

USER MANUAL

AVL DISMOKE 480

AVL DISMOKE 480 BT



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FUTURE SOLUTIONS FOR TODAY

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Warning and Safety Notices

This device manual contains important **warning and safety notices** that must be observed by the user.

The product is intended only for the highly specific use described in the user manual. The most important prerequisites and safety measures for the use and operation of the product are also described to ensure faultless operation.

No warranty can be given and no liability is assumed for applications beyond the described use, irrespective of observance of the necessary prerequisites and safety measures.

The product may only be used and operated by personnel who, based on their qualifications, are capable of adhering to the necessary safety measures during use and operation. Only accessories and consumables supplied by AVL DiTEST or approved by AVL DiTEST may be used. The measurement results obtained from the product in question depend not only on correct functioning of the product, but also on a series of general conditions. The results delivered by the product must therefore be evaluated by a specialist (e.g. plausibility check) before further measures are taken on the basis of a delivered measurement.

Settings and maintenance work on open devices while still live may only be performed by trained specialists who are aware of the associated danger.

The product may only be repaired in the factory of origin or by specialists specifically trained to perform such repair.

When using the product, it must be ensured by a specialist that the test object or test system is not brought into any operational state that could result in damage to goods or endangerment of people.

Summarized Safety Notices



DANGER



Danger to life by electric potential on vehicles with high voltage systems

Deadly high voltages are present on the HV energy store (HV battery) and on parts connected to it! Make sure no-one can come into contact with the connections on the hybrid battery, connecting cables, HV battery or other parts under high voltage!



WARNING



Danger to life by electric potential on the ignition system

The ignition system carries a deadly high voltage!
Do not touch the ignition system while the motor is running!



WARNING



Danger to life by electric potential on vehicles with Xenon light

A lighting system that uses a xenon light carries a deadly high voltage!
Do not touch the components of the xenon light while the lighting is turned on!



WARNING

Danger from harmful or irritating substances

When performing measurements on the running motor in closed rooms (workshops, test halls, etc.), extract the vehicle exhaust gases and ventilate the rooms thoroughly!



WARNING

Risk of burns from hot parts

Measurements must be performed at normal motor operating temperature or according to the test specification! Do not touch hot parts such as the motor, motor components or any of the entire exhaust system! Use cooling fans if necessary!

**WARNING****Risk of injury from rotating parts**

Only ever perform work in the engine bay while the motor is not running and the ignition is turned off!

Do not touch any rotating parts such as alternator, radiator fan or their drives (e.g. drive belts)!

Make sure measurement cables are laid safely while the motor is running!

**WARNING****Risk of injury from unsecured vehicle**

Engage the handbrake or shift the gearshift to P (on automatics)!

Adequately secure the vehicle against rolling!

**WARNING****Risk of explosions due to pyrotechnical setups and restraint systems**

Testing and assembly work may only be performed by trained personnel!

Never test the igniter with a multimeter!

Only perform system tests with approved testing equipment!

Disconnect the battery when working on the airbag system!

When reconnecting the battery, the ignition must be turned off and there must be no person inside the vehicle.

Always store the airbag unit with the discharge side facing upwards or according to the storage specifications!

Never leave the airbag unit lying around unattended!

Protect the airbag unit against flying sparks, open fire and temperatures above 100°C!

Do not transport the airbag unit in the passenger space!

Do not allow the airbag unit to come into contact with oil, grease or cleaning agents!

An airbag unit that has been dropped from a height greater than 0.5 m must be renewed!

Dispose of untriggered airbag units!

Do not open or repair the airbag unit!

NOTICE

When maintaining the cut-off speed of diesel engines, observe the applicable manufacturer's specifications!

NOTICE

Always turn off the ignition before connecting or disconnecting the OBD connector or the various AVL DiTEST vehicle adapters!

Safety Notices

NOTICE

Maintain the device as described in Chapter 5 *Maintenance*!
Maintenance and repairs may only be performed by specialist personnel!

NOTICE

AVL DiSmoke 480 may not be set up directly behind the exhaust pipe of a vehicle (risk of contamination).

NOTICE

Note that after transporting or storing the device at low temperatures, it is necessary to wait at least one hour after setting up the device to allow for temperature equalization before the device may be switched on (to avoid water condensation).

NOTICE

Instruments stored at temperatures below 0°C must be heated to at least +2°C before they are switched on.

NOTICE

Never leave the probe lying on the floor.

Make sure neither liquids (e.g. water) nor other contaminants can be drawn up through the probe into the exhaust instrument.

NOTICE

Make sure the instrument is not set up in direct sunlight, rain, wet environments (e.g. carwash), or snow, or in atmospheres that are corrosive or polluted with gasoline vapor.

NOTICE

Make sure no devices that cause strong electromagnetic interference (e.g. radio telephones, electronic welding equipment, large electric motors etc.) are operational in a vicinity of approx. 5 m around the instrument.

NOTICE

Use only:

DiTEST - Standard exhaust probes

DiTEST - Standard replacement parts

NOTICE

The device may not be operated in a potentially explosive environment.

To avoid the risk of fire or risk of electric shock, the device must never be exposed to rain or permanent humidity.

To avoid electric shock, the device may only be opened by qualified personnel.

NOTICE

Should an object or liquid penetrate inside the device, disconnect the device from the power supply and have it revised by a specialist before continuing to use it.

NOTICE

Choose an installation site where unhindered air circulation is allowed through the air vents on the device.

NOTICE

When maintaining the cut-off speed of diesel engines, observe the applicable manufacturer's specifications!

Important Notices

Maintenance

The AVL DiSmoke 480 must be maintained according to specifications (see Chapter 3 *Maintenance*):

The half-yearly maintenances must be documented:

- On the maintenance sticker of the respective device with date and name.
- In the test logbook.

The time of maintenance, the work performed and the name of the person or company who performed the work must be specified.

These recordings must be kept for a period of 5 years and must be presented upon every calibration upon demand.

Calibration (Relevant for Germany only)

Instruments for emissions testing are subject to design approval and obligatory calibration.

The AVL DiSmoke 480 has the necessary design approvals.

The AVL DiSmoke 480 is first calibrated in the factory.

The AVL DiSmoke 480 must be calibrated at yearly intervals.

The calibration must be documented in the test logbook.

The date for the next calibration service must be entered on the maintenance sticker of the AVL DiSmoke 480.

NOTICE

It is not permissible to exceed the calibration date.

The annual maintenance (with calibration service) can be performed by

AVL DiTEST Central Service

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1 General

Opacimeter module for diesel engines:

- Low sensitivity to pollution thanks to optimal purge air guidance
- High heating power for short warm-up times of the diesel measurement chamber
- Modern, quick-response turbidity measurement chamber
- Patented automatic linearity test (without calibration filter)
- Highly flexible control cable to the diesel measurement chamber
- One probe for all exhaust pipe diameters
- Measures turbidity from a partial stream of the exhaust of diesel engines and calculates:
- The turbidity coefficient k [1/m]
- Wireless Bluetooth connection to AVL DiTEST CDS (AVL DiSmoke 480 BT only)

1.1 AVL DiSmoke 480

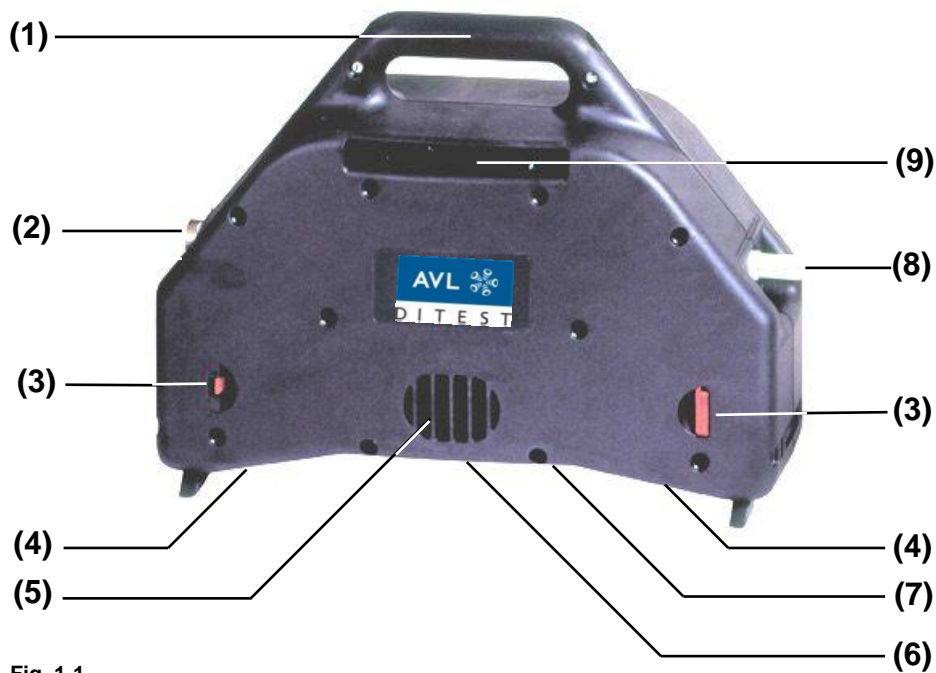


Fig. 1-1

- 1 Carry handle
- 2 Connection for connector cable to AVL DiLink 480
- 3 Optical protection (removable)
- 4 Purge air outlet
- 5 Measurement gas output
- 6 Holder for suction funnel (underside)
- 7 Type plate (underside)
- 8 Measurement gas input
- 9 Fresh air input

1.2 AVL DiSmoke 480 BT

Information

AVL DiSmoke 480 BT can communicate wirelessly with the AVL DiTEST CDS. This eliminates the need for a connector cable to connect to the AVL DiLink 480.

For the settings required for the radio connection, refer to User Manual AVL DiTEST CDS, Chapter 5.1.5.1.10 *AVL SMOKE*.

Optionally, as an alternative to the radio connection, it is possible to communicate with the AVL DiTEST CDS using a conventional RS232 cable.

The RS232 cable is not included and can be ordered as a separate option.



Fig. 1-2

- 1 Carry handle
- 2 RS 232 connection for connecting to the AVL DiTEST CDS
- 3 Network cable connection
- 4 Optical protection (removable)
- 5 Purge air outlet
- 6 Holder for suction funnel (underside)
- 7 Measurement gas output
- 8 Measurement gas input
- 9 Fresh air input

1.3 Safety Notices

This document contains important warning and safety notices that must be observed by the user. Faultless and safe operation can only be guaranteed if the prerequisites and safety measures are adhered to. Always additionally observe the safety notices on the screen.

1.4 Typographic Conventions

Safety Notices:



DANGER

Refers to an **extremely hazardous** danger that, if not avoided, would lead to death.



WARNING

Refers to an immediate threat that, if not avoided, could lead to death or severe injuries.



CAUTION

Refers to a danger that could lead to moderate or light injuries.

Additional warning signs:



Danger from electric current.

Notices:

NOTICE

This text refers to situations or examples of incorrect operation that could result in damage to goods or loss of data.

Information:

Information

This text refers to important information or instructions. Failure to observe these instructions will prevent or significantly encumber successful conclusion of the actions described in this document.

Standard font formats:

bold	Important text/text passages, parameters
<i>italic</i>	Dialogues and reports on screen
ALL CAPITALS	Names of devices and operating modes
Menu Menu item	Selection of menu commands by clicking on buttons

List formats:

1. 2.	Step-by-step instructions to be performed in a specific order
•	Instructions involving only one step
▪	Lists with no specific order
-	

2 Preparation for First Use



WARNING

Safety Notices

Observe the safety notices at the beginning of this device manual!
Observe Chapter 5 *Maintenance*!

Information

For first use, also observe:
AVL DiX: -> Device Manual AVL DiLink 480
AVL DiTEST CDS: -> User Manual AVL DiTEST CDS

2.1 AVL DiSmoke 480

1. Connect the control cable to the connection (1).
Make sure the bayonet connector is properly engaged.
2. Push the exhaust probe onto the exhaust input (2). Make sure the probe is firmly attached.
3. On the underside of the device (3) is a holder.
You can push the suction funnel onto this.

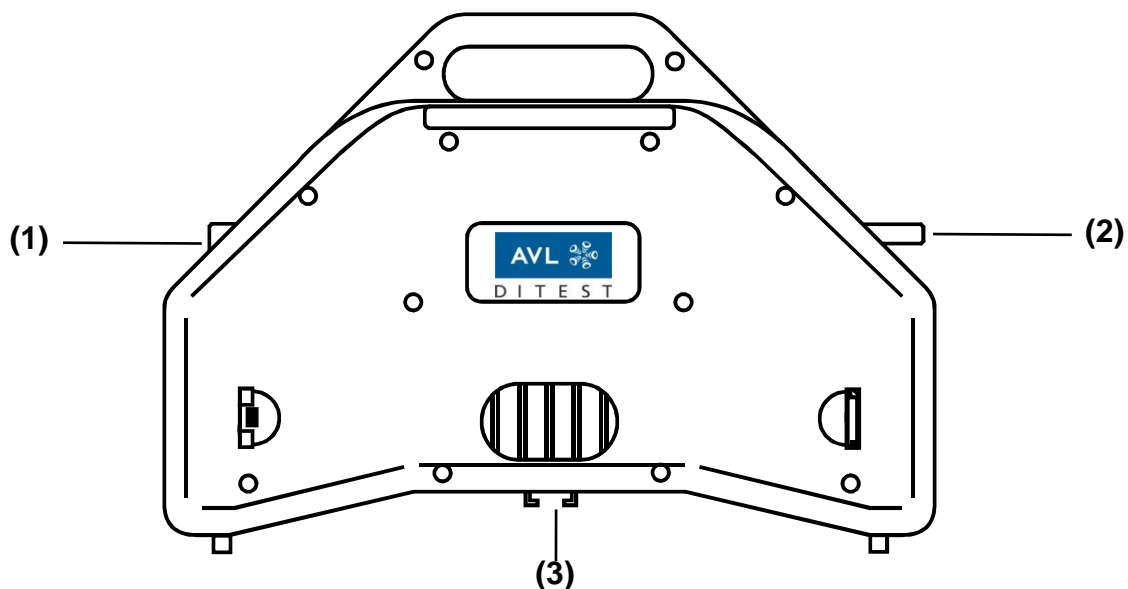


Fig. 2-1

4. Switch the AVL DiLink 480 on.
After the warm-up phase, the AVL DiSmoke 480 will run through the white point balancing and a linearity test.
The white point balancing is performed before every measurement.

2.2 AVL DiSmoke 480 BT

1. Connect the network cable to the connection (1).
2. Push the exhaust probe onto the exhaust input (2). Make sure the probe is firmly attached.
3. On the underside of the device (3) is a holder.
You can push the suction funnel onto this.
4. If you are not working with the wireless connection, then connect the RS 232 cable to the socket (5) and to the RS 232 connector on the AVL DiTEST CDS.

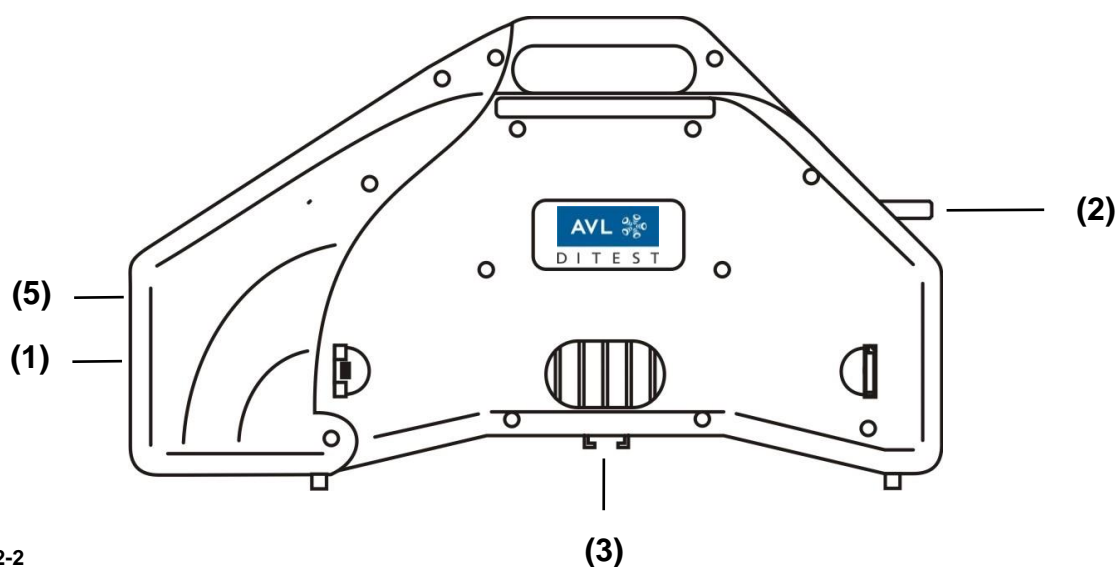


Fig. 2-2

5. After the warm-up phase, the AVL DiSmoke 480 will run through the white point balancing and a linearity test.
The white point balancing is performed before every measurement.

3 Maintenance

3.1 Maintenance Plan

The following maintenance procedures must be performed as necessary or at the latest within the maintenance cycles specified below.

Maintenance Task	As required	Half-yearly (minor maintenance)	Yearly (major maintenance)	Comments	Entry into Maintenance log
Control cable RS 232 cable	•			⇒ Chapter 3.2	
Exhaust probes	•			⇒ Chapter 3.3	
Clean optical protection inserts	•	•	•	⇒ Chapter 3.4	•
Outer visual inspection		•	•		
System check with filter			•	⇒ Chapter 3.5 By authorized service only	•
Test with software			•	By authorized service only	•
Software update	•		•	By authorized service only	•

3.2 Control Cable

AVL DiSmoke 480:

Make sure the connector cable is not damaged, not kinked and that the bayonet connectors are properly engaged!

AVL DiSmoke 480 BT:

Make sure the RS 232 cable is not damaged, not kinked and that the screws are properly tightened!

3.3 Exhaust Probes

NOTICE

Remove the probe from the AVL DiSmoke 480 before doing any cleaning work, in order to avoid damaging the AVL DiSmoke 480!

Do not kink the probe!

3.4 Cleaning the Optical Protection Inserts

NOTICE

Take care not to scratch the protective screens when cleaning them!

1. Remove the optical protection (1) on both sides.
Do this by pushing the locks (2) on the opposite side of the device.
2. Clean the protective screens (3) using a soft, lint-free cloth, and using glass cleaner if necessary.
3. Remount the optical protection (1).
Make sure the locks (2) snap tight.

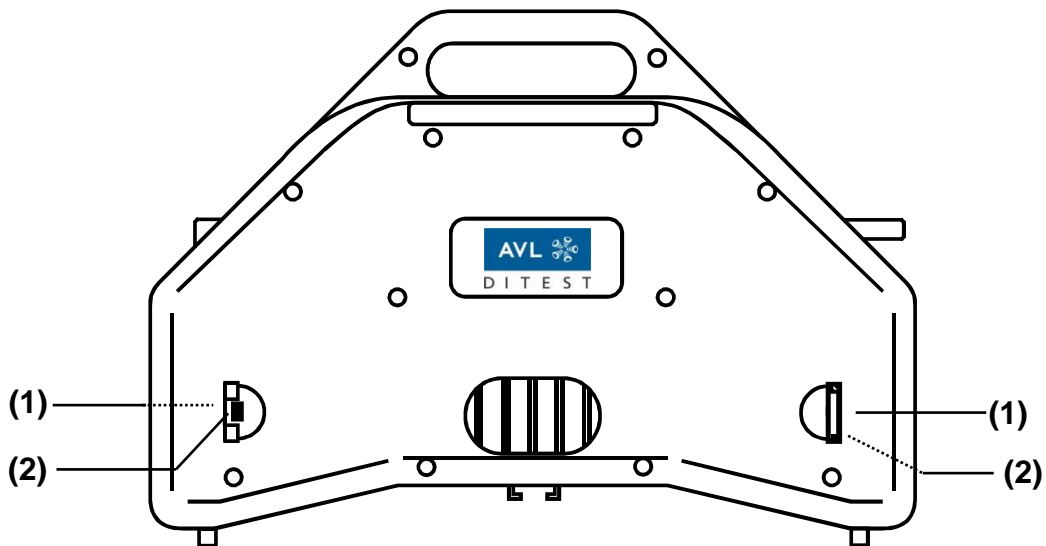


Fig. 3-1

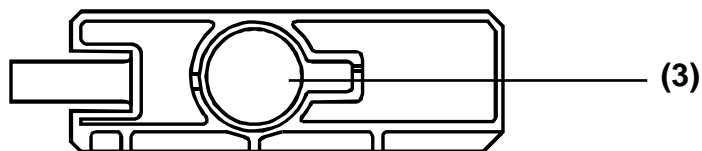


Fig. 3-2

3.5 System Check with Filter

1. Start the AVL DiSmoke 480 running.
2. Select Filter test.
(AVL DiX: -> see User Manual DiX AU SOFTWARE, Chapter *Service/Maintenance, Filter Test*.
AVL DiTEST CDS: -> see User Manual AVL DiTEST CDS, *Chapter AU/Filter Test*).
3. Remove the optical protection (1) of the turbidity measurement chamber on the receiver side (side on which the probe hose (2) is located).
Do this by pushing the lock (3) outwards (located on the opposite side of the device).

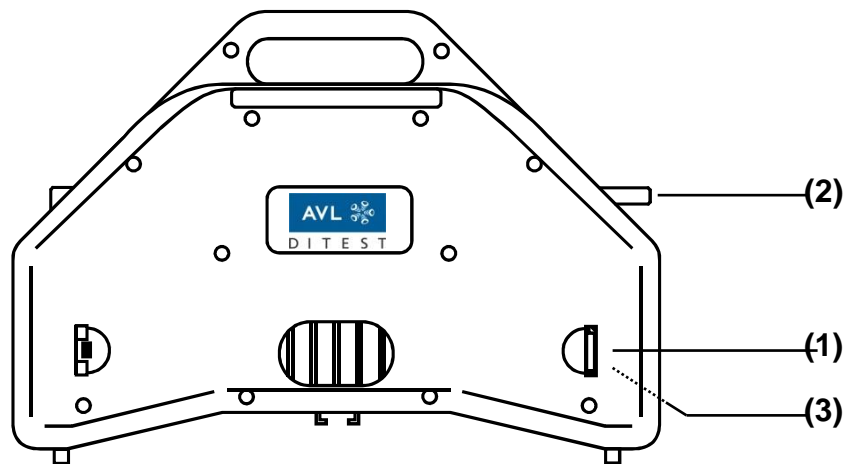


Fig. 3-3

4. Insert the filter holder (4) with filter (5) into the optical protection (1).

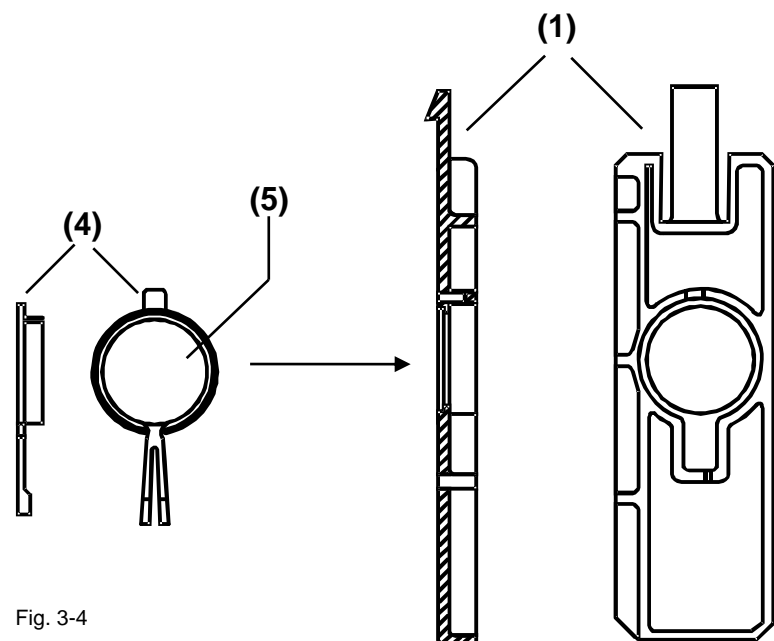


Fig. 3-4

5. Reinsert the optical protection (1) into the turbidity measurement chamber.
6. Perform the test; the measured turbidity will be displayed.
7. Remove the optical protection (1) from the turbidity measurement chamber.
8. Remove the filter holder with filter from the optical protection.
Do this by pushing the lock (4) inwards (see arrow).

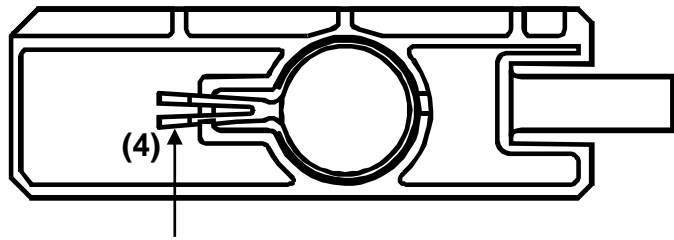



Fig. 3-5

9. Reinsert the optical protection (1) into the measurement chamber.
Make sure the lock (3) on the opposite side of the device snaps tight.
10. Finish the measurement.

4 Technical Data

Measuring principle	Extinction measurement	
Operating temperature	+5 ... +45°C	Adhering to measurement accuracy
	+1 ... +50°C	Ready for measurement
Storage temperature	-20 ... +60°C	
Air humidity	Max. 90%, non-condensing	
Power supply	AVL DiSmoke 480:	from AVL DiLink 480
	AVL DiSmoke 480 BT:	from mains network 90–230V
Power draw	AVL DiSmoke 480:	Approx. 55 VA (with heating)
	AVL DiSmoke 480 BT:	Approx. 78 VA (with heating)
Dimensions	AVL DiSmoke 480:	395 x 285 x 136 (width x height x depth)
	AVL DiSmoke 480 BT:	490 x 285 x 136 (width x height x depth)
Weight	AVL DiSmoke 480:	3.5 kg
	AVL DiSmoke 480 BT:	4.6 kg
Turbidity measurement chamber		
- Measurement chamber heating	100°C	
- Effective length	0.215 m ± 0.002 m	
- Maximum exhaust temperature	200 °C	
Measurement parameters		
	Measuring range	Resolution
- Turbidity	0–100%	0.1%
- Absorption (k value)	0–99.99 1/m	0.01 1/m
Compliance	89 / 336 / EEC Council Directive, electromagnetic compatibility, fulfilled by adherence to the standard: <ul style="list-style-type: none"> EN 61326:97/A1:98/A2:01 Electrical equipment for measurement, control and laboratory use EMC requirements 73 / 23 / EEC Low Voltage Directive, fulfilled by adherence to the standard: <ul style="list-style-type: none"> EN 61010-1:01 Safety requirements for electrical equipment for measurement, control and laboratory use 	
Disposal: 	This AVL DiTEST product is a high-quality electrical and electronic device that may not be disposed of in the household waste. For disposal, it is essential to comply with local legal obligations!	

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