

MATRIX GAS INJECTORS

HS Series - CNG & LPG

Universal Direct Mounting



MATRIX
mechatronics

MATRIX GAS INJECTORS

HS SERIES

Expressely developed for modern gaseous fuel injection systems, the HS Series takes advantage of MATRIX third-generation technology, following the XJ Series that introduced the multipoint sequential injection and the HD Series, which reached a production of one million units/year since its release in 2005.

MATRIX unique Zero Internal Friction technology grants an outstanding reliability and durability to over 500 Million cycles, equivalent to more than 400.000 Km.

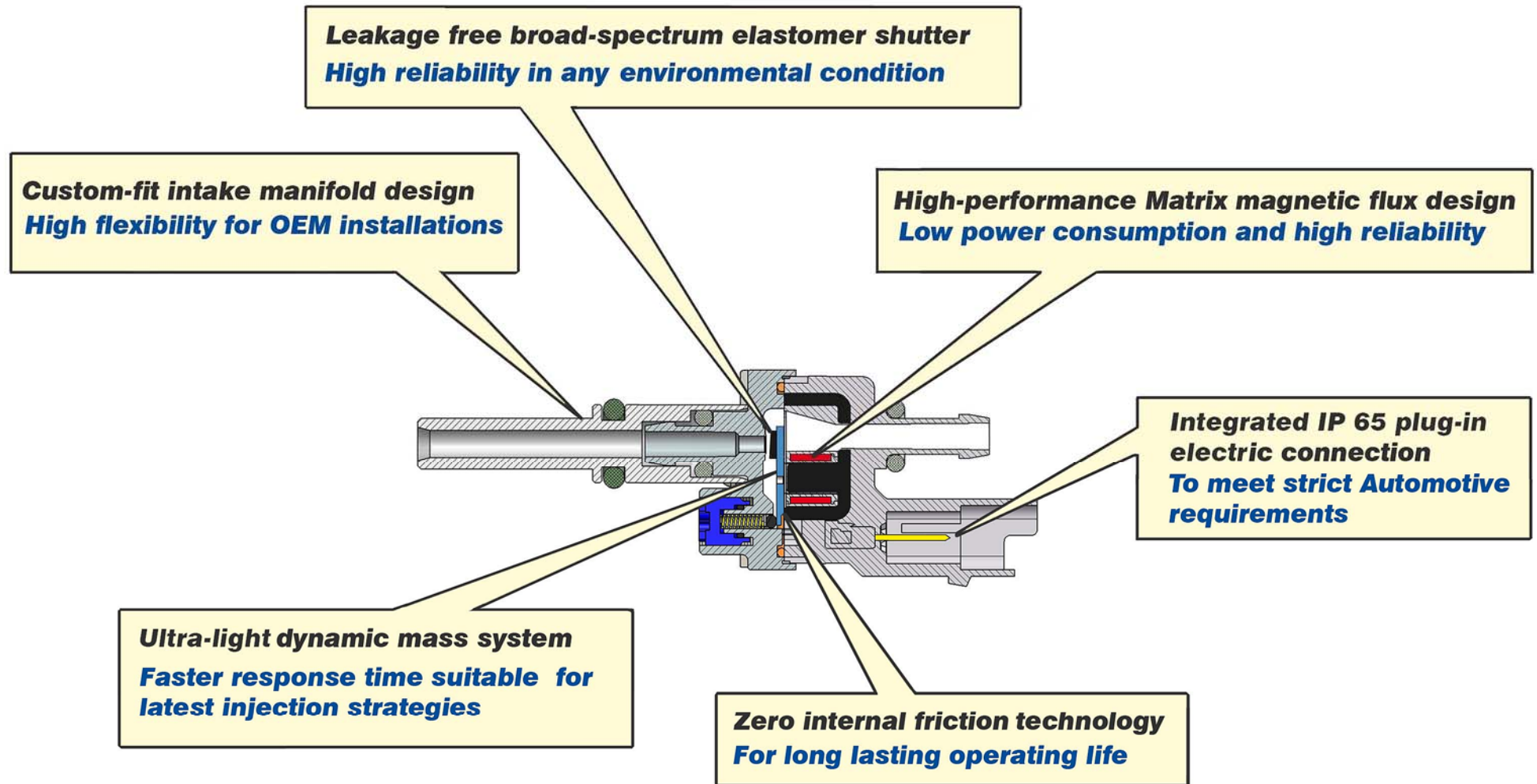
Both the ultra-light dynamic mass shutter system and the high-performance magnetic flux design ensure extremely fast and accurate response times for an enhanced fuel supply linearity.

Through the use of leakage free broad-spectrum elastomers the HS Series offers perfect sealing characteristics in any environmental condition and a reduced noise level for better acoustic comfort.

The advanced design of the HS Series, coupled with the reduced weight and dimensions, allows high mechanical compatibility and ease of installation.

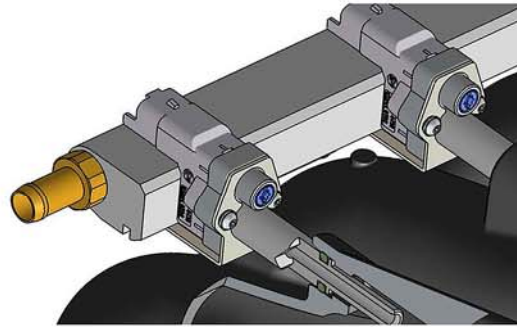
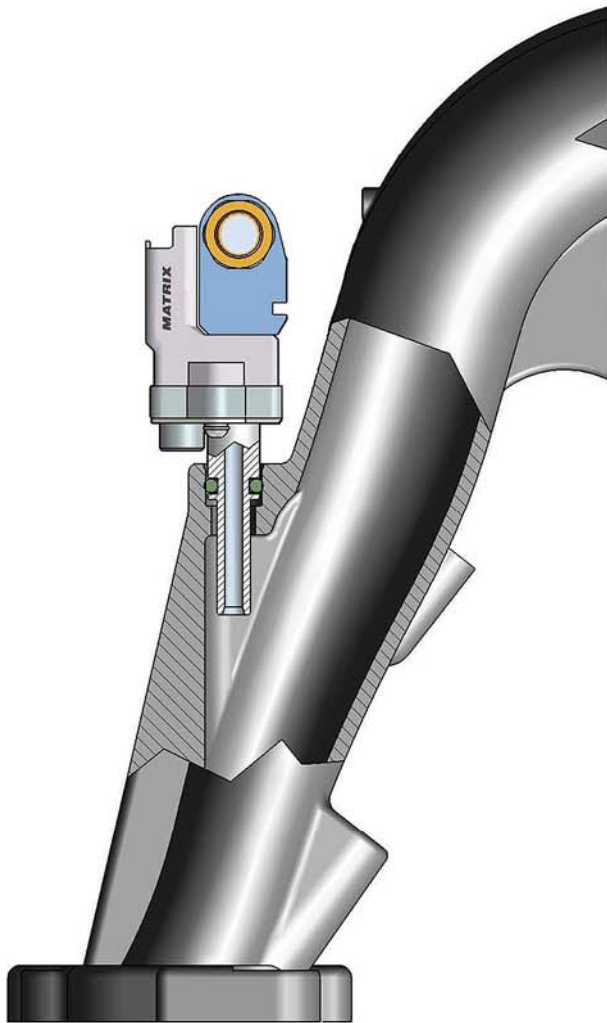
HS INJECTORS HIGHLIGHTS

Universal Direct Mounting



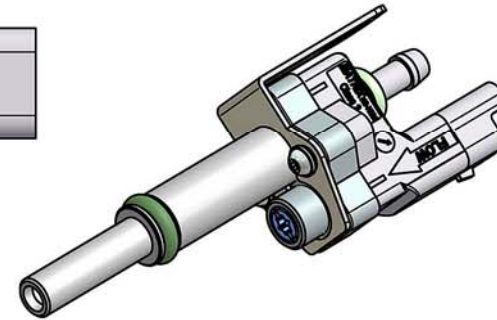
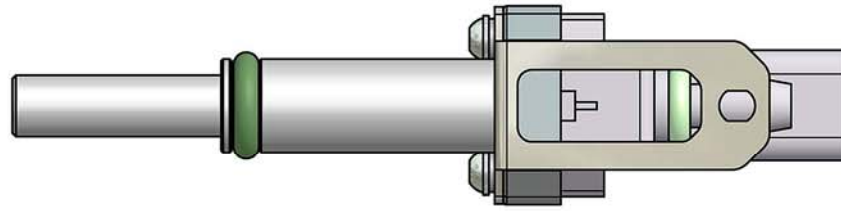
HS INJECTOR - UDM VERSION

Mounting solutions



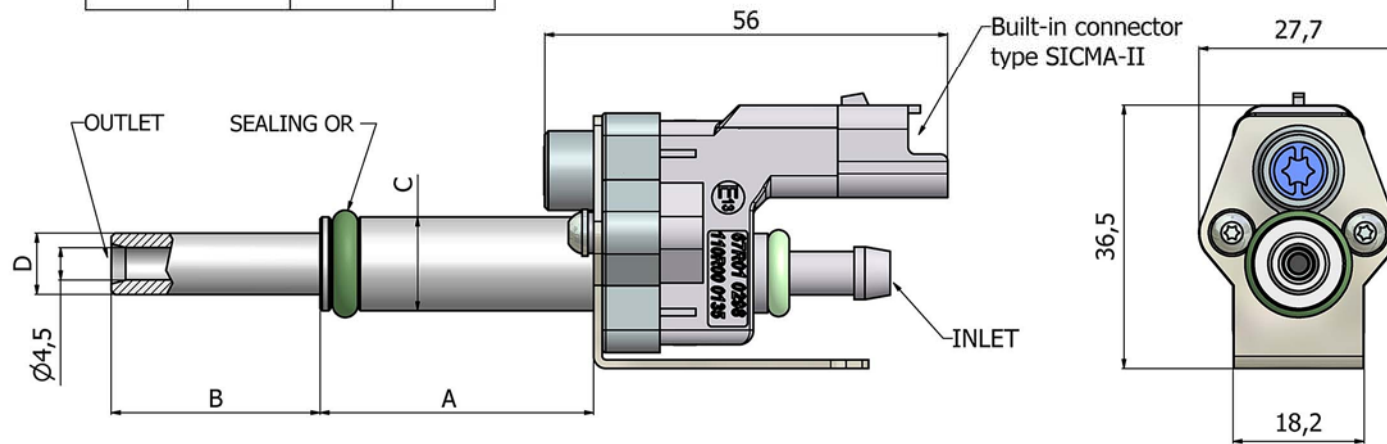
Fuel Rail assembly

HS SERIES UDM - DIMENSIONS



CUSTOM-FIT INTAKE MANIFOLD

A	B	C	D
38	29	13	8,5
38	5	13	8,5
21	5	13	8,5



HS INJECTORS - CHARACTERISTICS 1

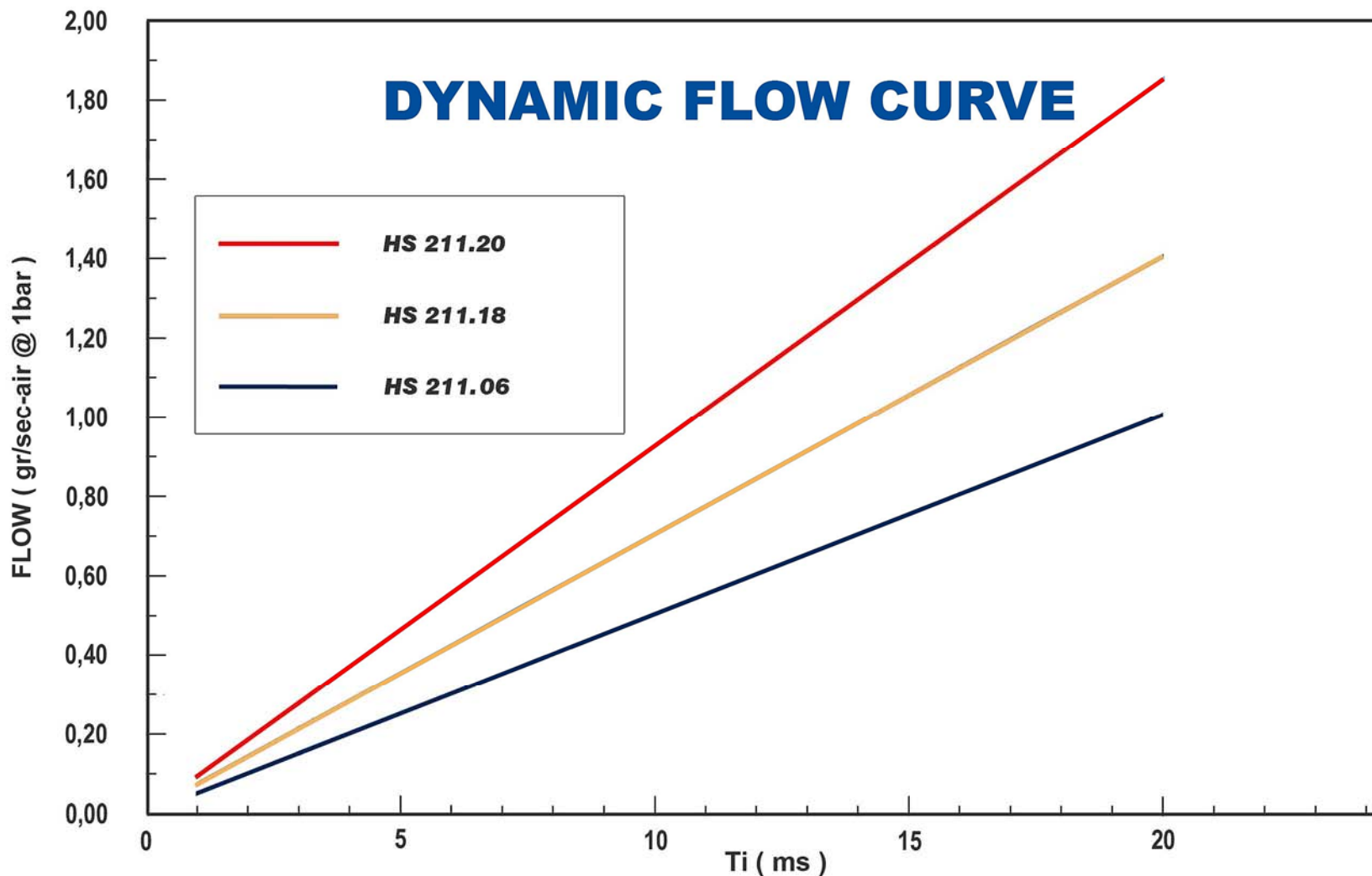
GENERAL CHARACTERISTICS	HS 211.06	HS 211.18	HS 211.20
Handled fluid	LPG - CNG		
Ambient temperature range	- 20°C to 120°C		
Lubrication	Not required		
Max operating frequency (@1bar 1,5ms peak)	150 Hz		
Product life expectancy	500 MI. cycles		
Leakage max	15 cc/h		
IP Protection ratio	IP 65		
PRESSURE			
Typical working pressure	1,0 - 2,0 bar		
Handled pressure	0,5 - 3,0 bar		
Classification pressure (R67-R110 Class 2)	4,5 bar		
FLOW RATE			
Static Flow Rate (@ 1 bar)	1,02 g/s	1,41 g/s	1,85 g/s
Static Flow Rate (@ 2 bar)	1,58 g/s	2,24 g/s	2,84 g/s
RESPONSE TIME			
Opening response time (@12VDC -1bar)	0,85 ms	0,95 ms	1,00 ms
Closing response time (@12VDC -1bar)	0,85 ms	1,00 ms	1,00 ms
Pressure response time (0 - 2 bar or 2 - 0 bar)	0,50 ms	0,50 ms	0,50 ms

HS INJECTORS - CHARACTERISTICS 2

ELECTRICAL CHARACTERISTICS	HS 211.06	HS 211.18	HS 211.20
Electrical control	Peak & hold		
Coil resistance (@ 20°C)	2,0 Ohm	2,0 Ohm	2,0 Ohm
Inductance (@ 20°C)	0,78 mH (open) 0,85 mH (closed)		
Speed-up voltage range	10 to 14 VDC		
Min. operating range (@2bar-3ms peak)	6,0 VDC	6,0 VDC	6,5 VDC
PEAK & HOLD CHARACTERISTICS			
Typical speed-up time (@ 12VDC 50Hz)	2,0 ms (from 0,5 to 1,5 bar)		
	2,5 ms (from 1,5 to 2,0 bar)		
	3,0 ms (from 2,0 to 3,0 bar)		
Speed-up current (@12VDC)	6 Amp max		
Holding current	0,8 Amp		
MECHANICAL CHARACTERISTICS			
Dimensions (standard configuration)	33 x 65 mm		
Electrical connection	Sicma II		
Weight (standard configuration)	45 g		
ECE REGULATION COMPLIANCE			
ECE R67 approval	67R01 0298		
ECE R110 approval	110R00 0135		

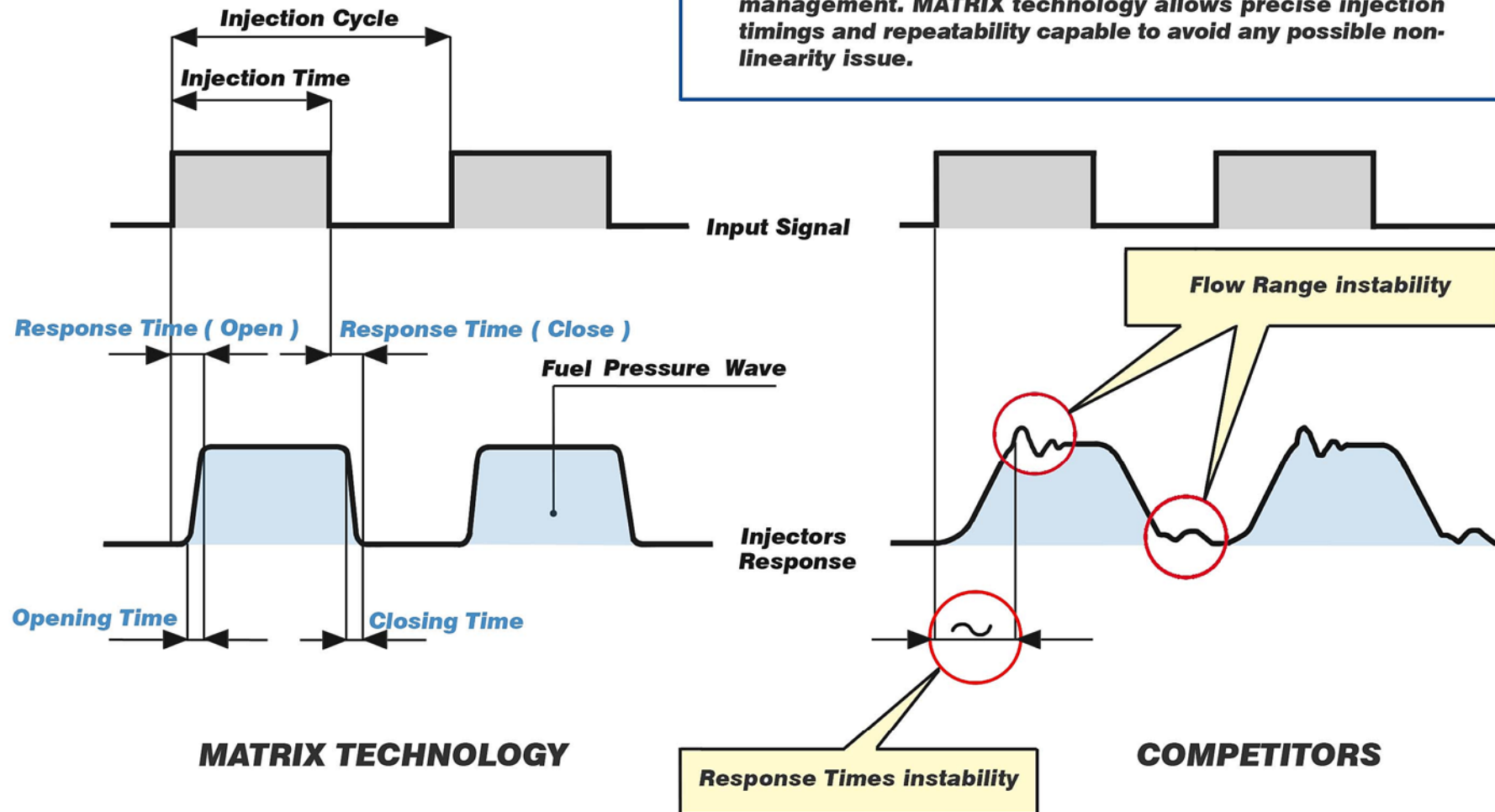
DYNAMIC FLOW RANGE

HS series	Injection time (ms)	2	4	6	10	16	20
Flow rate gr/sec-air @ 1bar	HS 211.06	0,11	0,20	0,30	0,50	0,80	1,02
	HS 211.18	0,15	0,29	0,43	0,70	1,14	1,41
	HS 211.20	0,19	0,37	0,56	0,92	1,46	1,85

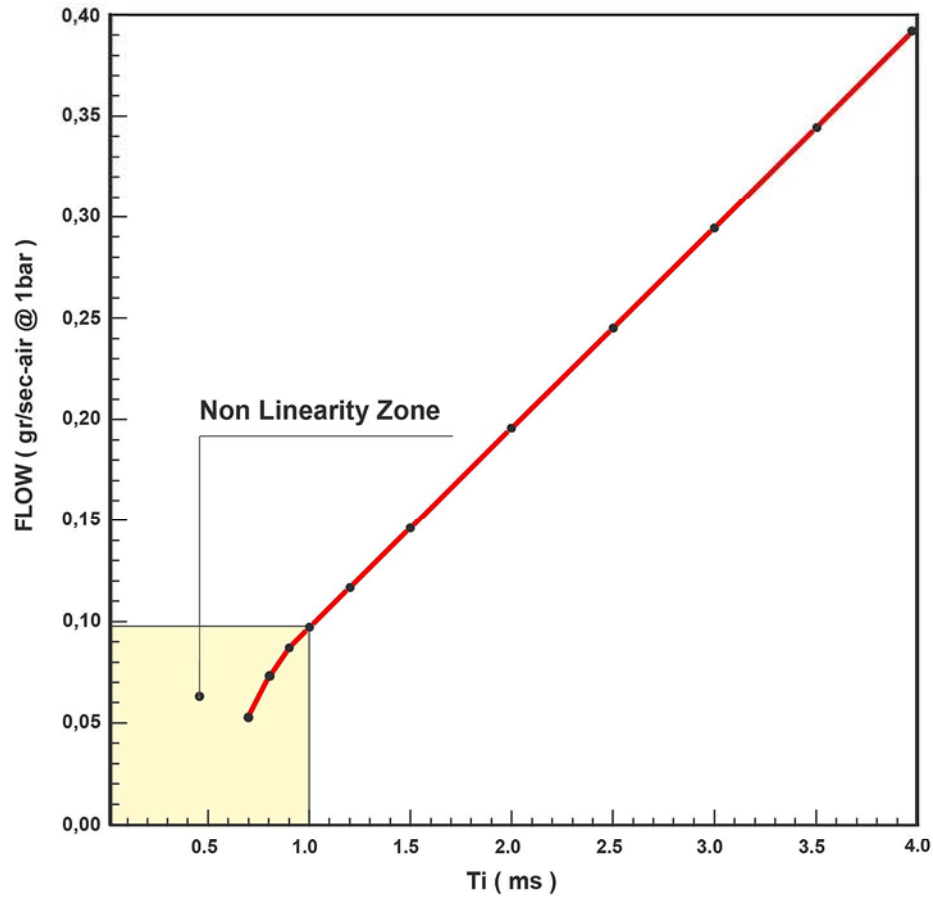


LINEARITY PERFORMANCE - COMPARISON

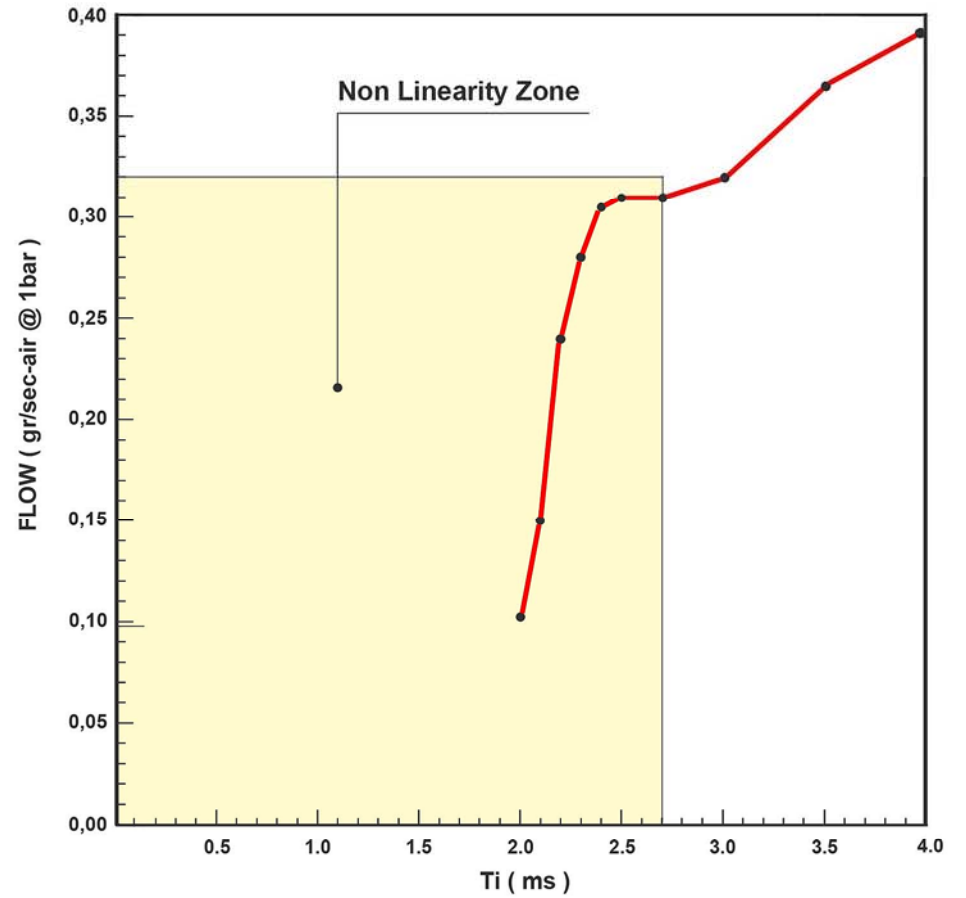
MATRIX injectors grant an overall improvement of response accuracy and fuel supply linearity, two key performance factors in driving quality perception and engine emissions management. MATRIX technology allows precise injection timings and repeatability capable to avoid any possible non-linearity issue.



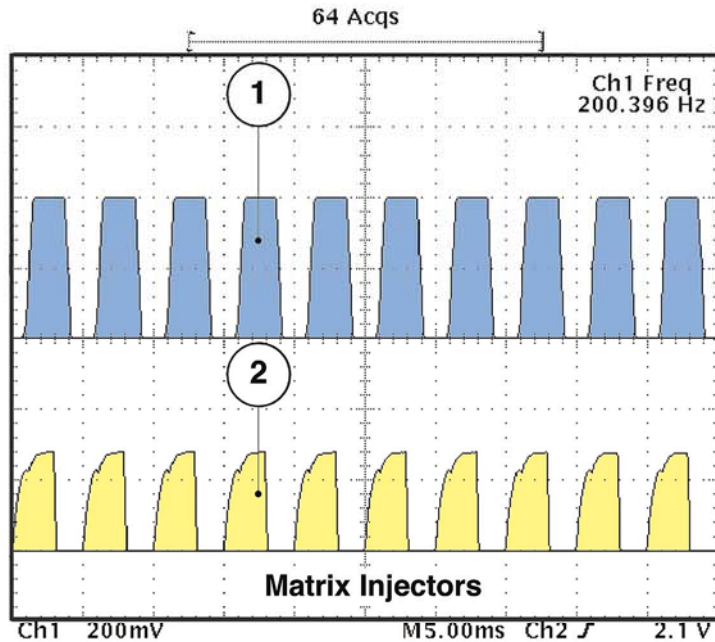
MATRIX HS SERIES



COMPETITORS



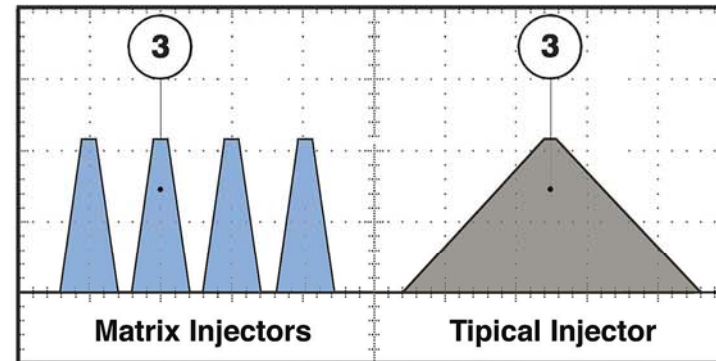
RESPONSE TIMES & NEW APPLICATIONS



REPEATABILITY AND PRECISION. The graph shows the high level of precision and repeatability guaranteed by Matrix's injectors. Fluctuation of response times are lower than measurable levels; such values, due to a functional principle which is absence of friction, remain constantly unaltered in all environment conditions featured by product specifications.

1 Outlet pressure wave

2 Current wave

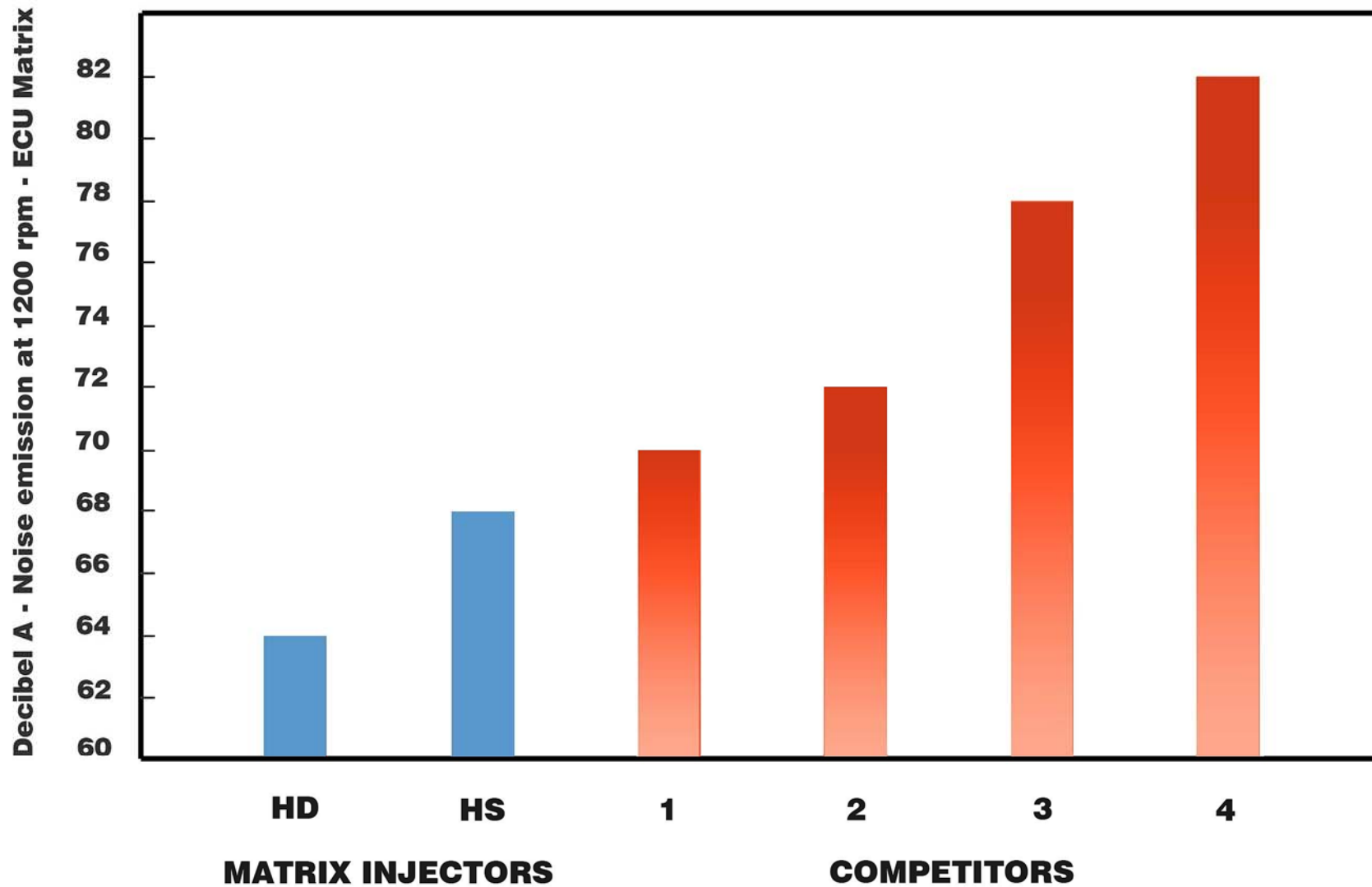


HIGH LINEARITY and NEW APPLICATIONS. The remarkable injection time reduction typical of Matrix's injectors grants an engine output linearity enhancement, currently not available with any other injector or technology. For this reason Matrix's injectors have been chosen for the development and implementation of new and innovative gas injection strategies in gasoline and diesel applications such as micro-injections and multi-injections, focused on performance improvements both in terms of fuel consumption and emissions reduction.

3 Minimum injection time

MATRIX
mechatronics

NOISE EMISSION - COMPARISON



RELIABILITY & PHISICAL TEST

Test	Test condition
Compatibility	ECE R67 (LPG) and ECE R110 (CNG)
Working life	500.000.000 Cycles
Salt spray	In compliance with 15500-2
Ozone ageing	In compliance with iso 1431-1
Damp resistance	90° umidity at 60°C
Vibration	40 to 500 Hz , 1 Oct/min frequency sweep, 20g
Thermal shock	-30°C to 120°C
High temperature exposure	130°C stabilized
Low temperature exposure	-40°C stabilized
Mechanical shock	Ref. SAE J1832 11/89 regulation 5.8.7
Leakage	Ref. ECE R67 and ECE R110
Over pressure	7 bar
Over voltage	24 VDC 1 min. 50Hz

COMPLETE HS SERIES RANGE



Rail version



Plug-in version



Flying version



Universal DM version