



EFS 8246, the natural successor to the EMI2

GENERAL

The latest developments in injection to **minimize the consumption and pollution of new diesel motors** mean that the latest generations of injection system have to be more accurate and repeatable in terms of shot to shot injection. **The 8246 is the natural successor to the EMI2** to perform measurements for this new equipment. It is adapted to every type of injection technology available on the market and is closely linked with the actual functioning of the motor (angle measurement principle synchronized with piston measurement) to guarantee the very best combustion development.

The goal is to remain as closely linked to the physical phenomenon as possible and thus to provide the most accurate results based on this information. To **achieve this high level of repeatability**, the new injection technology uses **electronic injectors**. In order to optimize synchronisation and measure all the injector's characteristics, the 8246 has an input for each injection created allowing it to store the electrical pulse used to drive the injector and measure the opening delay .

Moreover, it can drive up to 5 injections per revolution to guarantee the optimal synchronization between driving and measurement.

SPECIAL FEATURES

- Use in the gasoline and diesel fields possible
- Extra wide measurement range of up to 6000 mm³/ revolution*
- Very high accuracy:
 - ± 0.05 mm³ from 0 to 100 mm³**
 - ± 0.1 mm³ from 100 to 600 mm³
- Up to 5 injection events can be measured (extendable to 10)
- Resolution of the injection distance after the preinjection **60 µs @ 3000 RPM**
- Simple to use
- Easy adaptation for all types of test
- Compact setup with embedded electronics
- Very low noise level (no cable between sensor and conditioner)
- Only one instrument and its rack to install
- High degree of reliability
- Suitable for use in rough production environment
(more than 2000 instruments installed around the world)

NOTE : How accuracy is measured and certified

These types of flowmeter are basically volumic flow measurement systems. However to calibrate them, volumic reference cannot be used because fluid volume size is linked with temperature. For this type of equipment only mass can be used as reference measurement and this means that temperature and volume have to be measured so as to transform volume into mass by means of the density relationship. This means that accuracy has to be given in mass to be rechecked by users. A **checking principle** is available by means of a **comparison** between the average measurement provided by the **flowmeter** and a **scales** which collects the same injection (see EFS 8111 checking kit).

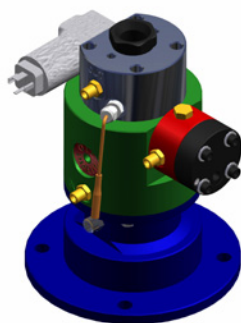
For information, **1°C error** gives **approx. 0.4 mg** for 600 mm³ with ISO4113 fluid.

MEASUREMENT PRINCIPLE

Each injection is collected in a chamber closed off by a solenoid valve and a piston able to move to emphasize the volume. Due to the very low compressibility of the fluid, the piston moves proportionally to the injected volume.

The piston is linked to a highly accurate displacement sensor which gives the image of the added volume. To correlate the result with a mass, a sensor gives the average temperature to transform the volume into mass by the fluid density relation.

After completion of all the injections for one revolution, the chamber is drained by opening the solenoid valve.



All in one compact measuring head

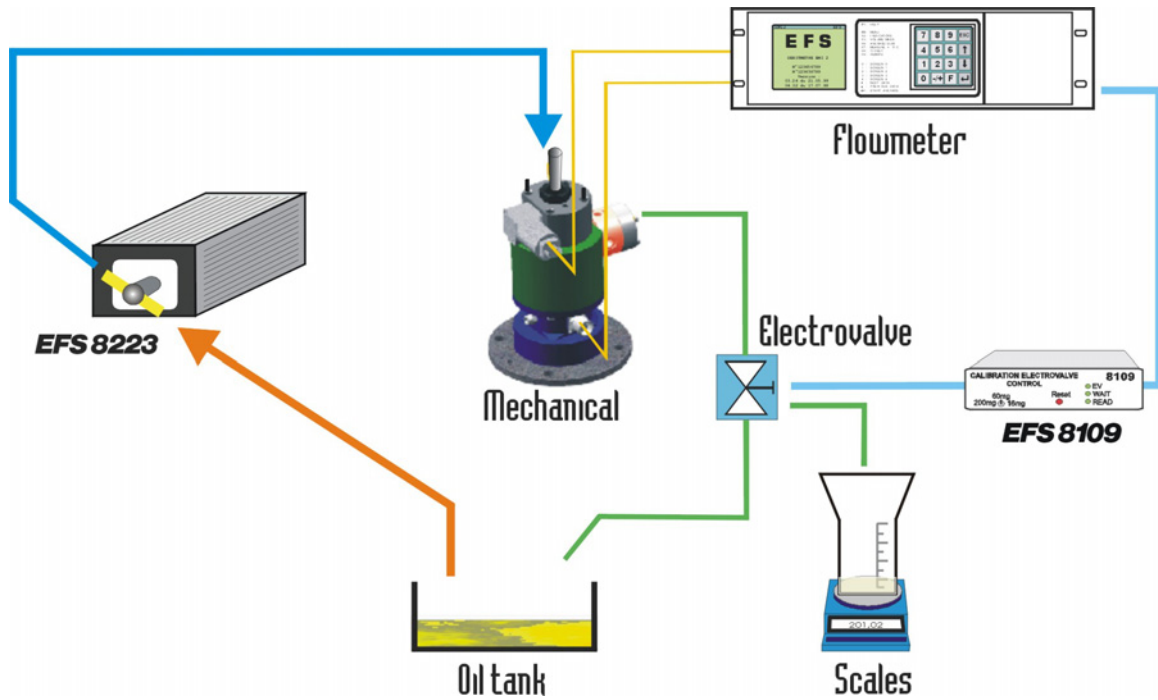
- Injector adaptor
- Measuring chamber with piston
- Temperature sensor
- Solenoid valve
- Back-pressure input
- Displacement sensor
- Conditioning board for all sensors



8246 control rack

- Power stages
- 2 channel ADC
- monitoring output
- internal and external trigger for measurement synchronization
- 1/rev and 3600/rev pump synchronization
- Complete stand alone concept with screen and keyboard for easy adjustment and control

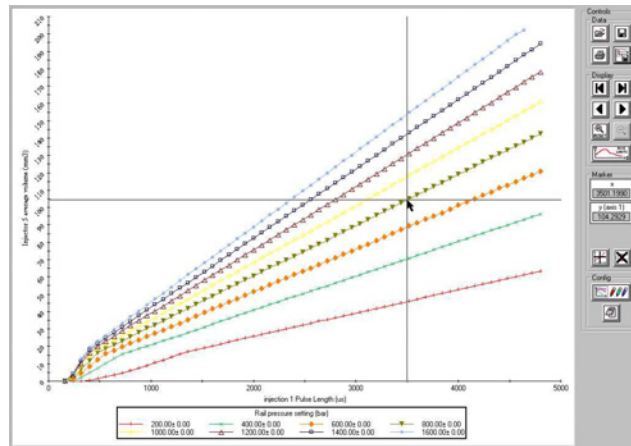
MEASUREMENT SETUP



OPERATING SOFTWARE

For global measurement device :

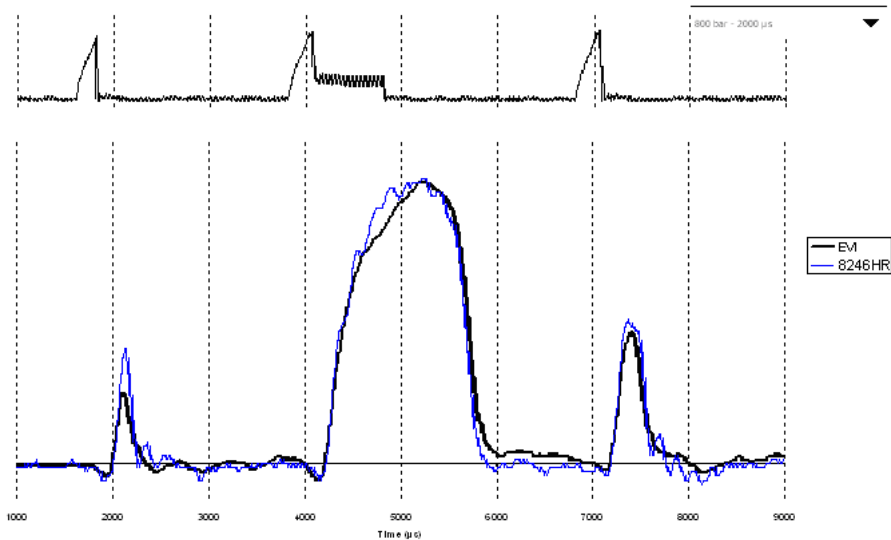
- Test bench software
- XMIQ data acquisition presentation
- Storage with ASCII file output
- Graphic output or XML file
- Injection rate graph display on request
- Cursors for post-analysis
- All synchronization is performed in the hardware and there is no delay between each measurement due to the processing analysis.



The screenshot shows the XMIQ version 4.06.0 software interface. It features a main window with a menu bar (File, Communication, Parameters, Measurement, Screen, Help) and a toolbar. The main area is divided into several sections: a parameter table with columns for Sp, Sat, Dr, T.C, T.S, Leak, Cush, Osc, P.L, Ang, No dr, Outp, Input, D.EV, and EV; a section for Injection 1 through Injection 5 and Total, showing Instant, min/Max, Average, and Cumulative values in mm3; a section for Delays (Instant, min/Max, Average, and Sgm) in μs; and a section for Temperature, Cushion, Speed, and Leakage, showing Instant, min/Max, and Average values. The status bar at the bottom displays the ID (8246), Electronics Serial No. (1595), and Mechanical Serial No. (No meca).

The screenshot shows the 'Additional information - Injection starts, and pulse lengths' window. It displays a table with columns for Injection 1, Injection 2, Injection 3, Injection 4, and Injection 5. The table shows Instant, min/Max, Average, and Sgm values for each injection. Below the table, there is a section for 'Length' with Instant, min/Max, and Average values for each injection.

EVI/8246 injection rate comparison



TECHNICAL DATA

Measuring range (per revolution)	from 0.5 to 600 mm ³ (maximum quantity dependent on speed)
Quantity tolerance (volume measuring error)	range 0.5 – 100 mm ³ : ± 0.05 mm ³ ** range 100 – 600 mm ³ : ± 0.1 mm ³
Quantity tolerance (mass error checked with 1000 averaged shots)	range 0.5 – 100 mm ³ : ±0.15 mg *** range 100 – 600 mm ³ : -0.2 / +0.6 mg
Resolution	0.005 mm ³ **
Number of measurable injections per rev	5 (extendable to 10)
Back pressure	0 to 100 bars
Maximum calibration fluid temperature in the measuring chamber of the EMI2	0 – 140°C average temperature with cooling circuit (injection can be above 210°C)
Operating speed	Up to 3000 RPM
Rotary encoder	1/3600 pulses/revolution, 2 BNC
Diagnostic outputs	4 configurable : 0 – 10V
Operating temperatures	Function : -40°C to +140°C Measuring accuracy : +40°C to +140°C cooling of 60°C (guarantee of accuracy)
Electric supply	230V/50Hz, 110V/60Hz
Power consumption	60VA
Dimensions :	
Electronic element	19" 3U Rack
Mechanical element	Mechanical lower part : Ø 178 mm Mechanical body : Ø 114 mm Height : 235mm

* with EMI6000 option, ** with HR option, *** with HR/HP option.

EFS

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EFS 8246