

Turbocharger Diagnostic Tool

MESS02



Described product

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Turbocharger Diagnostic Tool

Manufacturer

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1. Safety

1.1 General Safety instructions and regulations

In order to be able to guarantee safe and reliable work with the Turbocharger Diagnostic Tool and to protect the user from injuries, the following points must be observed:



- Please read the user manual carefully.



- The Turbocharger Diagnostic Tool may only be operated by trained specialists and may only be used on vehicles with combustion engines. The user must have the appropriate specialist knowledge and qualifications for the area of application, be familiar with the applicable standards, regulations and specifications and observe them.



- The operating instructions are part of the diagnostic tool. Keep the manual in a safe place so that you can quickly find the required information you need when needed.
- In general, the legal specifications and regulations as well as the specifications and regulations of the vehicle manufacturer must be observed.

1.2 Instructions for use



- Before each use, ensure that the Turbocharger Diagnostic Tool and all its components are in perfect condition.
- For all work on the vehicle, only the data specified by the vehicle manufacturer apply.



- All listed vehicle-specific data are subject to change.
- Only use original spare parts and accessories.



- Using the product beyond the specification or disregarding the safety and operating instructions can lead to serious malfunctions as well as personal injury and damage to property.
- Wear personal protective equipment when working with the Turbocharger Diagnostic Tool.

1.3 Intended use

The Turbocharger Diagnostic Tool is used to test various pressures, such as the crankcase internal pressure and the exhaust back pressure as well as to test the pneumatic boost pressure control on combustion engines.



WARNING

Danger from improper use.

Any improper use and disregard of safety and operating instructions can lead to serious malfunctions as well as personal injury and damage to property.

- Only use the Turbocharger Diagnostic Tool in accordance with the intended use.
- All information in the operating instructions must be strictly observed.

1.4 Disclaimer

If the intended use is not observed, all guarantee and warranty claims against the manufacturer will immediately expire. No liability is accepted for damage or malfunctions caused by improper use, assembly errors or non-compliance with the operating instructions.

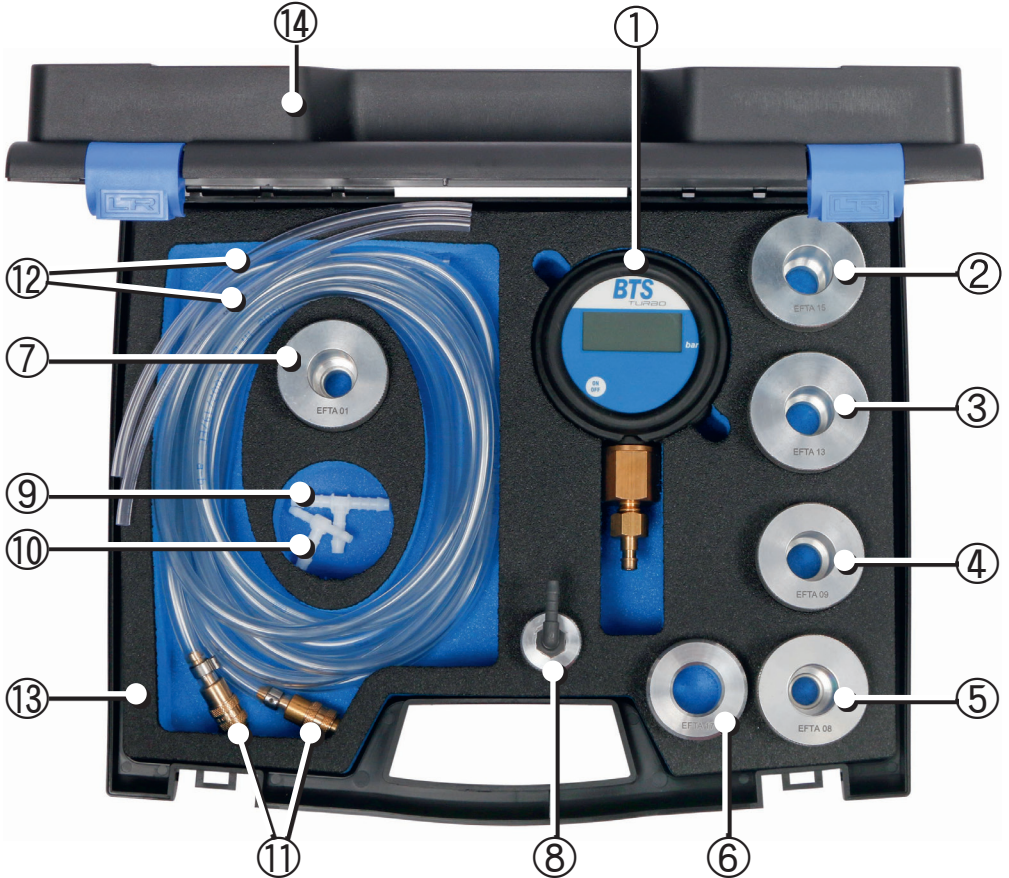
1.5 Environmental conditions

The Turbocharger Diagnostic Tool is only to be used in a commercial workshop area.

2. Product description

The Turbocharger Diagnostic Tool enables a quick and easy mechanical diagnosis of the turbocharger environment without an OBD diagnostic tester. The three proven rapid tests provide a quick overview when checking the the crankcase pressure, the exhaust back pressure and the pneumatic boost pressure control.

2.1 Tool view



2.2 Scope of delivery

Pos.	Description
1	Pressure gauge with DNS plug nipple
2	Adapter EFTA15
3	Adapter EFTA13
4	Adapter EFTA09
5	Adapter EFTA08
6	Adapter EFTA17
7	Adapter EFTA01

Pos.	Bezeichnung
8	Hose connection adapter
9	T-piece 6/6/6
10	T-piece 4/6/4
11	Hose 2.5 m with plug-in connector (2 pieces)
12	Hose 25 cm (2 pieces)
13	Foam insert (milled)
14	Plastic case

Description	Use	Connector	Item no.	Image
EFTA 01	Audi, BMW, Porsche, Mercedes-Benz, Toyota, VW, Seat, Skoda, u.a. <i>Replacement seal: ET 960, item no. 120460_1</i>	Bayonet closure	040604	
EFTA 08	Opel/GM Org.TI.Nr. 90412508, 55566555 <i>Replacement seal: ET 1046, item no. 120494_1</i>	Bayonet closure	040615	
EFTA 09	VW Group as of introduction of MQB platform, Golf VII etc. <i>Replacement seal: ET 962, item no. 120462_1</i>	Bayonet closure	040613_1	
EFTA 13	Mercedes Citan W 415, OM 607, Renault Kangoo from 2013, K9K-engine <i>Replacement seal: ET 1047, item no. 120495_1</i>	Bayonet closure	040625_1	
EFTA 15	Mercedes M 282 Otto 1.4l Org.TI.Nr. A 282 018 11 00 Mercedes OM 654 Diesel Org.TI.Nr. A 654 010 26 02 <i>Replacement seal: ET 964, item no. 120464_1</i>	Bayonet closure	040627_1	
EFTA 17	VW-engine EA211evo <i>Replacement seal: ET 1049, item no. 120497_1</i>	plugged	040632_1	

3. Application examples

3.1 Application example: Checking the crankcase internal pressure

Term definition: Crankcase ventilation = CV

To check the crankcase internal pressure, use the vehicle specific adapter for the valve cover or oil filler neck. Plug the configured hose into the mounted adapter and connect it to the electronic manometer.



Fahrzeugspezifischer Adapter



Unfortunately, we do not have any reliable manufacturer information from the vehicle manufacturers regarding the crankcase internal pressure. The following values are empirical values from many differentiated tests. In general, the statement applies that the crankcase internal pressure should generally be negative, upward deviations should not exceed +5 mbar, underpressures greater than -90 mbar are alarming for the motor from a technical point of view.

Turbocharged diesel vehicles:

Checking the CV at idle speed:

- The measured pressure must not exceed + 5 mbar.
A negative pressure of up to – 10 mbar is permitted.

Checking the CV at 3500 rpm (stationary):

- The value measured when idling must not increase upwards, as a general rule, a positive value goes into the vacuum range.
A negative pressure of max. -20 mbar is considered normal.

Checking the CV while driving at all speeds and for performance:

- Depending on the speed and performance requirement, the measured values are between – 40 mbar and 0.
Brief overshoots of up to +10 mbar are to be considered tolerable.

Gasoline vehicles (Otto engines) with turbocharger:

Checking the CV at idle speed:

- Depending on the manufacturer, the values are between -90 mbar and -15 mbar.

Checking the CV at 3500 rpm (stationary):

- With negative intake manifold pressure (induction operation), the values usually remain in a clearly negative range.

Checking the CV while driving at all speeds and for performance:

- If the intake manifold pressure is positive (loading operation), the CV switch to a different operating state. From now on, the internal pressure will range between -45 mbar and 0. Brief overshoots of up to +10 mbar are to be considered tolerable.
- The idle speed values apply in coasting mode.

Turbocharged gas vehicles:

Are comparable to Otto engines.



Note: A faulty crankcase ventilation is responsible for compressor-side and/or turbine-side oil losses in turbochargers. Accumulations of oil in the boost pressure line can have devastating effects when driving. In the case of turbochargers with variable turbine geometry, oil loss on the exhaust side causes errors in the boost pressure control and permanent damage to the components of the exhaust gas cleaning system.

With this tool and the extensive range of adapters, functional faults in the crankcase ventilation can be determined. This rules out consequential damage or repeated failures of the newly installed turbocharger.

3.2 Application example: Checking exhaust back pressure

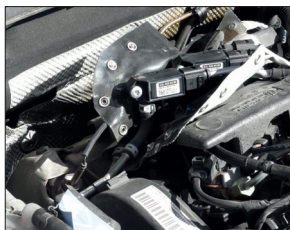
Term definition:

Exhaust back pressure = exhaust pressure between the turbine outlet of the turbocharger and the first component in the exhaust system

Differential pressure sensor = electronic Sensor that determines the differential pressure between DPF inlet and outlet or DPF inlet and atmosphere.

The electronic pressure gauge must be used with the pre-assembled hose.

Connect to the front test line of the DPF using the appropriate T-piece and connecting hose.



Checks of the exhaust back pressure must always be carried out while driving for speed and power. It is advisable to take into account the kilometers driven since the last successful regeneration of the DPF. The upper limit of acceptable exhaust back pressure is +300 mbar.

In vehicles with an SCR catalytic converter after the DPF, it is advisable to also check the exhaust back pressure after the DPF. Here the measured value should not be above +100 mbar.

Checking the back pressure after the DPF is also recommended for vehicles with low-pressure EGR. For active EGR in the partial load range, the manufacturer's information should be used. When the dynamic pressure flap is open in the full load range, the exhaust back pressure after the DPF should be less than 70 mbar.

i **Note:** The first approach is to measure the back pressure in front of the diesel particulate filter. In vehicles with a downstream SCR catalytic converter with AdBlue[®]* injection, a check behind the DPF is very useful as it usually shows quite sobering results. An SCR catalytic converter and the muffler must not generate any back pressure.

Vehicles with low-pressure EGR are usually equipped with a controlled dynamic pressure flap in the exhaust pipe after the DPF. If there is an undetected malfunction, this also leads to incorrect measurement results from the built-in differential pressure sensor.

In the case of a petrol engine, one does not generally expect an increased exhaust back pressure. However, from our experience at BTS, this has turned out to be a misconception. Damaged 3-way catalytic converters are not uncommon. Inadequate control times due to chain elongation and defective injectors are usually the culprits. In the future, the Otto particle filter will, in some cases, also make itself.

3.3 Application example: Checking the control pressure on the pneumatic control box

The electronic pressure gauge must be used with the pre-assembled hose.

Connect to the vacuum line between the boost pressure control valve and the turbocharger control box using the appropriate T-piece and connecting hose.



The electronic pressure gauge of our measuring tool is used to test all pneumatic actuators on the turbochargers. The pressures can also be determined while driving on pressure and vacuum-controlled actuators. A comparison of the determined pressures with the cycle rates of the electropneumatic converters can thus be implemented.

Measurement data from pressure sensors such as the boost pressure sensor or the differential pressure sensor can be checked very precisely. Leaks in the vacuum system or a lack of wear on the vacuum pumps can be determined with an appropriate test routine. To do this, the vacuum present at the actuator is determined at idle speed. If the foot brake is actuated several times, the determined value must not drop.

If there are no leaks in the assemblies involved in the vacuum, then a defect in the vacuum pump will be found.

*AdBlue[®] is a registered trademark of VDA, the Association of the German Automotive Industry.

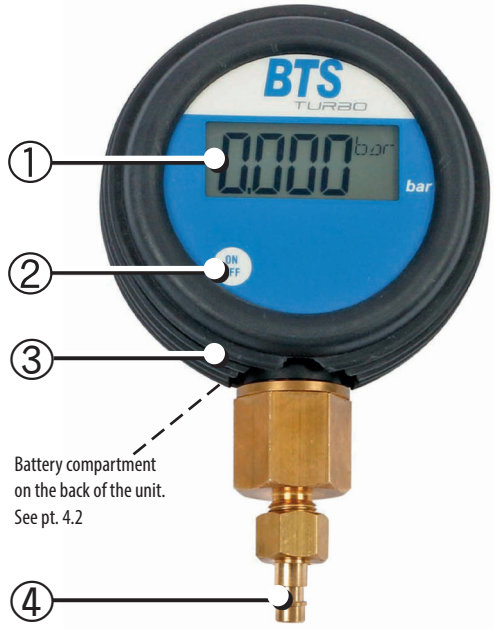
4. Product description (pressure gauge)

The DM 80 L is a digital pressure gauge with actual value display, min/max display, accuracy class 0.5 FS and measuring unit in bar.

4.1 Device view, buttons and functions

Display: 4½ digit display. Display of measured values.

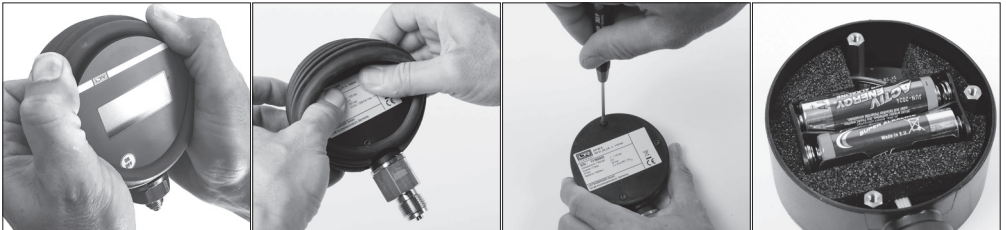
Pos.	Description	Function
1	actual value display	Shows the actual pressure. A too low battery status is displayed as LOBAT (top left side of the display)
2	ON/OFF button	Click the button to switch the device on and off
3	rubber protective cup	Protects the device from damage
4	pressure connection	Plug nipple for connection to an DN5 quick coupling



4.2 Installation / inserting/changing the battery

The batteries are included in the delivery and are not installed in the device yet. The batteries must be inserted before use.

- Slide the protective rubber cap backwards over the housing.
- Open the back of the device (3 x Allen key 2.5 mm) and remove the battery lid.



- Insert batteries (2x AA 1.5V) into the battery compartment with the correct polarity.
- Close the lid and slide the protective rubber cap back.

4.3 Calibration

Press and hold the On/Off button for 5 seconds while the calibration is carried out.



Note:

It is recommended to calibrate the manometer before each use, since a value in the mbar range is almost always displayed as a result of temperature and environmental conditions.

5. Care and Storage

In order to enable effective work, we have designed the diagnostic tool to be low-maintenance. However, you should note a few points. This promotes trouble-free operation and preserves the value of the technology.



Note:

Damage to the diagnostic tool, the digital manometer or individual components due to aggressive cleaning agents or solvents. Do not use aggressive or abrasive cleaning agents, solvents or other similar chemicals for cleaning.

- Keep dust and dirt away from the diagnostic tool.
- Clean the digital manometer with a soft, slightly damp cloth.
- Store your product in a dry and dust-free environment.
- Avoid places with high temperatures and humidity, or places that can get wet, also during maintenance and care.
- The device warranty is 12 months.
- Replace the batteries of the device as soon as “LOBAT” appears on the display.
- Keep the original packaging for transport to avoid damage.

5.1 Environmentally friendly disposal



Recycling according to WEEE (EU Directive 2002/96 EG)

You have the option of returning the diagnostic tool to us for disposal.

This diagnostic tool or its components must not be disposed of as residual waste.

If you do not return the diagnostic tool to us for disposal, you are obliged to take the device to a specialized center for separate collection and disposal of hazardous materials and hazardous waste. The digital pressure gauge contains an electronic circuit board and batteries. These parts must be removed before the device is scrapped. Used batteries can, for example, be returned free of charge to municipal collection points or to retailers.

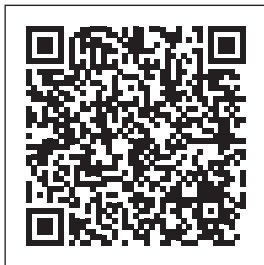
6. Technical data, specifications (pressure gauge)

Feature		Unit	Measuring range/description
Pressure range		bar	-1...+3
Ambient pressure range		°C	-10...+50
Storage temperature		°C	-20...+60
Medium temperature		°C	-20...+120
Maximum relative humidity		% r.F	85
Material pressure connection		-	brass
Material	membrane	-	ceramic
	seal	-	H-NBR
Housing diameter	with protective rubber cap	mm	approx. 95...100
	without protective rubber cap	mm	ca. 80
Temperature-compensated area		°C	+10...+40
Errors in the temperaturecompensated area		% FS / °C	±0,02
Minimum load cycles		-	10 x 10 ⁶
Supply		-	2 x 1.5 VDC LR6-AA
Maximum battery life		h	1500
Display		bar	LCD
Pressure connection		-	plug DN5
Weight		g	approx. 390

7. Instruction manual (pressure gauge)

The operating instructions for the pressure gauge -1 ... +3 bar are available for download under the following link:

https://www.autotestgeraete.de/fileadmin/website/autotestgeraete/website/BTS/BA_DM80_L-BTS-en_557713_3.pdf



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