



Emission Test Instruments

AVL 439 Opacimeter

As the Opacimeter measurement value results from the attenuation of visible light in the measuring chamber, the smoke density value is in effect the result of black smoke ("C"), blue smoke (hydrocarbon vapor) and white smoke (water vapor). In addition to the well-known ECE R24 test procedure, the European Load Response (ELR), a part of the ECE R49 Heavy Duty Emission legislation, places much higher specifications on opacity measurement instruments than the ECE R24.

With its high accuracy, dynamics, reliability and user-friendly design for test cell applications, the AVL 439 Opacimeter is now eminently suitable for a number of statutory tests such as ECE R24 and ELR as well as for R&D purposes and engine production.

Application Area

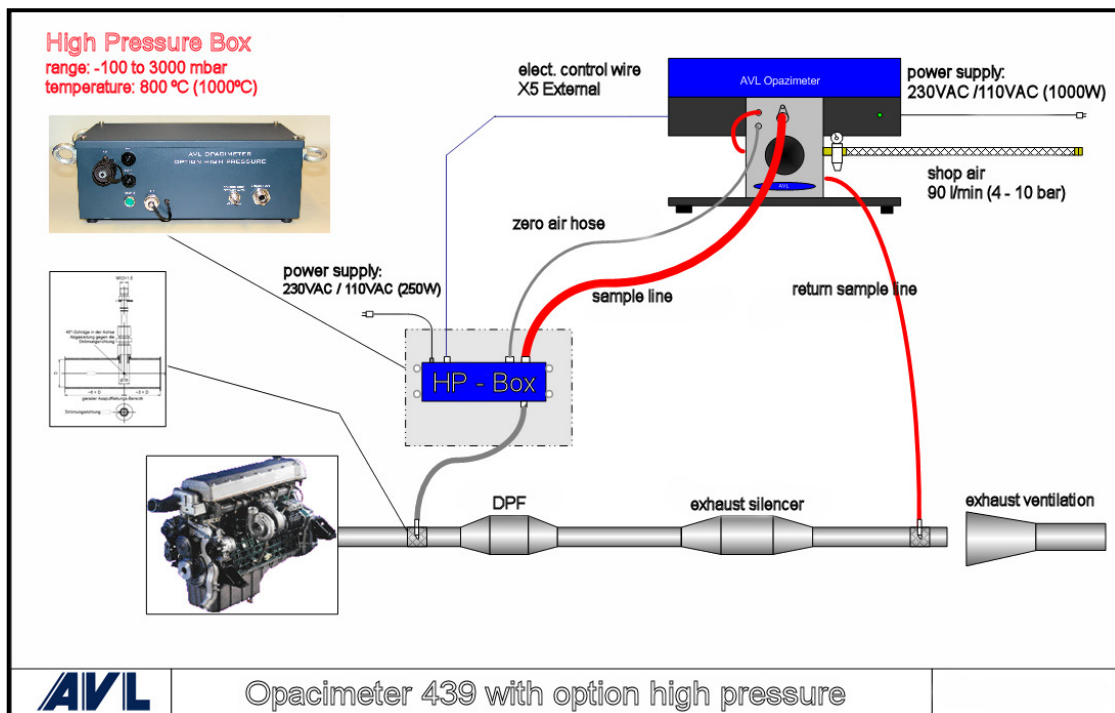
For engine test bed, chassis dynamometer, and on-board tests.

Statutory test runs for ECE-R 24 – EEC 72/306, HD EURO III, EURO IV and EURO V ELR Test, ISO 8178, and SAE J 1667.

As a partial-flow system for on-line measurement of exhaust gas opacity in diesel engines (also for gasoline engines like GDI engines) the AVL 439 Opacimeter is a unique system that satisfies not only the existing statutory standards but also reliably meets the new challenges embodied in the EURO IV. The AVL 439 Opacimeter is also perfect for meeting the demands of engine development and production. In addition, its actual application has been substantially simplified.

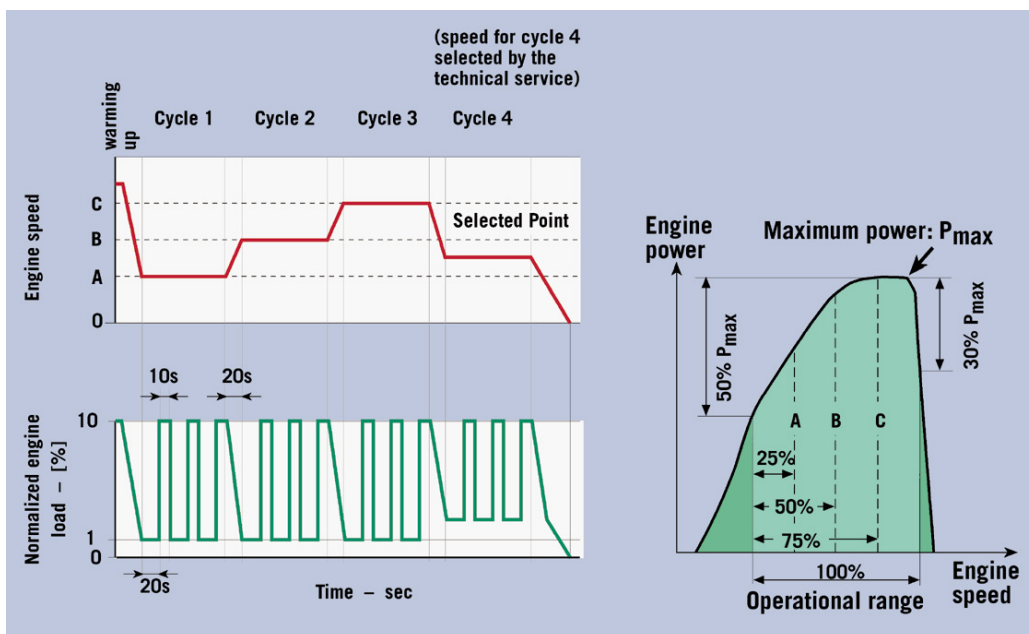
Your Benefits at a Glance

- State-of-the-art technology from AVL
- Reliable results
- High sensitivity
- High measurement dynamic permits even dynamic test runs
- Easy handling means quick installation, user-friendly operation and simple maintenance
- Sample probe conditioning
- Measurements up to 3000 mbar exhaust back pressure.



Technical Features

- Partial flow opacimeter for a number of statutory tests
- Optical length of 430 mm and optimized sensitivity
- Diaphragm sampling pump guarantees constant filling of the measuring chamber
- Sample re-circulation
- Constant flow rate even at varying exhaust pressure
- Easy maintenance
- Heated windows protect optical components
- Time response: 0.1 sec
- Dynamic testing
- New statutory requirements
- Sensitivity: $N = 0.1 \%$, $k = 0.0025 \text{ m}^{-1}$
- Sample conditioning (100 °C)
- Signal stability
- Heat protection
- Opacity raw value analog + RS232 interface
- Predefined ECE R24 cycle
- Predefined ELR cycle
- Bessel filter
- Floating average (floating mean value)





Technical Data 1

Measurement value output:	Opacity N [%] or absorption coefficient k [m^{-1}]
Measurement range:	N = 0 ... 100 % or k = 0 ... 10 m^{-1}
Measurement value resolution:	0.01 % opacity or 0.0025 m^{-1} (10 s mean value)
Zero stability:	{0.1 % or 0.0025 m^{-1} } for 30 min
Response time:	0.1 s
Inputs/outputs:	Analog output 0 ... 10 V Serial RS232C interface, 9600 baud Serial interface for connecting the optional AVL 4210 Instrument Controller Digital input/output: 3 inputs, 3 outputs; potential separated by optocoupler
Sampling rate for opacity signal:	50 Hz
Output rates:	Serial interfaces: up to 2 Hz using the AK generic communication interface (required by protocol) max. 10 Hz for ASCII transmission (required by interface) Analog output (50 Hz)
Electronic measurement value filter (parameterizable):	Floating mean 0.02 ... 10 s Bessel filter of 2 nd order (0.2, 0.5, 1.0, 1.077, 1.5, 2 s) not filtered
Exhaust gas temperature:	0 ... 600 °C 0 ... 800 °C with option High Pressure
Exhaust gas back pressure: (incl. pulsation peaks)	-100 mbar ... + 400 mbar 0 mbar ... +3000 mbar relative pressure with option High Pressure
Ambient temperature:	5 ... 50 °C
Power supply:	230 V (100/115 V optional)
Power consumption:	1 kVA (max.)



Technical Data 2

Compressed air supply/consumption:

Required: max. 180 $\frac{1}{\text{min}}$,
non-oiled, dry and filtered
input pressure regulated to 4...10 bar

Dimensions: 650 x 420 x 450 mm (W x H x D)

Weight: 47 kg

Options

- 100/115 V power supply
- Sampling line, special length 4m
- AVL 4210 Instrument Controller
- 19" mounting frame for AVL 4210 Instrument Controller
- 19" bench cabinet for AVL 4210 Instrument Controller
- Wall bracket
- Trolley
- Analog cable
- Digital cable hybrid interface
- PC Software
- Probe for open exhaust pipe (for chassis dyno and on-board testing)

Accessories

- Calibration equipment
- Transmission filter 10 %
- Transmission filter 20 %
- Transmission filter 40 %
- Transmission filter 50 %
- Condensate trap

Other Information

- TÜV certificate
- The 439 is designed as stand-alone unit as well as for integration into test cell automation systems, e.g. with AK generic communication protocol.