

NGV & LPG

Environment-friendly
Low air-pollution

 **HANA ENGINEERING**

Patent & Certification

CLASSIFICATION	ITEM	No.	Remarks
PATENT	Duty Solenoid Valve	0282291	
	Injector Control Unit	0295073	
	Fuel Cut Valve	0282292	
	HAHA LOGO	40-0796992	
I S O	ISO 9000:2000	August 2003	
Australia AGA	Injector, ECU, Vaporizer, Solenoid Valve		
TOYOTA Motor	Philippines Quality Guarantee		
EURO-III	CNG Bi-Fuel System in China		
Malaysia SIRIM	CNG Regulator (Sequential)		
ECE-67R LPG	Single Injector	E4 67R-01 0213	
	Injector Ass'y	E4 67R-01 0214	
	Vaporizer	E8 67R-01 5316	
ECE-110R CNG	Injector	E8 110R-00 4686	
	Regulator	E8 110R-00 5020	
	Automatic solenoid valve	E4 110R-000148	
	Filling Unit	E4 110R-000147	

Injector

H2000



H2100












H2200



H2300



Comparison with competitors

HANA Injector		Max Pressure	Full & Voltage	Injector		Flow Rate L/min	Injector			Engine Size	Remark
Model No.	Picture			Type	Color		Maker	Color	Type		
H2000 Top Feed		4 bar	Gasoline DC 12V	AA	Blue	130	JAPAN KEIHIN	Brown	100cc	>3.0L	
				A	Green	115		Yellow	73cc	>2.4L	
				B	Red	90		Orange	63cc	2.0~2.4L	
				C	Black	75		Blue	52cc	1.6~1.8L	
				D				White	43cc	1.1~1.6L	
				E				Green	32cc	< 1.1L	
H2100 Top Feed		5 bar	Gasoline DC 12V	A	Green	224	USA CAP			3.0~9.0L	Only HANA
		8 bar	Diesel DC 24V	A	Green	584				9.0~15L	
				B	Red	494				Heavy-Dyty-Truck	
		H2200 Side Feed		12 bar	Diesel DC 24V	A				Green	
H2300 Side Feed Top Feed		9 bar	Gasoline DC 12V	A	Green	140	BOSCH			1.1~4.0L	Bosch No. 0 280 158 821
											

Technical Specification

Model No.			H2000			H2100		H2200	H2300		
Item			Top Feed Type			Top Feed Type		Side Feed Type	Top Feed		
			Specification								
Voltage			DC 12V			DC 12V	DC 24V	DC 24V	DC 12V	DC 12V	
Resistor (Ω)			3 Ω	1.9 Ω	1.2 Ω	1.4 Ω	1.4 Ω	1.15 Ω	1.2 Ω	1.2 Ω	
Max Pressure			3.0 bar	4.0 bar	5.8 bar	3.5 bar	8 bar	12 bar	9 bar	9 bar	
Operation Pressure			1.2 bar			1.5 bar	5 bar	9 bar	7 bar	7 bar	
Flow Rate L/min	AA-Type	Blue	130			-	-	-	-	-	
	A-Type	Green	115			224	584	437	140	140	
	B-Type	Red	90			200	494	-	-	-	
	C-Type	Black	75			-	-	-	-	-	
	D-Type	Yellow				-	-	-	-	-	
Open Time	AA-Type	Blue	-	-	2.2ms	-	-	-	-	-	
	A-Type	Green	2.8ms	2.36ms	-	3.0ms	1.54ms	1.64ms	1.8ms	1.8ms	
	B-Type	Red	2.7ms	2.24ms	-	2.8ms	1.54ms	-	-	-	
	C-Type	Black	2.6ms	2.0ms	-	-	-	-	-	-	
	D-Type	Yellow			-	-	-	-	-	-	
Closing Time	A,B,C		1.2ms			1.2ms	0.8ms	0.8ms	1.2ms		
Pick Current			4 A			6 A	7.5 A	7.5 A	4 A		
Hold Current			2 A			2 A	2.5 A	2.5 A	2 A		
Operating gas			LPG / CNG / LNG / Hydrogen								
Size			70 \times Φ 25			80 \times Φ 33			70 \times Φ 25		

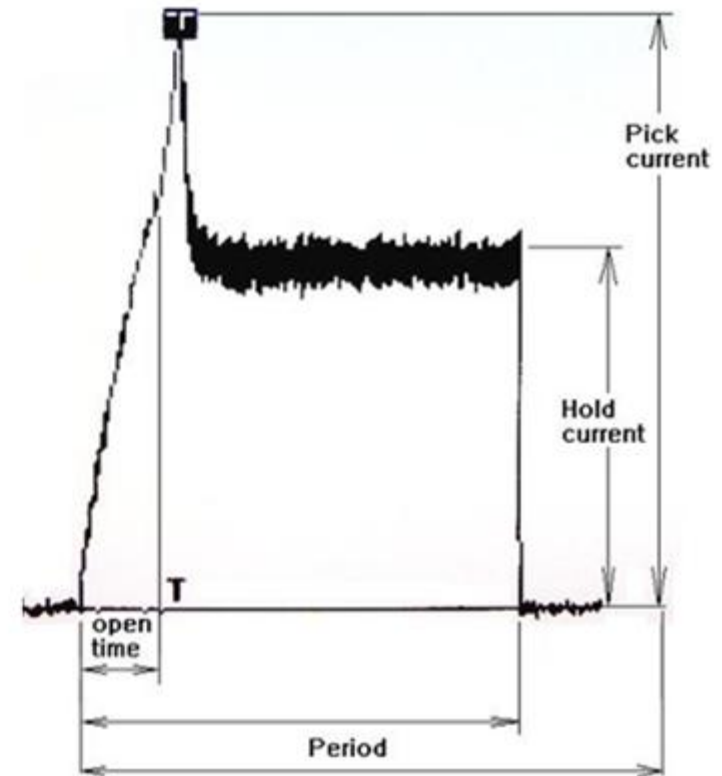
Engine Size according to Flow Rate

Model No.	Fuel	Voltage	Injector		Flow Rate L/min	Engine size
			Type	Color		
H2000	Gasoline	DC 12V	AA	Blue	130	6 & 8 cylinder
			A	Green	115	6 & 8 cylinder
			B	Red	90	4 & 6 cylinder
			C	Black	75	4cylinder
H2100	Gasoline	DC 12V	A	Green	224	8 cylinder
			B	Red	200	8 cylinder
	Diesel	DC 24V	A	Green	584	Heavy-duty truck
			B	Red	494	
H2200	Diesel	DC 24V	A	Green	437	Heavy-duty truck
H2300	Gasoline	DC 12V	A	Green	140	4~8 cylinder

■ Refer to the above flux. You must use the above data when you test vehicle.

Peak & Hold Current

No	TEST CONDITION	H2000			H2100		H2200	H2300
		3Ω	1.9Ω	1.2Ω	1.4Ω	1.4Ω	1.15Ω	1.2Ω
1	Operating Voltage	DC 12V			DC 12V	DC 24V	DC 24V	DC 12V
2	Pick Current	4A	4A	4A	6A	7.5A	7.5A	4A
3	Hold Current	2A	2A	2A	2A	2.5A	2.5A	2A



Pick & Hold Current must be adjusted to E.C.U and Injector spec.

Advantages of Hana injectors

1. Existing Italian type Injectors

Most injectors used around the world look like the right picture. They have the same structure as solenoid valves which are used on LPG and CNG regulators.



2. Advantages of Hana injectors

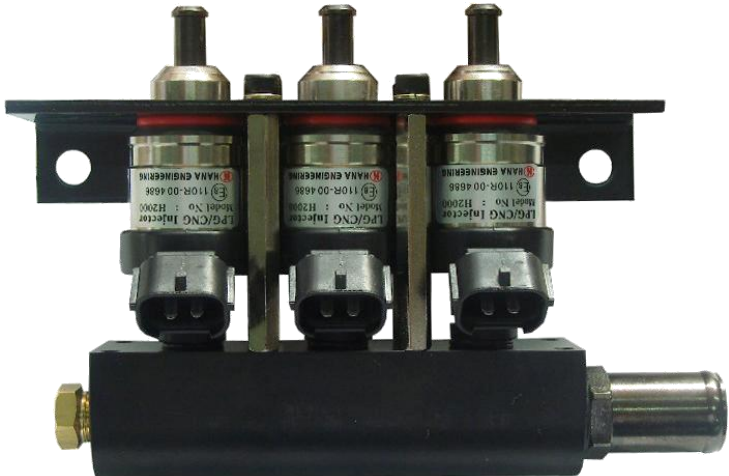
- Long durability
- Excellent reliability
- Good resistance to vibration & heat
- Can be used for OEM applications
: Side feed type can't be directly installed on manifold.



Advantages of Hana injectors

- Various types (H2000, H2100, H2000 & H2300) are available to cater for small and large engine displacement
 - :Our competitors have injectors corresponding to H2000 only
- Superior quality, but low price
 - : Compared with competitors such as Keihin(Japan), Cap(USA), Aec(Australia), Bosch(German).
- Customization according to customer's request is possible
 - : Flow rate, resistance, etc.

Rail Assembly



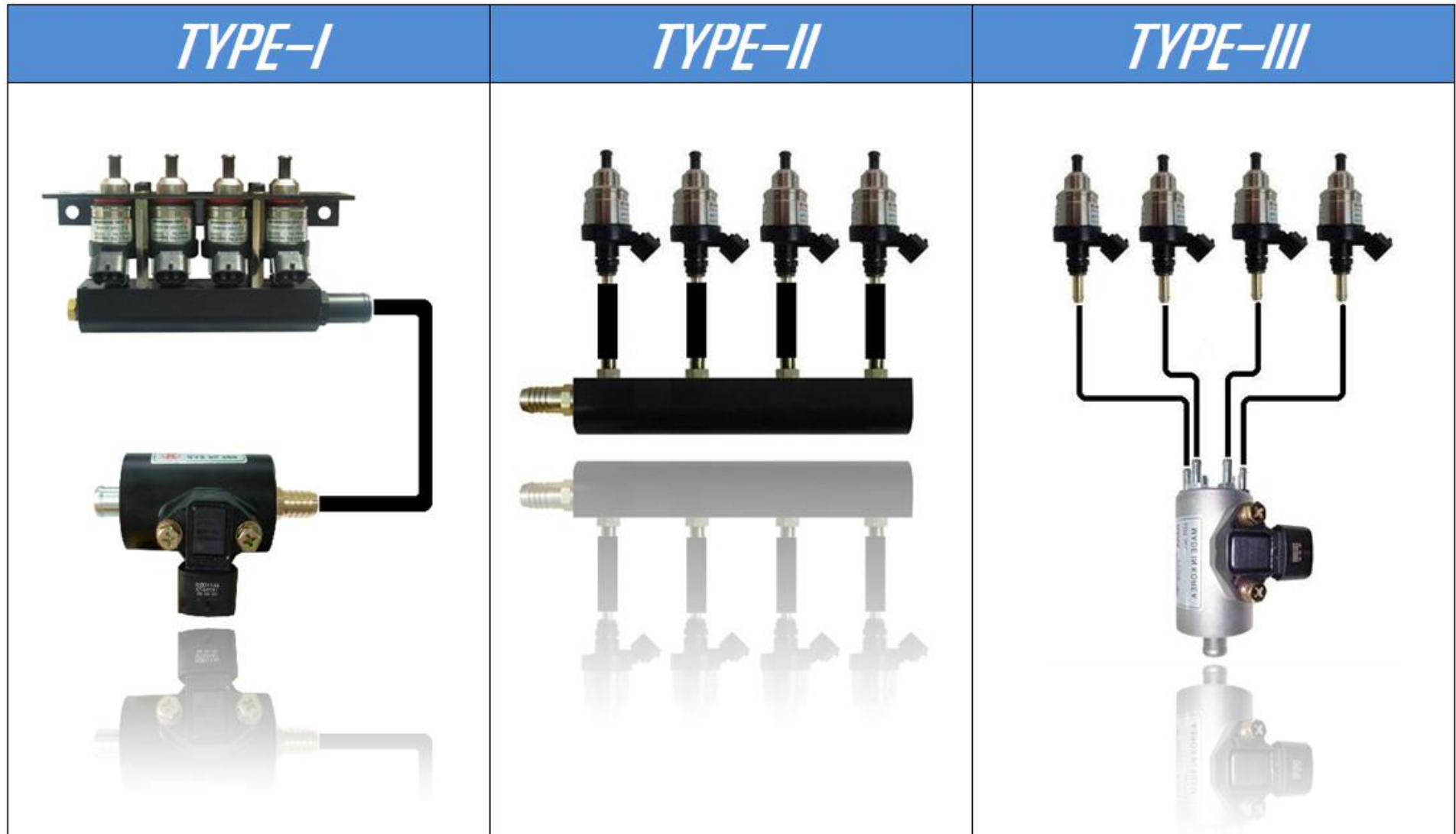
General Type



Hose Type



Hose Type & Rail Assembly



Sales Record of HANA Injectors in domestic & foreign market

Model No.	Year	Customers	Example to apply	Sales period
H2000	2005	Domestic & foreign	Selling injection system in domestic & foreign market	6 years
			Selling injectors in domestic & foreign market	
	2008	China OEM	Chinese Changchun FAW Sihnan Engine Manufacture Co.,Ltd.	3 years
	2008	KOREA	Diesel→LPG : Dedicated (mono fuel) KOREA HYUNDAI MOTORS STAREX	3 years
H2100	2009	KOREA	Diesel→LPG : Dedicated (mono fuel) KOREA KIA MOTORS CARNIVAL	2 years
H2200	2010	China OEM	Chinese Changchun FAW Group Corporation Manufacture Co., Ltd.	1 year
		KOREA	LNG DDF System : EROOM G&G Co. Dedicated LNG system is being developed by EROOM G&G and Korea Gas Corporation	

Applications in automakers



H2000

Korea



Europe



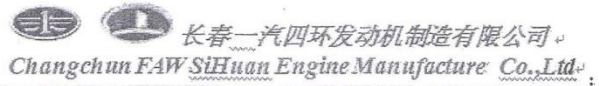
Japan



USA



China OEM – HANA CNG Regulator & Injector



CA4GNE4 天然气欧IV发动机公告参数审批表

序号	参数名称	CA4GNE3	CA4GNE4
1	容积压缩比	10.5: 1	9.5: 1 或 10.5:1
2	最大净功率/转速预定值	80 kW/ 3200r/min	80 kW/ 3200r/min
	最大净功率/转速实际值		78.255kW/ 3400r/min
3	最大净扭矩/转速预定值	290Nm/1600 r/min	290Nm/ 1800~2400r/min
	最大净扭矩/转速实际值		259.89 Nm/ 1800~2400r/min
4	额定功率/转速预定值	85 kW/ 3200r/min	85kW/ 3400r/min
	额定功率/转速实际值		79.18 kW/ 3400r/min
5	全负荷开始减油点转速	3600r/min	3600r/min
6	怠速转速	750±50 r/min	650±30r/min
7	最高允许转速	3400r/min	3600r/min
8	燃料温度	233.15 最低温度 (K)	263.15 最低温度 (K)
		403.15 最高温度 (K)	393.15 最高温度 (K)
9	燃料压力	100 最低 (kPa)	30 最低 (kPa)
		500 最高 (kPa)	300 最高 (kPa)
10	(液冷)发动机冷却液出口处最高温度	106℃	106℃
	靠近排气歧管出口法兰处的排气管中最高温度	850℃	850℃

12	润滑油温度	80℃ (最低) 90℃ (最高)	80℃ (最低) 90℃ (最高)
13	蒸发器型号	115103001 (锐意泰克)	H6009 HanaEngineeringCo.,Ltd
14	蒸发器末级压力	100kpa 到 500kpa	30KPa 到 300KPa
15	现电控单元型号	TR20D (锐意泰克)	TT30C (锐意泰克)
16	OBD 型号		TT30C (锐意泰克)
17	曲轴箱气体	1014010-01C1	1014010-01C1
	再循环装置型号	一汽实业橡塑制品公司	一汽实业橡塑制品公司
18	氧传感器型号、生产厂家	OSH4B (锐意泰克)	OSH 4B
		排气总管与三元催化器之间	排气总管与三元催化器之间 申菱 (中国) 投资有限公司
19	喷射器型号、生产厂家	0 280 156 006 联合电子	H2000 HanaEngineeringCo.,Ltd
20	火花塞型号、生产厂家	F7TC 南京雷电火花塞制造有限公司	F7TC 南京雷电火花塞制造有限公司
21	水泵厂家及型号	CA4GH 富奥汽车零部件有限公司制泵分公司	CA4GH 富奥汽车零部件有限公司制泵分公司
22	催化转化器型号、生产厂家	SH3. 7L-III	SH3. 7L-IV
		长春一汽四环发动机制造有限公司	封装: 佳木斯金马科技发展有限公司 涂覆: 昆明贵研催化剂有限责任公司

编制: 姜洪源

会签部门: 采购老总: 孙政

销售老总: 刘峰

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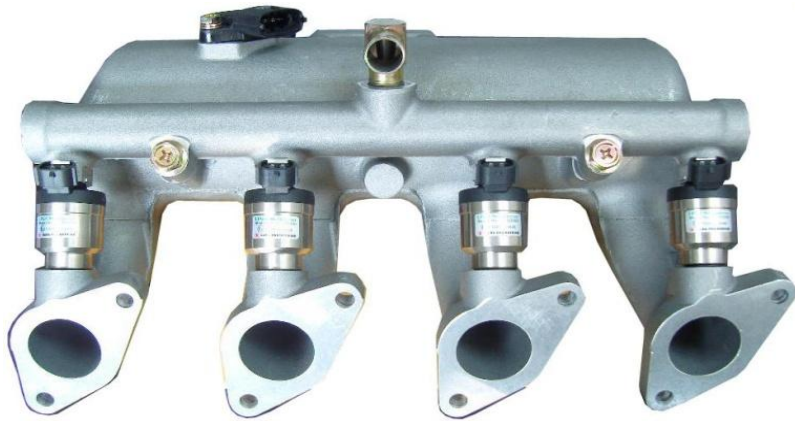
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Applications of H2000 in aftermarket



KOREA HYUNDAI MOTORS STAREX

INSTALLATION : 7,473 PCS

Engine Size ; 3,000cc

Applications of H2100 in aftermarket



KOREA KIA MOTORS CARNIVAL

INSTALLATION : 2,087 PCS

Engine Size : 2,700cc

China OEM Heavy Duty Truck (Direct Injection)



中国第一汽车集团公司技术中心
CHINA FAW GROUP CORPORATION R&D CENTER



H2200

China FAW Group Corporation GAS Engine

Engine Type	Displacement(L)	GAS Type	Cylinder Diameter	Applied Vehicle		Remarks
				Truck	Bus	
CA6SM	11	LNG	123×155	○	×	Be developing
CA6SL1	7.7	CNG	110×135	○	12m Bus	Be developing
		LNG				
BF6M2012	6	CNG	101×126	○	10m Bus	Be developing
CA6SE	6	CNG	106×125	○	10m Bus	Under production

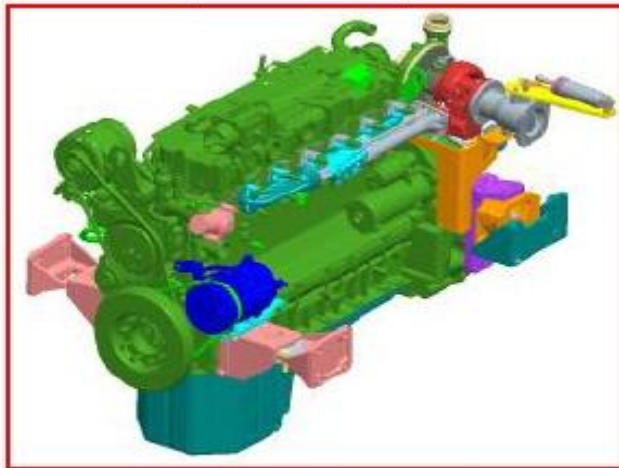
China OEM Heavy Duty Truck (Direct Injection)



CA6SM



CA6SL1



BF6M2012



CA6SE

China OEM Heavy Duty Truck (Direct Injection)



CNG卡车



LNG卡车



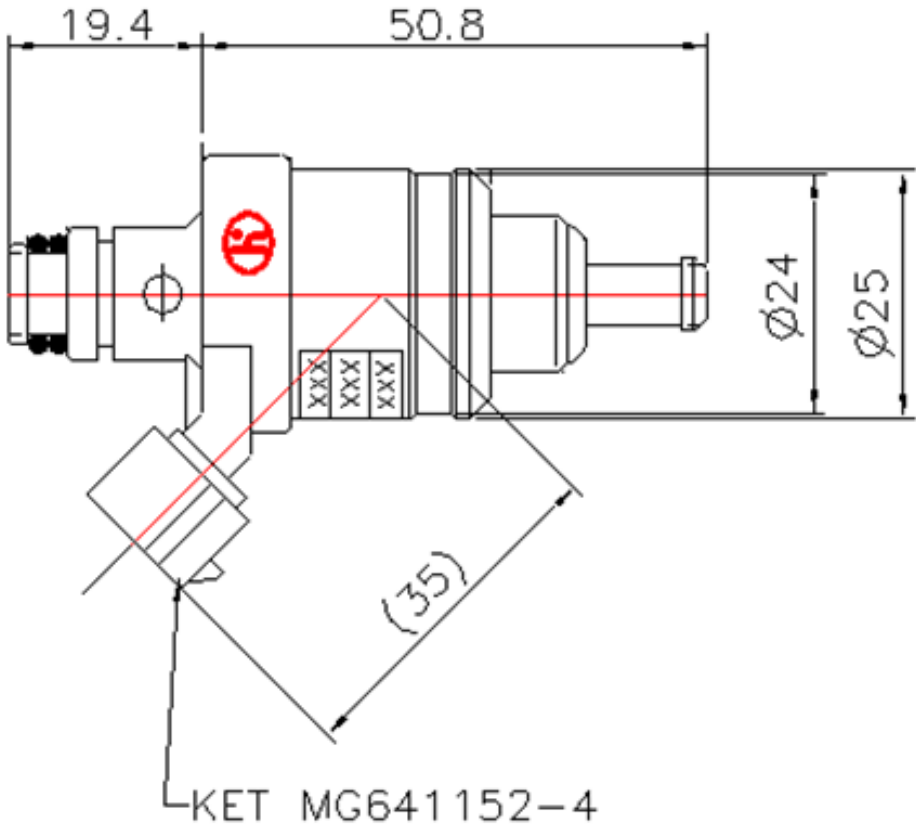
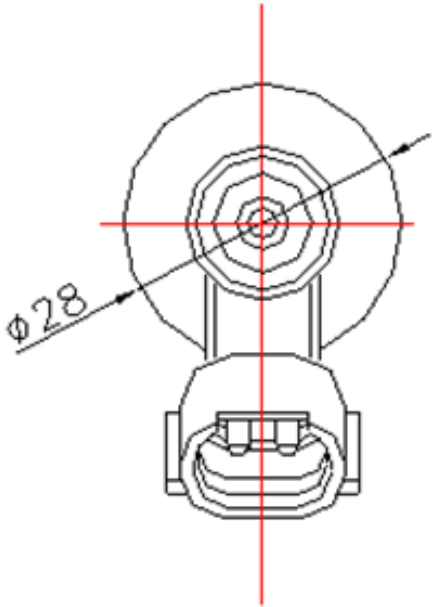
LNG/Diesel Dual Fuel (DDF) System for EROOM G&G Co



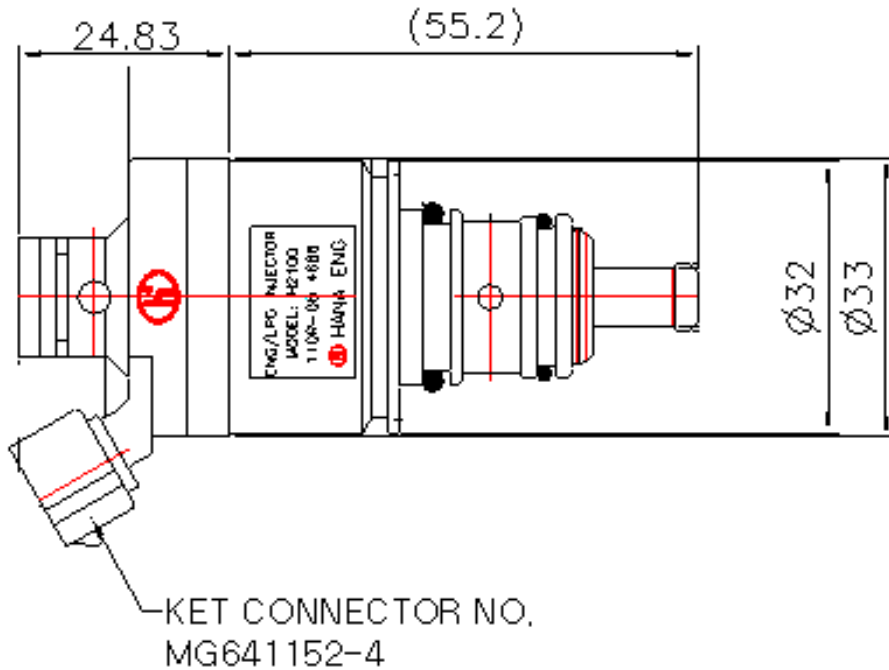
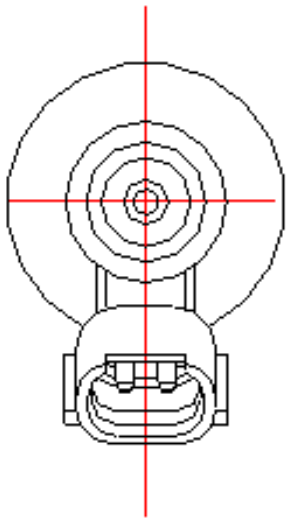
H2200

1. Hana H2200 injectors have been used by EROOM G&G Co in the demonstration project of LNG/Diesel Dual Fuel System by the Korean government. (200 vehicles a year)
2. Dedicated LNG system using Hana H2200 injectors is being developed jointly by EROOM G&G Co and Korea Gas Corporation with governmental funds.

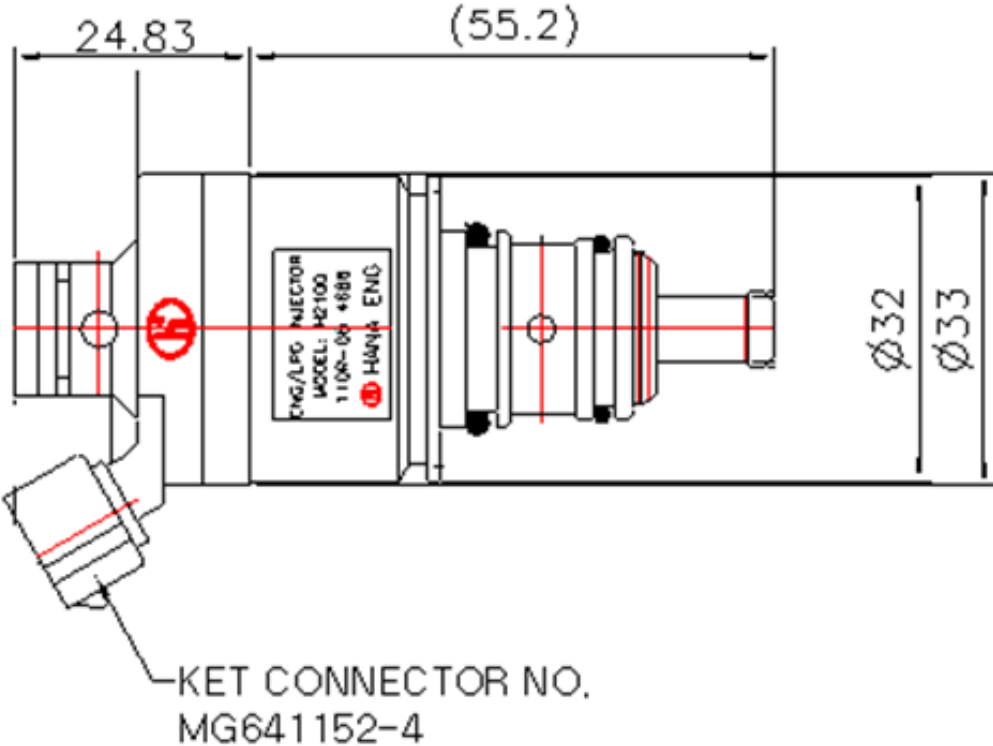
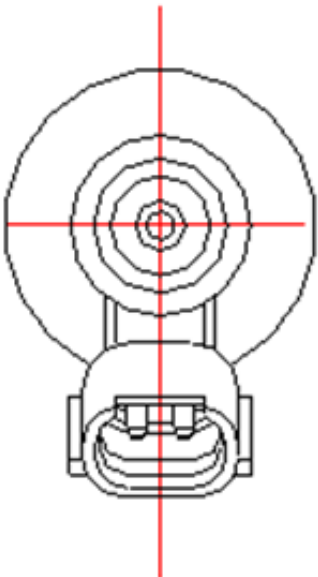
Injector Drawing (H2000)



Injector Drawing(H2100)



Injector Drawing (H2200)





HANA ENGINEERING

Thank You !