AVL

AVL X-ion™

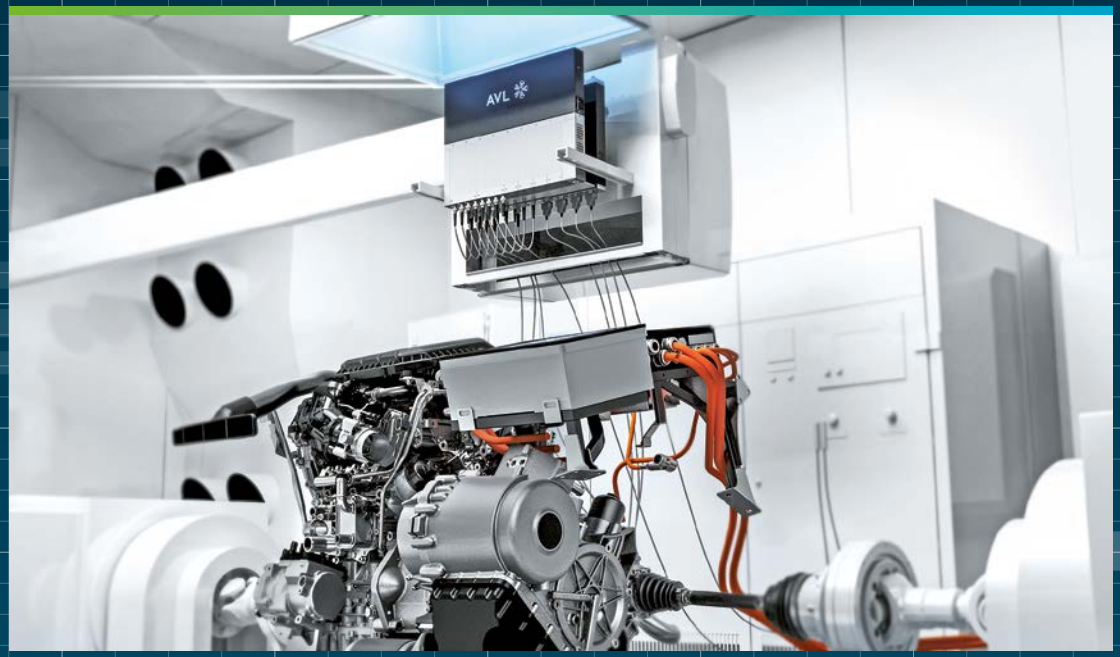
Adapts. Acquires. Inspires.

THE CHALLENGE

Facing ever more stringent emissions targets, the quest for an efficient and affordable powertrain leads invariably through complexity. On the one hand, optimizing every single combustion cycle is becoming a necessity to which modern combustion analysis systems must respond. On the other hand, the capacity of pure internal combustion engines to fulfill upcoming emissions legislations at affordable costs is being questioned – causing development resources to be increasingly invested in solutions based on hybrid and pure electric powertrains.

THE AVL SOLUTION

Confronted with this very complexity in powertrain development and driven by innovation, AVL presents AVL X-ion™ – the cutting-edge high-speed data acquisition platform. AVL X-ion™ is a modular acquisition system that can be easily adapted to different units under test and test environments. Furthermore, the innovative data acquisition platform helps in managing the growing powertrain complexity and combines AVL know-how and expertise in several application areas: indicating, optical combustion and e-Power analysis.



THE ADDED VALUE

- Increased efficiency based on reduced number of tools in the test facility and in the office
- Enables testbed versatility, reduces changeover and retooling times
- Stress-free transition to electrified powertrains
- Future-proof investment thanks to evolutionary module concept

ADAPTS.

- The system consists of a modular platform with 8 slots for front-end modules (X-FEM).
- The X-FEMs optimally combine the analog-digital converter with signal conditioning. The X-FEMs also provide sensor supply and recognition.
- Application-specific X-FEMs ensure the perfect match with target investigations and unit under test.
- The X-FEMs can be easily swapped to quickly adapt to the demands of the project.

ACQUIRES.

- The unique architecture offers a very short analog signal path, which results in highest noise immunity and signal quality.
- AVL X-ion™ allows time and crank angle based sampling at the same time, enabling the collection of the optimal set and amount of data for the desired investigations.
- The signals are centrally synchronized, which drastically simplifies post-processing activities.
- An 8-core signal processor guarantees real-time calculation and output of highly accurate results.

INSPIRES.

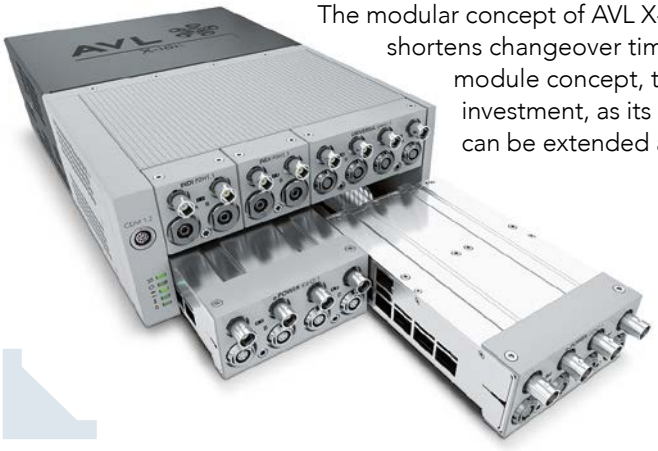
- Powerful acquisition software: User-specific formulas, scripts and macros for creative brains also enable the standardization of operation and process conformity.
- The large system flexibility at all levels opens up a new world of possibilities for facility managers and test methodology teams.
- Significant cost savings and increase in efficiency thanks to a single entry point for all fast signals on the test cell.

ONE HIGH-SPEED ACQUISITION PLATFORM FOR ANY TEST ENVIRONMENT

Revolutionizing the Management of Test Equipment and Facilities

AVL X-ion™ is a compact system with high channel density. The platform can be easily mounted on a boom box or on a trolley, close to the unit under test. The result: short analog cables, a high immunity to interferences and an exceptionally high signal quality. The latter benefit is made possible by the short distance between the input socket and analog-digital converter (ADC) in the front-end modules.

The sophisticated "all-in-one" hardware architecture drastically simplifies the cable schematics for complex test facilities. This significantly reduces installation efforts as well as commissioning mistakes, and increases data quality and test field efficiency at the same time.



The modular concept of AVL X-ion™ enables versatility and notably shortens changeover times between projects. Thanks to its module concept, the AVL X-ion™ is a future-proof investment, as its system capabilities and performance can be extended anytime through new modules.

A Stress-free Transition to Hybrid and e-Powertrains

AVL X-ion™ is delivered with a powerful acquisition software. Regardless of the application, all measurement results are stored in a unique I-file, which greatly simplifies the data post-processing, for instance with AVL CONCERTO™.

The acquisition software also features an advanced interface to AVL PUMA Open 2™, which allows to perfectly control AVL X-ion™ from the automation system. The calculations and data compression results delivered by AVL X-ion™ are consistently transferred to and perfectly synchronized with the automation system.

The unique software environment, which is available with AVL X-ion™, allows engineers to professionally harmonize the development processes for different application areas, and sets high standards of quality and performance for your test facility.

APPLICATION FIELDS

INDI – Combustion Measurement

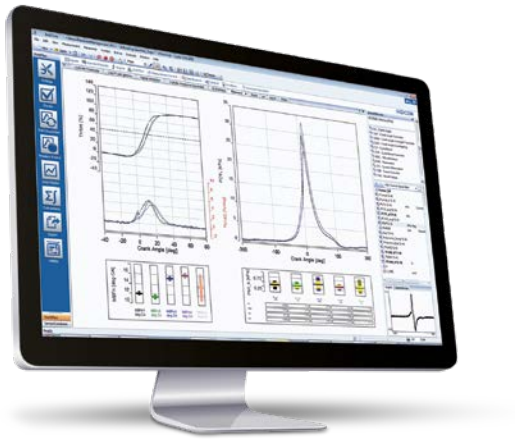
AVL X-ion™ is the product of three decades of experience as market leader in the field of combustion measurement technologies. The new acquisition platform combines high performance and data quality with great comfort for users: Built-in sensor supply and recognition (TEDS, SID), integrated charge amplifier with robust drift compensation, real-time processing and multiple inputs and conditioning for crank angle sensors make it the perfect indicating solution for the entire test field.

VISIO – Optical Combustion Analysis

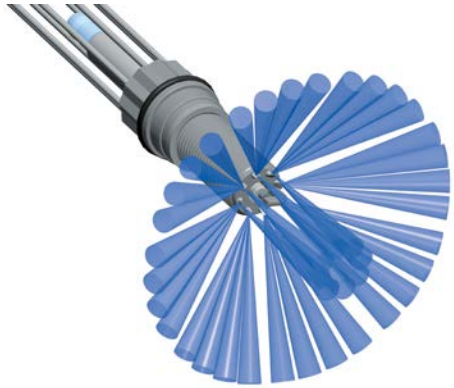
Traditional and optical combustion analyses can now be ideally combined with one unique acquisition platform: AVL X-ion™. A 24-bit ADC combined with high-precision photodiodes make it possible to measure up to 32 light signals per base unit. This highly facilitates the usage of Visio spark plugs for geographic analysis of the light intensity within the cylinder. The light intensity signals can be analyzed directly in AVL IndiCom™ and can be easily combined with cylinder pressure traces thanks to the system modularity

E-POWER – Power Analysis of E-Motors

In order to calculate the power transfer and losses for the optimization of the control parameters, a dedicated front-end module collects and perfectly synchronizes the voltage and current signals between battery, inverter and e-motor. Thanks to the high-speed digital inputs of AVL X-ion™, the AC and DC power analysis of the electric components can be easily combined with the mechanical power available at the flange. Furthermore, the e-power analysis can be combined with combustion measurements of the internal combustion engine (ICE) on hybrid power-trains for the optimization of power distribution.



Cylinder pressure and heat release analysis



Visio spark plug with 40 fiber optics

e-Power and harmonics analysis

PRODUCT HIGHLIGHTS

DIGITAL "UTC" I/Os

AVL X-ion™ offers numerous digital inputs available as "UTC" channels, meaning that solely the changes of digital state are stored. This drastically optimizes the data size and system performance, especially when measuring multiple digital inputs in parallel, e.g. for rotational analysis.

DUAL FILTER*

Every physical input channel of X-FEMs of type "H" can be easily duplicated into two identical virtual signals. These two signals can be filtered individually in real-time, offering the possibility to adapt the filtering to different online calculation results.

GRAPHICAL PROGRAMMING INTERFACE

The graphical programming interface AVL CalcGraf™ offers – as part of IndiCom – an intuitive yet comprehensive way to implement new algorithms. The existing application-oriented libraries strongly facilitate the creation of customer-specific functions.

MODULARITY

The X-FEMs in the base unit can be easily swapped on-site, meaning a quick adaptation of the instrument to the current project and unit under test. This maximizes the system availability and reduces the retooling time and costs.

SENSOR SUPPLY AND IDENTIFICATION

Most X-FEMs feature an embedded sensor supply, which makes it very simple to connect current clamps or low-pressure sensors. In addition, the ability to read industry-standard TEDS and AVL SID™ identification elements ensures a correct setup of the measurement chain and the production of reliable data.

TIME AND CRANK-ANGLE BASED DATA

AVL X-ion™ delivers and synchronizes time and crank-angle based data, making real-time calculations in both domains possible. Most X-FEMs are furthermore able to create both data tracks at the same time.

DYNAMIC PERIOD DETECTION

In combination with the e-Power toolbox, AVL X-ion™ offers a highly dynamic period detection for the calculation of electric power. The robust algorithm avoids blind spots during transient testing and guarantees reliable and precise results.

THERMODYNAMIC DRIFT COMPENSATION*

The X-FEM P2H1 offers a unique and patented drift compensation method for cylinder pressure: The amplifier conducts a zero-level correction, then uses the absolute manifold pressure to precisely evaluate the amount of drift – not biased by transient changes of the manifold pressure – and compensates it. This results in a significant accuracy gain of the cylinder pressure signals during dynamic testing.

* Requires IndiCom V2.9 or higher

PRODUCT PORTFOLIO

X-FEMs







	INDI P2H1	UNIVERSAL U2H1	UNIVERSAL U4H2	VOLTAGE U4S2	E-POWER E4H2	VISIO V8X2	BLANK B001
Type							
# Channels	2	2	4	4	4	8	0
# Free slots required	1	1	2	2	2	2	1
Input type	piezo-electric	voltage	voltage	voltage	voltage	photodiode	–
Sampling rate	2 MS/s	2 MS/s	2 MS/s	1 MS/s	2 MS/s	0.5 MS/s	–
ADC resolution	18 bit	18 bit	18 bit	16 bit	18 bit	24 bit	–
Bandwidth	200 kHz	250 kHz	250 kHz	100 kHz	1,000 kHz	180 kHz	–
Data type	time based, crank-angle based	time based, crank-angle based	time based, crank-angle based	time based, crank-angle based	time based	time based, crank-angle based	–
Input range	up to 36,000 pC	± 1, 10, 60 V	± 1, 10, 60 V	± 10 V	± 1, 10, 60 V	200 ... 1,100 nm	–
Functionalities	Drift compensation, Dual filter, SID, TEDS	Sensor supply (5 V, 12 V), Dual filter, TEDS	Sensor supply (12 V, 24 V, 1 mA), Dual filter, TEDS	Sensor supply (12 V on channels A and C)	Sensor supply 12 V, Dual filter, TEDS	–	–
Recommended applications	INDI	INDI	INDI	INDI	E-POWER	VISIO Gasoline	–

BASE UNITS

X-ion Testbed 683

X-ion Mobile 684

FOR FURTHER INFORMATION PLEASE CONTACT:

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