

NGV & LPG

HANA Injector
(H2000) Series

 **HANA ENGINEERING**

Injector (H2000 Series)



The performance of GAS vehicle depends on the quality of Injector

Injector (H2000 Series)



Passenger Car

Medium Vehicles




Heavy – Duty Truck



H2000 & H2001 Nozzle



Nozzle

TYPE	(Ω)	Color	Remark	
AA Type	1.2Ω	Blue	Without Nozzle	
A Type	1.9Ω	Green	Without Nozzle	base model
B Type	1.9Ω	Red	With Nozzle	
C Type	1.9Ω	Black	With Nozzle	
D Type	1.9Ω	Black	With Nozzle	
<p>● A type is base model. It can be changed to B, C, D type by using Nozzle.</p>				

H2002 New Injector



Coil	
Plunger Ass'y	
Rail	

1) Cheaper in price, but same in quality as H2000 or H2001.

2) Same components as H2000 or H2001 are used for plunger ass'y.



Plunger

[Characteristics]




1) Low A/S cost because coil, plunger ass'y and rail can be disassembled.

● In case of a defect, just replace plunger ass'y.

H2002 Nozzle Application



Nozzle

TYPE	(Ω)	Color	Remark	
AA Type	1.2 Ω	Blue	Without Nozzle	
A Type	1.9 Ω	Green	Without Nozzle	base model
B Type	1.9 Ω	Red	With Nozzle	
C Type	1.9 Ω	Black	With Nozzle	
D Type	1.9 Ω	Black	With Nozzle	
<p>● A type is base model. It can be changed to B, C, D type by using Nozzle.</p>				

H2002 [How to disassemble plunger ass'y]



- 1) Open the cap.
- 2) Release the bolt.
- 3) Remove the bracket to separate coil.
- 4) Remove the nut.



Plunger Ass'y

**In case of a defect, just
replace plunger ass'y**

Sales Record of HANA injectors in domestic & foreign market

Model No.	Year	Customers	Description	Sales period
H2000	2004	Domestic & foreign	Selling injection system & Injector in domestic & foreign market (exported to 20 countries including Japan)	9 years First developed
	2008	China OEM	Chinese Changchun FAW Sihnan Engine Manufacture Co., Ltd.	5 years
	2008	KOREA	Diesel->LPG : Dedicated (mono fuel) Korea Hyundai Motors Starex	5 years
H2100	2009	KOREA	Diesel->LPG : Dedicated (mono fuel) Korea KIA Motors Carnival	5 years
H2200	2010	China OEM	Chinese Changchun FAW Group Corporation Manufacture Co.,Ltd.	3 year
		KOREA	LNG DDF System : EROOM G&G Co. Dedicated LNG system is being developed by EROOM G&G and Korea Gas Corporation	3year
H2002	2012	Domestic & foreign	Selling injection system & Injector in domestic & foreign market	1year

H2001 with new type of connector

H2000



Existing Connector

H2001



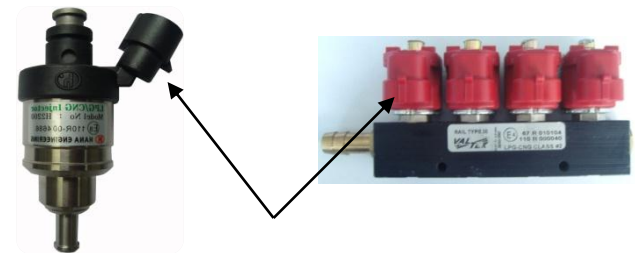
New Connector
AMP 282104-1

- Same as H2000 except connector.
- H2001 has VALTEK type connector.
(AMP 282104-1)
- Cost-saving effect by removing an adapter.



HANA
Type

AMP
282104-1










Same Connector
AMP 282104-1







Patent & Certification

CLASSIFICATION	ITEM	No.	Remarks	Date
PATENT	Duty Solenoid Valve	282291		2000.11.28
	Injector Control Unit	295073		2001.04.24
	Fuel Cut Valve	282292		2000.11.28
	HAHA LOGO	40-0796992		2009.09.04
I S O	ISO 9001:2008	15138		2003.07.31
Australia AGA	Vaporizer, Solenoid Valve		AGA7111 , 7110	2007.05.15
Malaysia SIRIM QAS	CNG Regulator	2008 MA 0755	Injection	2008.12.09
TOYOTA Motor Quality Guarantee		ASD-S06-MD-224	2006.12.20	2006.12.20
EURO-III	CNG Bi-Fuel System in China			2008.11.17
ECE-67R LPG	Injector Ass'y	E4 67R-01 0214	H2000	2008.12.17
	Injector	E4 67R-01 0213	H2000 / H2001	2008.12.17
		E11 67R-010086	EG2001	2011.10.24
		E11-67R-010256	H2002	2013.01.17
		E11-67R-010251	H2100	2012.01.05
		E8 67R-01 5316	Mixer Type	2009.08.04
	Vaporizer	E11-67R-01 0254	Injection	2012.09.
		E11-67R-010252	H3800	2012.06.21
	E.C.U	R10.04(EMC): E11-10R-047642	H3800	2012.06.21
		E11-110R-000507	H3800	2012.06.21
ECE-110R CNG	Injector	E8 110R-00 4686	H2000,H2001,EG2000	2007.08.28
		E11-110R-000516	H2002	2013.10.17
		E11 110R-000501	H2100	2012.01.05
		E11 110R-000143	H2200	2011.10.14
	Regulator	E8 110R-00 5020	Injection	2008.09.03
		E11 110R-000090M	LC2201	2011.01.18
	Automatic solenoid valve	E4 110R-000148	H6101	2008.09.16
	Filling Unit	E4 110R-000147	H6102	2008.09.16

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 H2001 Top Feed H2002 Side 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	 	9.0~15L	Heavy-Dyty-Truck	
		8 bar	Diesel DC 24V	A	Green	584					
	B			Red	494						
	H2200 Side Feed		12 bar	Diesel DC 24V	A	Green					437
H2300 Side Feed Top Feed							 	9 bar	Gasoline DC 12V	A	

Technical Specification

Model No.		H2000	H2001	H2002	H2100		H2200	H2300			
Product Picture											
Item		Top Feed Type		Side Feed	Top Feed Type		Side Feed Type		Top Feed		
		Specification									
Voltage		DC 12V			DC 12V	DC 24V	DC 24V		DC 12V		
Resistor (Ω)		3 Ω	1.9 Ω	1.2 Ω	1 Ω		1 Ω		1 Ω		
Max Pressure		3.0 bar	4.0 bar	5.8 bar	11 bar	15 bar	12 bar		12 bar		
Operation Pressure		1.2 bar			1.0 bar	5 bar	6 bar		7 bar		
Flow Rate L/min	AA-Type	Blue	130		250	-	0.2400 kg/min		130		
	A-Type	Green	115		224	584			115		
	B-Type	Red	90		200	494			90		
	C-Type	Black	75		170	-			75		
	D-Type	Yellow	65		150	-			65		
Open Time	AA-Type	Blue	2.8ms	2.36ms	1.56ms	-	1.54ms		-	1.56ms	1.8ms
	A-Type	Green	2.8ms	2.36ms	-	2.9ms			1.64ms		
	B-Type	Red	2.7ms	2.24ms	-	2.8ms			-		
	C-Type	Black	2.6ms	2.0ms	-	-			-		
	D-Type	Yellow	2.6ms	2.0ms	-	-			-		
Closing Time	A,B,C		1.2ms		1.2ms	1.2ms	0.8ms		1.3ms		
Pick Current		4A			6A	7.5A	7.5A		4A		
Hold Current		2A			2A	2.5A	2.5A		2A		
Operating gas		LPG / CNG / LNG / Hydrogen									
Size		70× ϕ 25			80× ϕ 33			70× ϕ 25			

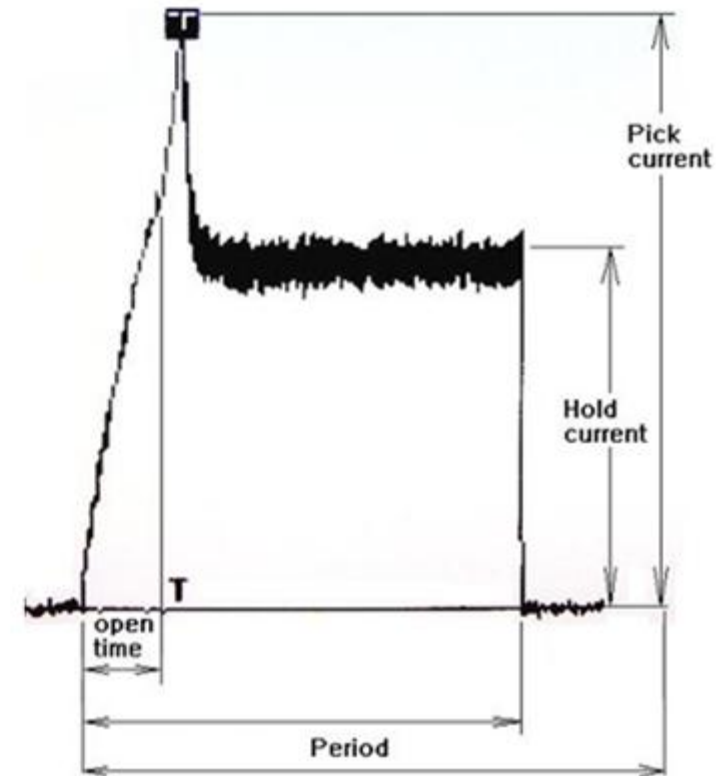
Engine Size according to Flow Rate

Model No.	Fuel	Voltage	Injector		Flow Rate L/min	Engine size
			Type	Color		
H2000	Gasoline	DC 12V	AA	Blue	130	6 & 8 cylinder
H2001			A	Green	115	6 & 8 cylinder
H2002			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 , H2001 H2002			H2100		H2200	H2300
		3Ω	1.9Ω	1.2Ω	1.0Ω	1.0Ω	1.0Ω	1.0Ω
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.

Record (Injector)

'2004 Year

Developed first in Korea.

Sales

Ranked first in sale of injectors in Korea.

Exporting to 20 nations (450,000 pcs in a year)

First in durability in Korea.

China OEM Chang chun FAW Si-Huan Engine Manufacture





China OEM Chang chun FAW Group Corporation

The only supplier with small to large capa GAS Injector

The comparison of design between Hana injector and competitor's

Part	HANA Injector	Another Injector	Remarks
<p>Injector Ass'y</p>	<p>⇒ Design is the same as Bosch & Keihin. Hana's injector is the one for typical vehicles.</p> <div data-bbox="343 458 986 861"> </div> <p>⇒ DURABILITY is 2 or 3 times higher than another's.</p>	<p>⇒ As design is like on-off solenoid for general lpg & cng regulators, it is not suitable as injector for vehicles.</p> <div data-bbox="1052 522 1705 825"> </div> <p>⇒ DURABILITY is low.</p>	
<p>Plunger</p>	<ol style="list-style-type: none"> 1) After inserting rubber, make injection molding. 2) Special coating on the surface of plunger 3) Special coating on the rubber 4) Weight of plunger is 4g. <div data-bbox="830 1008 975 1243"> </div> <p>⇒ To improve durability, we make coating on the surface of plunger and rubber.</p>	<ol style="list-style-type: none"> 1) After inserting rubber into plunger, press it. 2) No coating on plunger 3) No coating on the rubber 4) Weight of plunger is 6g. <div data-bbox="1562 951 1645 1219"> </div> <div data-bbox="1479 1232 1725 1362"> </div> <p>⇒ Because the rubber is swollen, these injectors are weak to the variation of flux.</p>	

The comparison of design between Hana injector and competitor's

Part	HANA Injector	Another Injector	Remarks
<p>Bush</p>	<p>1) Inlet coating on the friction surface of Bush Plunger</p>  <p>HAHA ON->OFF Solenoid v/v, Bush & Plunger</p>	<p>1) without inlet coating</p> 	
<p>Center Core</p>	<p>1) Rubber insert molding to Center Core</p> <p>2) Special coating on the rubber</p>  <p>☞ The purpose of rubber insert molding is to prevent noise.</p>	<p>1) without rubber insert molding</p>  <p>☞ The type of injectors make a loud noise.</p>	

Advantages of Hana injectors

HANA type injectors



- Low Noise
 - 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

another type injectors



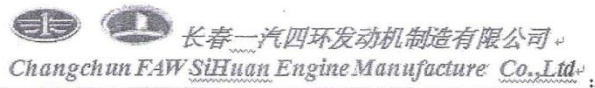
- Most injectors used around the world look like the right picture.
- They have the same structure as solenoid valves which are used on LPG and CNG regulators.



Advantages of Hana injectors

- Various types (H2000, H2100, H2200 & 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.

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

执行总裁: 刘子安

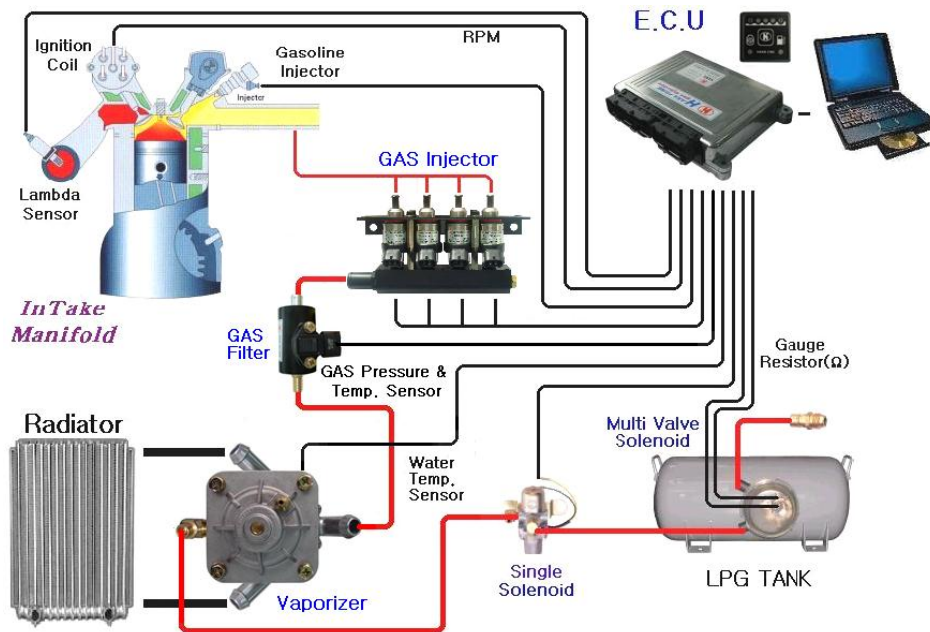
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Applications of H2000 in aftermarket

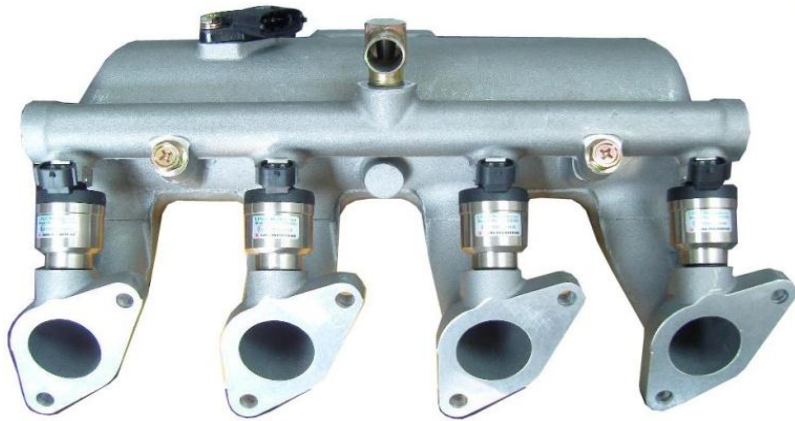


ZVW30



JAPAN HANA TOYOTA PRIUS HYBRID CAR HANA System 최초장착

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

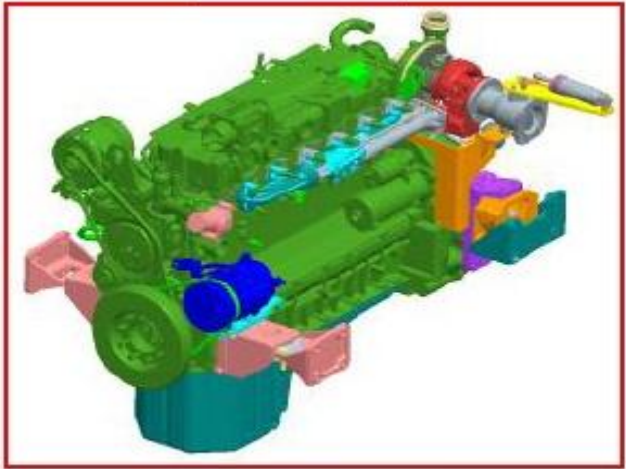
China OEM Heavy Duty Truck (Direct Injection)



CA6SM



CA6SL1



BF6M2012



CA6SE

China OEM Heavy Duty Truck (Direct Injection)



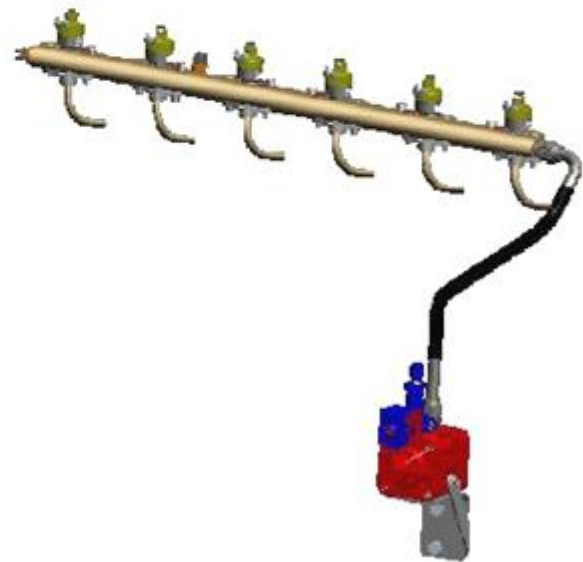
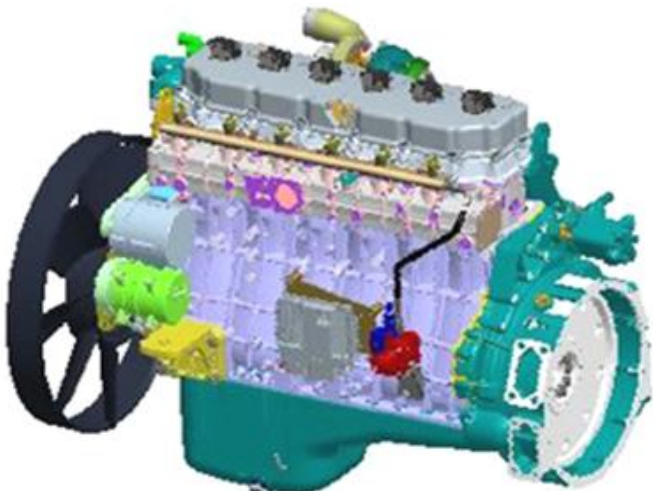
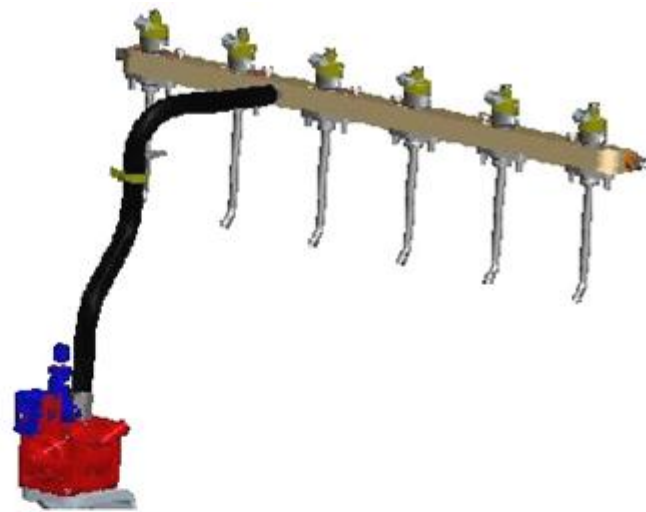
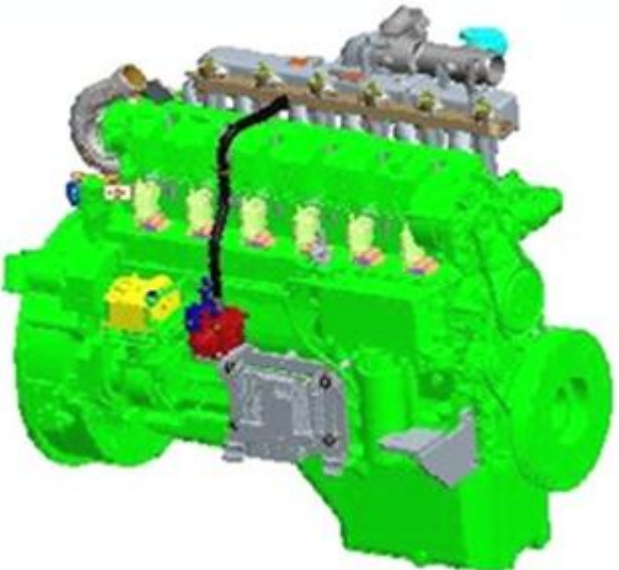
CNG卡车



LNG卡车



China OEM Heavy Duty Truck (Direct Injection)



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.

Rail Assembly (H2000 , H2001 & H2100)



H2000 / H2001

H2100

Rail Assembly (H2200 & H2000)



China OEM



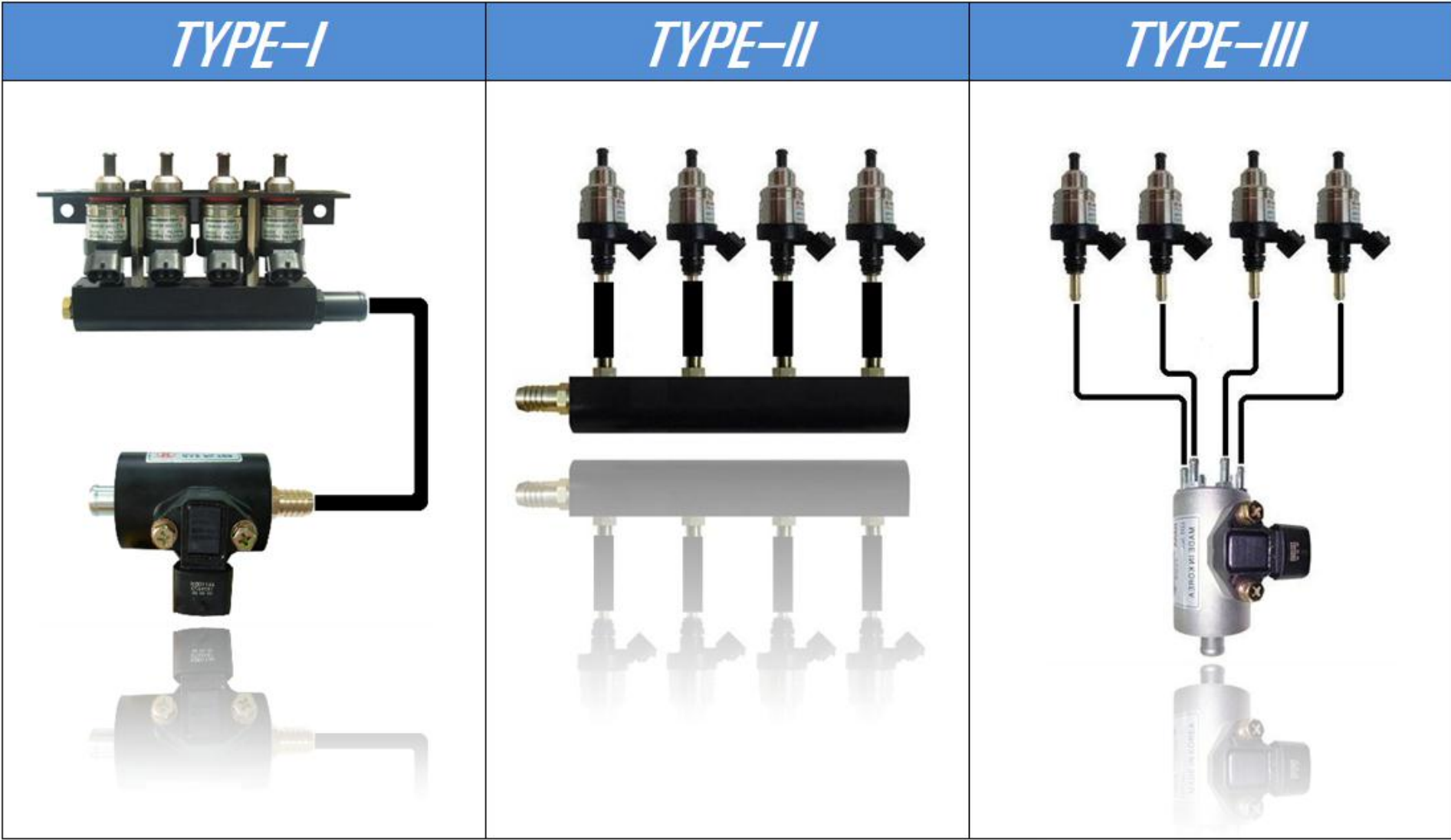
General Type



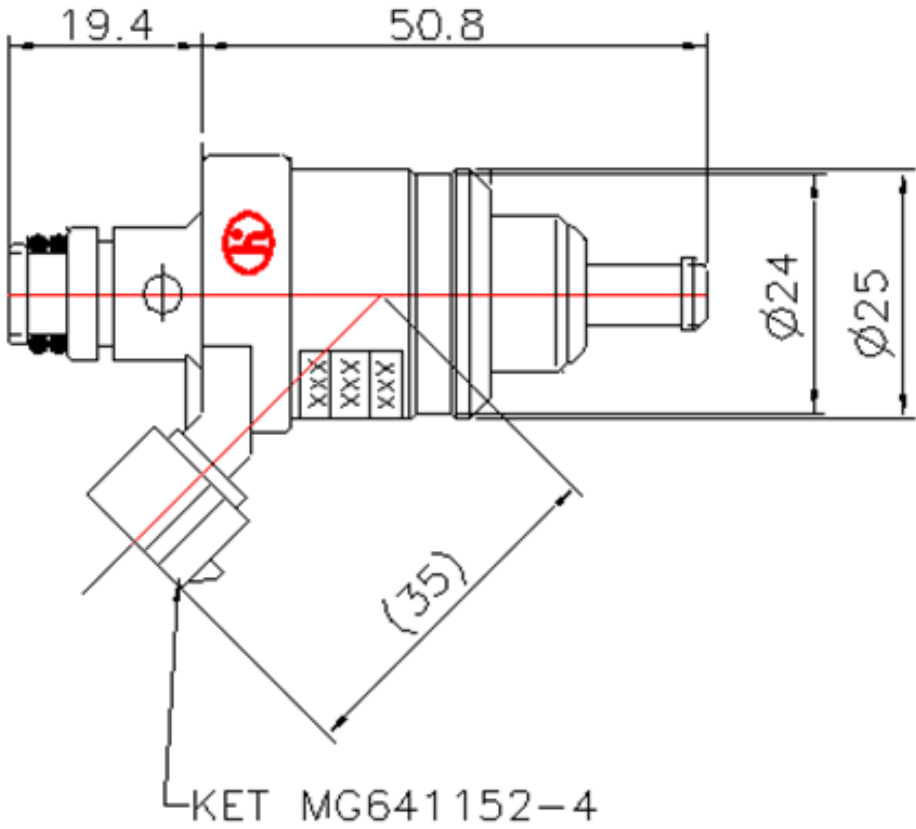
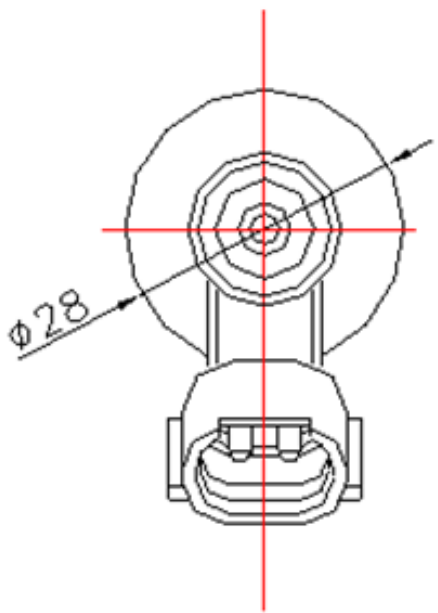
Hose Type



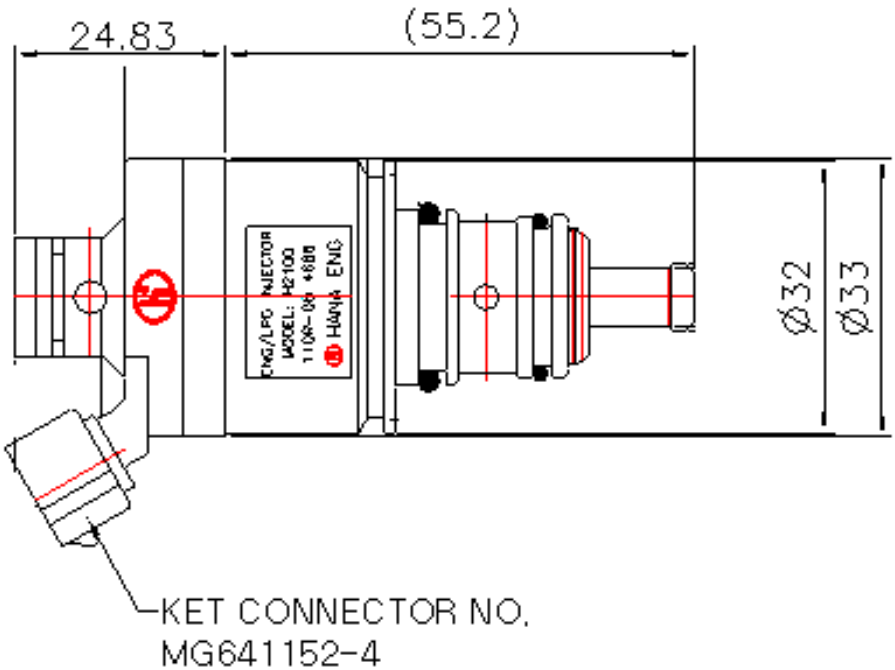
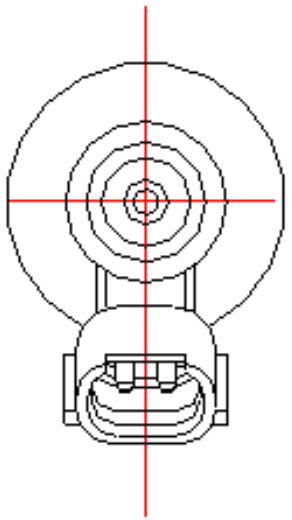
Hose Type & Rail Assembly



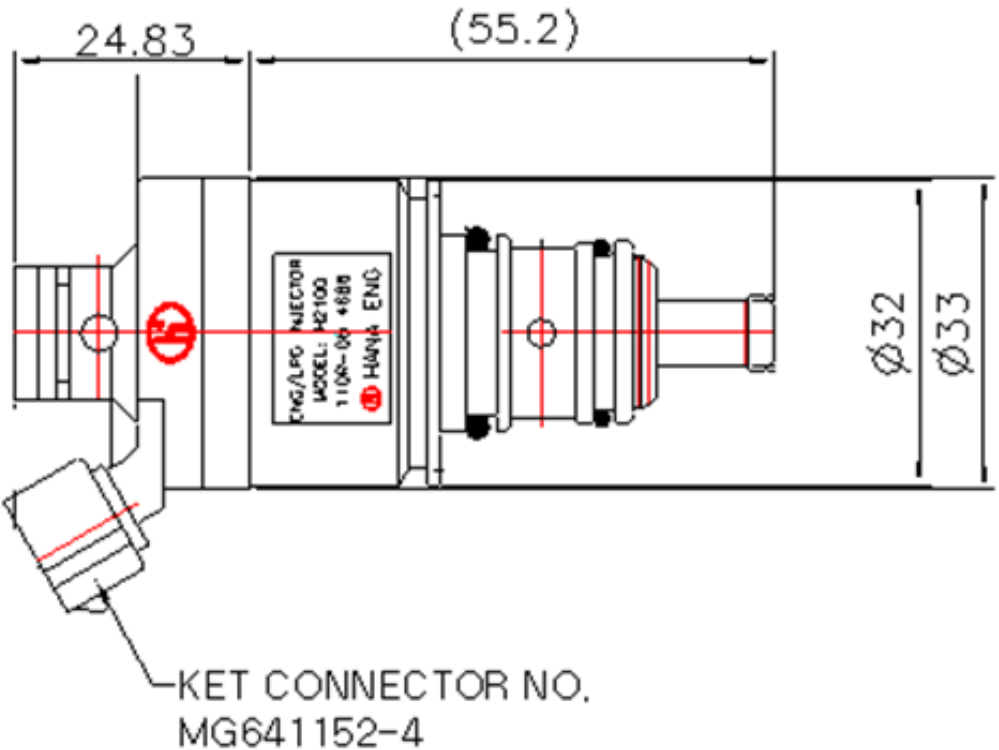
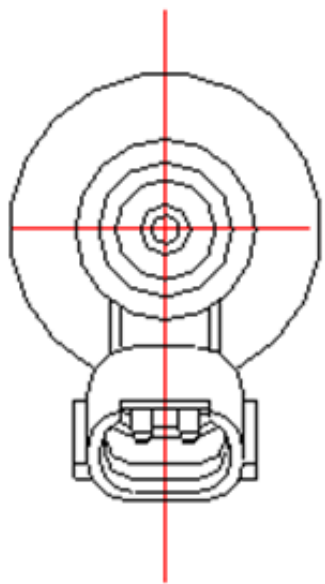
Injector Drawing (H2000)



Injector Drawing(H2100)



Injector Drawing (H2200)





HANA ENGINEERING

Thank You !