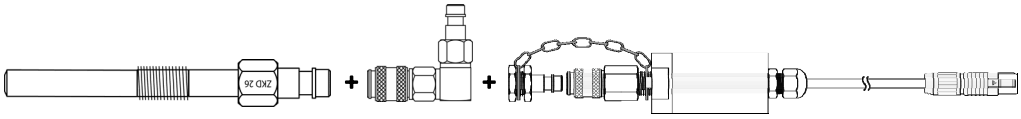
Use the pressure transmitter 0 to 60 bar for Diesel engines.

4.1 Preconditions for compression tests on Diesel engines

- Engine is at operating temperature.
- Fuel supply is interrupted.
- Parking brake is applied.
- Park position of automatic transmission is engaged.
- Idle position is engaged on manual transmissions.
- Throttle valve is completely opened.

4.2 Performing compression tests

1. Use the pressure transmitter 0 to 60 bar.
2. Plug on the pressure transmitter directly to the glow plug adapter.
3. Use the enclosed metal angle piece if there is not enough or only insufficient space.



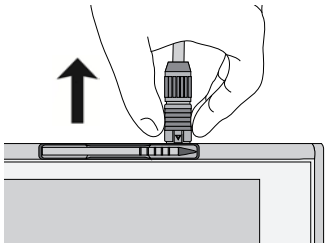
CAUTION!

Pressure values of up to 35 bar are possible.

Danger of bursting of the adapter hose!

Connect the pressure transmitter 0 to 60 bar for Diesel engines.

4. For vehicle connection follow the instructions of the device.
5. Carry out the measurement.
6. Disconnect and clean all components afterwards and put them back into the accessory case.
7. Pull back the locking ring of the quick release coupling to disconnect the electric receptacle strip (4) from the device.



Disconnection of electric receptacle strip

E General Information

1 Care and maintenance

As every measuring tool, the LPD kit should also be handled with care.

- Always check hoses/accessories for damage before every use.
- Clean all parts with a dry lint free cloth after every use.
- Put all components back in to the casing after every use.
- Always use original spare parts.

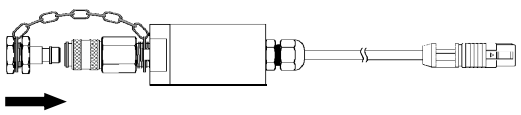
1.1 Cleaning the pressure transmitter

Regard the following before cleaning the pressure transmitter:

- Disconnect the electric receptacle strip (4) from the device.
- Disconnect the pressure transmitter from vehicle components and adapters only in unpressurised state.
- Do not use any sharp or solid objects for cleaning.

Proceed as follows to clean the pressure transmitter:

1. Insert the barb nipple (1) into the quick release coupling (11).



Insert the barb nipple

The quick release coupling is open now and you can clean the pressure chamber.

2. Spray a suitable cleansing agent, e.g. brake cleaner into the pressure chamber.

☞ **NOTE**

Should residues of the cleaning agent remain in the pressure chamber, them blow them out with compressed air of max. 16 bar.

3. Pull back the quick release coupling and disconnect the barb nipple to keep the pressure chamber clean.
   The pressure chamber is closed.

2 Troubleshooting

The following list shall help you to solve minor problems yourself. Select the relevant problem description and check and perform the steps listed under **Solution** in sequence until the problem is solved.

Problem	Cause	Solution
The device does not indicate the measurement signal of the pressure transmitter.	• Wiring defective • Damaged test hose • No voltage supply present • Pressure transmitter defective	• Check the wiring/test hose for damage • Switch on the power supply of the device. • Replace the pressure transmitter.
The pressure regulator cannot be adjusted.	• Cylinder-compressed air not connected • Not enough cylinder-compressed air • Calibration jet at the pressure regulator clogged • Cylinder-compressed air or pressure trans-	• Connect the cylinder-compressed air to the pressure regulator. • Increase the cylinder-compressed air (max. 10 bar). • Clean the calibration jet. • Assign the pressure

Problem	Cause	Solution
	mitter connected to the wrong pressure regulator connection. • Pressure regulator defective.	regulator connections accordingly. • Replace the pressure regulator.

3 Technical data sheet

Technical data of pressure transmitter -1 to 16 bar	
Measuring range	-1 - 16 bar
Operating temperature	-10 - 85 °C
Precision at operating temperature	<+/- 0.5 % FS* (+/- 85 mbar)
Protection class	IP64
Supply voltage	15 - 18 VDC
Current consumption	<30 mA

Technical data of pressure transmitter 0 to 60 bar	
Measuring range	0 - 60 bar
Operating temperature	-10 - 85 °C
Precision at operating temperature	<+/- 0.5 % FS* (+/- 300 mbar)
Protection class	IP64
Supply voltage	15 - 18 VDC
Current consumption	<30 mA

*Full scale

4 Disposal

The construction of the **LPD kit** mainly consists of metal and is hence made of recyclable material. Therefore, please return metal parts to private or local recycling station and return plastic parts to the relevant stations.

5 Environmental protection

Instantly remove escaped fluids such as oil, fuel or coolant with an absorbent cloth and dispose it accordingly.

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