Side Feed Gaseous (SFG) Injector

part number 1309-6188

Applications

The Side Feed Gaseous (SFG) Injector is designed for compressed natural gas (CNG), on-highway, commercial engines.

CNG is preconditioned on the vehicle to the appropriate fuel temperature and pressure before delivery to the injector. A peak-and-hold driver circuit commands the required pulse width to the injector to provide the desired fuel mass to the engine.

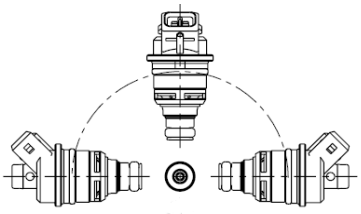
Description

Flow Direction
Fuel admission is through a 25 µm filter screen and side ports around the injector body circumference. Metered fuel is discharged through the outlet nozzle at the bottom of the injector.

Permitted Media
Vapor phase natural gas consisting of primarily methane (85 % to 95 %) with balance of longer hydrocarbons such as ethane or propane, and inert gases such as nitrogen or carbon dioxide.

Media Constraints
Use on LNG is not permitted. Fuel sulfur levels must be in accordance with ISO 15403-2:2006. Upstream particulate filtration is required with 95 % efficiency at rating of 1 µm or smaller.

Installation Guidelines



Orientation
- Inlet above outlet (see diagram)

Installation Procedure
- O-rings must be lightly lubricated with oil before installation (clean motor oil).
- Using a light twisting motion, gently push injector into installation pod.

Retention
The injector must be retained in the installation pod by means of a hold-down clamp or clip applied over the main body flange. A flange circumference of 260° should be supported in order to meet final assembly burst and leakage specification, and the retaining clamp must be supported by no less than two fasteners adjacent to each injector, spaced evenly (180°) apart.

Mating Electrical Connector
Use Packard Housing P/N 12129140 connector, with 2x Packard Terminal P/N 12077939, or equivalent

- Designed for heavy duty on-highway applications
- Cartridge-style body for simple fuel block or rail integration
- Fluorosilicone and low-temperature fluorocarbon O-rings for operation in cold environments
- Proven through 600 million cycle endurance testing

Specifications

Electrical and Driver

Coil Resistance	(4.2 ± 0.50) Ω @ 20 °C
Inductance (reference)	11.4 mH @ 20 °C
Insulation Resistance	10 Mς minimum @ 500 V (dc)
Operating Voltage	
Nominal	27.6 V (18 to 36) V (dc) range
Driver	3 A peak with 0.75 A hold

Do not operate without flow.

Performance Specification

Static Flow Rate	19.69 kg/h ±5 %
Dynamic Flow Rate	15.12 mg/pulse ±7 % @ 3.0 ms pulse width
External Leakage	0.25 sccm at 9 bar differential
Internal Leakage	0.25 sccm at 9 bar differential

Flow Test Conditions

Engineering Test Stand	FI-ETS1
Voltage	(27.60 ± 0.05) V (dc)
Pulse Period (frequency)	10.0 ms (100 Hz)
Drive Circuit Type	Peak and Hold
Drive Card Number	U9122-765
Peak/Hold Current Levels	3 A / 0.75 A
Peak Dwell Time	2 ms
Test Fluid Type	Nitrogen
Test Fluid Spec	Grade 4.0
Pressure	(10.0 ± 0.01) bar absolute
Temperature	(25 ± 1) °C

Minimum Pulse Width

Linearity ± 5 %	2.5 ms
Duration of injection	1.0 ms

Reference Flow Values

Reference Fluid	Compressed natural gas
Static Flow Rate	14.74 kg/h
Dynamic Flow Rate	10.86 mg/pulse

Operating Pressure

Maximum Operating Pressure	10.0 bar absolute
Maximum Opening Pressure (dry)	≥ 15.17 bar differential inlet to outlet

Operating Temperature

Operating Temperature Range (media and ambient) –40 °C to +125 °C

Storage Temperature

Long Term –40 °C to +60 °C

Burst Pressure

No release of components below 114 bar gauge

Overpressure without Damage

Short term operation with pressure spikes no larger than 21.7 bar gauge

Weight

Dry 75 g (approx.)

Operating Environment

- Automotive under-hood
- Water, condensing and non-condensing petrochemicals (oil, fuel, exhaust emissions, gasoline, diesel, natural gas)

Environmental Verification Procedures

Salt Fog	144 hour salt fog test, 5% aqueous NaCl, (33 to 36) °C Upon completion, unit must pass leakage specification
Vibration	Random vibration to demonstrate 20 000 h field life at up to 6 Grms
Mechanical Shock	MIL-STD 810F, Method 516.2, Procedure 1, Basic Design Test at 40 g, 11 ms sawtooth pulse, in each of 3 planes, 3 shocks per axis
Endurance	Bench durability to 600 million cycles, compressed air with 25 ppm oil. Tolerance limits: static flow shift (±7 %), dynamic flow shift (±15 %) and room temperature internal leakage (≤ 0.25 sccm)

Permitted Cleaning Solutions

It is permitted to clean the injector wetted parts and external surfaces with n-Heptane or Stoddard solvent. Methanol-containing solutions are not allowed for cleaning.

WOODWARD

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