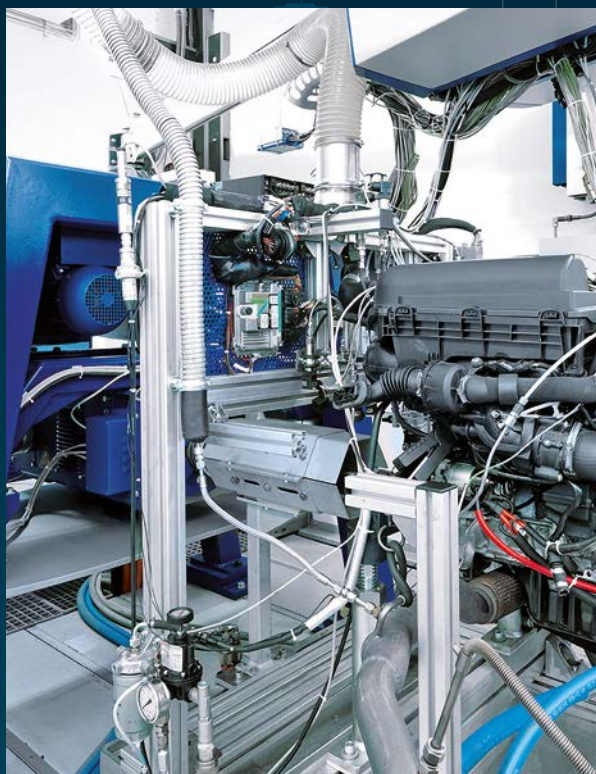




AVL MicroIFEM™ INDICATING AMPLIFIERS

Signal conditioning solutions for combustion measurement and engine monitoring





Combustion Measurement

Combustion measurement has become a standard and essential element of engine testbeds, and the always more challenging emission legislation further dictates the use of highest-performance indicating equipments: While having a perfect control of the combustion process is the key to reducing complexity and hence costs of an exhaust after-treatment system, it is also the guarantee for optimal engine behavior – in terms of fuel consumption, driveability and NVH – in any driving conditions.

User expectations have also significantly increased in terms of monitoring equipment on testbeds in the past few years. The combustion measurement chain is of course expected to be easy to set up, to have low down-times and to perform any type of steady-state or dynamic measurements. In order to comply with internal quality and cost-saving efforts, the equipment is now also expected to monitor the health and life-cycle of the sensors it reads, or to offer high traceability for the data it collects.

BENEFITS AT A GLANCE

- Error-free parameterization thanks to automatic sensor detection
- Seamless integration into AVL IndiCom™ for highest data quality and traceability
- Easy maintenance and reduced downtimes due to on-site accuracy check and adjustment capabilities
- Sensor life cycle tracking for optimal sensor usage
- Compatible with all sensor types necessary for combustion analysis



AVL Sensor Data Management™ – Professional quality solutions adapted to your processes and test environment.

SENSOR DATA MANAGEMENT

PRODUCT FUNCTIONS

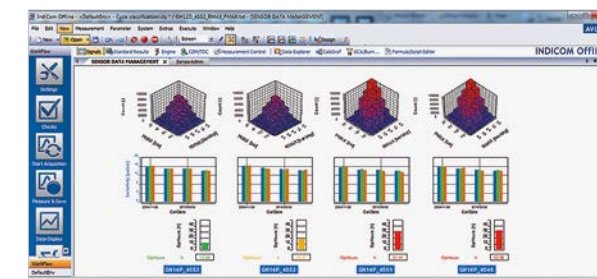
AVL SDM™ (Sensor Data Management) is a unique chance to improve the quality of combustion measurement data and at the same time to monitor the life cycle of piezoelectric sensors.

Sensor Identification

Thanks to the AVL SID™ identification tag built into our sensors and based on the innovative Surface Acoustic Wave technology, MicroIFEM piezo amplifiers are able to automatically detect and identify sensors connected to their inputs, thus allowing an error-free parameterization of the measurement chain. Of course, as an alternative our amplifiers are also able to read standard TEDS. With the “virtual sensor ID” functionality we can furthermore integrate sensors without TEDS or SID.

Online Sensor Database

AVL now provides a free-of-charge access to the online database where sensor electronic datasheets are stored. These electronic data sheets can be easily downloaded and used to parameterize the MicroIFEM inputs. When using IndiCom, the software is furthermore able to connect directly to the web server and retrieve the datasheets of your newly purchased sensors.



Sensor life cycle analysis

YOUR BENEFITS

Sensor Monitoring

MicroIFEMs are able to measure the operating hours and the number of combustion cycles observed by piezoelectric sensors. These data can be stored either in the sensor TEDS, or in the central database for later analysis. In combination with IndiCom, this information can also be used to automatically notify the user of any urgent need to calibrate sensors.

Piezoelectric sensors are permanently subject to extreme pressure conditions seen in the combustion chamber, and their life expectancy and recommended calibration interval closely depend on these observed pressure profiles. The deep interactions between MicroIFEM and IndiCom allow additional monitoring and logging of sensor history, delivering crucial information to the sensor pool managers: A unique online two-dimensional classification of cycles observed by each sensor can be activated for advanced sensor monitoring purposes. The collected data can be used either online to detect potentially damaging events or effects, like super-knock, and react accordingly, or in the office for statistical analysis of the sensor pool and for sensor selection to suit an application.



MicroIFEM combi, MicroIFEM multipurpose,
MicroIFEM piezo & p_{max} and MicroIFEM piezo
(from left to right)

AVL APPROACH

AVL MicroIFEM™ is a family of high-end amplifiers dedicated to combustion measurement. The new generation of MicroIFEM amplifiers is the result of several decades of experience in combustion measurement combined with a similarly voluminous background in test field optimization. They are thus optimized for use in combustion R&D, engine testing and automated calibration.

The form factor of the MicroIFEM ideally suits the testbed environment with a height of 1 HU, e.g. perfect for mounting into the cable boom box close to the unit under test. All MicroIFEM amplifiers feature two or four input channels and are able to read TEDS. Each channel is electrically isolated to avoid ground loops and reduce the impact of electromagnetic

interferences generated by engine components or other instruments.

One of the greatest improvements of the MicroIFEM portfolio probably relates to its maintainability: In combination with the new AVL CalUnit™ it has become child's play to calibrate a MicroIFEM and meet internal requirements in terms of data quality and monitoring of testbed instruments.

The MicroIFEM family offers conditioning solutions for a broad range of sensor types: piezoelectric channels can typically condition cylinder pressure sensors or piezoelectric accelerometers for which a robust and non-intrusive drift compensation algorithm is available, while multipurpose channels are able to condition strain-gages, piezoresistive, inductive and voltage sensors.

FLEXIBLE AND COMPLETE PORTFOLIO

The broad variety of sensors covered by the multipurpose channels offers great flexibility to users, and thus enables easy switching between applications.

The following devices are available:

- MicroIFEM piezo: 4 piezoelectric channels
- MicroIFEM multipurpose: 2 multipurpose channels
- MicroIFEM combi: 2 piezoelectric and 2 multipurpose channels
- MicroIFEM piezo & p_{max} : 2 piezoelectric channels

In addition, the MicroIFEM piezo & p_{max} can evaluate the peak firing pressure for each cycle without the use of a crank-angle encoder. Additional functions like averaging over several cycles, thresholds for limit detection and analog & digital outputs make it a perfect stand-alone peak pressure monitor.

**We don't only
condition signals:
We deliver data
you can trust.**



Amplifier Calibration Unit

UNIQUE INDICOM INTEGRATION

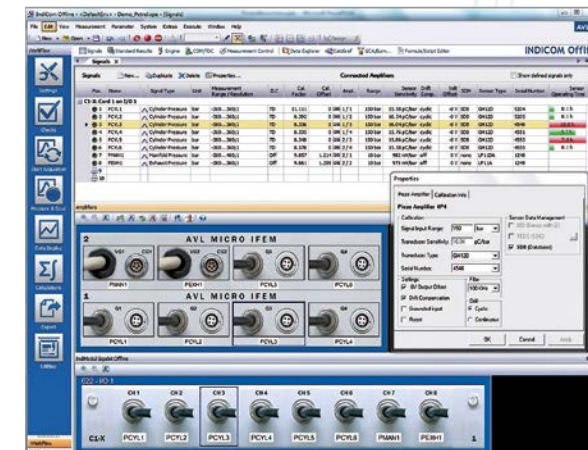
MicroIFEM amplifiers can be parameterized directly from the stand-alone software AVL IndiSignal™. But connected to an AVL acquisition device – such as AVL X-ion™ – the parameterization is taken over by AVL IndiCom™, the leading software for combustion analysis, enabling advanced functionalities. All the parameters of amplifier and acquisition unit essential for measurement definition and data accuracy are accessible from one interface, i.e. with IndiCom. The UI guides the user intuitively through the setup, thus drastically reducing parameterization mistakes. IndiCom stores the complete amplifier settings, including serial number, channel assignment, date of last calibration etc. thus allowing useful data traceability. A sophisticated self-monitoring functionality allows IndiCom to react to critical amplifier status e.g. when internal temperatures become too high.

AVL AMPLIFIER CALIBRATION UNIT

The AVL CalUnit™ is able to check the accuracy of charge amplifier channels, and has been optimized for the on-site maintenance of MicroIFEM amplifiers. The complex process of calibrating charge amplifiers is solved with a single device.

The AVL CalUnit™ software guides the user and controls the complete calibration process, hence eliminating error sources to a large extent. Less than 5 minutes are sufficient to adjust and verify the accuracy of a MicroIFEM. Furthermore, the AVL CalUnit™ software delivers a complete calibration certificate, as well as a calibration log listing all conducted operations.

The AVL CalUnit™ significantly helps MicroIFEM owners reduce maintenance costs while increasing quality and process compliance.



AVL IndiCom™

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