



AVL M.O.V.E. PRODUCT LINE

AVL M.O.V.E. GAS PEMS 493

PORTABLE SYSTEM FOR MEASURING THE GASEOUS PHASE EMISSIONS OF DIESEL AND GASOLINE ENGINES AND VEHICLES

Market Requirements

Measurements with Portable Emission Measurement Systems (PEMS) under real-world driving conditions on the road are a very efficient way to keep the development effort at an acceptable level even if the requirements regarding fuel economy, exhaust emissions and customer expectations are increasing.

PEMS systems are also required with the introduction of the in-use compliance legislation where HD Diesel on-road and non-road manufacturers need to report compliance to emission standards.

Such measurements require robust and compact test systems which are able to withstand the rough testing conditions and which provide reliable and accurate measurements over long test durations and at changing ambient conditions.



Functional Overview

The AVL GAS PEMS is a compact and robust portable emission measurement system (PEMS) for measuring the THC, NO/NO₂, CO/CO₂ and O₂ concentrations within the exhaust gas of Diesel- und Gasoline vehicles and engines.

High measurement accuracy is achieved by the usage of proven test cell analyzers which are optimized for the mobile application and which are temperature conditioned to ensure reliable measurements even at changing ambient conditions.

The GAS PEMS is controlled via the AVL M.O.V.E System Control device which calculates the online mass emissions, stores the data and provides interfaces to access e. g. ECU/ CAN bus data and additional sensors.

Functional Description

The AVL Gas PEMS uses a heated FID Analyzer for measuring the THC concentrations which does not require any external shop air supply. Except the burner gas (He/H₂ mixture) there are no other operating gases which need to be carried along.

The NO / NO₂ Measurement is carried out with an UV Analyzer, which can measure NO and NO₂ simultaneously and directly without the need of any converter like a CLD analyzer.

The UV analyzer can be calibrated with internal calibration cuvettes which avoids carrying along an additional NO₂ calibration gas bottles on board the vehicle. It is of course also possible to connect gas bottles for span calibration.

For the CO / CO₂ measurement a NDIR analyzer is used which was especially optimized for a high accuracy and resolution of the CO channel at a measurement range below 0.1vol%.

An especially for the mobile operation developed internal temperature conditioning system allows a reliable operation over a wide operating temperature range from -30 °C to + 45 °C without any additional external heating or cooling device. For higher temperatures it is possible to connect an external cooling aggregate or a hose to e. g. the temperature conditioned passenger compartment. This solution ensures a reliable operation during cold tests and/or ambient temperature changes.

The robust design of the instrument supports these attributes additionally. Internal dampers and a special mounting plate with vibration and shock dampers ensures a safe mounting and reliable operation when installed on board a vehicle. For non road applications a rugged case is available.

A special "Sleep – Mode" reduces the power demand and the warm-up time.

A service door makes the access to all replacement parts (e. g. filters) very easy. Optimized components extend the service intervals and reduce the maintenance effort.

The device is operated with 24V DC either by using a battery pack or a voltage converter.

Control of the GAS PEMS is done via the AVL M.O.V.E System Control device which also calculates the online mass emissions and which provides interfaces to access e. g. ECU/ CAN data and additional sensors like a GPS receiver or an exhaust flow meter. System



Control also acts as a central data logger for storing the different data within one device. For the direct exhaust flow measurement differential pressure based Exhaust Flow Meter are available as an option. For data post processing and reporting according e. g. U.S. EPA HDIUT regulations AVL offers a powerful PEMS Post processing Software based on AVL Concerto

Applications

- In-Use Testing according 1065 and EU PEMS rules
- Engine and vehicle sub-system development and optimization
- Catalyst and particulate trap testing
- Vehicle surveillance testing
- Portable solution for testing on stationary and large emission sources

Benefits at a glance

- Special conditioning concept for extended operating temperature range (-30°C to 45°C) and an accurate measurement (connection of external cooling possible)
- Robust against vibration through internal and external dampers
- High measurement accuracy even at the low measurement range
- Low span and zero drift for long measurement intervals
- NDUV analyzer internal calibration with gas filled cuvettes possible – no span gas bottle needs to be carried along
- Special “Hibernate” Mode to reduce warm-up time
- Purging with higher flow rate and back purging with pulsed purge air
- Low maintenance effort and easy access to consumables
- Communication via TCP-IP/ AK commands which makes the integration into existing systems easy

Technical Insight – Preliminary Specifications

Operating temperature	-30 to 45°C (higher temperatures can be achieved by connecting external cooling air e. g. from the temperature conditioned passenger compartment)
Storage temperature	-40 to +70° C (Oxygen sensor needs to be removed)
Dimensions	appr. 19“ x 8 HU x 540mm (w*h*d)
Weight	appr. 50kg
Warm-up time at 20° C ambient temp.	< 1 hr (ready for measurement)
Power demand	24V DC, appr. 450W @ 20°C ambient temperature (with 2m Sample Line)
Sample flow rate	< 3.5l/min



Inputs/Outputs electrical	Heated line connectors (3 heating circles with 2 x PT100); 1 x Ethernet (TCP/IP); 1 x CAN (CAN bus monitoring); 8 x analog out; 4 x analog In, 4 x digital Out (DC-isolated); 5 x digital In (DC-isolated)
Measurement Range	<u>THC:</u> 0-30,000 ppmC1 <u>NO/ NO2:</u> 0-5000 ppm (NO) 0-2500 ppm (NO2) <u>CO/ CO2:</u> 0-5 vol% (CO), 0-20 vol% (CO2)
Zero Drift	<u>THC:</u> < 1,5 ppmC1/8h <u>NO/ NO2:</u> 2ppm/8h <u>CO:</u> 20ppm/8h <u>CO2:</u> 0,1 vol%/8h
Pneumatics Inputs/Outputs	ZERO gas, SPAN gas, burner gas for HFID, sample gas IN, exhaust and drainage OUT

Specifications are subject of change without notice

Scope of Supply

The standard scope of supply includes the following components:

- 1*AVL GAS PEMS
- 1*Heated Line (4m, extension up to 6m available as an option)

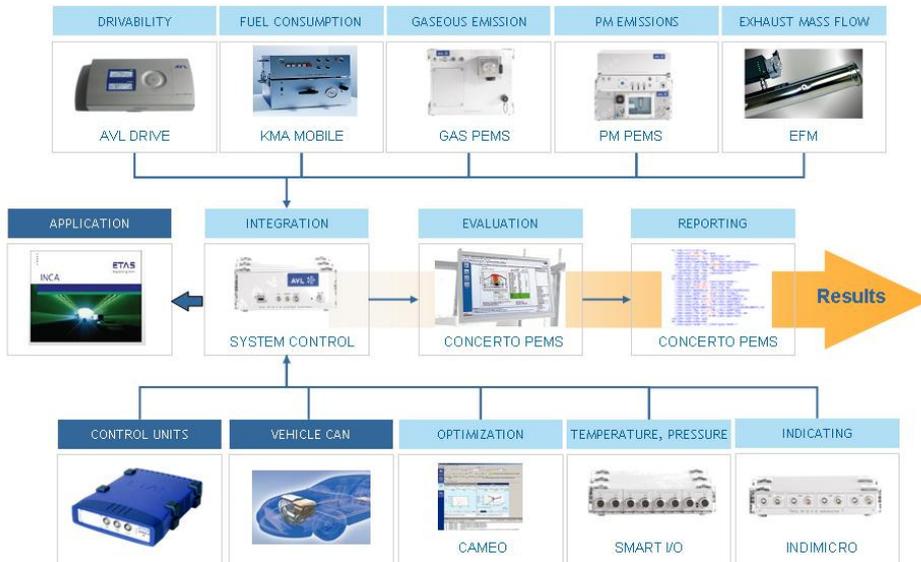
Recommended Options:

- 1 Voltage Converter (110V/230 AC to 24V)
- 1 AVL M.O.V.E System Control including touch screen, weather station and GPS receiver (prerequisite for mass emission calculations and access to vehicle CAN bus)
- 1 AVL M.O.V.E System Control extension providing additional interfaces
- 1 Exhaust flow meter (different sizes from 2" up to 6" are available)
- 1 AVL Concerto PEMS Software
- 1 Mounting plate with vibration dampers and lashing straps for installing the unit on board a passenger car (2 sizes available: 1*19" and 2*19")
- 1 Rugged Case with vibration dampers for the heavy duty and non road application

The following services are available:

- Training and Start-up support
- Experts support
- Calibration services

M.O.V.E Product Line – The Key Is Integration



The AVL M.O.V.E Product Line consists of:

- AVL M.O.V.E SYSTEM CONTROL
- AVL M.O.V.E PM PEMS
- AVL M.O.V.E GAS PEMS
- AVL M.O.V.E SMART-FEM
- AVL M.O.V.E IndiMicro
- AVL KMA Mobile
- AVL CONCERTO PEMS
- AVL DRIVE