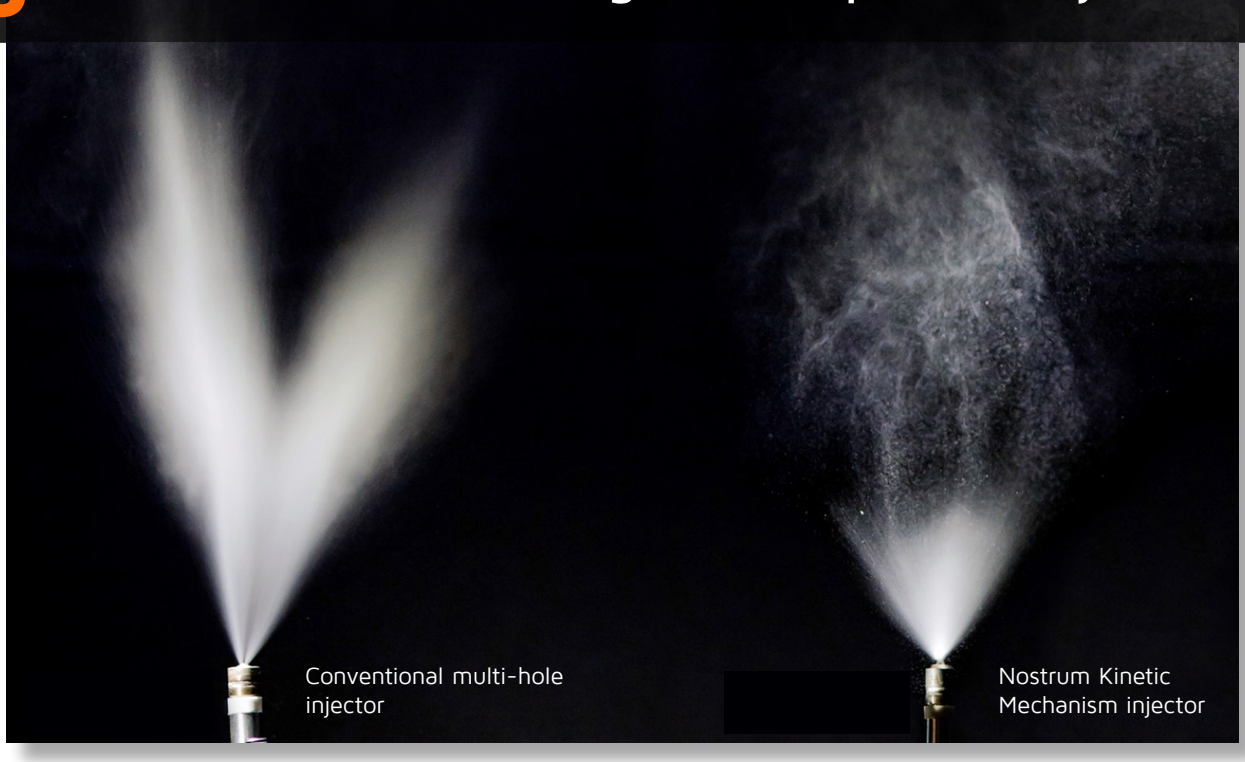
NOSTRUM energy

High Flow K-DI™ High Horsepower Injectors



High flow and high atomization direct injectors with advanced injector technology utilizing a novel kinetic particle break-up mechanism. More than four years of research and testing have demonstrated significant improvements in fuel delivery. Engine tests show higher heat release and faster burn rates than conventional air-shear fuel injection mechanisms, resulting in improved fuel efficiency and increases in power. This novel injector technology is now being made available for high flow after-market products.

Applications:

- **GM 2.0T LHU MY 2010-13**
- **GM 2.0T LTG MY 2013-16**
- **GM Gen5 V8: LT1, LT4 2014+**
- **VAG 2.0 TFSI EA888 MY 2009-14**
- **Ford EcoBoost 2.3 MY 2015+**
- **Ford EcoBoost 2.0 MY 2011-15**
- **BMW 3.0L N55 MY 2010-16**

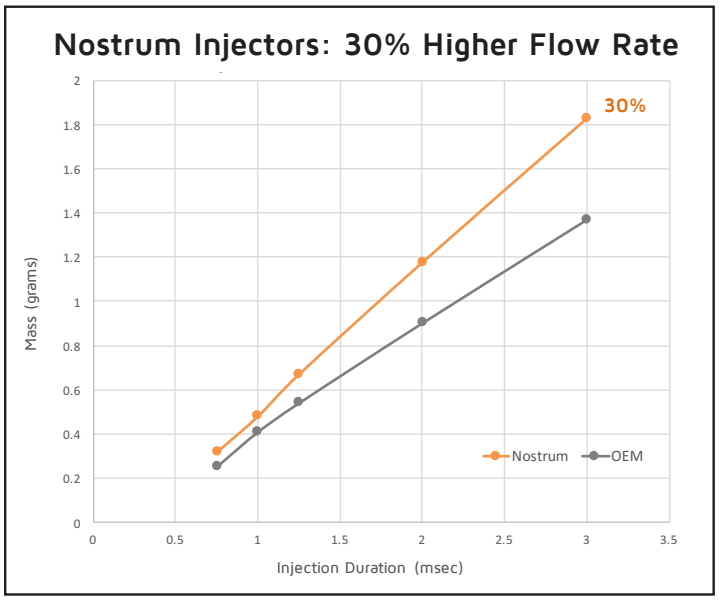
Customer-specific flow rates and additional applications on request.

We are seeking demonstration & retail partners for 2017.

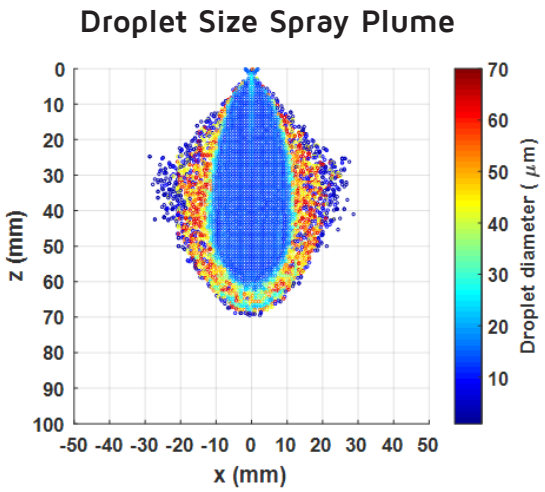
Kinetic Direct Injection (K-DI™)

- Proprietary "Kinetic" particle break-up mechanism with patented nozzles provide superior fuel atomization, better Air-Fuel mixing, and shorter liquid lengths versus leading conventional injectors
- High flow, high performance applications
- Flow rates and spray patterns are application specific
- Compatible with Ethanol up to E100
- Standard GDI injector body profiles, connectors & fuel pressures
- Standard OEM ECM injector drivers

* May require engine calibration changes * Vehicle application results may vary

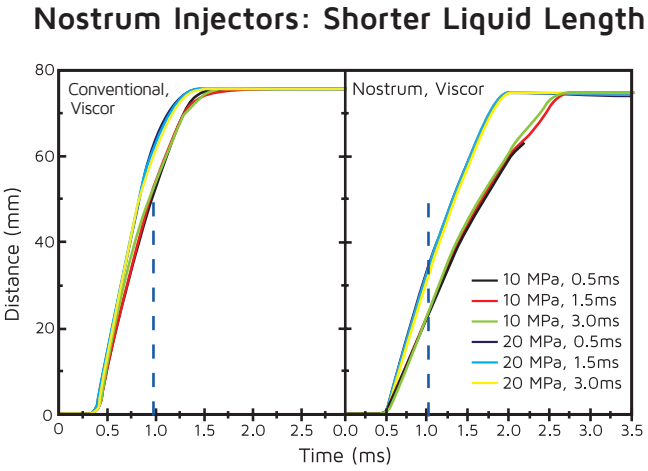


Validation tests demonstrate **high flow** capabilities (left) with **small droplet** size distribution (below) and **short liquid lengths** (below), all providing less wall impingement and great fuel delivery.

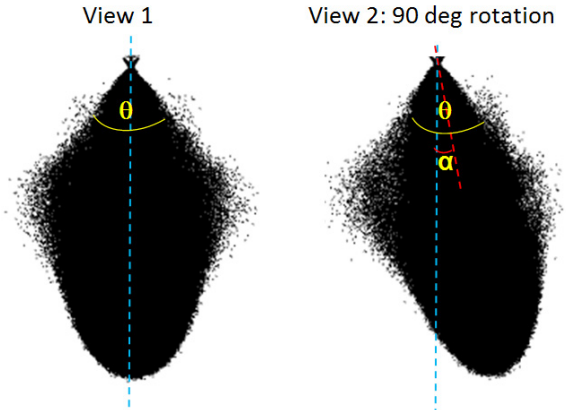


High Flexibility in Injector Design

Product Line	Kinetic Gasoline Direct Injection O
Model Line	Premium Line
Application	Direct Replacement After-market & Custom Programs
Description	Fully integrated impinging nozzle geometry with Swiss Machining Processes
Spray Type	Diffuse Cone Plume
Number of holes (n)	2, 3, 4, 5, 6 and 7 holes
Plume angles (Theta)	35° to 110°
Targeting angles (Alpha)	0° to 35°
Plume cross sections	Round, oval, irregular, concavely or convexly polygonal, or any freehand shape
Static flow rates	Up to 30 g/sec @ 100bar
Minimum pulse width	0.35 msec
Static flow tolerance	+/- 3%
Dynamic flow tolerance	+/- 3% @ 1ms
Leakage	< 2.5 mm^3/min
Dead volume	~2 mg
Base Injectors	HDEV 5.2
Operating pressure	up to 280 bar
Operating temperature range	-31°C to 130°C / -24°F to 266°F
Fuel compatibility	All Ethanol grades
Power Supply	Standard GDI Driver
Coil Resistance	1.5 Ω
Length (mm)	90



Optimized Spray Angles to Match Any Combustion Chamber Geometry



For more information, please contact:
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