FOREWARD

This manual is intended for use by service technicians to help provide efficient and correct service on CRDi vehicles using Common Rail Tester.

To ensure customer satisfaction with Nextech product, it is essential quick and accurate service operation as well as reasonable price.

Consequently, it is important that the service personnel fully understand the contents of this manual, which should be kept within reach for future reference.
All information in this manual including photographs, drawings, and specifications is current at the time of publication.

Nextech reserves the right to make any changes to the design or to make additional improvements in this manual.

DEC ,2005, Printed in Korea

CONTENTS

1. GENERAL

This Tester has been developed to diagnose efficiently and accurately for diesel vehicles with common rail system.

1-1. Criteria of diagnosis using Commom Rail Tester

Impossible to start engine or engine stall while driving

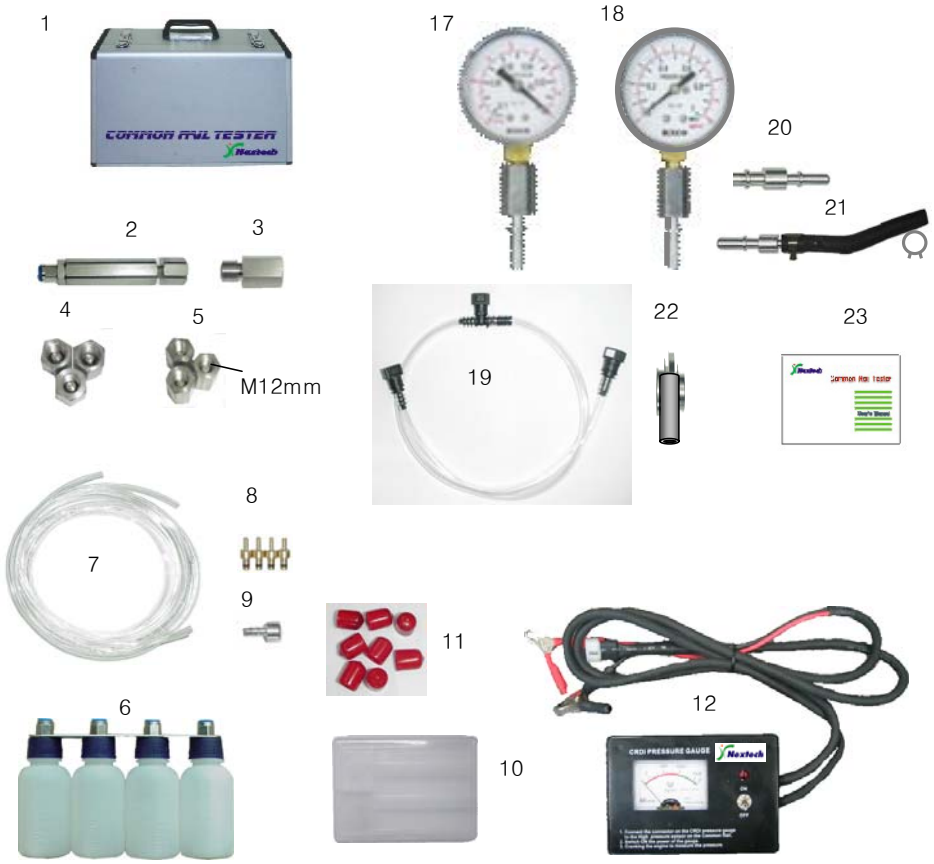
※ It would be recommended performing Power Balance Test by Hi-Scan (for Bosch system) or by disconnecting injector's connecter one by one (for Delphi system), if vehicle has problem beside the above symptoms such as engine vibration or emission of black/white smoke while engine idle.
The problem may be due to differences of the injected amount in each injector.

1-2. Notice

A CRDi system has been constructed using precision-made components.
If an extremely small foreign particle enters the system during service, it may cause sticking or clogging of injectors.

Therefore, be sure to eliminate any dust or contaminated deposits on or around the engine and fuel lines during service.

2. COMPONNENTS



1. Tool Case
2. Regulator Valve
3. Plug(for Delphi)
4. Plug(for Bosch)
5. Regulator Valve Adapter(for SM model)
6. Flask & Holder
7. Visible Tube
8. Injector return hose adapter
9. Injector return hose plug
10. Clean Case
11. Dust Cap
12. High pressure gauge
13. Adapter connector (for Delphi old)
14. Adapter connector(for Delphi new)
15. Adapter connector(for Bosch)
16. Pressure Control Valve cable
17. Vacuum Gauge
18. Low pressure gauge
19. Gauge connection tube
20. Connection Adapter
21. Connection adapter with hose
22. Fuel Filter Plug
23. User's Manual

3. PARTS INDEX

NO	Part Name	Part no.	Quantity	Figure
	Common Rail Tester	CRT-1000	1SET	
1	Tool Case	CRT-1010	1EA	
2	Regulator Valve	CRT-1020	1SET	
3	Plug(for Delphi) M14mm	CRT-1021	3EA	
4	Plug(for Bosch) M12mm	CRT-1022	3EA	
5	Regulator Valve Adapter (for SM Model))	CRT-1023	1EA	
6	Flask & Holder	CRT-1030	1SET	

3. PARTS INDEX

NO	Part Name	Part no.	Quantity	Figure
7	Visible Tube	CRT-1031	4EA	
8	Injector Return Hose Adapter	CRT-1032	4EA	
9	Injector Return Hose Plug	CRT-1033	1EA	
10	Clean Case	CRT-1034	1EA	
11	Dust Cap	CRT-1035	8EA	

3. PARTS INDEX

NO	Part Name	Part no.	Quantity	Figure
12	High Pressure Gauge	CRT-1040	1SET	
13	Adapter Connector (for Delphi Old)	CRT-1041	1EA	
14	Adapter Connector (for Delphi New)	CRT-1042	1EA	
15	Adapter Connector (for Bosch)	CRT-1043	1EA	
16	Pressure Control Valve Cable	CRT-1044	1SET	

3. PARTS INDEX

NO	Part Name	Part no.	Quantity	Figure
17	Vacuum Gauge	CRT-1050	1EA	
18	Pressure Gauge	CRT-1051	1EA	
19	Gauge Connection Tube	CRT-1052	1EA	
20	Connection Adapter	CRT-1053	1EA	
21	Connection Adapter With Hose	CRT-1054	1EA	
22	Fuel Filter Plug	CRT-1055	1EA	
23	User's Manual	CRT-1055	1EA	

4. DIAGNOSIS

4-1. DIAGNOSIS PROCEDURE ACCORDING TO SYMPTOM

1) When the engine is not able to start
① Low Pressure Line Test → ② Injector Back Leak Test (Static Test) →
③ High Pressure Line Test

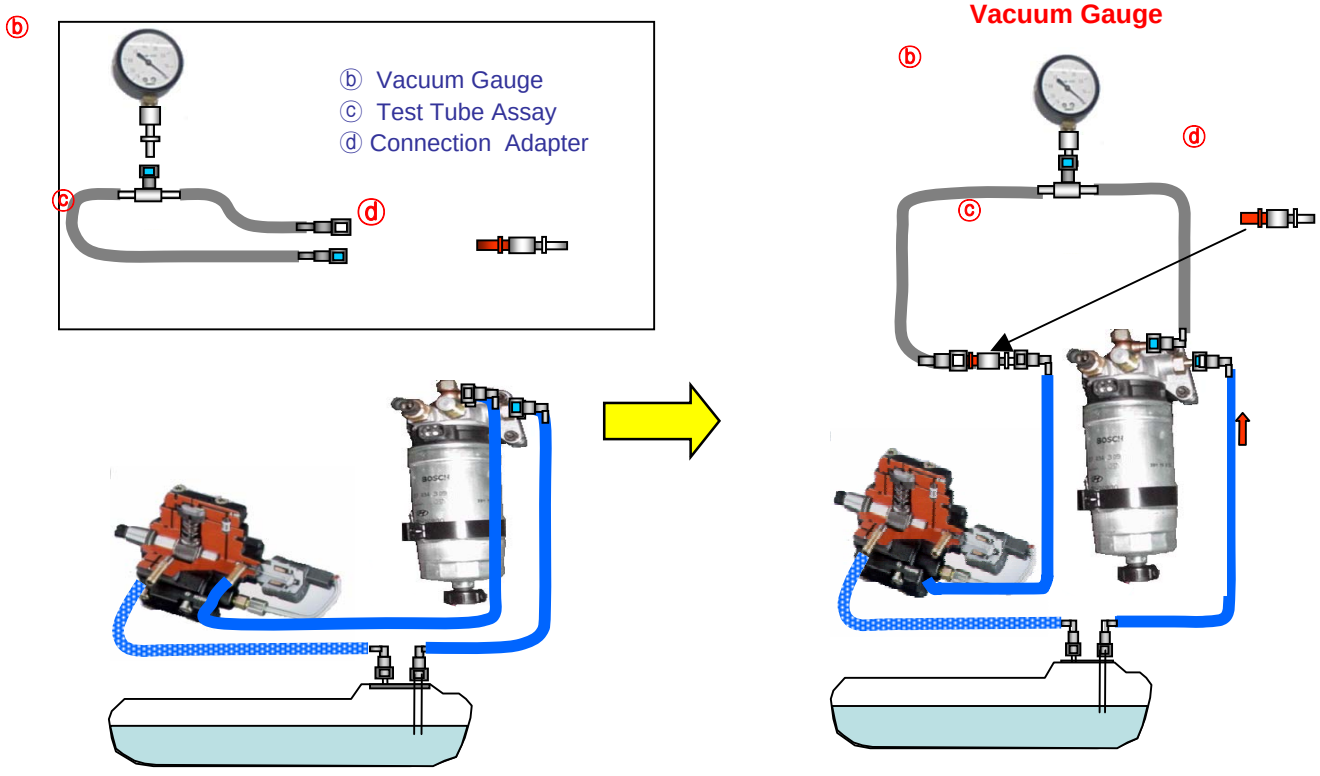
2) When the engine is able to start
① Low Pressure Line Test → ② Injector Back Leak Test (Dynamic Test) →
③ High Pressure Line Test

4-2. LOW PRESSURE FUEL LINE TEST

1) Remove fuel hose from fuel filter and connect low pressure gauge (CRT-1051) or vacumn gauge (CRT-1050) according to engine system as shown.
* Additional parts needed: tube for gauge connection (CRT-1052), Connection adapter with hose (CRT-1054), connection adapter (CRT-1053) Fuel Filter Plug (CRT-1055)
2) Start the engine and keep idle approxmately 5seconds, then turn of the engine.

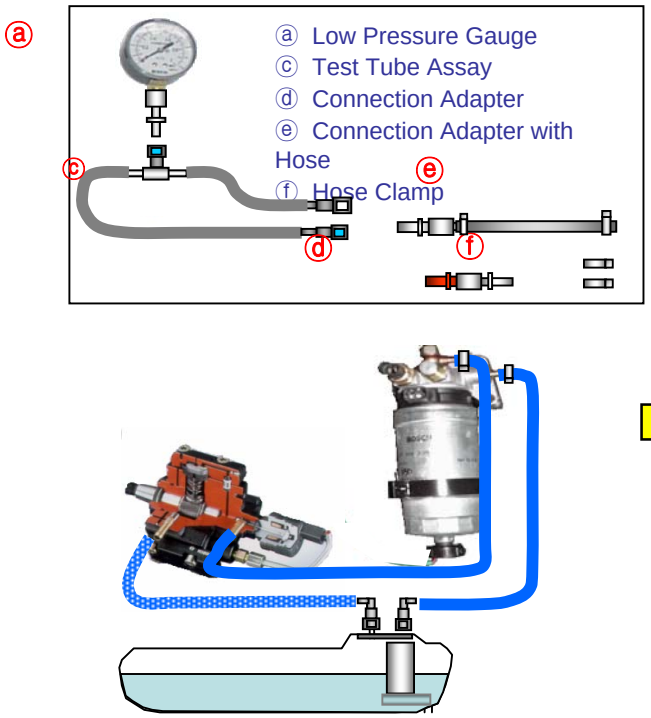
4. DIAGNOSIS

Internal suction pump type (Bosch Type Ⅰ)

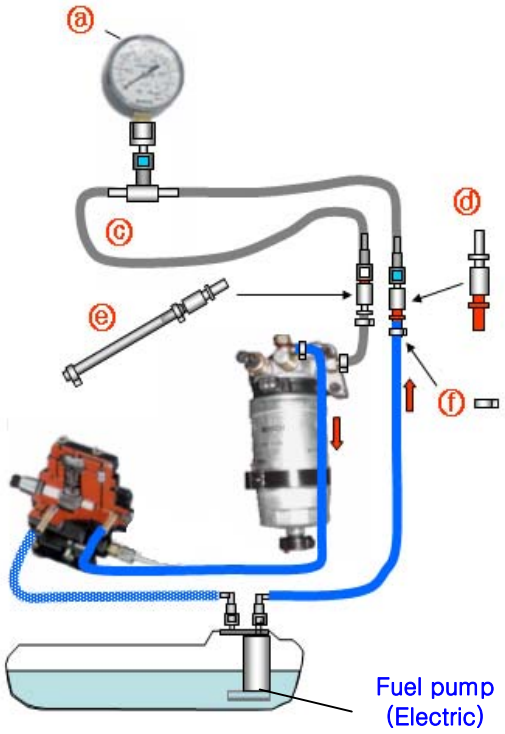


4. DIAGNOSIS

Electric pump type (Bosch Type Ⅱ)

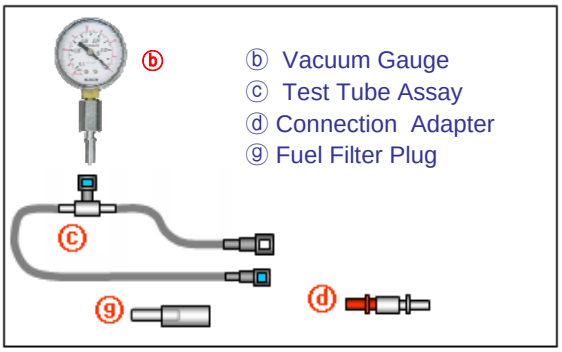


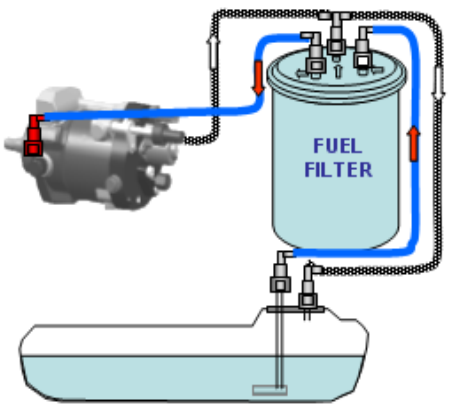
Pressure Gauge

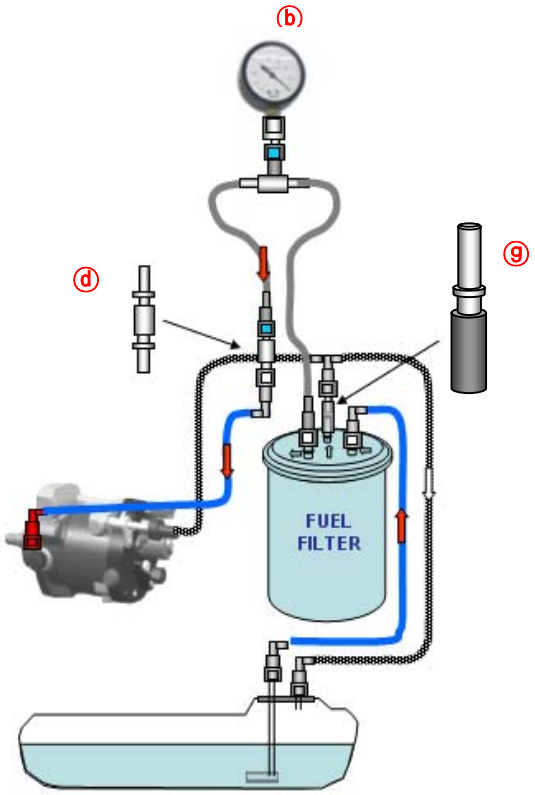


4. DIAGNOSIS

Internal suction pump type (Delphi)



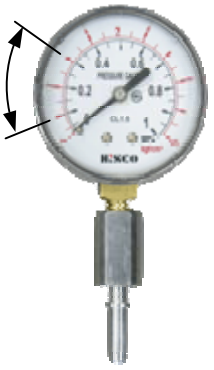




4. DIAGNOSIS

3) Read the fuel pressure or suction pressure indicated.
4) Judgement

Electric pump type (Bosch Type Ⅱ)		
CASE	PRESSURE (bar)	JUDGEMENT
1	1.5~3 kg/㎠	System normal
2	4~6 kg/㎠	Filter or fuel line clogging
3	0~1.5 kg/㎠	Pump or fuel line leak

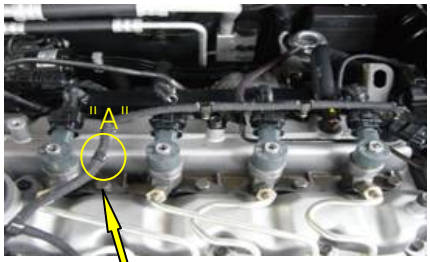


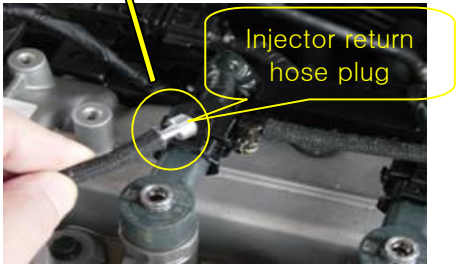
Internal suction pump type (Bosch Type Ⅰ and Delphi)		
CASE	VACUUM	JUDGEMENT
1	8~19 cmHg	System normal (good condition)
2	20~60 cmHg	Filter or fuel line clogging (pump in good condition)
3	0~7 cmHg	Air leak in to the system or Suction pump damage

4. DIAGNOSIS

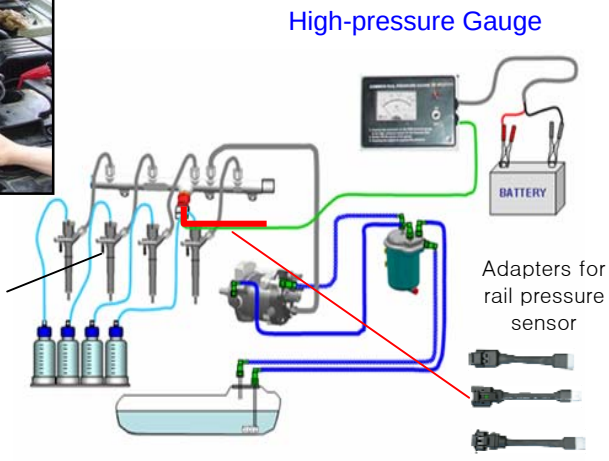
4-3. INJECTOR BACK LEAK TEST (STATIC)

1) Remove the return hose from each injector and Install injector return hose adapter (CRT-1032), visible tubes (CRT-1031) and connect the visible tube's end to the flasks (CRT-1030).
2) Disconnect "A" point on the fuel return hose in below photograph and block the fuel return hose in the direction of the high pressure pump with injector return hose plug (CRT-1033).
3) Connect the adapter connector (CRT-1041,CRT-1042,CRT-1043) to rail pressure sensor and connect high pressure gauge (CRT-1040) as shown.
4) Disconnect the injector connectors to prevent its operating.





Injector return
hose adapter



4. DIAGNOSIS

Delphi, Bosch Type Ⅰ

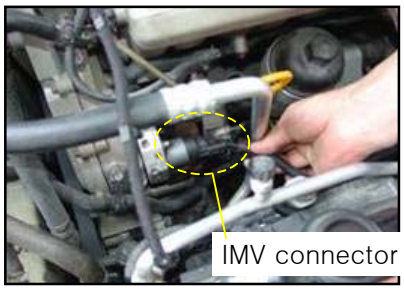
5) Remove the Inlet Metering Valve connector to allow fuel feeding to high pressure line.

Bosch Type Ⅱ

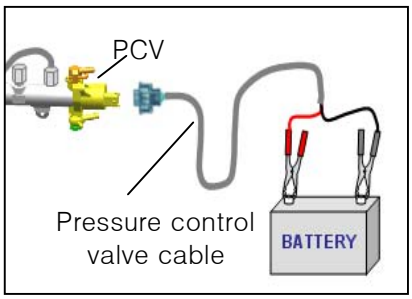
5) Disconnect the Pressure Control Valve connector and connect the pressure control valve cable (CRT-1044) to the Pressure Regulator Valve, and then connect pressure control valve cable (CRT-1044)'s lead to battery so that pressure control valve will block fuel return from rail.

Bosch Type Ⅲ

5) Perform No. 5) procedure both Bosch Type Ⅰ and Bosch Type Ⅱ so that fuel will be supplied to the high pressure line and pressure control valve will block fuel return from the rail.



● Delphi, Bosch Type Ⅰ ,Bosch Type Ⅲ



● Bosch Type Ⅱ, Bosch Type Ⅲ

※ Notice : Do not supply the battery power over 5 minutes. It may cause to damage PCV.

4. DIAGNOSIS

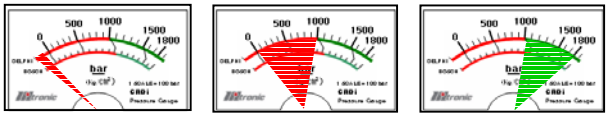
* Engine Type

Delphi : J3(2.9L)

Bosch Type Ⅰ : D4CB(2.5A-ENG)

Bosch Type Ⅱ : D3EA(1.5D-ENG), D4EA(2.0D-ENG),

Bosch Type Ⅲ : D4FA(1.5U-ENG)



Sensor abnorma Low pressure Normal

6) Crank the engine once for 5 seconds.

※ Do not exceed the 5seconds in any case.

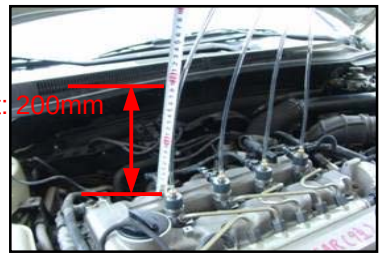
※ Cranking RPM must exceed 200 RPM.

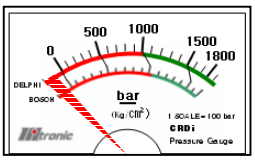
※ Perform the test under 30℃ with coolant temperature (If the fuel pressure test performed over 30℃, the fuel pressure indicated may be diffrent accoding to fuel viscosity change.).

7) Read the pressure from high pressure gauge (CRT-1040) and measure the amount of fuel contained at each visible tube (CRT-1031).

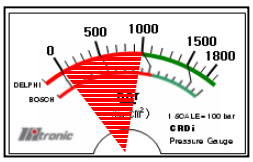
8) Judgement

CASE	PRESSRUE(bar)	INJECTOR BACK LEAK	JUDGEMENT	FACTOR TO BE CHECKED
1	1000~1800 (above 1000)	0~200mm (below 200)	Normal	
2	0~1000 (below 1000)	200~400 (above 200)	Faulty injector (excessive back leak)	Replace injector if there is only excessive back leak (over 200mm).
3	0~1000 (below 1000)	0~200 (below 200)	HP Pump (Insufficient pressure)	Conduct the high pressure pump test

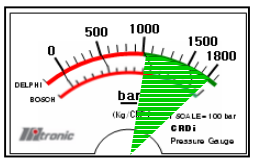




Sensor abnormal



Low pressure



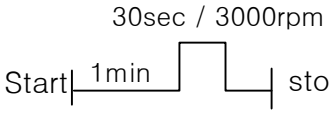
Normal

4- 4. INJECTOR BACK LEAK TEST (DYNAMIC)

1) Remove the return hose from each injector and Install injector return hose adapter (CRT-1032), visible tubes (CRT-1031), flasks (CRT-1030) and injector return hose plug (CRT-1033) referring to Injetor back leak test (STATIC) in previous page.
2) Conduct the high pressure leak test refering to following explanation.

BOSCH Type Ⅰ, Ⅱ, Ⅲ : D3EA(1.5D-ENG), D4EA(2.0D-ENG), D4FA(U-ENG), D4CB(2.5A-ENG)

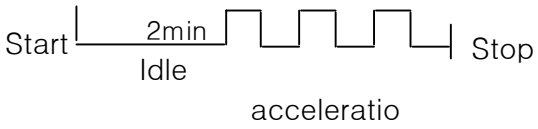
3) Start engine → 1minute at idle → accelerate engine up to 3000 rpm and keep the 3000rpm for 30seconds →Stop Engine
4) When the test is completed, measure the amount of fuel in each flask (CRT-1030).

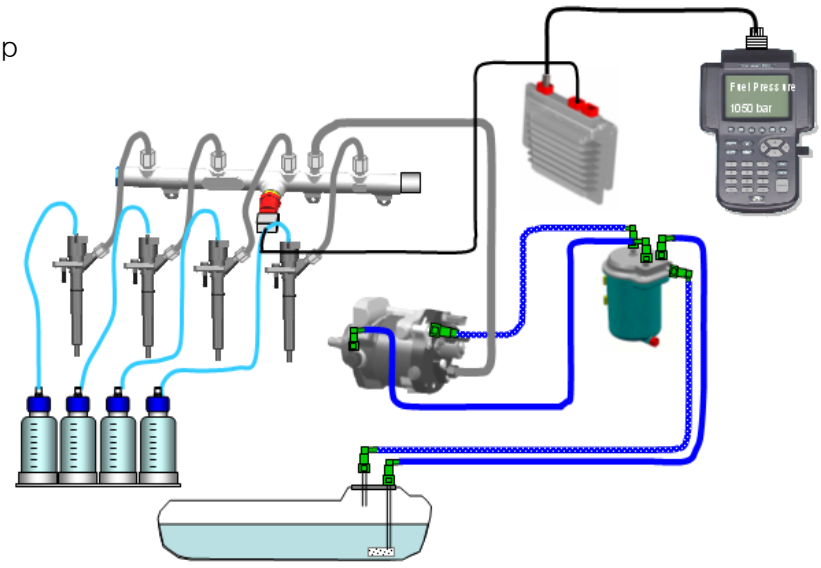


DELPHI : J3 (2.9L)

3) Connect the Hi-Scan and select the 'High Pressure Leak Test' mode.
4) Conduct the 'High Pressure Leak Test' untill the Hi-Scan finish the test automatically.
or manualy : Start engine → 2minutes at idle → 3 times acceleration →Stop Engine

※One acceleration: Accelerate up to 3800rpm for 2 seconds and keep idle for 2 seconds.



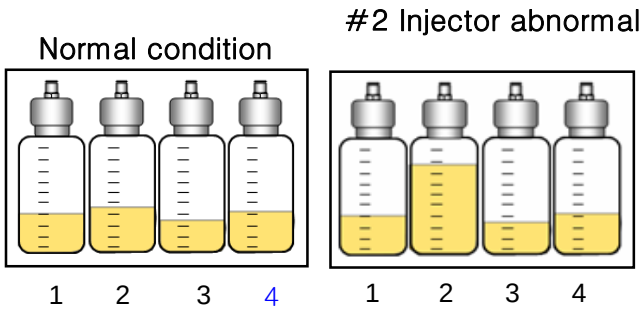


5) For the accuracy of the test, perform the test more than twice and select the largest amount as a measured value.
※ The flasks (CRT-1030) should be empty before the 2nd test started.
6) Judgement

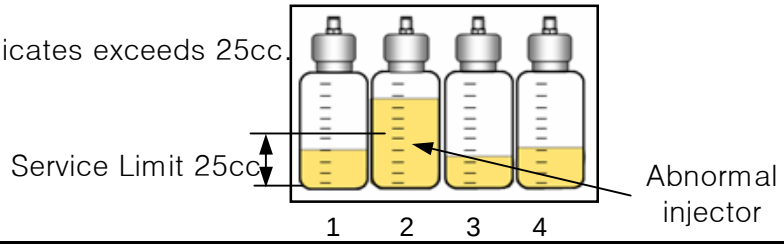
BOSCH Type Ⅰ, Ⅱ, Ⅲ
Replace the injector which is shown more 3 times than the minimum value.

● Example

Injectors	Quantity back leaked	Results
Cylinder 1	30	
Cylinder 2	61	Faulty injector
Cylinder 3	20	Minimum value
Cylinder 4	30	



DELPHI
Replace the injector which indicates exceeds 25cc.



4-5. HIGH PRESSURE PUMP TEST

1) Clean the regulator valve (CRT-1020), regulator valve adaptor (CRT-1023) and plugs (CRT-1021 or CRT-1022) with diesel fuel.
2) Remove all 4 fuel injector pipes from the common rail and disconnect the rail pressure sensor's connector.
3) Install the regulator valve (CRT-1020), plugs (CRT-1021 or CRT-1022), dust caps (CRT-1035), adapter connector (CRT-1041, CRT-1042,CRT-1043) and High pressure gauge (CRT-1040) to the common rail securely as shown.
※ Use regulator valve adaptor (CRT-1023) for Santafe(SM) model.
※ Be sure that the regulator valve (CRT-1020) and the plugs (CRT-1021 or CRT-1022) have installed securely so that there will not be any fuel leakage.

Delphi, Bosch Type Ⅰ
4) Disconnect the IMV connector from the high pressure pump.

Bosch Type Ⅱ
4) Disconnect Pressure Control Valve connector and connect the pressure control valve cable (CRT-1044) to the Pressure Regulator Valve, and then connect pressure control valve cable (CRT-1044)'s lead to battery so that pressure control valve will block fuel return from rail.

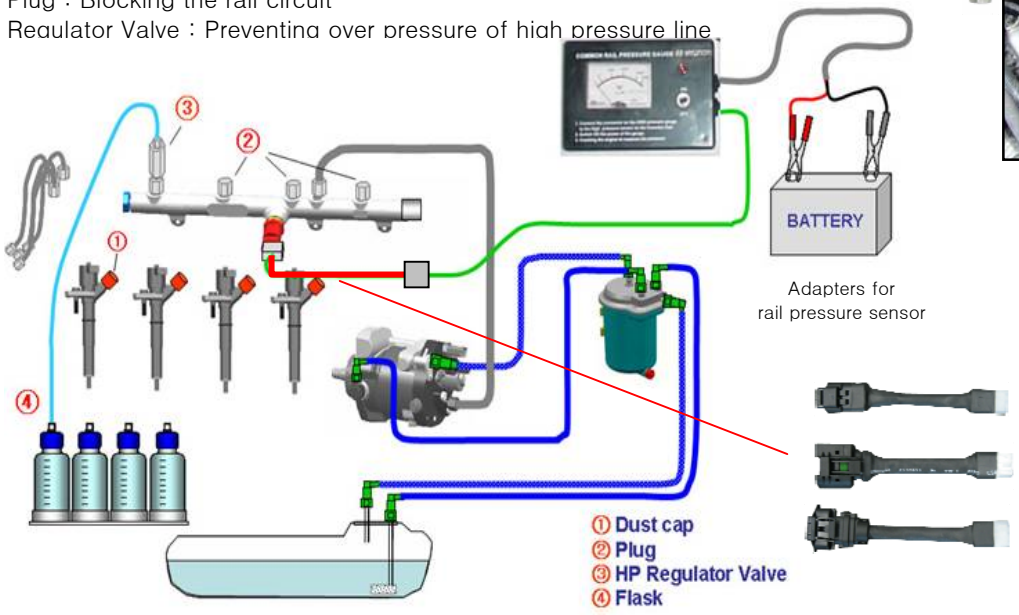
Bosch Type Ⅲ
4) Perform No. 4) procedure both Bosch Type Ⅰ and Bosch Type Ⅱ so that fuel will be supplied to the high pressure line and pressure control valve will block fuel return from the rail.

4. DIAGNOSIS

Purpose of the test : Inspection for mechanical capability of the High pressure pump (Maximum pressure check)

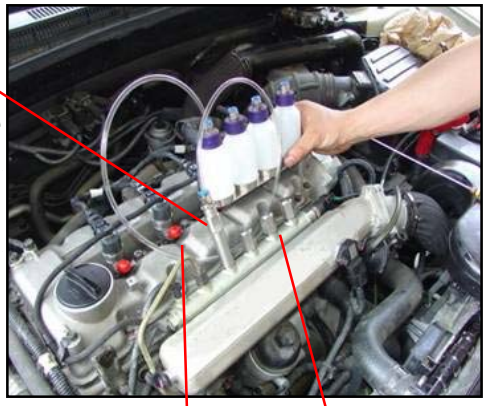
Method : Check the pumping capability of the high pressure pump by actuating pump after blocking rail's outlets using the plug and regulator.

Plug : Blocking the rail circuit
Regulator Valve : Preventing over pressure of high pressure line



Regulator valve

Regulator valve adapter for Santafe



Adapters for rail pressure sensor

4. DIAGNOSIS

5) Crank the engine for 5-6 seconds.
For the accuracy of the test, perform the test twice and select the higher pressure one as a measured value.

6) Judgement
If the fuel pressure indicated on the gauge is within the range of specification, the high pressure pump is normal.
But if not, check the below items before the High pressure pump replaced.
a. Check the plug or regulator valve if it leaks.
b. If fuel pressure is lower than specification, test it again when coolant temperature is below 30℃.
The pump is in normal condition if the pressure restores to normal range.
c. In case of the system in which pressure control valve implemented, check the valve condition & internal leak and replace them if necessary.
* Refer to '4-6 pressure control valve test' procedure

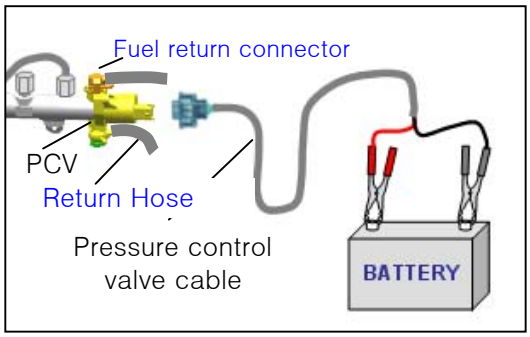
Specification of high pressure of common rail :
BOSCH System : 1000~1500 bars
DELPHI System : 1050~1600 bars

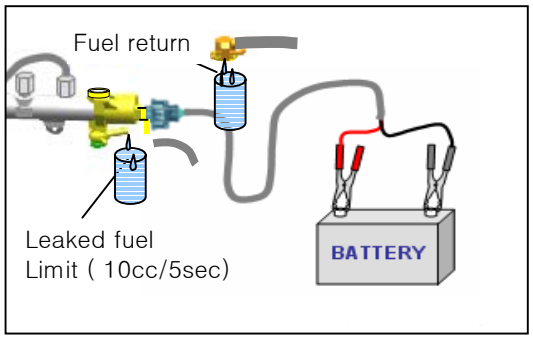
If fuel pressure indicated on the gauge is lower than specification there may be a problem in the rail pressure sensor or its circuit even fuel flows out from the regulator valve (CRT-1020).

4. DIAGNOSIS

4-6. PRESSURE CONTROL VALVE TEST

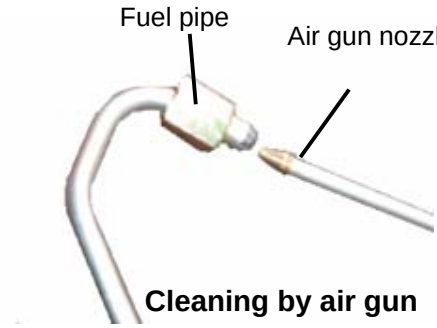
1) Remove fuel return connector from PCV upper.
2) Remove fuel return hose from PCV lower.
3) Disconnect Pressure Control Valve connector and connect the pressure control valve cable (CRT-1044) to the Pressure Control Valve, and then connect the pressure control valve cable (CRT-1044)'s lead to battery so that pressure control valve will block fuel return from rail.
4) Put fuel return pipes to flasks(CRT-1030).
5) Crank the engine for 5 seconds.
6) Check fuel return amount.
   ※ Service Limit : Less than 10cc (Fuel pressure must over 1000 bars)



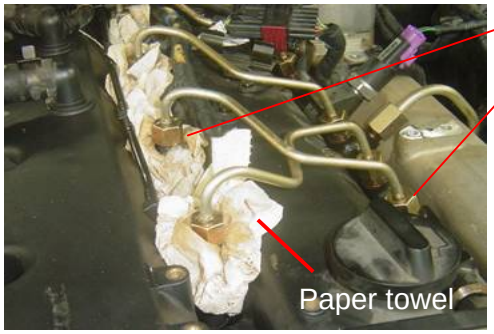


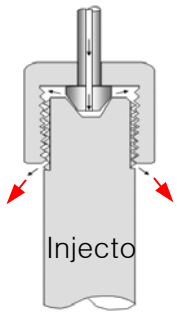
5. FUEL LINE FLUSHING

1) Before connecting the fuel pipes to the engine, be sure that all the pipe outlet surfaces, inner passages, and especially fuel pipe fitting nuts are clean.
   Clean using air gun if necessary.
2) Assemble all fuel pipes except the fuel pipe fitting nuts of injector side.
3) Temporarily tighten the fuel pipe fitting nuts to injectors by hand after aligning the nuts to the injectors.
4) To prevent contamination on engine room, wrap up around the injector using paper towel or shop rag as shown.
5) Crank the engine 2 to 3 times for 5 to 6 seconds to flow out the fuel contamination from injector connection area.
6) Tighten the nuts with specified torque using special tool.
7) Erase the DTC code by Hi-Scan.



Cleaning by air gun





6. DIAGNOSIS CHECK SHEET

Model : VIN : Milage :

NO	Test items			Value measured	Result
1	Low Pressure Fuel Line Test			( ) Kg/㎠ ( ) CmHg	(Good, Failure)
2	Injector Back Leak Test	Static	Rail pressure	( ) bars	(Good, Failure)
			Amount of fuel in visible tube	# 1 Cylinder ( ) Cm	(Good, Failure)
				# 2 Cylinder ( ) Cm	(Good, Failure)
				# 3 Cylinder ( ) Cm	(Good, Failure)
				# 4 Cylinder ( ) Cm	(Good, Failure)
		Dynamic	Amount of fuel in visible tube	# 1 Cylinder ( ) Cm	(Good, Failure)
				# 2 Cylinder ( ) Cm	(Good, Failure)
				# 3 Cylinder ( ) Cm	(Good, Failure)
				# 4 Cylinder ( ) Cm	(Good, Failure)
3	Fuel Pressure Test			( ) bars	(Good, Failure)

Tool supplier : Nextech Co., Ltd.
Contact Point : Mr. Alex Lim
Tel : +82-2-3140-1489 or 1443
Fax : +82-2-3140-1449
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QUALITY ASSURANCE

Name of products: Commom Rail Tester

We hereby certify that the above product is guaranteed by our quality assurance policy and procedures listed below.

Subject of assurance: All components contained in the Common Rail Tester as supplied to all Nextech distributors and dealers by Nextech Co., Ltd.

Parts Guarantee : Quality and Durability of each component.

Guarantee Period :1 Years from the date of purchase.

Nextech Co., Ltd.

President:

Seoul Korea

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