Gasoline Injectors Tester With Ultrasonic Cleaner Gs2

INSTRUCTION MANUAL

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Warranty

2 –Year Gs Series Limited Warranty

Magneti Marelli company manufactures its equipment from new parts and components that are in accordance with industry standard practices. Magneti Marelli warrants that the equipment it manufactures will be free of defects in materials and workmanship.
The warranty terms are 2 years, beginning on the date of the Magneti Marelli invoice in accordance with the following described:

This warranty does not cover damage due to external causes, including accident, abuse, misuse, scratches on external components or surfaces, problems with electrical power supply, servicing not authorized by Magneti Marelli, usage not in accordance with machine's operating manual, failure to perform required preventative maintenance, failure to change the testing calibration oil fluid and ultrasonic cleaning fluid regularly, failure to change the testing fluid filter when needed, to permit machines fluid pump to sit or operate without fluid in it, usage of improper testing or cleaning fluid in the machine, usage of improper ultrasonic cleaning fluid in the ultrasonic bath, usage of ultrasonic fluid instead of testing fluid or the opposite, usage of cleaning solvents and chemicals not provided or indicated/approved by Magneti Marelli, use of parts and components not supplied or approved by Magneti Marelli.

Note: Failure to clean injectors with Magneti Marelli's ultrasonic device before any test is performed on the GS Series test bench will void the warranty of the machine, if dirt particles from the injectors enter the GS valves.

Magneti Marelli will repair or replace parts and components returned to manufacturer's facility. To request warranty service, contact Magneti Marelli within the warranty period. If warranty service is required, you must ship the defective part or component in their original or equivalent packaging, prepay shipping charges, and insure, or accept the risk of loss or damage during shipment. Magneti Marelli will return the repaired or replacement part or component freight prepaid. If Magneti Marelli repairs or replaces a part or component, its warranty term is Not Extended.

Magneti Marelli does not accept liability beyond the remedies set forth in this warranty statement or liability for incidental or consequential damages.

Chapter 1
“Introduction”

Through the years, there has been an excess demand in Pollution Reduction, Fuel Economy and Enhanced Performance for Consumer Engines (Automobiles & Motorcycles). Engine Manufacturers have gone a long way, since Carburetor Engines, to reach today at the revolutionary approach of Electronically Controlled Injection (Port Injection & Direct Injection). With this approach they have successfully reduced emissions and gained fuel economy through accurate injection of fuel.

The Electronically Controlled Fuel Injectors, although accurate, produce chronicle defects. Through time numerous faults may occur, such as fuel residue built-up (at nozzle), electrical coil failure and injector pathway blockage. These faults in turn, produce an undesired effect which causes increase in emissions, increase in fuel consumption, unstable engine operation and loss of engine performance.

Magneti Marelli, a leading manufacturer in Automotive Injection Service Solutions, offers the GS Series units for the treatment of all Electronically Controlled Fuel Injectors presently used (MPFI, TBI, CIS, G-DI / FSI), and provides upgradeability of the machine for Future Injectors yet to come.

Equipment checklist

Carefully unpack the machine and its components. Save the box and packaging materials for future use.

Check if you have all the following items:

- GS Series Gasoline Injector Testing and Servicing Unit
- Injector Ultrasonic Device [100/240 VAC] with:
    - Operating Manual
    - AC Power Cord[100/240 VAC]
    - Injector Holder
- AC [100/240 VAC] Power Cord, for GS Series Unit
- Calibrating Oil, prefilled tank with start-up consumable for Testing injectors
- 4 liter Calibration Oil, start-up consumable for GS Testing injectors
- 4 liter Ultrasonic Cleaning Solvent, start-up consumable for Ultrasonic Cleaning injectors
- Calibration Oil/Fluid Funnel – Small
- Adapters and Accessories Kit for Testing Injectors
- Injector Test Rail(s)
- Portable Stand [Optional]
- Operating Manual and Quality Control Certificate

Options

There are a number of options to make the GS units even more powerful and universal in diagnosing and servicing the Gasoline Injectors. The following options are available:

Code	Description	Hardware Needed	Models
EXCL-ADAPT.4/8	Exclusive Adapters Kit for 8 or 4 injectors	YES	GSx-**1**XXX
TBI-ADAPT	Side Adapters Kit	YES	GSx-**1**XXX
SRC-505	Screen Filter extractor tool	YES	-
PS1 / PS2	Portable stand GS Series	YES	GSx-XXX**0**

Chapter 2
“Machine & Adapters”

This chapter provides an overview of the GS Series exterior views and connections. It covers the following topics:

- Machine Views
- Injector Test Rails
- Adapters

A new user should be familiar with all the views and connections in this chapter.

Front View

a. Injector Harness [ih]: Provides electrical signal to the injectors
b. Fluid Supply hose[fs]: Provides pressurized fluid to the Test Rail(s)
c. Test Rail(s): Provide fluid to the injectors
d. Injection Spray chambers: Lit chambers for viewing the injection spray pattern
e. Scaled Volumetric Tubes: used to measure and compare the volume displaced by the injectors
f. Testing Calibration Oil level indicator
g. Control Panel
h. Pressure Indicator (analog gauge)
i. Reverse Flushing device: used to wash the injector remaining dirt particles after cleaning
j. Reverse Flushing Device injector harness
k. Reverse Flushing device waste tray
l. (Gasoline Injectors): Not Provided

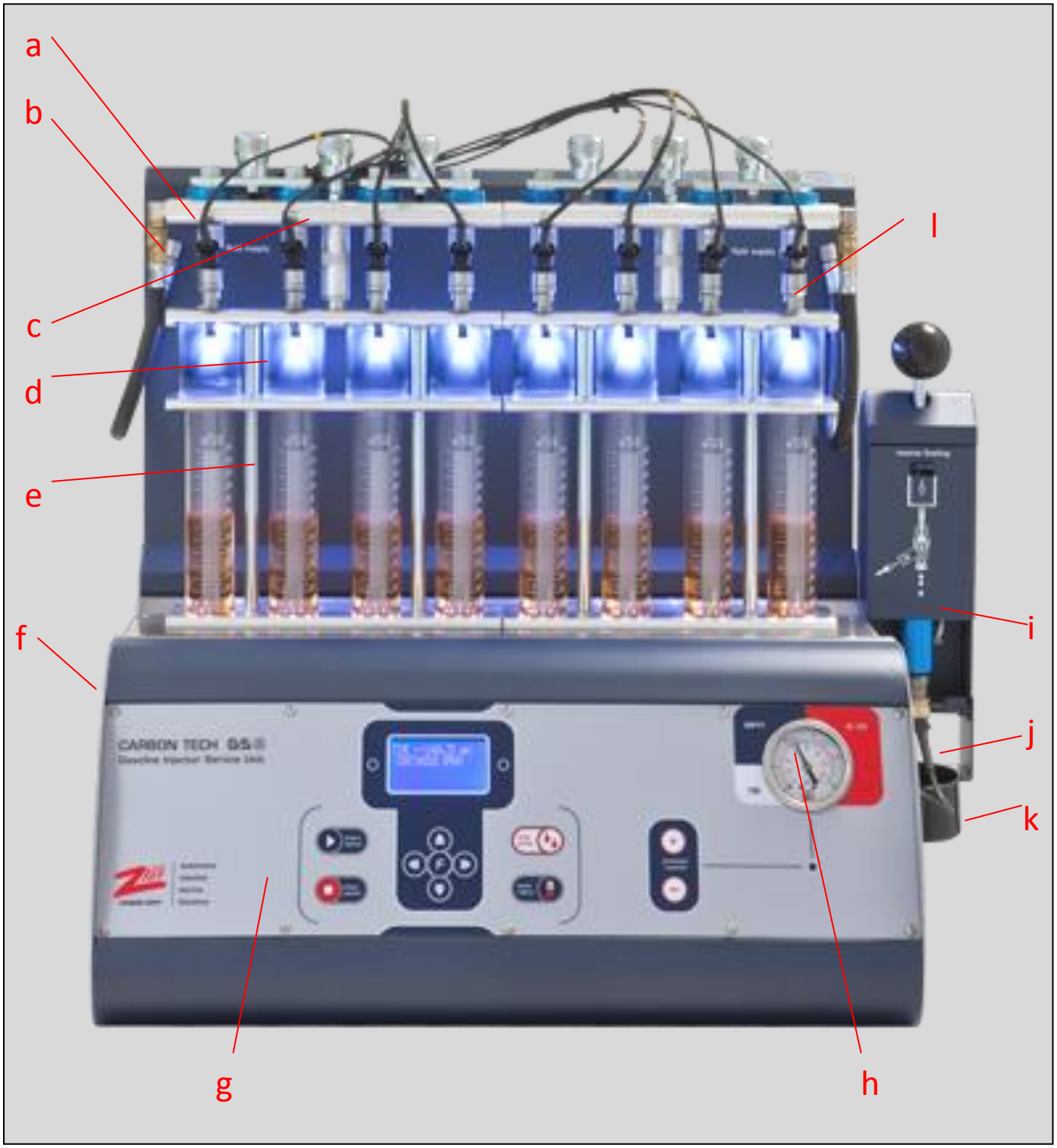


Figure 2-i

Side/Rear View

a. Drain Lever: Used to drain the GS2 volumetric tubes. Lift to empty.
b. Reverse Flushing Device (GS2 units)
c. Side Panel
d. Mains, Rear ON/OFF switch and Power connection
e. Mains Loop Power Connection (Auto-Switched), for ultrasonic device
f. Rear Bottom Panel
g. Serial Tag

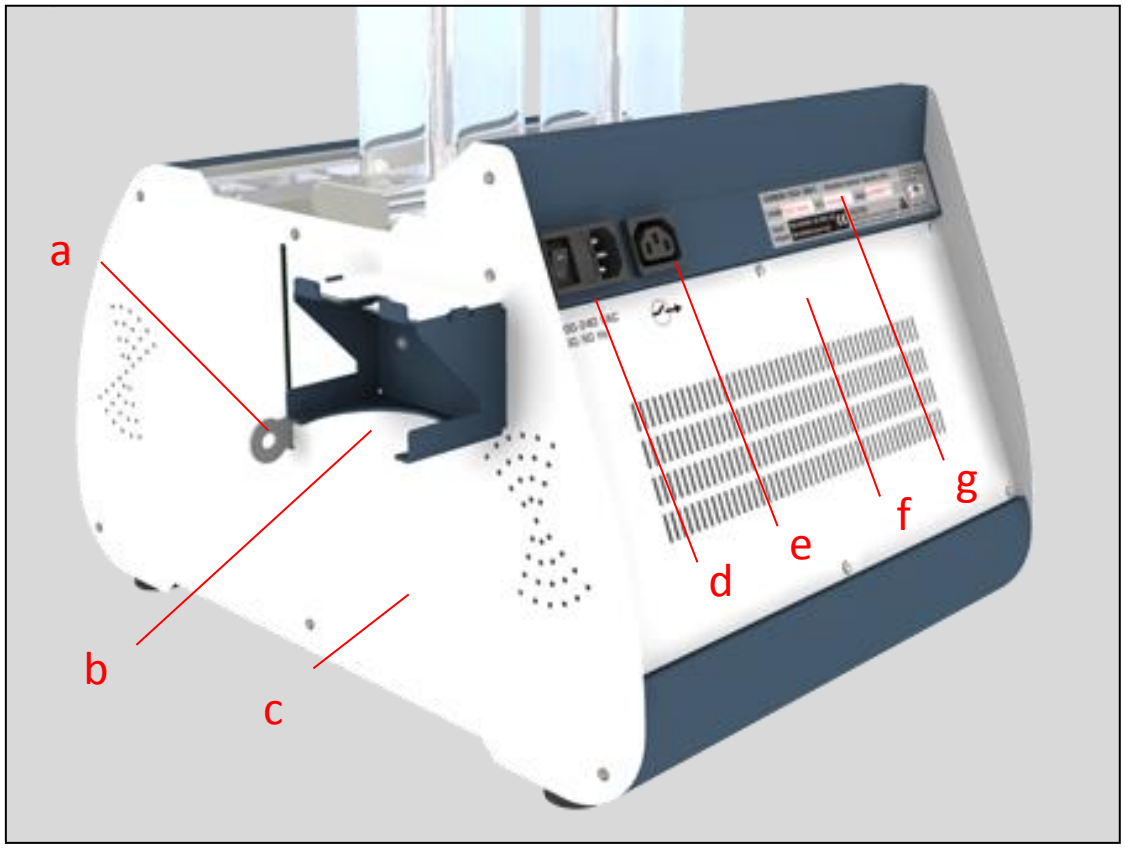


Figure 2-ii

Injector Test Rails

The Exclusive Test Rail, Figure 2-iv, is the most versatile test rail, since the user can fit up to 4 top-feed injectors or up to 4 side-feed injectors at a time, on each rail. Through a complete combination of adapters provided in the exclusive Adapters Kit, the user is capable of fitting any top-feed or side-feed injector on this test rail.

Figure 2-iii, Test Rail Handle (HNDL-1)

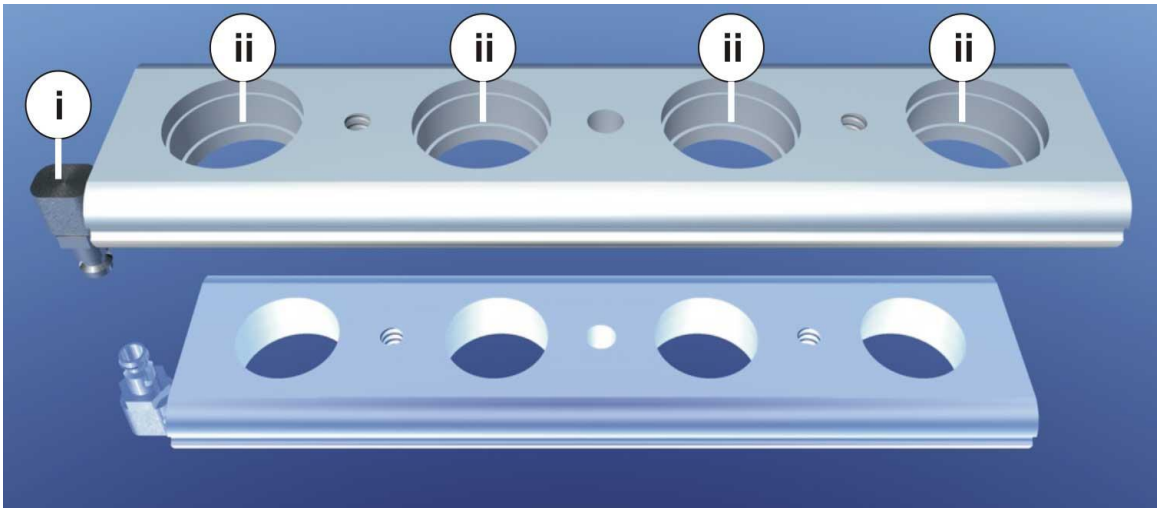


Figure 2-iv, Test Rail Exclusive (TESTRAIL-EX)

i) Machine Fluid Hose Connector

ii) Exclusive Injector Adapter Housings

iii) Test Rail Handle (HNDL-1)

The Standard Top-Feed Test Rail, Figure 2-vi, is used solely for Top-Feed injectors, and can fit up to 4 top-feed injectors at a time.

Figure 2-v, Test Rail Handle (HNDL-1)

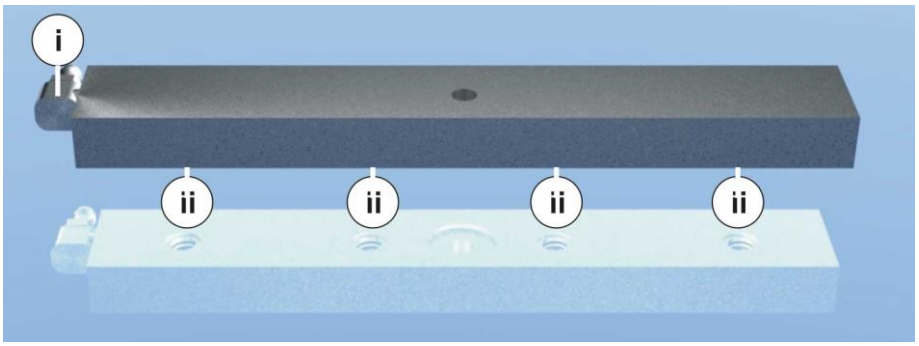


Figure 2-vi, Test Rail Standard Top-Feed (TESTRAIL-STD.TOP)

i) Machine Fluid Hose Connector

ii) Standard Injector Adapter Thread

iii) Test Rail Handle (HNDL-1)

The Standard Side-Feed Test Rail, Figure 2-viii,is used solely for Side-Feed injectors, and can fit up to 1 side-feed injector at a time.

Figure 2-vii, Test Rail Handle (HNDL-1)

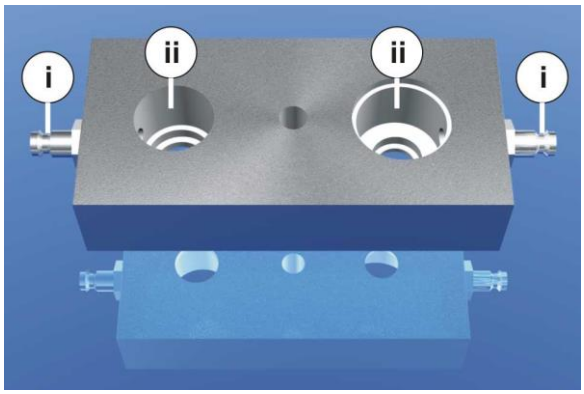


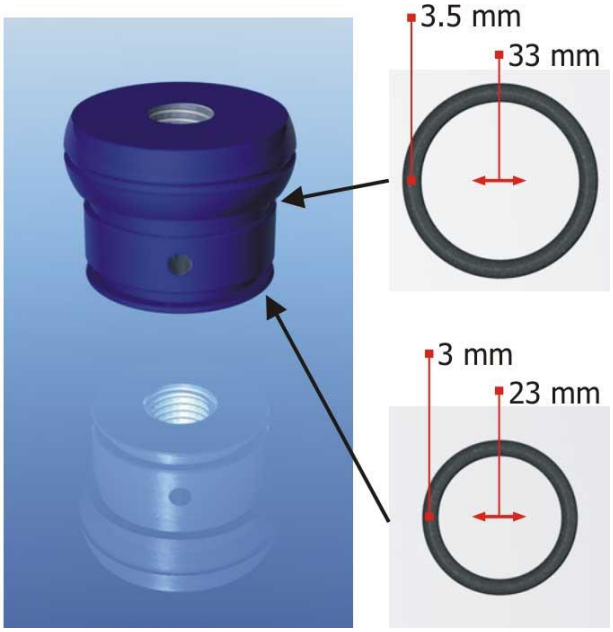
Figure 2-viii, Test Rail Standard Side-Feed (TESTRAIL-STD.SIDE)

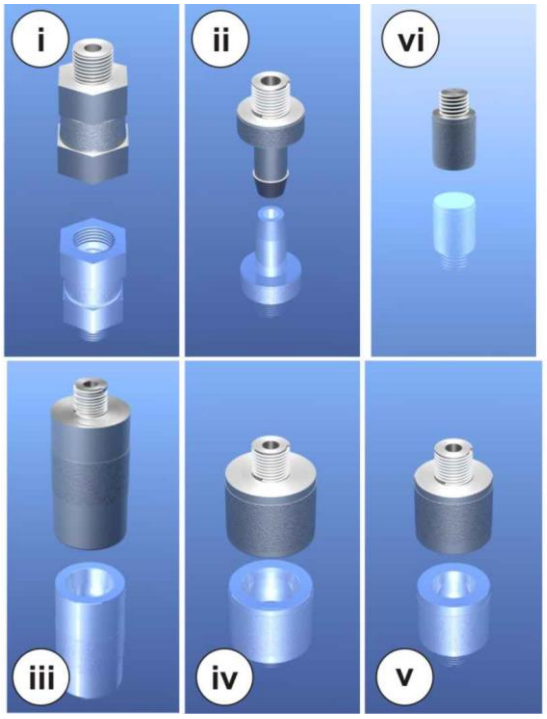
i) Machine Fluid Hose Connector

ii) Standard Injector Adapter Housings

iii) Test Rail Handle (HNDL-1)

Top-Feed Adapters

ADAPTER FIGURE	DESCRIPTION
	**Adapter Handle (Short):** (HNDL-2) **[GSx-2xxx only]**
	**'H' Shaped Injector Adapter:** (ADAPT-'H') **[GSx-2xxx only]**
	**Adapter Height Adjuster:** (ADJ-1) **[GSx-2xxx only]**
	**Top-Feed Injector Adapter:** (ADAPT-1) **ADAPT-1 O-rings:** (ORNG-001) **TOP SIDE** (ORNG-002) **BOTTOM SIDE** **[GSx-2xxx only]**



Top-Feed Injector fittings:

i) CIS Adapter
(ADAPT-TOP.CIS)

ii) Hose Adapter
(ADAPT-TOP.HOSE)

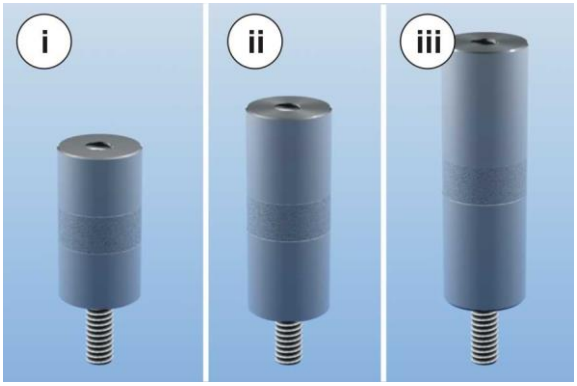
iii) Long Wide Top feed Adapter
(ADAPT-TOP.3)

iv) Wide Top feed Adapter
(ADAPT-TOP.2)

v) Narrow Top feed Adapter
(ADAPT-TOP.1)

vi) Blinder
(ADAPT-SEAL)

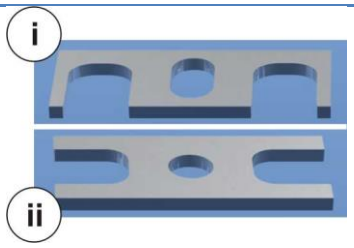
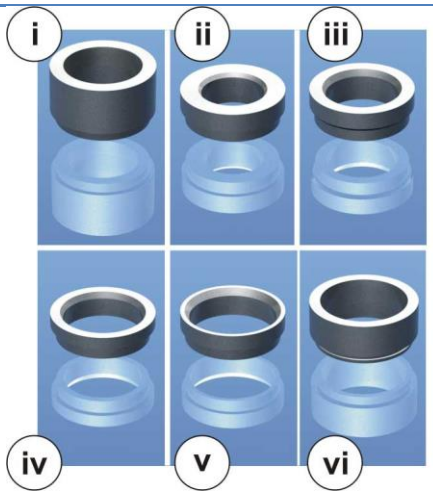
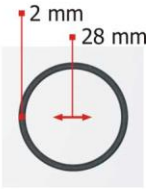
Top-Feed Injector fitting O-ring:
(ORNG-003)

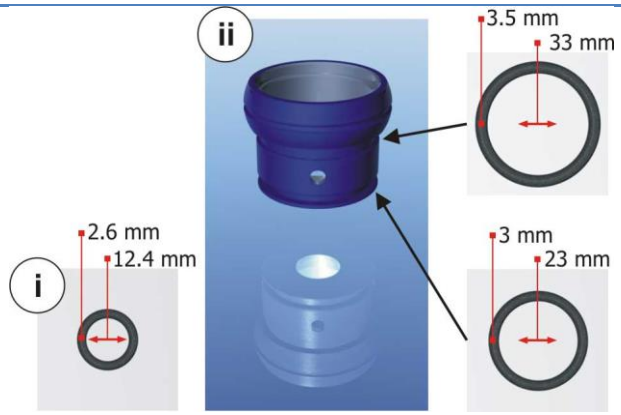


Test Rail Spacer:

i. **Height 45mm** (COL-45)
ii. **Height 60mm** (COL-60)
iii. **Height 90mm** (COL-90)

Side-Feed Adapters (Type A)

ADAPTER FIGURE	DESCRIPTION
	**Adapter Handle (Short):** (HNDL-2) **[GSx-2xxx only]**
	i. **'E' Shaped Injector Adapter:** (ADAPT-'E') ii. **'H' Shaped Injector Adapter:** (ADAPT-'H')
 	**Side-Feed Injector fittings Type(A):** **i.** (ADAPT-SIDE.A1) **[GSx-2xxx only]** **ii.** (ADAPT-SIDE.A2) **iii.** (ADAPT-SIDE.A3) **iv.** (ADAPT-SIDE.A4) **v.** (ADAPT-SIDE.A5) **vi.** (ADAPT-SIDE.A6) **[GSx-2xxx only]** **Side-Feed Injector fitting O-ring Type(A):** (ORNG-004)



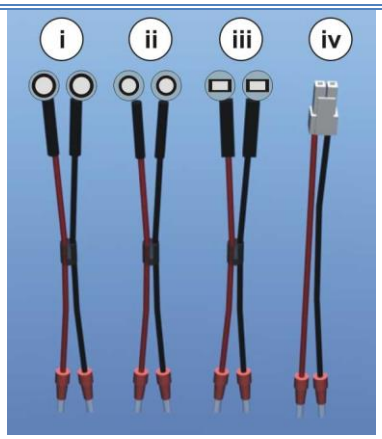
i. Side-Feed Injector Adapter Type(A):
(ADAPT-2)

ADAPT-2 O-rings:
(ORNG-001)
TOP SIDE

(ORNG-002)
BOTTOM SIDE

ii. ADAPT-2 extra O-ring:
(ORNG-005)

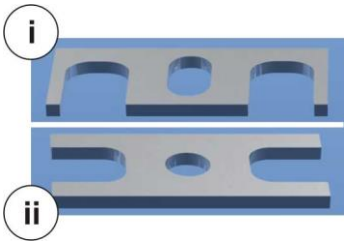
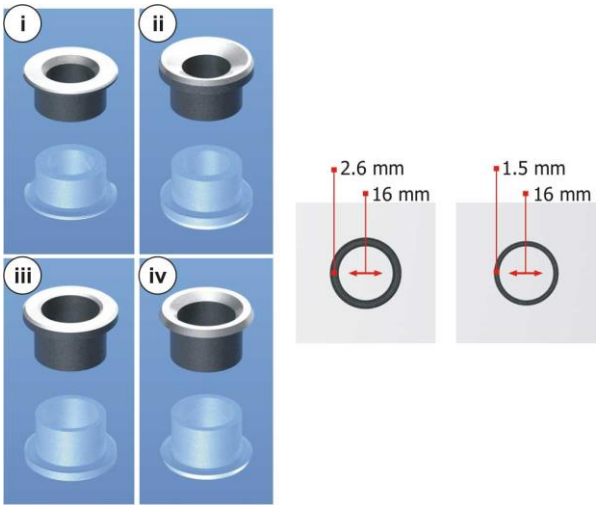
[GSx-2xxx only]

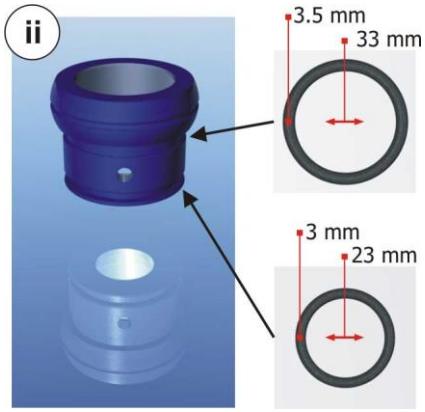


Side-Feed Injector Connectors:

i. (CON-1)
ii. (CON-2)
iii.(CON-3)
iv.(CON-4)

Side-Feed Adapters (Type B)

ADAPTER FIGURE	DESCRIPTION
	**Adapter Handle (Short):** (HNDL-2) **[GSx-2xxx only]**
	i. **'E' Shaped Injector Adapter:** (ADAPT-'E') ii. **'H' Shaped Injector Adapter:** (ADAPT-'H')
	**Side-Feed Injector fittings Type(B):** **i.** (ADAPT-SIDE.B1) **ii.** (ADAPT-SIDE.B2) **iii.** (ADAPT-SIDE.B3) **iv.** (ADAPT-SIDE.B4) **Side-Feed Injector fitting O-ring Type(B):** (ORNG-006) **Thick O-ring** (ORNG-007) **Thin O-ring**

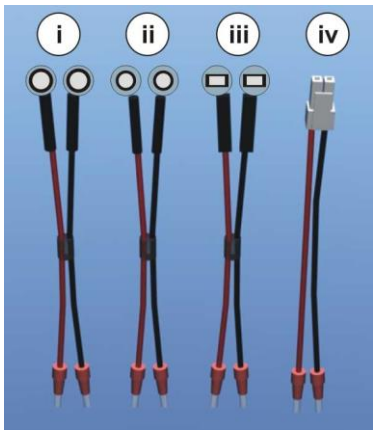


Side-Feed Injector Adapter Type(B):
(ADAPT-3)

ADAPT-3 **O-rings:**
(ORNG-001)
TOP SIDE

(ORNG-002)
BOTTOM SIDE

[GSx-2xxx only]



Side-Feed Injector Connectors:

i. (CON-1)
ii. (CON-2)
iii. (CON-3)
iv. (CON-4)

Other Adapters

Reverse Flushing Adapters

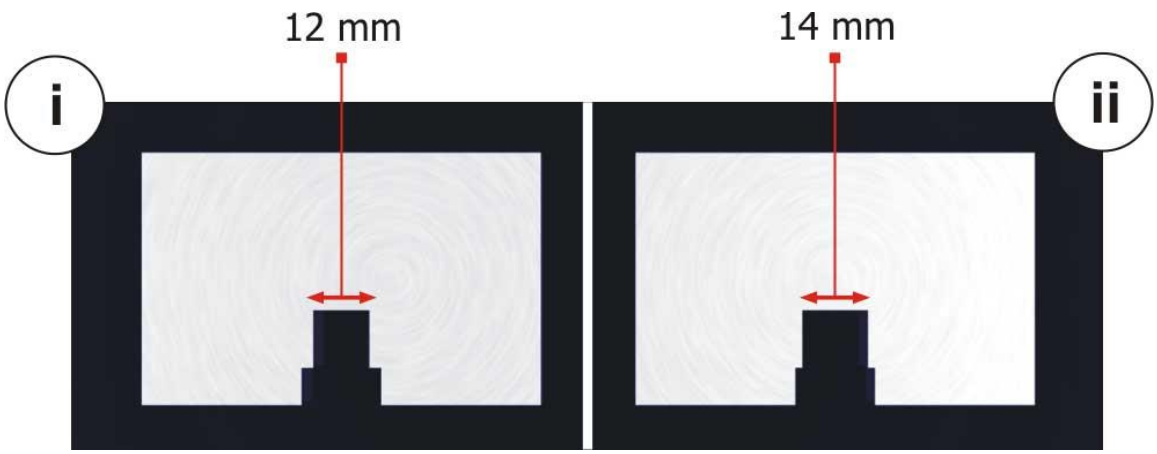


Figure 2-ix, Reverse Flushing Adapters

i) Smaller opening Reverse Flushing Adapter **(ADAPT-BF.1)**

ii) Larger opening Reverse Flushing Adapter **(ADAPT-BF.2)**

These adapters, are used solely for the Reverse Flushing device and the only difference is the injector opening. Use what best fits the injector type.

Ultrasonic Rails

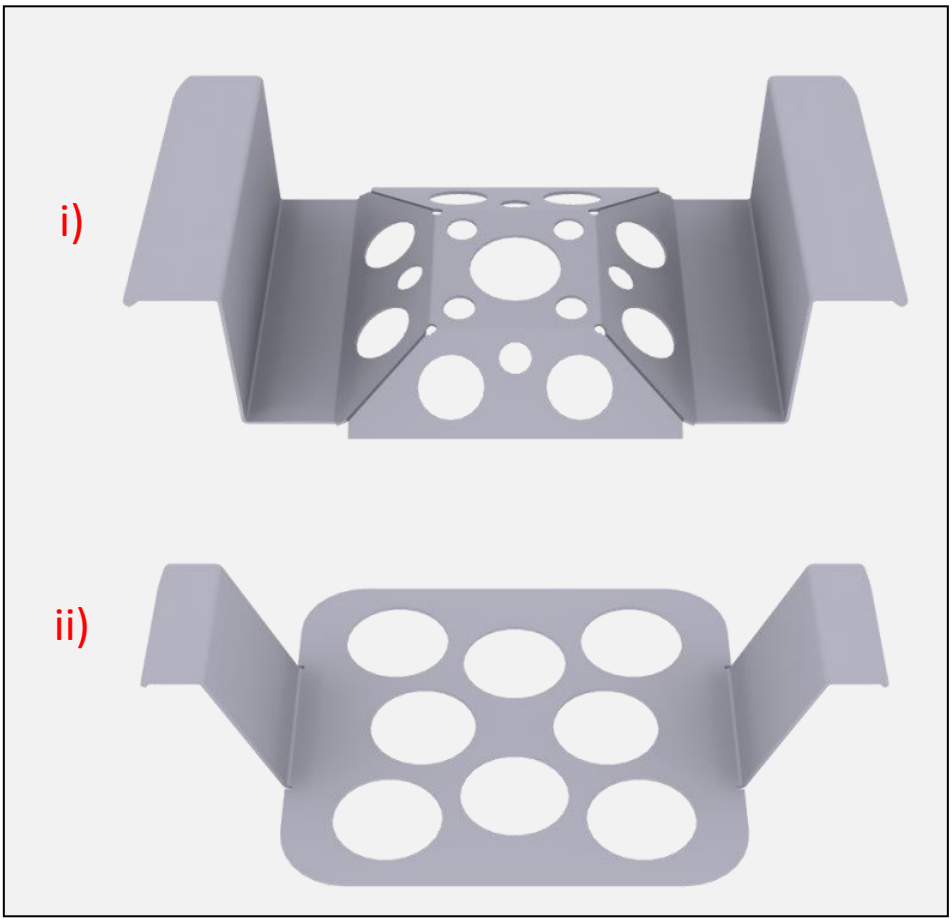


Figure 2-x, Ultrasonic Unit Bath Rails

i) Ultrasonic Rail for Top-Feed Injectors **(RAIL-US.1)**

ii) Ultrasonic Rail for Side-Feed Injectors **(RAIL-US.2)**

Use the ultrasonic rails RAIL-US.1 or RAIL-US.2, according to the type of injector.

Chapter 3
“Getting Started”

This chapter provides basic information to start using the GS Series unit and covers the following topics:

[**info**]

All users should be familiar with diesel systems and should always wear protective goggles and gloves.

- Unpacking and setting up
- Connecting the AC and the Ultrasonic power
- Starting up for the first time
- Powering down the system
- Testing Fluid
- Ultrasonic Fluid

A new user should follow the steps in each section of this chapter in order to operate the machine.

Unpacking and setting up

- Verify that all the items in the equipment check list in Chapter 1 are present
- Place the GS Series Unit and Ultrasonic Device in a clean and well ventilated space
- Use a leveled, steady bench that can support the weight of the machine, or use the PS1/PS2 Portable Stand [optional].

Connecting the AC and the Ultrasonic power

GS Series Unit

Verify that the rear ON/OFF Power Switch is in the OFF position.

1. Connect one end of the AC power cord [a] to the rear power socket of the machine [b] (Figure 3-i)
2. Connect the other end of the AC Power cord to any grounded 100/240 VAC, 50/60 Hz power source (live wall outlet)

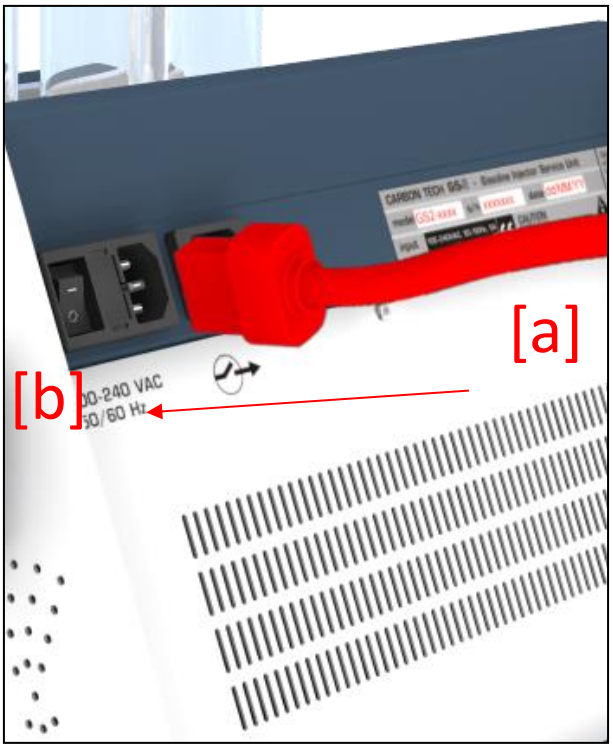


Figure 3-i

Injector Ultrasonic Device

1. Connect one end of the AC power cord to the rear power socket of the device
2. Connect the other end of the AC Power cord to the GS unit loop back connection, depending on the Ultrasonic device specifications. Also switch on the ultrasonic device if applicable, using the Rear On/Off switch.

[**info**]

Please consult the accompanying Ultrasonic device Operating Manual.

Starting up for the first time

1. Switch to the ON position the rear power Switch.
   0: OFF / **I**: ON
2. Wait a few seconds until the GS Series Software Boots up. If more than 1 minute pass and the Software has not loaded (Blank screen), consult your local dealer.
3. Once the software loads, the initial screen will show the S/W and H/W version of the machine
4. Look in Chapter 4 “Control Panel” for further information on software navigation.

[**important**]

- Always wait at least 15 seconds when switching on the unit again (after a power down)

Powering down the system

1. Press the CANCEL button for more than 3 seconds until the Home screen is revealed
2. Once this operation is complete, you can switch off the machine using rear ON/OFF Power.

Testing Fluid

The GS Series comes with a tank of Testing fluid (Gasoline Calibration oil) / (Figure 3-ii). In order to fill the Testing tank up to acceptable level, you must use the accompanied funnel and pour liquid through the Spray Chambers. Press the Drain button (lift the Drain lever [GS2 units]), in order to empty filled tubes into the tank.

Figure 3-ii

[**info**]

- Always check if you have acceptable levels of fluids.

[**important**]

- Never operate the machine if the fluid is not within acceptable levels.
- It is recommended to clean the injectors with the ultrasonic device before installing on the machine in order to avoid fluid and filter contamination.

Ultrasonic Fluid

Pour a mixture of Distilled water and Ultrasonic Fluid in the Ultrasonic bath (1:3), and fill up to 2/3 or the marked line.

[**info**]

- Always consult device manual and fluid labeling.

[**important**]

- Never operate the device if the fluid is not within acceptable levels. Add water or refill with mixture as needed.

Chapter 4
“Control Panel”

This chapter provides useful information on the GS Series Menu. It covers the following topics:

- Control Panel
- Language Selection
- Machine Logo Customization
- Procedure Screens

A new user should preview all the screens in this chapter prior to operating the GS Series unit.

Control Panel

In this section the Control Panel, buttons and features are previewed and explained. The Menu is designed for easy and simple operation.

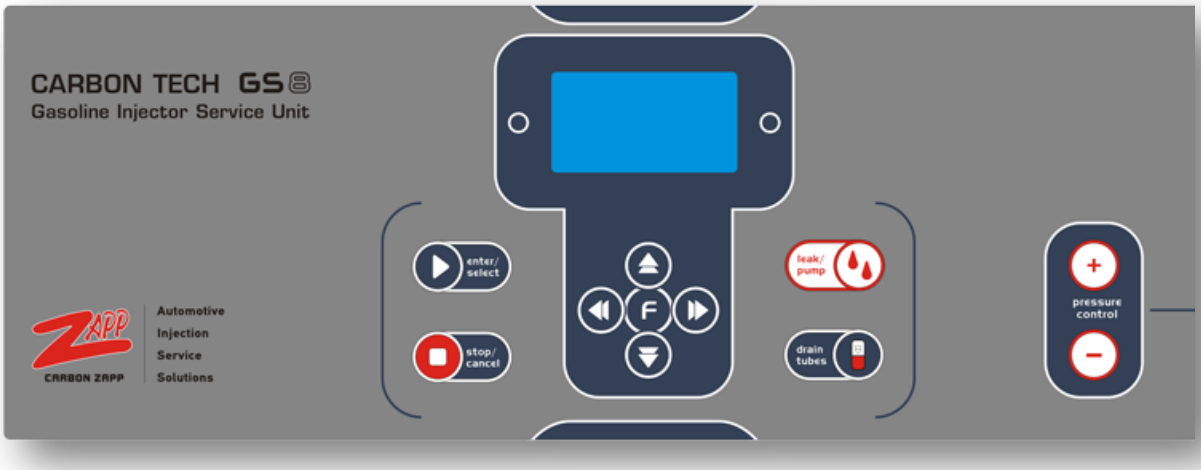


Figure 4-i

a. The Display shows instructions or messages on how to proceed.
b. The ENTER button is used to Confirm an action, move forward in the menu, or select an option.
c. The STOP button is used to Stop / Cancel an action or move backward in the menu
d. The Leak / PUMP button is used to toggle the pressure On and OFF. The Analog gauge will show the pressure in the system.
e. The + / - (more/less) buttons in the Pressure control area, are used to adjust the required pressure. Each injector type has an automatic setting, therefore only fine tuning is required.
f. The Drain Tubes button [GS4, GS8 only] is used to toggle the Volumetric tube drain valves ON and OFF, draining the tubes from any remaining liquid. This is also done automatically, in

between programs. For the GS2 unit, the mechanical use of the side lever is required to empty the tubes.

g. The Arrow Keys are used to navigate through the menu, select another option, or change a value.
h. The [F]unction button is used to edit or reset a value

Language Selection [GS4 and GS8 only]

In order to change the language of operation on the GS units the user should follow the steps below:

1. If the unit is not switched off, switch it OFF.

2. Switch the machine back ON.

3. As soon as the machine initializes, press and hold the **Stop/Cancel button** for more than ***3''***.

4. Scroll through the available languages using the **Up/Down Arrows**.

5. Press the **Enter/Select** button to select the desired language and exit to the main menu, or press the **Stop/Cancel button** to exit without changing the language.

Machine Logo Customization [GS4 and GS8 only]

The GS units include a feature that the user can alter the Company message display on the machine. In order to customize this feature follow the instructions below:

1. If the unit is not switched off, switch it OFF.

2. Switch the machine back ON.

3. As soon as the machine initializes, press and hold the **Stop/Cancel button** for more than **3''**.

4. Press **Right Arrow** to enter the Company Logo editor.

5. Using the **Left/Right Arrows** select the position of the text and change the current character using the **Up/Down Arrows**.

6. Press the **Enter/Select** button to save the new logo and exit to the main menu, or press the **Stop/Cancel button** to exit without changing the language.

Procedure Screens

There are several options in GS Series software, navigate the screens by using Arrow keys, and press the Enter button to select an option.

1. Engine Configuration (Vehicle / Motorcycle) [GS4 and GS8 only]:

In order to proceed with the simulation and cleaning of the injectors, the user begins by selecting which type of engine the injectors come from; A vehicle Engine or a Motorcycle Engine. If Motorcycle Engine is selected, the machine continues to step 3 of this procedure.

2. Choose System (MPFI / TBI / G-DI):

Here, the user should select which system the Vehicle Injectors come from: MPFI, TBI or G-DI.

- MPFI or MFI (Multiport Fuel Injection), is a term broadly used to describe all port fuel injection systems. It is more accurately used to describe systems where the injectors are pulsed simultaneously (Old Type) or in groups (SFI). MPFI systems employ individual fuel injectors for each cylinder. Located in the intake manifold, the fuel injectors are timed to spray fuel into the port area when the intake valves open. The fuel injector spray-in pressure is higher on MPFI systems than TBI designs, and run generally between 220-550 kPa (31.9-79.8 psi).

- TBI (Throttle Body fuel Injection), still in use today, the TBI design has full control over the air/fuel ratio. The TBI injectors can operate at various pressure levels based upon the model year of the vehicle, however generally run between 75-200 kPa (11-29 psi). Lightly atomized fuel is sprayed directly into the TBI bore and engine intake manifold where it mixes with air to form a combustible mixture.

- G-DI (Gasoline Direct Injection), also known as FSI, HPI, GDI, is a term broadly used to describe all direct fuel injection systems. G-DI systems employ individual fuel injectors for each cylinder, located in the combustion chamber. The fuel injectors are timed to spray fuel into the combustion chamber, in stratified or in homogeneous mode, depending on the load demanded by the engine. The fuel injector spray-in pressure is higher than all conventional fuel injection designs, and run generally between 5-13 MPa (725.2-1 885.5 psi).

If TBI system is selected, the machine continues to step 5 of this procedure, whereas if G-DI system is selected, the machine continues to step 4 of this procedure.

3. Injector Type (Side-Feed / Top-Feed) [GS4 and GS8 only]:

With Side-Feed Port Injectors, fuel enters at the Side of the injector as opposed to the Top of the injector which is typically for Top-Feed Injectors.

5. Number of Injectors (1..8):

The user should select the number of injectors currently under test.

6. Operation Program (Default / User) [GS4 and GS8 only]:

The machine also provides a way for the user to select between MAGNETI MARELLIs predefined simulation programs for testing and cleaning the injectors and User defined simulation programs. Whether in Automatic mode or Manual, when the System programs are selected, the machine will execute all the System Predefined Simulation Programs. For **advanced users**, there is an option to select User Programs; A series of edible simulation programs that the user can create explicitly for his /her needs. Detailed information on how advanced users can create their

own simulation programs is provided in Advanced User - page 5-10.

Once either operation is selected, a prompt will follow asking the user if all the required simulation steps should follow or if the user wants specific to operate programs.

7. Progress Mode (Auto / Manual) [GS4 and GS8 only]:

The GS Units provide two ways for the user to operate the machine, Automatic mode and Manual Mode. In the Automatic mode the machine goes through all the required steps of testing and cleaning the injectors, and provides detailed instructions on every action. For more advanced users, the machine can operate in Manual mode, allowing the user to select the desired operation without going through all the simulation steps selected.

Chapter 5
“Operation Basics”

In this chapter instructions with figures will be shown on how to perform a basic operation with the GS units. The following topics are covered:

- Sample Procedure on Testing Injectors
    - Injector Adaptation and Connection
    - Initial Coil Test
    - Initial Flow Test (Spray and Volume)
    - Injector Cleaning
    - Reverse Flushing
    - Final Coil & Flow Test
    - Leak Test
    - Spare Parts
- Advanced User

A new user should fully understand this chapter prior to operating the GS units.

SAFETY PRECAUTIONS

ALWAYS:

- Check machine rail & connections for leaks.
- Have a fire extinguisher nearby.
- Wear eye goggles.

NEVER:

- Operate the machine when leaking fluid.
- Disconnect under pressure.
- Smoke nearby machine.
- Operate close to open flame or sparks.

CAUTION: ***The machine's fuel pump is capable of delivering at least 2 liters (1½ gallons) of fluid flow per minute at a pressure greater than 10 bar (150 psi).***

Sample Procedure on Testing Injectors

Injector Adaptation and Mounting

Please consult the Appendix B, “Adapters and Mounting” for information on how to mount the injectors on the test rails.

Initial Coil Test [GS4 and GS8 only]

In this step, the injectors have been already fitted on the test rail and the machine conducts an (Ω) OHM test on the injector's coil (see Figure). This is the first (Initial) OHM test that is conducted by the machine and its purpose is for the user to better diagnose the injectors condition, before cleaning.

Figure 5-i, Correct Ohm (Ω) Test

Information is provide for 1..8 injectors and includes:

i) Resistance of each Injector in OHM
ii) OPEN-CIRCUIT-COIL
iii) SHORT-CIRCUIT-COIL.

After the OHM test is complete, the machine informs the user if there was a difference between the injector resistances.

Initial Flow Test (Spray & Volume)

In order for the user to have a complete diagnosis of the injectors under test, a Bench Flow Test must be conducted. In this step the machine goes through a series of *System Defined Engine Simulation Programs* (see Appendix C), a combination of STRKs – milliseconds – time, providing the user with visual diagnosis of each injector spray pattern and volume, on different engine operation modes. An advanced user has the capability of creating his/her own combination of STRKs, milliseconds and time, from a series of *User Defined Engine Simulation Programs*. In this section the advanced user can create up to 7 different simulation programs with a selection of a wide range of STRKs, milliseconds and time, for every type of engine (see Table 1)

Table 1, Advanced User Simulation Programs Parameters

	"STRK" (100 incr.)	"ms" (0.1 incr.)	"Time"
Minimum Value	500	0.9	5 sec
Maximum Value	16,000	100	20 min

At any time during the injectors operation the user can press the "F" button on the machine control panel, in order to have control of one injector independently. In other words, when the "F" button is pressed, only one injector at a time will spray, and by using the Left/Right Arrows the user can scroll between the injectors.

In addition, advanced users can also press the INCREASE/DECREASE pressure buttons, in order to adjust the system pressure according to his/her needs.

[note]
Acceptable volume displacement (ml) tolerance between injectors, by vehicle manufactures, is maximum 5%.

Injector Cleaning

Before any operation with the Ultrasonic device, the user must assure that the device is properly Set-Up and the Ultrasonic Tank is filled with cleaning mixture.

In this step, the injectors are fitted on the suitable Ultrasonic Rail (see Ultrasonic Rails, page 2-15) along with the electrical connectors of the machine. The GS Units power the Ultrasonic machine automatically once the operation has been selected from the menu. It is recommended (for better cleaning) that the user fills the injectors' fuel path-way (Top-Feed Injectors) with cleaning fluid, using the Ultrasonic Injector Filler provided (see Figure 5-ii). Again an **advanced user** has the capability of editing a series of simulation programs provided, although that is not recommended for the ultrasonic cleaning.

Figure 5-ii, Injector Fuel Path-Way Filling

After the cleaning process has completed, the user should blow shop air into each injector's fuel path-way to remove as much of the residue left from the ultrasonic cleaning. The machine provides

electrical operation for all injector connectors. Instructions for this operation are provided on the machine panel display when in automatic mode.

Operation of the Ultrasonic Unit

Once the Ultrasonic Unit is powered up, it operates in Automatic Mode for 33 minutes. The user should always adjust the required temperature of the ultrasonic machine.

Reverse Flushing

After the injectors have been ultrasonically cleaned, the user is required to fit the injectors (on-by-one) on the Reverse Flushing device. This device pushes testing fluid from the nozzle opening of the injector towards the wider opening, while the injector is operated (see Figure 5-iii). This operation assures that the injector is left free of dirt (internally) and also all the water-based cleaning fluid is removed.

Mounting on the Device:

1. Mount the injector on the device using the appropriate Reverse Flushing Adapter
2. Press Down on the Device Lever in order to secure and seal the injector. For the GS2 units, just fit the adapter on the injector Nozzle, and press firmly on the device in order to seal.
3. Connect the Reverse Flushing injector harness on the injector
4. Press the Enter button on the Control Panel for confirmation.

Figure 5-iii, Reverse Flushing Device

Final Coil and Flow Test

This step is similar to the initial test, and provides the capability for the user to compare the values. Also the effectiveness of the cleaning is shown in the spray pattern and the volumetric displacement.

Leak Test

This step is the final step of the testing procedure. After the injectors have been cleaned and tested, it is imperative that the user checks for leaks. In this operation the machine applies fluid pressure to the injectors, without operating their electrical part.

[**note**]

- An injector may be operating correctly (spray and volume), nevertheless the injector should be free of leaks for at least 25 seconds.

Spare Parts

Once the injectors have been cleaned and tested, it is recommended the user repairs the injector further by replacing faulty accessories such as: Screen Filters, Pintle Caps etc.

A sample kit of most commonly used injector accessory parts is provided initially with the machine. The user can order injector accessories through his/her locale distributor or by contacting MAGNETI MARELLI directly, using the Code provided in the Accessories list (Appendix D).

Advanced User

When the user is familiar with the GS units [GS4/GS8 only] and would like to further take advantage of the machines capabilities, the following instruction are provided:

The GS units have system defined simulation programs (combination of STRKs, ms & time) for every type of engine and type of injector, both different for testing and cleaning operations. These simulation programs have been carefully selected to better test and clean the fuel injectors.

Nevertheless, an option for the advanced user to create his own simulation programs on a duplicate of the system defined programs, and storing those programs in memory.

Once the user has selected Manual Operation Mode, any program operated is a user defined program and can be altered, following the directions below:

1. While a program is selected, but not operated, press the **”F”** button for more than 2’’.
2. The “STRKs” tab will start blinking, select the desired value using the Up/Down Arrows.
3. Press Left/Right Arrows to move to the “ms” tab. The “ms” tab will start blinking; select the desired value using the Up/Down Arrows.
4. Press Left/Right Arrows to move to the “time” tab. The “time” tab will start blinking; select the desired value using the Up/Down Arrows.
5. Press **ENTER/START** button to store the program, otherwise press **CANCEL/STOP** button to discard the changes made on this program and return to the programs menu.

[note]

Sometimes the Strokes & milliseconds will not reach their maximum or minimum values because it is limited by the duty cycle operation.

[Important]

When a large amount of operation “time” is selected, the user should always be aware that a fluid overflow may occur, and should press the DRAIN button to continuously drain the tubes or reduce the amount of operation time.

Chapter 6
“Injector Types”

In this part of the operating manual the user will find useful information on various combinations of the provided adapters along with the fitting of the most common Top-feed and Side-feed injectors.

The user can create his/her own combination of adapters and o-rings – provided in the adapters kit – in order to fit any type of injector on the test rail and hence the machine.

[**important**]

- The user must always check for leaks on the test rail before beginning the testing phase. Once the injectors have been fitted on the test rail, and the fluid hose is connected, the user should apply some pressure to the system and check for leaks.

Top-Feed Injectors

		
DENSO, B-4	DENSO, B-4	HONDA, B-4
		
B-4	B-4	B-4
		
DENSO, B-4	B-4	B-4
		
B-4	B-4	B-4

		
MITSUBISHI, B-4	KEIHIN, B-4	, B-4
		
B-4	B-4	B-4
		
LUCAS, B-5	B-5	GM MULTEC, B-5
		
B-5	WEBER, B-5	B-5

		
B-5	B-5	LUCAS, B-5
		
B-5	B-5	B-5
		
B-5	B-5	WEBER SIEMENS, B-5
		
HITACHI, B-5	B-5	B-5

		
B-5	DELPHI, B-5	B-5
		
LUCAS / SIEMENS, B-5	BOSCH (G-DI), B-5	MITSUBISHI (G-DI), B-5
		
B-6	B-6	B-6
		
B-6	B-6	B-6

		
B-6	B-6	BOSCH, B-7
		
SIEMENS (G-DI), B-7		

Side-Feed Injectors

		
GM, B-9	ROCHESTER, B-9	ROCHESTER GM,B-10
		
B-13	B-12	DENSO, B-11
		
BOSCH, B-19	BOSCH, B-19	BOSCH, B-19
		
BOSCH, B-19	BOSCH, B-19	B-18

		
B-14	B-15	B-15
		
B-15	NIPPONDENSO, B-15	B-15
		
JECS, B-15	B-17	B-17
		
B-14	B-14	NIPPON DENSO, B-14

Appendix A
“Specifications”

Mains Voltage	VAc	100-250 V
Mains Frequency	Hz	50 / 60
Mains Fuse	Ampere	5.0 A
Mains Power Cord (CE Approved) Voltage/Amperage/Length	V / A / mm	250 / 10 / 200
Power Consumption at Idle Operation	Watt	15.0
Power Consumption at Average Operation	Watt	100.0
Power Consumption at Max [GS2 / GS4-8)	Watt	200 / 320
Max. Filling Volume for Testing/Calibration Oil Tank [GS4/GS2]	lt. / gal.	3.7 / 0.98
Max. Filling Volume for Testing/Calibration Oil Tank [GS8]	lt. / gal.	4.6 / 1.2
Testing Filter Life	Hours / Months	300 / 6
Testing Fluid Life	Hours / Months	100 / 2
Max. System Build-Up Pressure	Bar / Psi	8 / 115

Appendix B
“Adapters and Mounting”

Sealing an output port

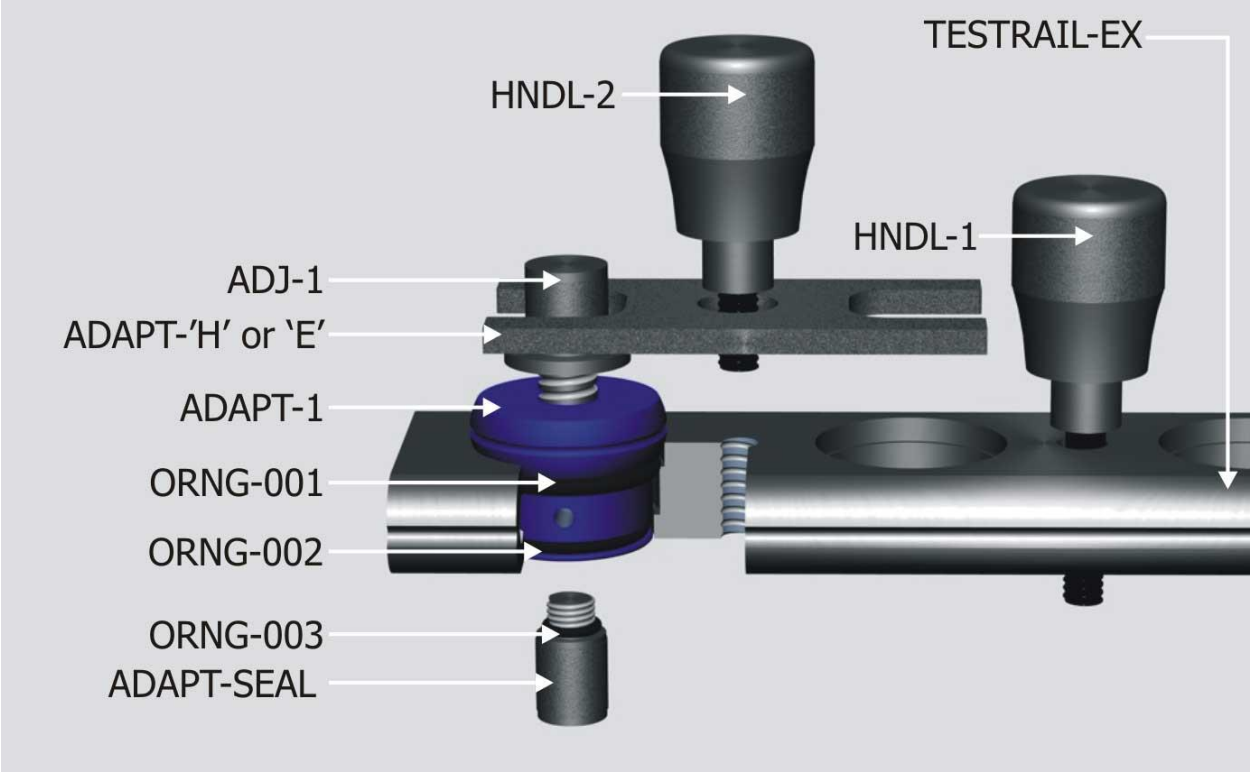


Figure 6-i, Test Rail Seal Illustration

When the number of injectors to be tested is less than the openings in the fuel injector testing rail, then the user should use the adapters provided, to seal any unwanted rail openings.

NOTE: For the "Standard Test Rail & Adapters, the user should replace the parts: TESTRAIL-EX, ADJ-1, ADAPT-1 w/ o-rings, with TESTRAIL-STD.TOP.

Top-Feed Injector Fittings

Top-Feed Injectors Fittings (Asian Top Feed)

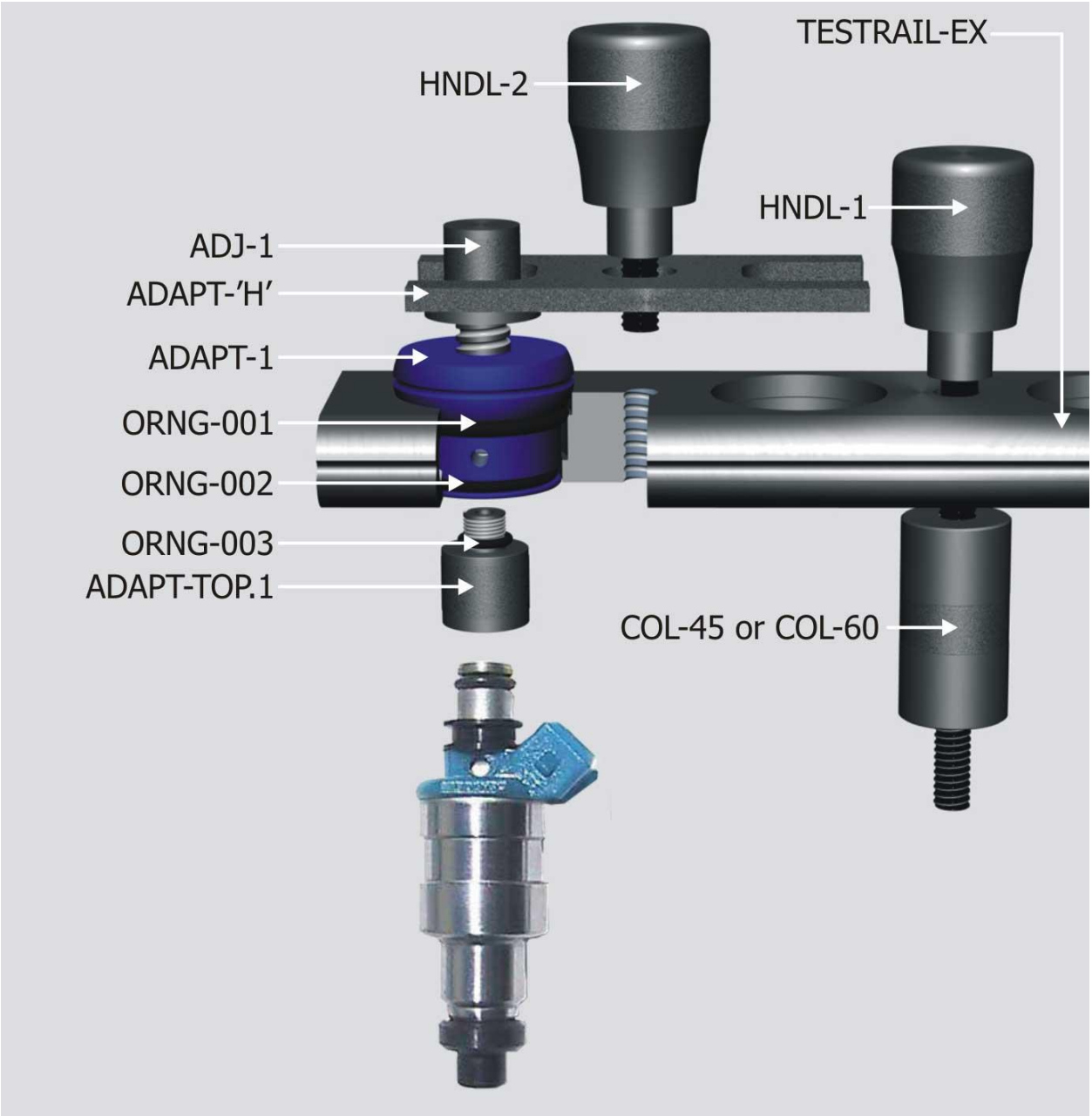


Figure 6-ii, Top-Feed Asian Type Fitting Illustration

***NOTE**: For the "Standard Test Rail & Adapters, the user should replace the parts: TESTRAIL-EX, ADAPT-'H', ADJ-1, ADAPT-1 w/ o-rings, with TESTRAIL-STD.TOP.*

Top-Feed Injectors Fittings (European Top Type)

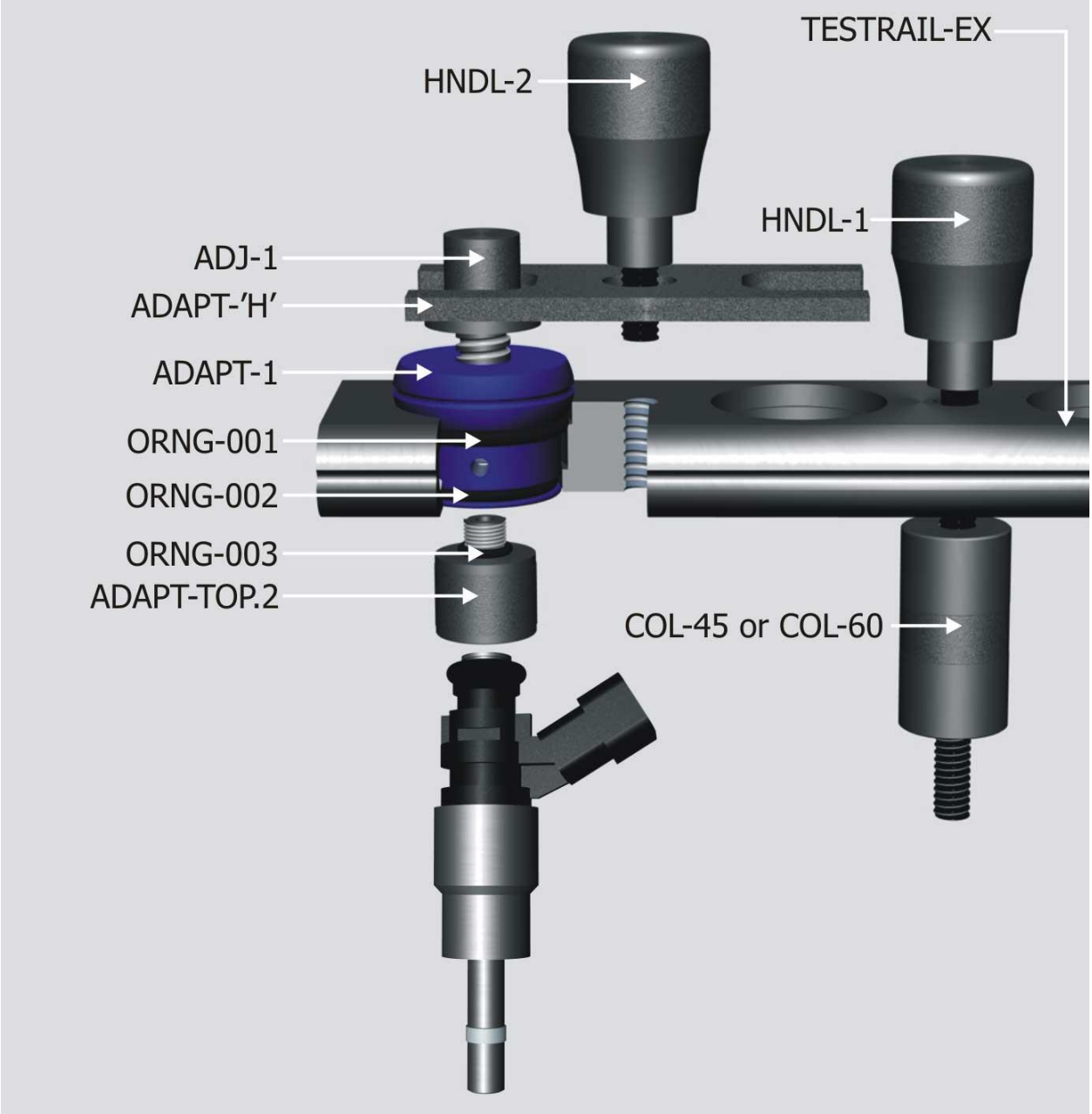


Figure 6-iii, Top-Feed European Type Fitting Illustration

NOTE: For the "Standard Test Rail & Adapters, the user should replace the parts: TESTRAIL-EX, ADAPT-'H', ADJ-1, ADAPT-1 w/ o-rings, with TESTRAIL-STD.TOP.

Top-Feed Injectors Fittings (Hose Type)

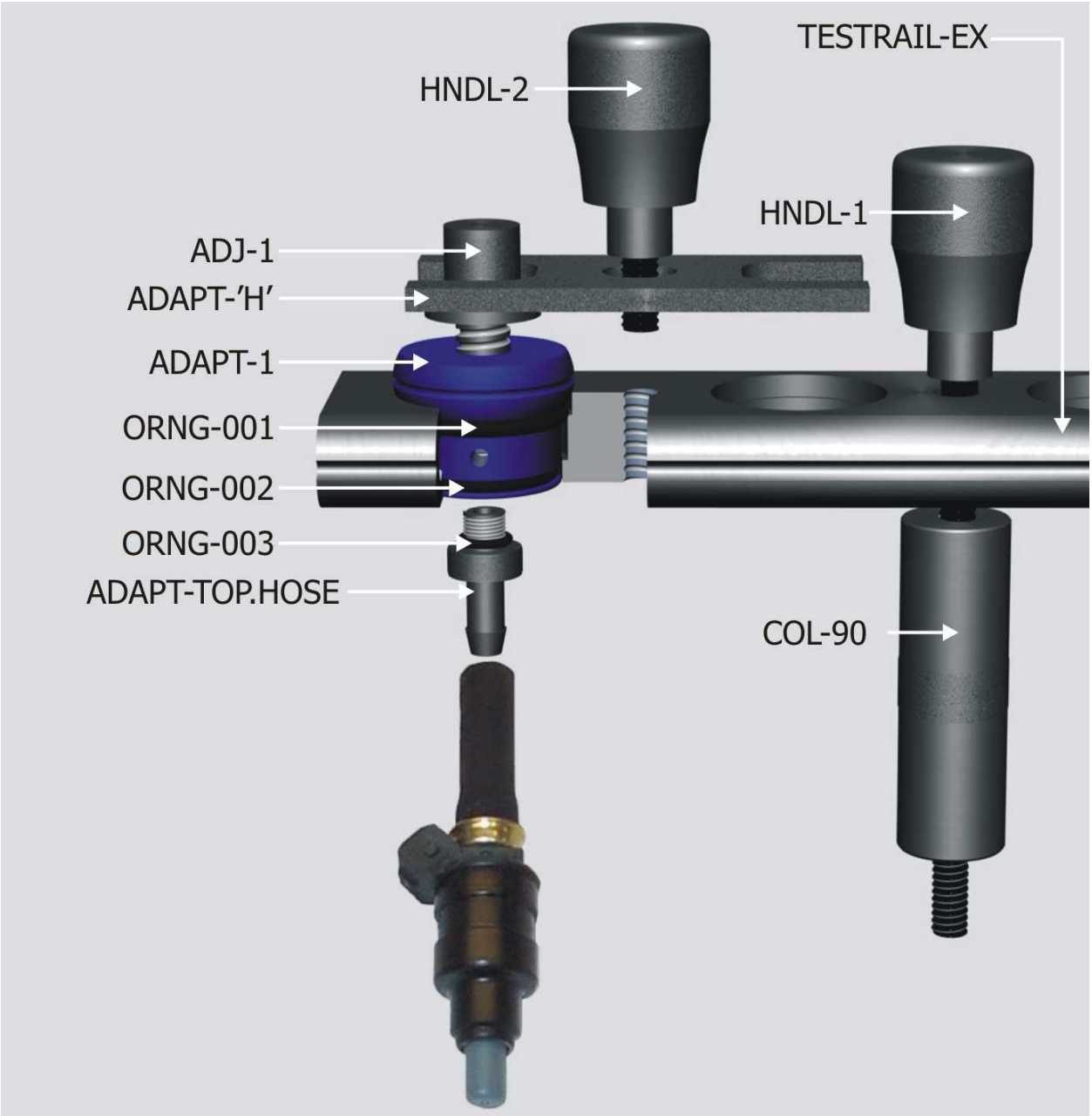


Figure 6-iv, Top-Feed Hose Type Fitting Illustration

NOTE: For the "Standard Test Rail & Adapters, the user should replace the parts: TESTRAIL-EX, ADAPT-'H', ADJ-1, ADAPT-1 w/ o-rings, with TESTRAIL-STD.TOP.

Top-Feed Injectors Fittings (CIS Mechanical Type)

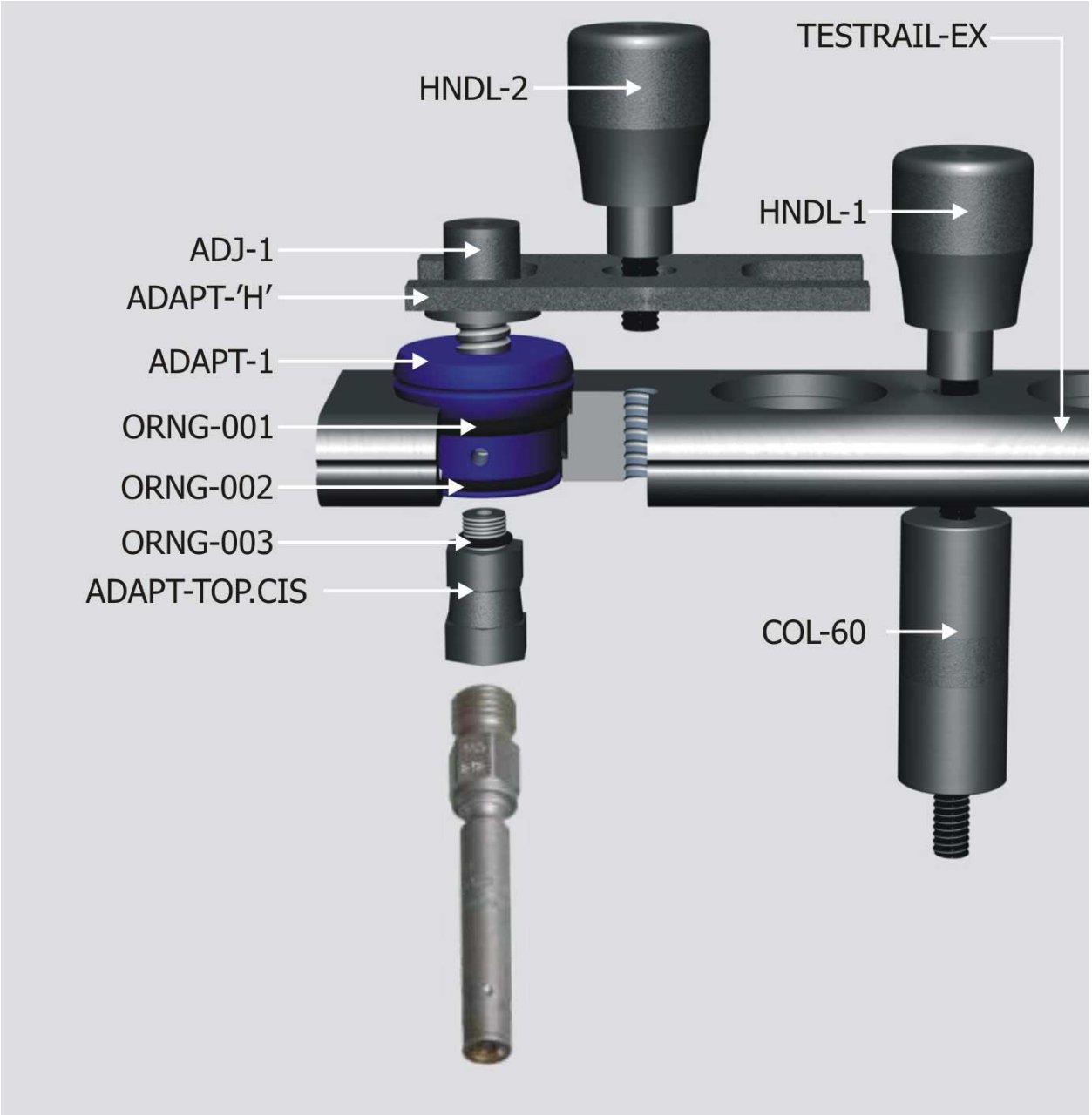


Figure 6-v, Top-Feed Mechanical Type Fitting Illustration

NOTE: For the "Standard Test Rail & Adapters, the user should replace the parts: TESTRAIL-EX, ADAPT-'H', ADJ-1, ADAPT-1 w/ o-rings, with TESTRAIL-STD.TOP.

Side-Feed Injector Fittings

Side-Feed Injectors Fittings (“A” Type, illustration 1)

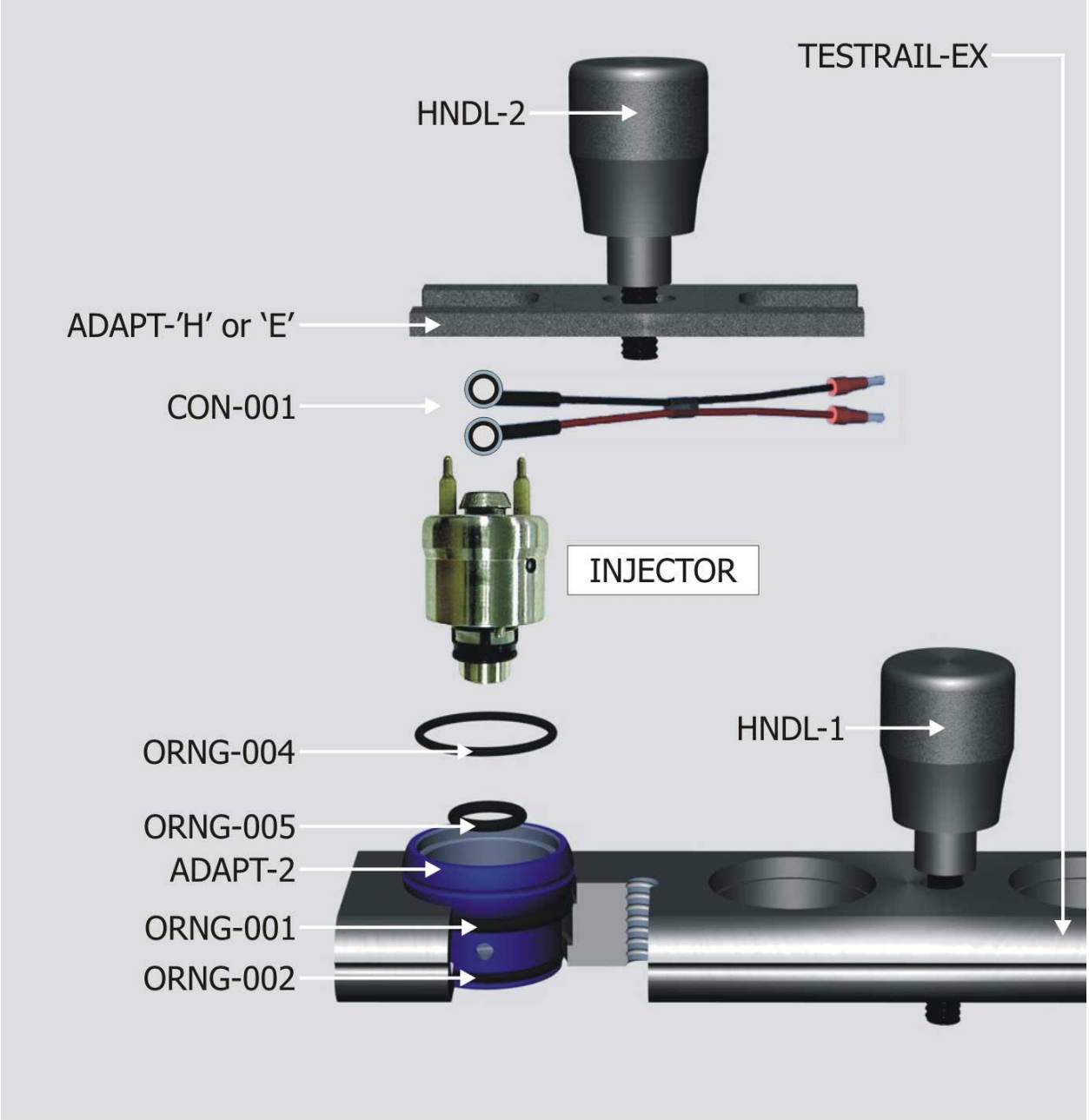


Figure 6-vi, Side-Feed Type (A) Fitting Illustration (1)

NOTE: For the “Standard Test Rail & Adapters, the user should replace the parts: TESTRAIL-EX, ADAPT-‘H’, ADJ-1, ADAPT-1 w/ o-rings, with TESTRAIL-STD.TOP.

Side-Feed Injectors Fittings (“A” Type, illustration 2)

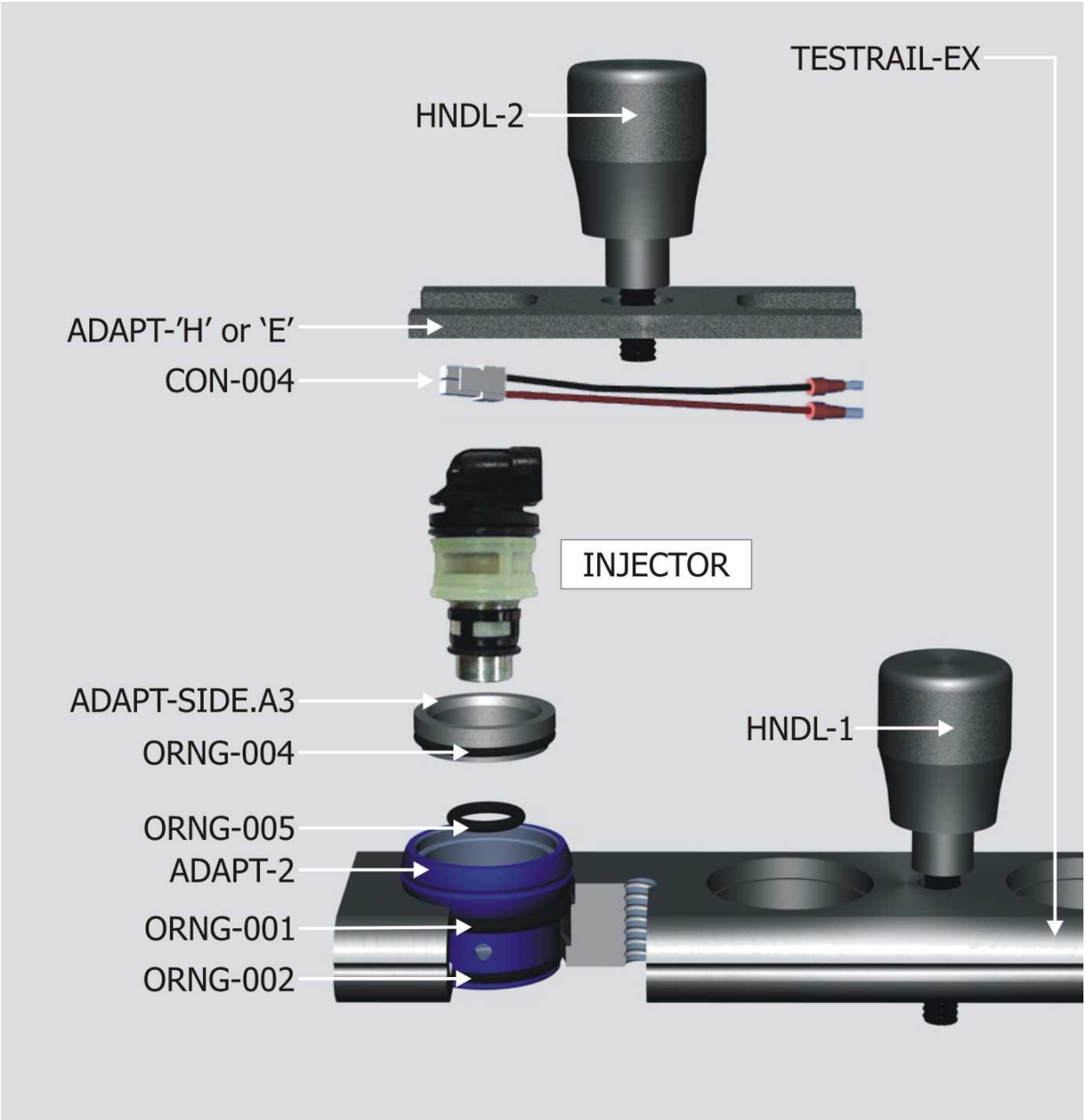


Figure 6-vii, Side-Feed Type (A) Fitting Illustration (2)

NOTE: For the “Standard Test Rail & Adapters, the user should replace the parts: TESTRAIL-EX, ADAPT-‘H’, ADJ-1, ADAPT-1 w/ o-rings, with TESTRAIL-STD.TOP.

Side-Feed Injectors Fittings ("A" Type, illustration 3)

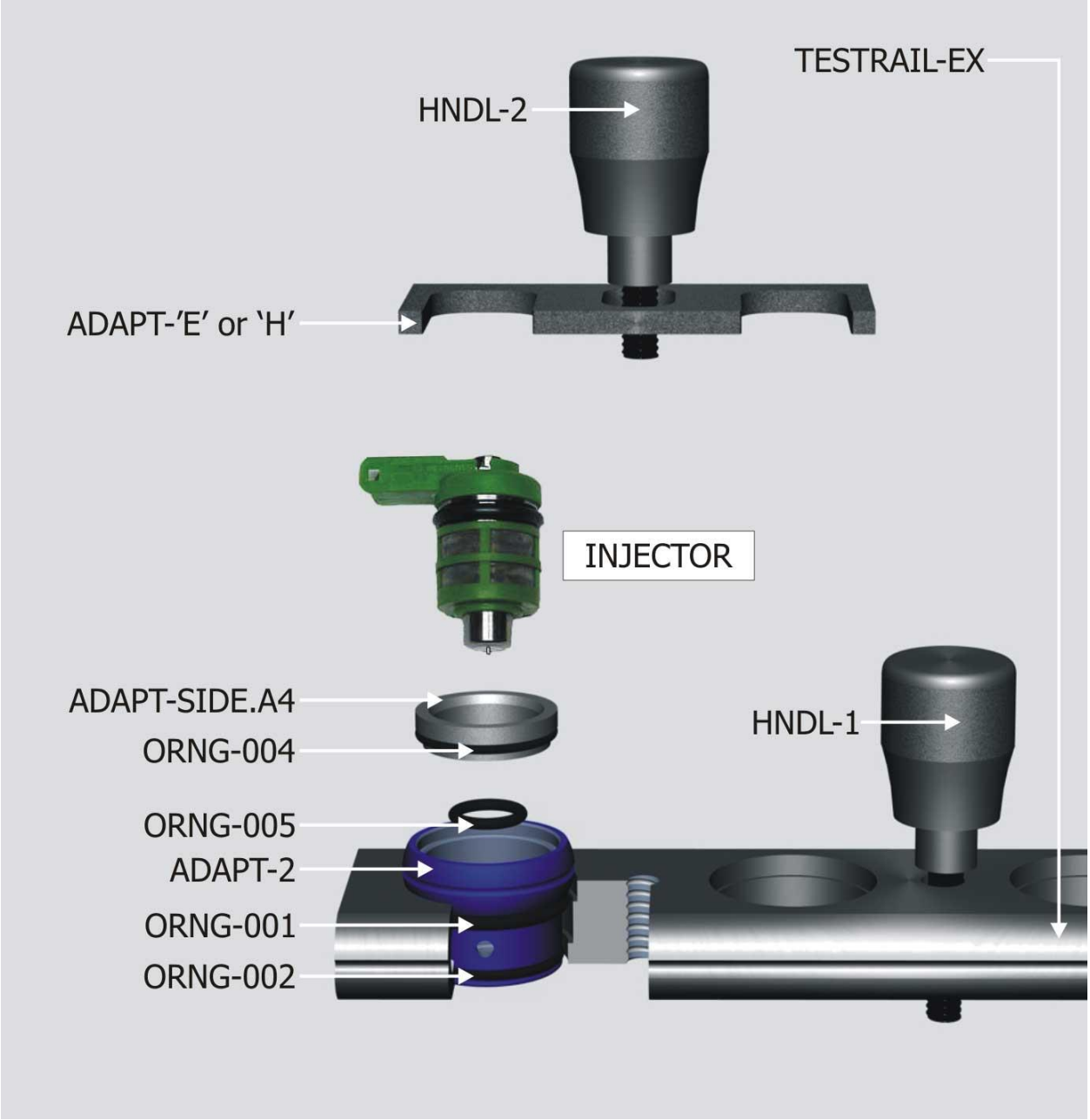


Figure 6-viii, Side-Feed Type (A) Fitting Illustration (3)

NOTE: For the "Standard Test Rail & Adapters, the user should replace the parts: TESTRAIL-EX, ADAPT-'H', ADJ-1, ADAPT-1 w/ o-rings, with TESTRAIL-STD.TOP.

Side-Feed Injectors Fittings (“A” Type, illustration 4)

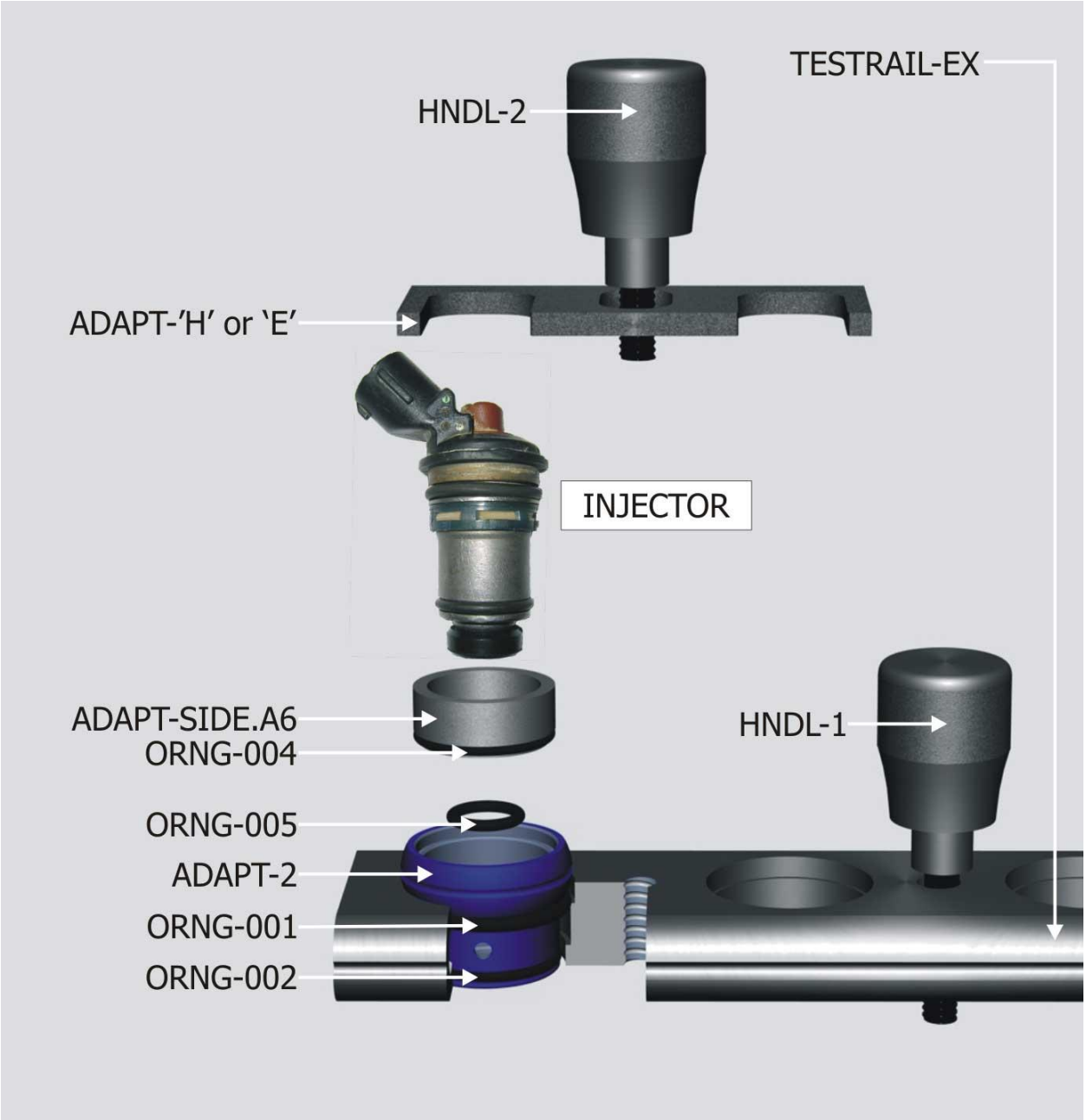


Figure 6-ix, Side-Feed Type (A) Fitting Illustration (4)

NOTE: For the “Standard Test Rail & Adapters, the user should replace the parts: TESTRAIL-EX, ADAPT-‘H’, ADJ-1, ADAPT-1 w/ o-rings, with TESTRAIL-STD.TOP.

Side-Feed Injectors Fittings (“A” Type, illustration 5)

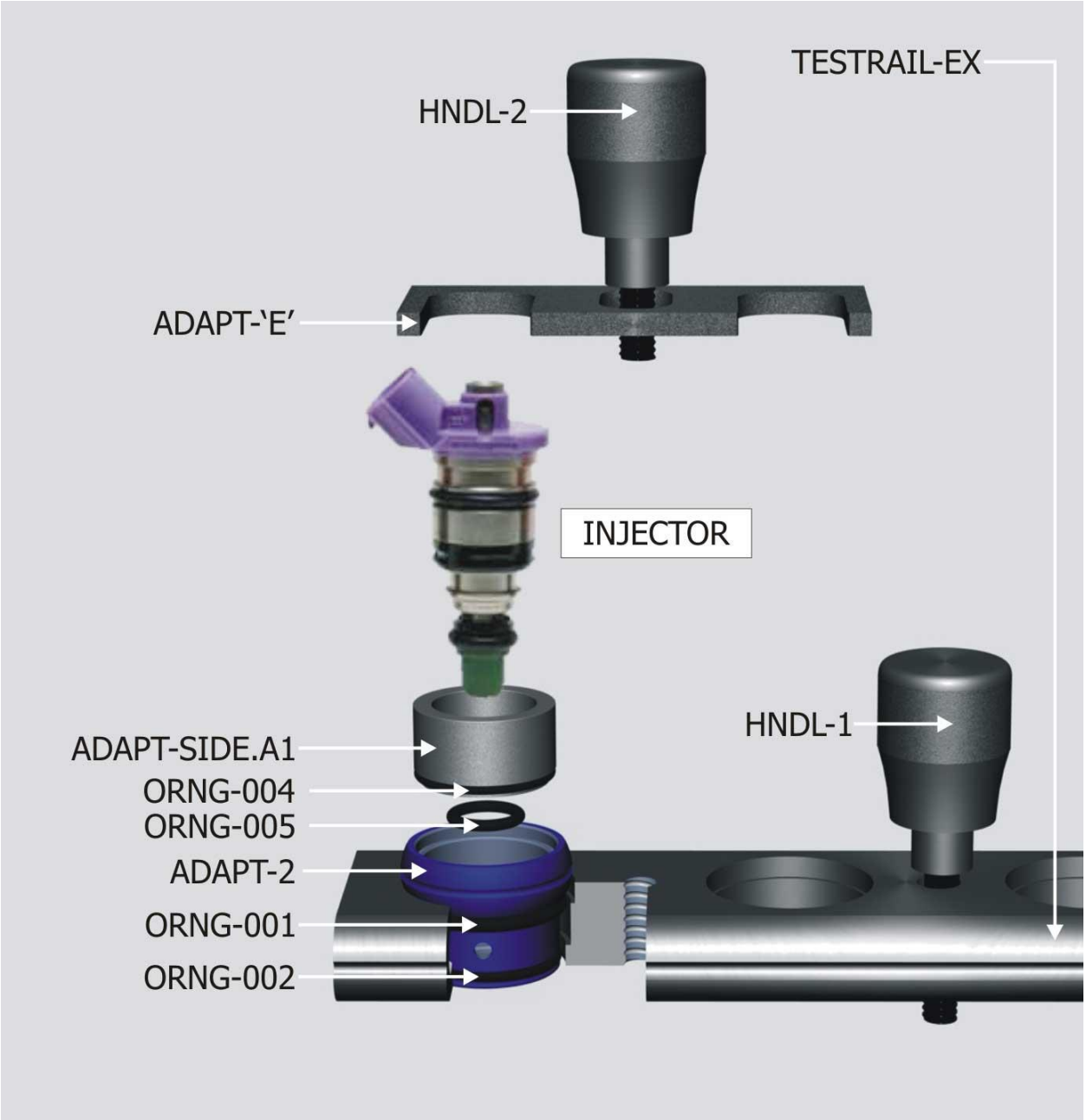


Figure 6-x, Side-Feed Type (A) Fitting Illustration (5)

NOTE: For the “Standard Test Rail & Adapters, the user should replace the parts: TESTRAIL-EX, ADAPT-‘H’, ADJ-1, ADAPT-1 w/ o-rings, with TESTRAIL-STD.TOP.

Side-Feed Injectors Fittings (“B” Type, illustration 1)

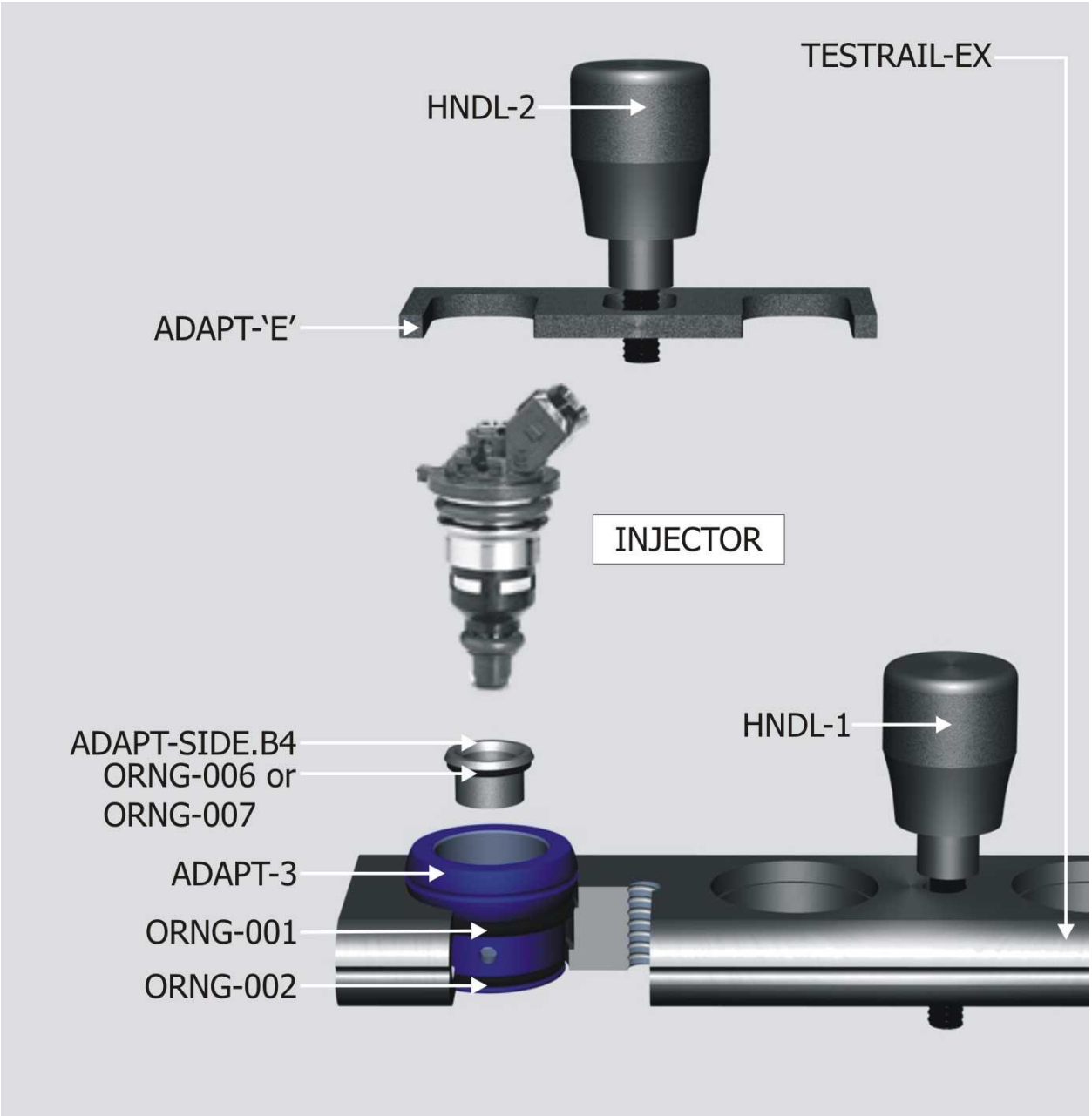


Figure 6-xi, Side-Feed Type (B) Fitting Illustration (1)

NOTE: For the “Standard Test Rail & Adapters, the user should replace the parts: TESTRAIL-EX, ADAPT-‘H’, ADJ-1, ADAPT-1 w/ o-rings, with TESTRAIL-STD.TOP.

Side-Feed Injectors Fittings ("B" Type, illustration 2)

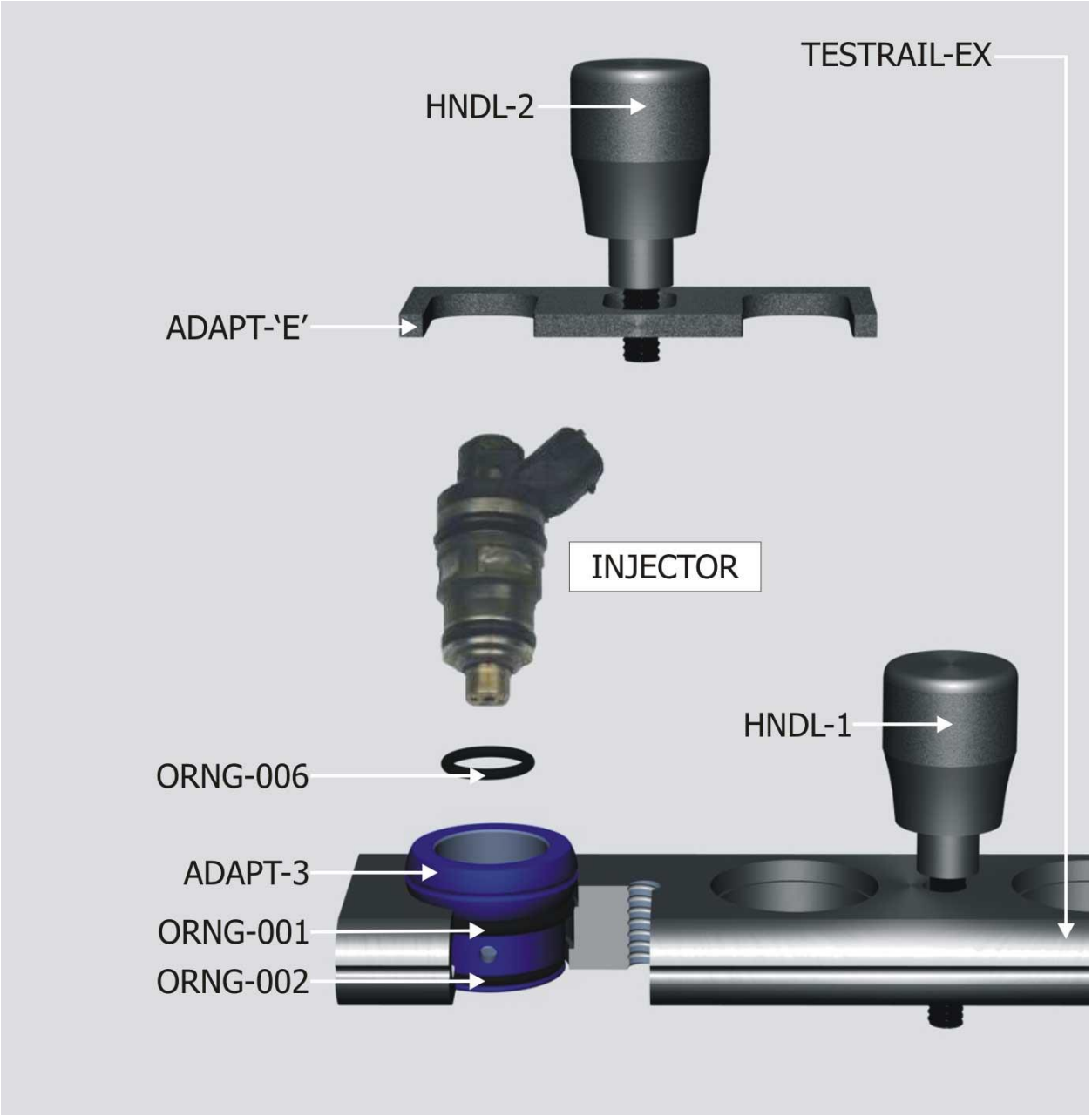


Figure 6-xii, Side-Feed Type (B) Fitting Illustration (2)

NOTE: For the "Standard Test Rail & Adapters, the user should replace the parts: TESTRAIL-EX, ADAPT-'H', ADJ-1, ADAPT-1 w/ o-rings, with TESTRAIL-STD.TOP.

Side-Feed Injectors Fittings (“B” Type, illustration 3)

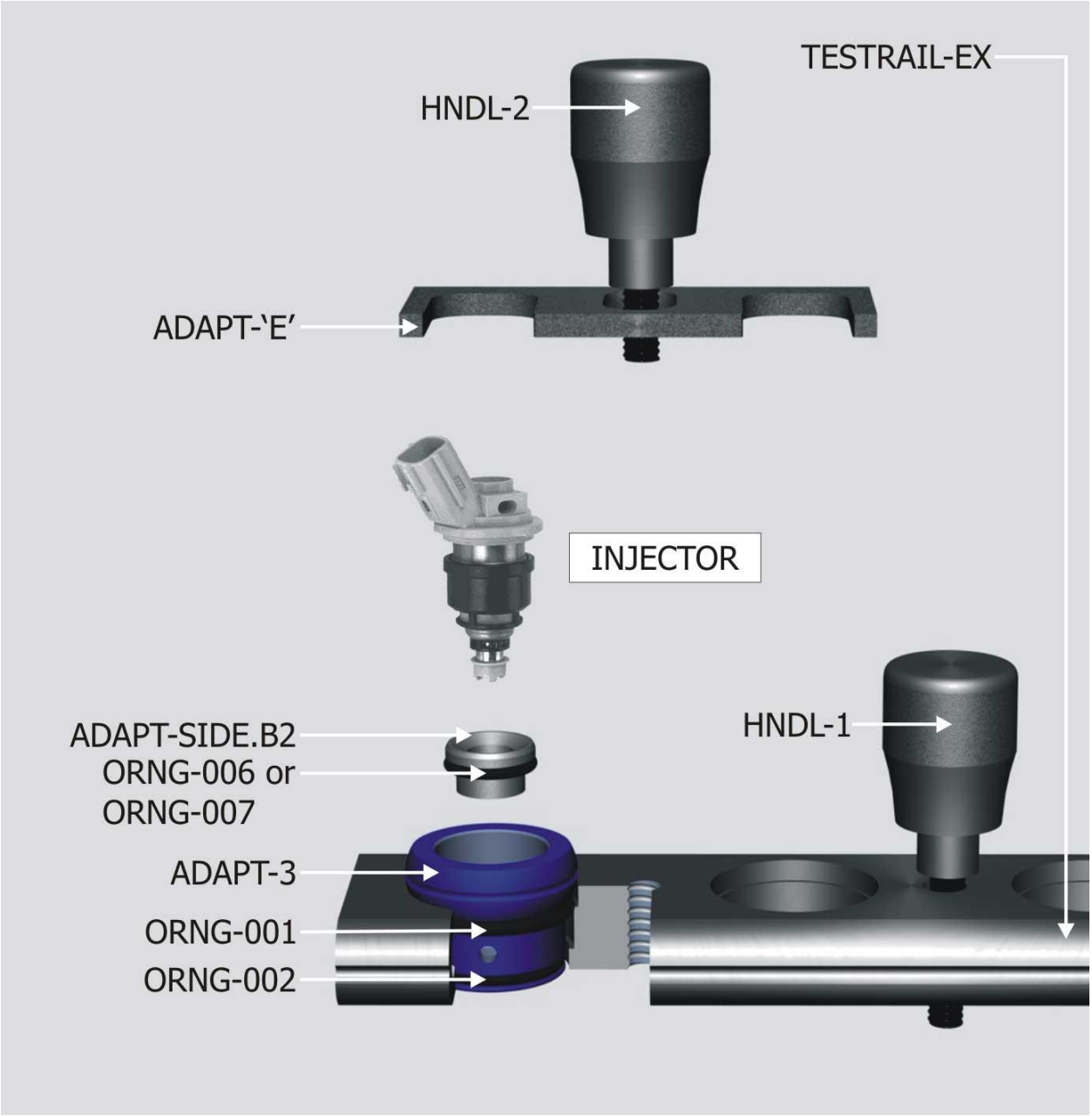


Figure 6-xiii, Side-Feed Type (B) Fitting Illustration (3)

NOTE: For the “Standard Test Rail & Adapters, the user should replace the parts: TESTRAIL-EX, ADAPT-‘H’, ADJ-1, ADAPT-1 w/ o-rings, with TESTRAIL-STD.TOP.

Side-Feed Injectors Fittings ("B" Type, illustration 4)

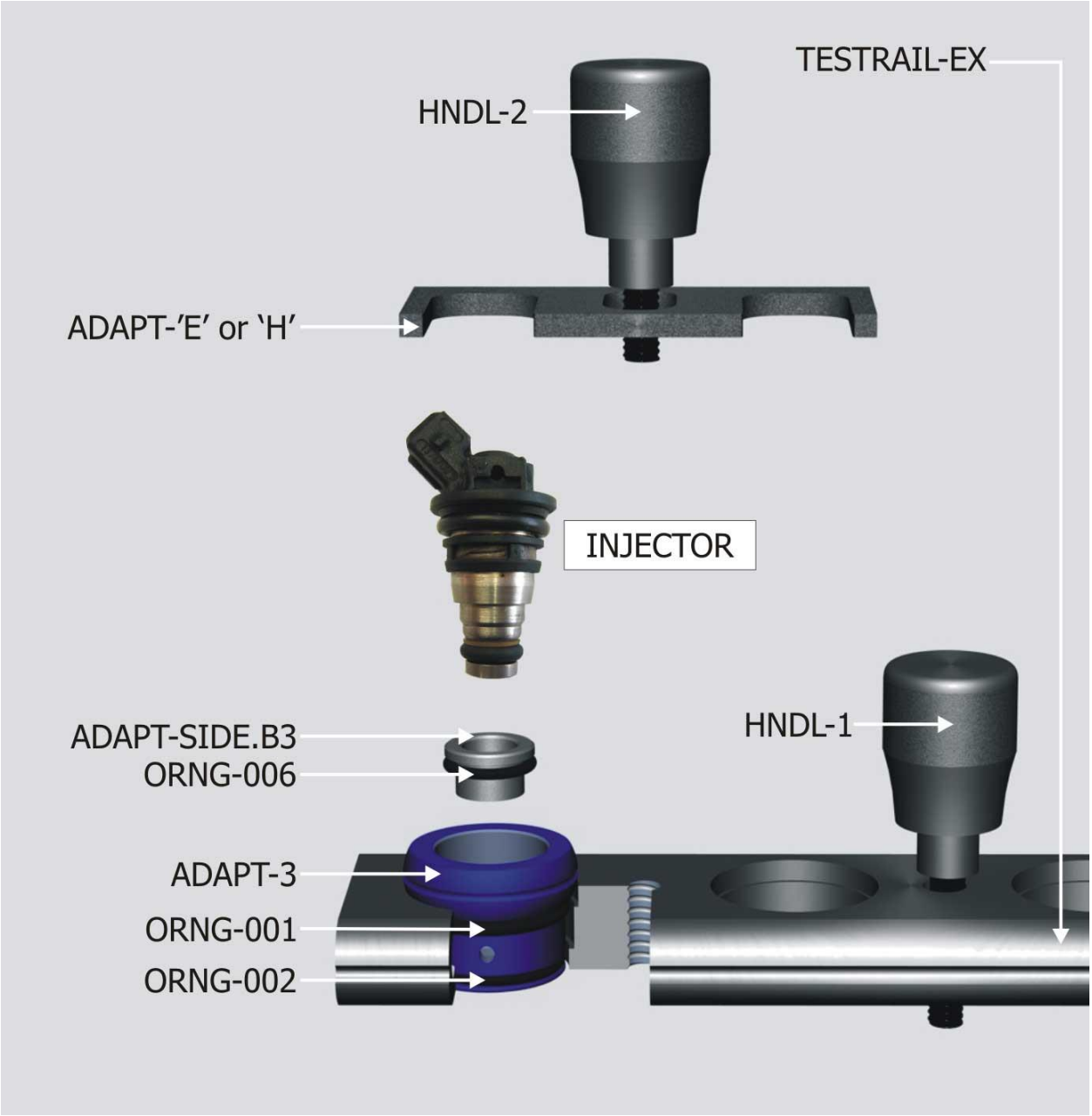


Figure 6-xiv, Side-Feed Type (B) Fitting Illustration (4)

NOTE: For the "Standard Test Rail & Adapters, the user should replace the parts: TESTRAIL-EX, ADAPT-'H', ADJ-1, ADAPT-1 w/ o-rings, with TESTRAIL-STD.TOP.

Side-Feed Injectors Fittings ("B" Type, illustration 5)

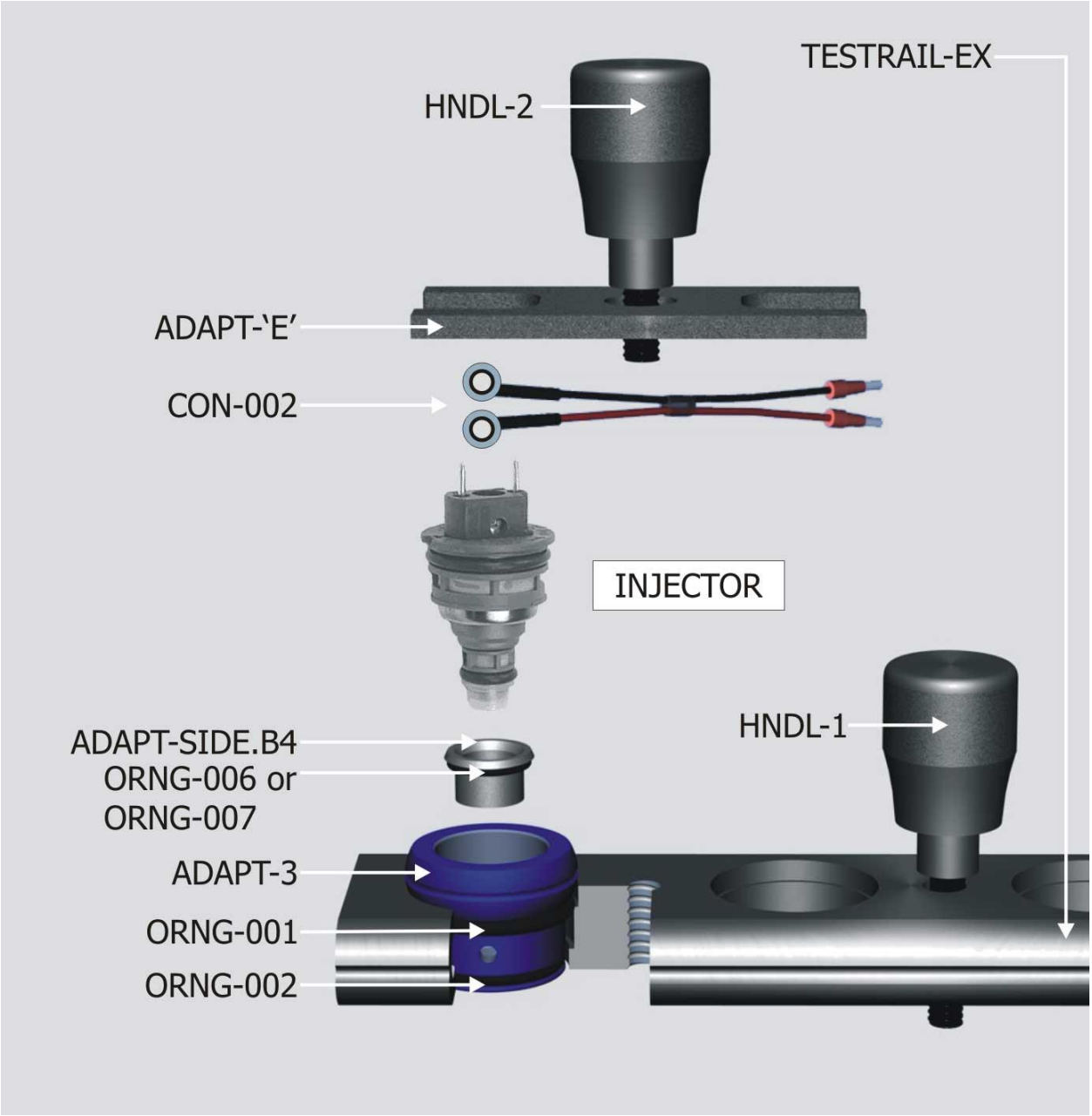


Figure 6-xv, Side-Feed Type (B) Fitting Illustration (5)

NOTE: For the "Standard Test Rail & Adapters, the user should replace the parts: TESTRAIL-EX, ADAPT-'H', ADJ-1, ADAPT-1 w/ o-rings, with TESTRAIL-STD.TOP.

Side-Feed Injectors Fittings ("B" Type, illustration 6)

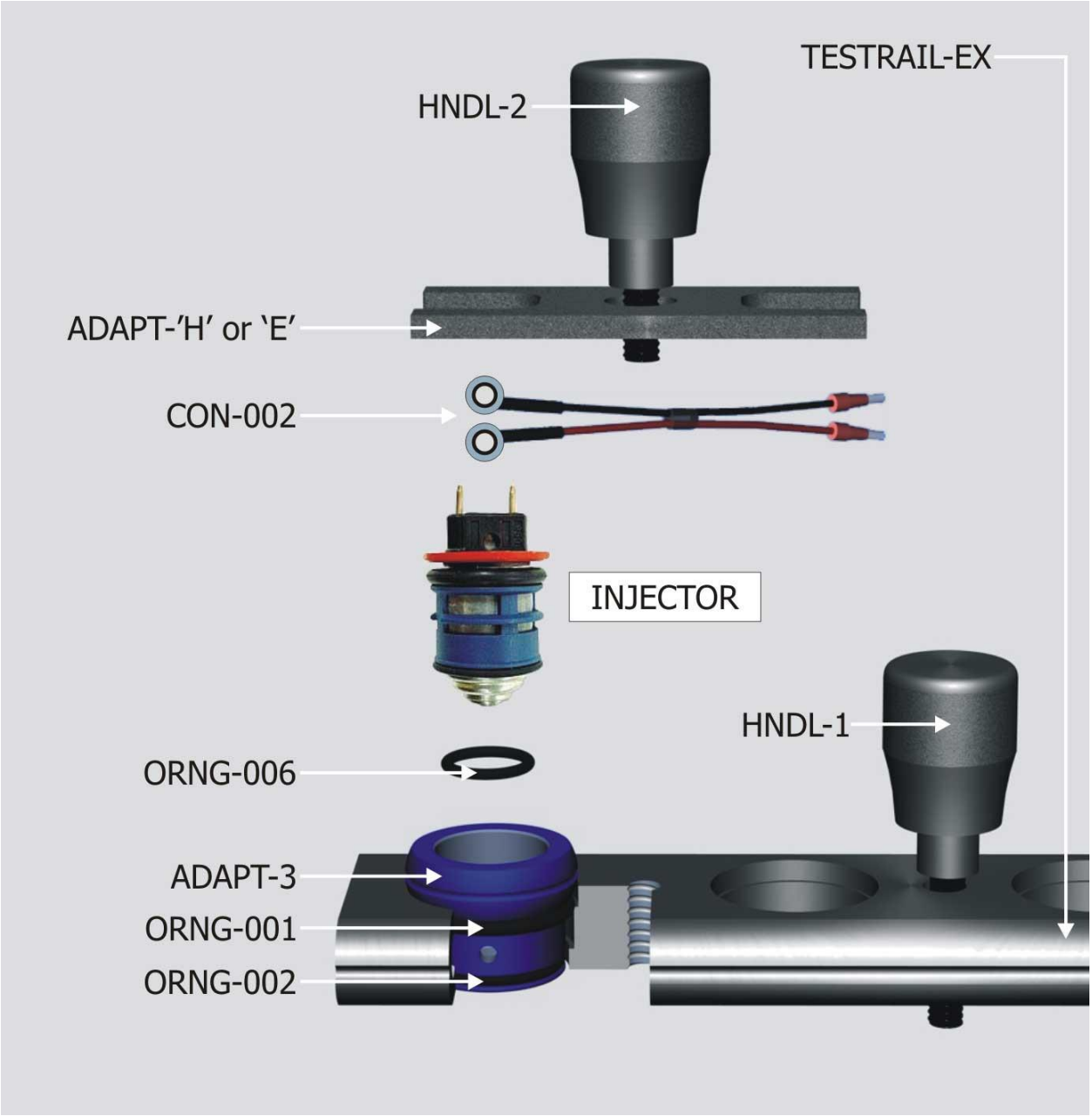


Figure 6-xvi, Side-Feed Type (B) Fitting Illustration (6)

NOTE: For the "Standard Test Rail & Adapters, the user should replace the parts: TESTRAIL-EX, ADAPT-'H', ADJ-1, ADAPT-1 w/ o-rings, with TESTRAIL-STD.TOP.

Appendix C
“Simulation Programs”

System Simulation for Testing Procedure

	STRK	ms	Time	Operation
MPFI	400	6.2	60 sec.	Idle Mode
	1250	2.4	60 sec.	Middle RPM Mode (cruise)
	3000	2.2	30 sec.	High RPM Mode
	CONT.		10 sec.	Continuous Spraying
	400>>3400	9.6>>2.6	60 sec.	Accelerate / Decelerate Rich mode
	400>>2800	1.5>>3.2	60 sec.	Accelerate / Decelerate Normal
	1750	1.7	60 sec.	Injector calibrating mode

	STRK	ms	Time	Operation
TBI	400	3.5	60 sec.	Idle Mode
	1000	2.1	40 sec.	Middle rpm Mode (cruise)
	2800	1.7	30 sec.	High rpm Mode
	CONT.		10 sec.	Continuous Spraying
	400>>2700	3.5>>2.0	30 sec.	Accelerate / Decelerate Rich mode
	400>>2700	2.0>>1.2	30 sec.	Accelerate / Decelerate Lean mode
	1300	1.4	30 sec.	Injector calibrating mode

	STRK	ms	Time	Operation
G-DI	380	7.1	60 sec.	Idle Mode
	1100	4.8	60 sec.	Middle rpm Mode (cruise)
	3000	2.4	60 sec.	High rpm Mode
	CONT.		10 sec.	Continuous Spraying
	300>>3000	9.2 >> 2.8	60 sec.	Accelerate / Decelerate Rich mode
	1000>>2600	1.4 >> 3.1	60 sec.	Accelerate / Decelerate Normal
	1750	1.7	60 sec.	Injector calibrating mode

System Simulation for Cleaning Procedure (Ultrasonic)

	STRK	ms	Time
MPFI	500>>1000	1.2>>4.0	8 min
	2000>>500	1.7>>2.5	7 min
	5000>>1500	2.0	10 min
	350	2.0	8 min

	STRK	ms	Time
TBI	500>>1000	1.2>>4.0	5 min
	500>>1000	3.0>>1.7	6 min
	750	1.2	13 min
	1000>>5000	1.2>>2.5	8 min

	STRK	ms	Time
G-DI	500	6.0	5 min
	500>>1000	1.2>>1.0	7 min
	1000	1.1	10 min
	2000>>1000	7.7>>1.1	8 min

Motorcycle System Simulation for Testing Procedure

	STRK	ms	Time	Operation
Motorcycle MPFI	500	6.1	60 sec.	Idle Mode
	2300	1.9	60 sec.	Middle RPM Mode (cruise)
	4250	2.4	60 sec.	High RPM Mode
	CONT.		10 sec.	Continuous Spraying
	500>>6250	8.9>>1.1	60 sec.	Accelerate / Decelerate Rich mode
	500>>4500	3.2>>4.8	60 sec.	Accelerate / Decelerate Normal
	1750	1.7	60 sec.	Injector calibrating mode

Motorcycle System Simulation for Cleaning Procedure (Ultrasonic)

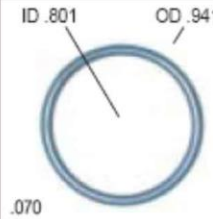
	STRK	ms	Time
Motorcycle MPFI	1000>>2000	0.4>>1.20	5 min
	1000>>500	1.7>>2.5	7 min
	500	1.5	10 min
	500>>1000	2.0>>1.0	8 min

Appendix D
“Accessories List”

General Accessory List

O-RINGS (Sort By I.D.)

G1539
UPPER INJECTOR
O-RING

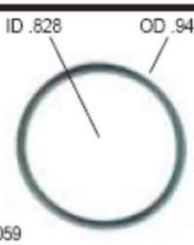


G1454
LOWER INJECTOR
O-RING

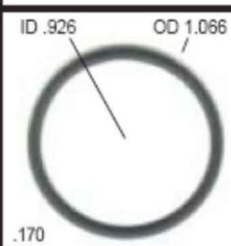
G1590
UPPER INJECTOR
O-RING

G1588
LOWER INJECTOR
O-RING

G1578
UPPER INJECTOR
O-RING

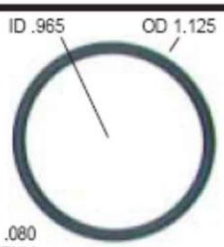


1205F
LOWER INJECTOR
O-RING

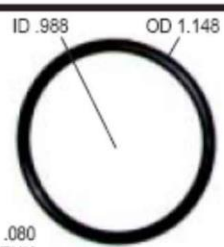


1404F
FUEL INJECTION
O-RING

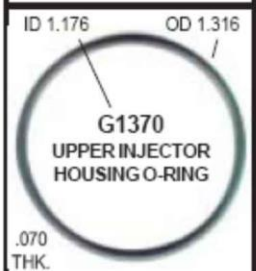
G1591
INSULATOR INJECTOR
O-RING



92-105
FUEL INJECTION
O-RING



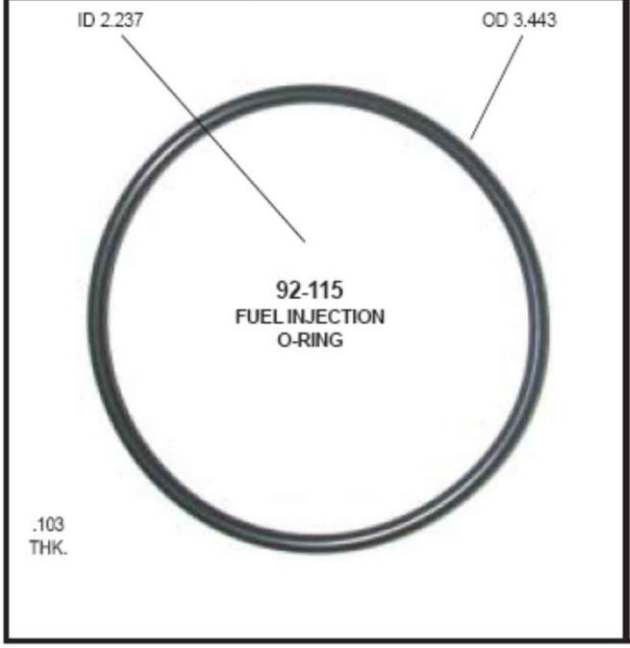
702F
MAIN JET
SOLENOID O-RING



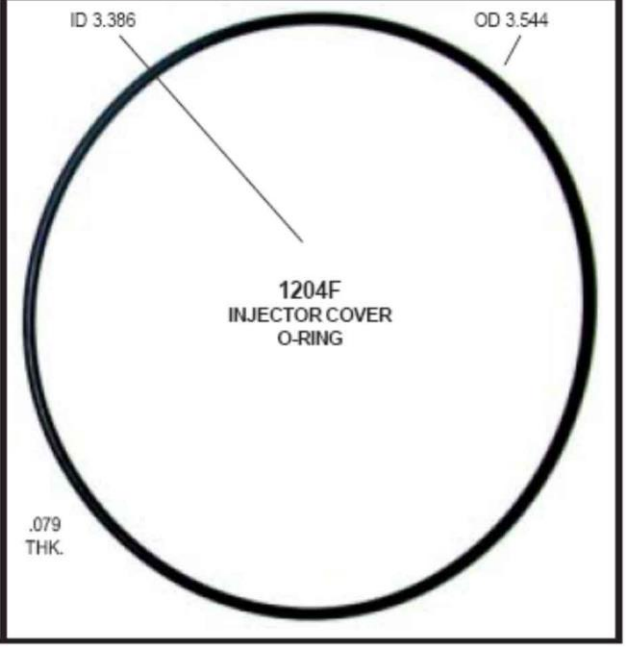
G1370
UPPER INJECTOR
HOUSING O-RING

1131F
INJECTOR RING
SEAL

1203F
IDLE AIR
MOTOR O-RING



92-115
FUEL INJECTION
O-RING



1204F
INJECTOR COVER
O-RING

SEALS			
 93-108 FUEL INJECTION SEAL	 93-104 FUEL INJECTION SEAL	 93-105 FUEL INJECTION SEAL	 1335F INJECTOR SEAL
 1336F INJECTOR SEAL	 1414F INJECTOR SEAL	 1448F PLASTIC INJECTOR SEAL (Flat End)	 1446F PLASTIC INJECTOR SEAL (Angled)
 G1570 INJECTOR SEAL	 G1559 LOWER INJECTOR SEAL	 1281F LOWER FUEL INJECTOR SEAL	 1280F LOWER FUEL INJECTOR SEAL
 G1467 INJECTOR RUBBER SEAL	 G1465 INJECTOR RUBBER SEAL	 G1367 INJECTOR HOUSING DUST SEAL	 1399F INJECTOR SEAL
 1447F FUEL INJECTOR SEAL	 1282F LOWER INJECTOR SEAL	 1500F INJECTOR SEAL	 1431F INJECTOR SEAL
 G1466 INJECTOR RUBBER SEAL	 G1447 INJECTOR RUBBER SEAL	 G1464 INJECTOR RUBBER SEAL	 G1582 UPPER INJECTOR SEAL

CAPS

85-353
FUEL INJECTOR
PINTLE CAP
(Bosch, Nippondenso)

85-354
FUEL INJECTOR
PINTLE CAP
(Bosch, D-Jetronic)

95-147
PINTLE CAP

95-142
PINTLE CAP
(2 Hole)

95-143
PINTLE CAP
(2 Hole)

95-149
PINTLE CAP

95-121
PINTLE CAP
(Toyota, Honda &
Mazda)

95-146
PINTLE CAP

95-126
FUEL INJECTOR
END CAP 9/16

95-124
FUEL INJECTOR
END CAP 3/8

95-125
FUEL INJECTOR
CAP 12 MM

95-106
FUEL INJECTOR
PINTLE CAP
(Bosch, Chrys.
& Mits.)

95-108
PINTLE CAP
(Bosch, Chrys.)

95-122
FUEL INJECTOR
PINTLE CAP
(Bosch, Ford)

95-141
PINTLE CAP
(Mazda, Ford)

95-145
PINTLE CAP
(2 Hole)

95-151
PINTLE CAP

85-366
FUEL INJECTOR
PINTLE CAP
(Bosch, BMW)

95-140
PINTLE CAP
(BMW)

95-104
MULTIPORT
PINTLE CAP
(Bosch)

95-139
PINTLE CAP
(Bosch)

85-348
FUEL INJECTOR
PINTLE CAP
(Universal)

95-101
MULTIPORT
PINTLE CAP
(Bosch, Ford,
Weber)

ID 5/16"X1/2" Long

95-130
FUEL INJECTOR
VINYL CAP

ID 3/8"X1/2" Long

95-136
FUEL INJECTOR
VINYL CAP

ID 7/16"X1/2" Long

95-135
FUEL INJECTOR
VINYL CAP

ID 17/32"X1" Long

95-138
FUEL INJECTOR
VINYL CAP

ID 9/16"X1/2" Long

95-137
FUEL INJECTOR
VINYL CAP

ID 9/16"X1" Long

95-127
FUEL INJECTOR
VINYL CAP

FILTERS, WASHERS AND SPEACERS				
30-107 FILTER	 30-88 FUEL INJECTOR FILTER	 30-69 FUEL INJECTOR FILTER	 30-84 FUEL INJECTOR FILTER	 30-95 LOWER FUEL INJECTOR FILTER
 30-76 FUEL INJECTOR FILTER	 30-73 LOWER FUEL INJECTOR FILTER	 30-77 FUEL INJECTOR FILTER	 30-78 UPPER FUEL INJECTOR FILTER	 30-94 UPPER FUEL INJECTOR FILTER
 963F BANJO BOWL WASHER	 G1626 CONCAVE COPPER WASHER	 G1425 INJECTOR O-RING WASHER	 G1417 .020 THK. FUEL INLET FITTING WASHER	 95-111 .058 THK.  G1434 .078 THK. FUEL INJECTOR SPEACER
 95-150 SPEACER	 95-148 SPACER	 95-113 FUEL PRESSURE REGULATOR SPACER		

GROMMETS

G1627
FUEL INJECTOR
GROMMET

1418F
FUEL INJECTOR
GROMMET

G1560
FUEL INJECTOR
GROMMET

1405F
FUEL INJECTION
GROMMET

1284F
FUEL INJECTOR
GROMMET

1415F
FUEL INJECTOR
GROMMET

1413F
FUEL INJECTION
GROMMET

1398F
FUEL INJECTION
GROMMET

MISCELLANEOUS PARTS

1286F
UPPER INJECTOR
GROMMET

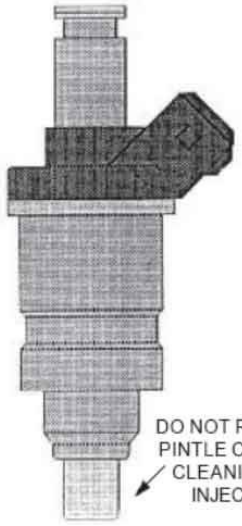
85-368
INJECTOR
CLAMP

85-369
INJECTOR
CLIP

85-352
INJECTOR CLIP
RETAINER

95-112
FUEL INJECTOR
CLIP

Accessory List by Vehicle Model



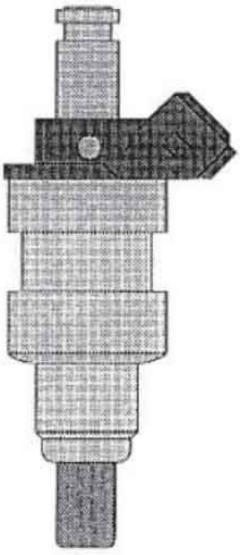
KEIHIN / HONDA INJECTOR STYLE

92-125
FUEL INJECTION
O-RING

1282F
LOWER INJECTOR
SEAL

1415F
FUEL INJECTOR
GROMMET

1284F
FUEL INJECTOR
GROMMET



NISSAN JECS INJECTOR STYLE

1334F
O-RING

1418F
FUEL INJECTOR
GROMMET

G1467
INJECTOR RUBBER
SEAL

85-353
FUEL INJECTOR
PINTLE CAP
(Bosch, Nippondenso)

30-88
FUEL INJECTOR
FILTER

BOSCH STYLE INJECTOR

G1558
UPPER INJECTOR
O-RING

1281F
LOWER FUEL
INJECTOR SEAL

G1559
LOWER INJECTOR
SEAL

85-353
FUEL INJECTOR
PINTLE CAP
(Bosch, Nippondenso)

95-124
FUEL INJECTOR
END CAP 3/8

95-135
FUEL INJECTOR
VINYL CAP

30-88
FUEL INJECTOR
FILTER

BOSCH STYLE INJECTOR

G1558
UPPER INJECTOR
O-RING

1281F
LOWER FUEL
INJECTOR SEAL

1279F
AIRBLEED SOCKET
O-RING

G1560
FUEL INJECTOR
GROMMET

85-353
FUEL INJECTOR
PINTLE CAP
(Bosch, Nippondenso)

95-124
FUEL INJECTOR
END CAP 3/8

95-135
FUEL INJECTOR
VINYL CAP

30-88
FUEL INJECTOR
FILTER

BOSCH STYLE INJECTOR

G1558
UPPER INJECTOR O-RING

1402F
FUEL INJECTION O-RING

1404F
FUEL INJECTION O-RING

G1570
INJECTOR SEAL

1399F
INJECTOR SEAL

1405F
FUEL INJECTION GROMMET

G1560
FUEL INJECTOR GROMMET

85-353
FUEL INJECTOR PINTLE CAP (Bosch, Nippondenso)

95-121
PINTLE CAP (Toyota, Honda, & Mazda)

95-124
FUEL INJECTOR END CAP 3/8

95-135
FUEL INJECTOR VINYL CAP

30-88
FUEL INJECTOR FILTER

BOSCH STYLE INJECTOR

G1558
UPPER INJECTOR O-RING

1279F
AIRBLEED SOCKET O-RING

1280F
LOWER FUEL INJECTOR SEAL

G1560
FUEL INJECTOR GROMMET

85-353
FUEL INJECTOR PINTLE CAP (Bosch, Nippondenso)

95-124
FUEL INJECTOR END CAP

95-135
FUEL INJECTOR VINYL CAP

30-88
FUEL INJECTOR FILTER

BOSCH STYLE INJECTOR

G1434
FUEL INJECTOR
SPEACER

G1422
INJECTOR
O-RING

85-348
FUEL INJECTOR
PINTLE CAP
(Universal)

85-366
FUEL INJECTOR
PINTLE CAP
(Bosch, BMW)

95-122
FUEL INJECTOR
PINTLE CAP
(Bosch, Ford)

95-126
FUEL INJECTOR
END CAP 9/16

85-352
INJECTOR CLIP
RETAINER

30-88
FUEL INJECTOR
FILTER

BOSCH STYLE INJECTOR

G1434
FUEL INJECTOR
SPEACER

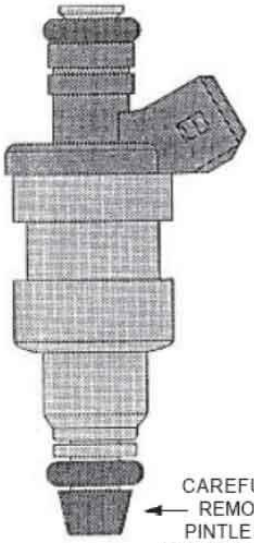
G1422
INJECTOR
O-RING

95-106
FUEL INJECTOR
PINTLE CAP
(Bosch, Chrys., Mits.)

95-126
FUEL INJECTOR
END CAP 9/16

85-352
INJECTOR CLIP
RETAINER

30-88
FUEL INJECTOR
FILTER



CAREFULLY
REMOVE
PINTLE CAP
REUSE EXISTING
PINTLE CAP

WEBER STYLE INJECTOR

G1435
INJECTOR
O-RING

95-148
SPACER

95-135
FUEL INJECTOR
VINYL CAP

95-124
FUEL INJECTOR
END CAP 3/8

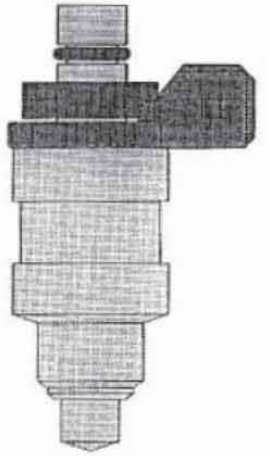
30-88
FUEL INJECTOR
FILTER

LUCAS INJECTOR STYLE

G1435
INJECTOR
O-RING

95-126
FUEL INJECTOR
END CAP 1/16

30-88
FUEL INJECTOR
FILTER



CHRYSLER / MITSUBISHI INJECTOR STYLE

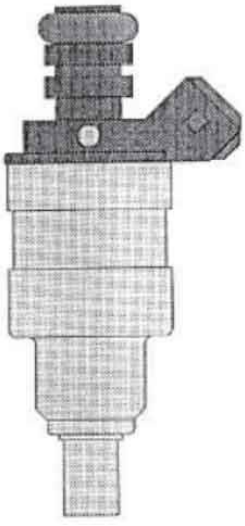
G1558
UPPER INJECTOR O-RING

1131F
INJECTOR RING SEAL

93-111
FUEL INJECTOR COLLAR

95-124
FUEL INJECTOR END CAP 3/8

95-135
FUEL INJECTOR VINYL CAP



CHRYSLER TBI SINGLE UNIT

G1440
INJECTOR O-RING

G1446
INJECTOR O-RING

1447F
FUEL INJECTOR SEAL

30-88
FUEL INJECTOR FILTER

GM STYLE INJECTOR

G1435
INJECTOR
O-RING

95-126
FUEL INJECTOR
END CAP 9/16

30-88
FUEL INJECTOR
FILTER

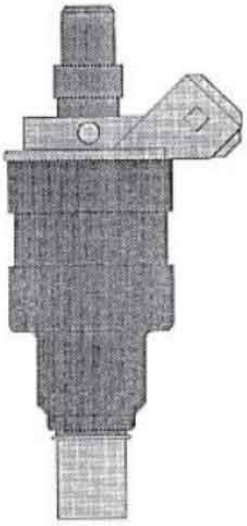
BOSCH STYLE INJECTOR

G1463
UPPER INJECTOR
O-RING

1285F
UPPER INJECTOR
O-RING

1286F
UPPER INJECTOR
GROMMET

95-135
FUEL INJECTOR
VINYL CAP



FORD CFI
DUAL UNIT

G1203
PRESSURE REGULATOR
INJECTOR O-RING

G1255
LOWER INJECTOR
O-RING

30-88
FUEL INJECTOR
FILTER

30-69
FUEL INJECTOR
FILTER

GM / CADILLAC
INJECTOR STYLE

G1203
PRESSURE REGULATOR
INJECTOR O-RING

G1626
CONCAVE COPPER
WASHER

G1467
INJECTOR RUBBER
SEAL

G1627
FUEL INJECTOR
GROMMET

85-353
FUEL INJECTOR
PINTLE CAP
(Bosch, Nippondenso)

95-124
FUEL INJECTOR
END CAP 3/8

30-88
FUEL INJECTOR
FILTER

BOSCH STYLE INJECTOR

G1467
INJECTOR RUBBER SEAL

G1466
INJECTOR RUBBER SEAL

85-353
FUEL INJECTOR PINTLE CAP (Bosch, Nippondenso)

85-354
FUEL INJECTOR PINTLE CAP (Bosch, D-Jetronic)

95-124
FUEL INJECTOR END CAP 3/8

30-88
FUEL INJECTOR FILTER

85-367
INJECTOR HOSE CLAMP

95-103
INJECTOR HOSE TYPE METAL RING

BOSCH STYLE INJECTOR

G1465
INJECTOR RUBBER SEAL

G1464
INJECTOR RUBBER SEAL

85-353
FUEL INJECTOR PINTLE CAP (Bosch, Nippondenso)

95-124
FUEL INJECTOR END CAP 3/8

30-88
FUEL INJECTOR FILTER

85-367
INJECTOR HOSE CLAMP

95-103
INJECTOR HOSE TYPE METAL RING

CHRYSLER (BOSCH)
LONG BODY TBI

30-94
UPPER FUEL
INJECTOR FILTER

1205F
LOWER INJECTOR
O-RING

1199F
UPPER INJECTOR
O-RING

1204F
INJECTOR COVER
O-RING

CHRYSLER (BOSCH)
SHORT BODY
TBI

1205F
LOWER INJECTOR
O-RING

1199F
UPPER INJECTOR
O-RING

30-77
FUEL INJECTOR
FILTER

1204F
INJECTOR COVER
O-RING

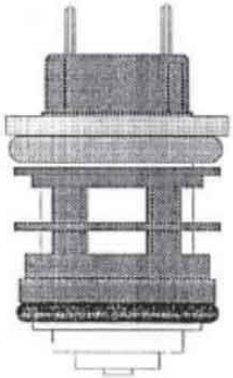
CHRYSLER (BOSCH)
TBI

G1589
LOWER INJECTOR
O-RING

G1590
UPPER INJECTOR
O-RING

30-95
LOWER FUEL
INJECTOR FILTER

30-94
UPPER FUEL
INJECTOR FILTER



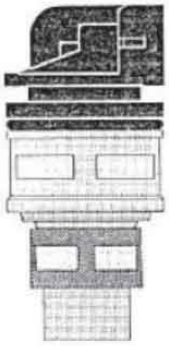
CHRYSLER (HOLLEY)
SHORT BODY
TBI

1205F
LOWER INJECTOR
O-RING

1199F
UPPER INJECTOR
O-RING

30-77
FUEL INJECTOR
FILTER

1204F
INJECTOR COVER
O-RING



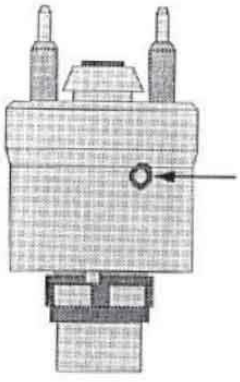
G M
TBI 700
MULTEC INJECTOR

G1371
LOWER INJECTOR
HOUSING O-RING

G1539
UPPER INJECTOR
O-RING

30-73
LOWER FUEL
INJECTOR FILTER

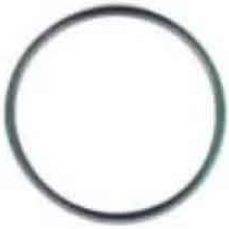
30-78
UPPER FUEL
INJECTOR FILTER



G M
TBI MAXI

G1371
LOWER INJECTOR
HOUSING O-RING

G1425
INJECTOR O-RING
WASHER

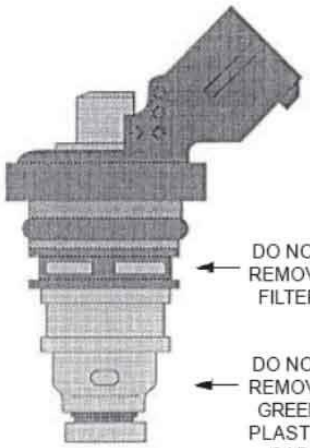


G1370
UPPER INJECTOR
HOUSING O-RING

30-84
FUEL INJECTOR
FILTER

30-73
LOWER FUEL
INJECTOR FILTER

G1367
INJECTOR HOUSING
DUST SEAL



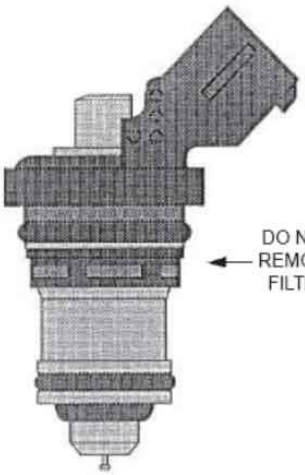
KEIHIN / HONDA INJECTOR STYLE

G1580
AUXILIARY INJECTOR
O-RING

G1579
LOWER INJECTOR
O-RING

G1578
UPPER INJECTOR
O-RING

G1582
UPPER INJECTOR
SEAL

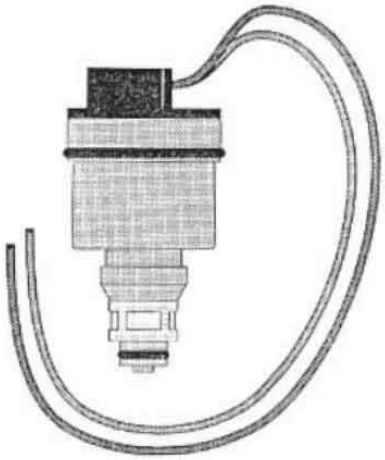


KEIHIN / HONDA INJECTOR STYLE

G1579
LOWER INJECTOR
O-RING

G1578
UPPER INJECTOR
O-RING

G1582
UPPER INJECTOR
SEAL

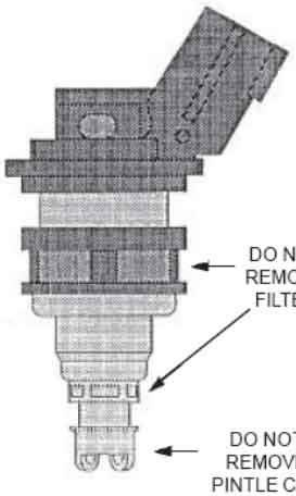


NISSAN
WITH WIRE

775F
FUEL INJECTOR
O-RING

702F
MAIN JET
SOLENOID O-RING

30-76
FUEL INJECTOR
FILTER



NISSAN
JECS INJECTOR STYLE

1334F
FUEL INJECTION
O-RING

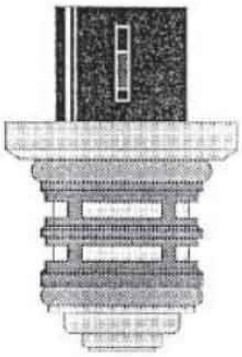
G1611
PRESSURE REGULATOR
MOUNTING O-RING

1199F
UPPER INJECTOR
O-RING

1336F
INJECTOR
SEAL

1413F
FUEL INJECTION
GROMMET

1398F
FUEL INJECTION
GROMMET



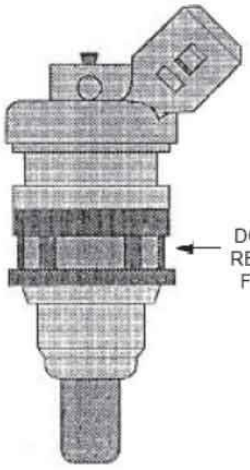
NISSAN
WITHOUT WIRE

1205F
LOWER INJECTOR
O-RING

92-105
FUEL INJECTOR
O-RING

30-77
FUEL INJECTOR
FILTER

1204F
INJECTOR COVER
O-RING



NISSAN STYLE
INJECTOR (SPI)

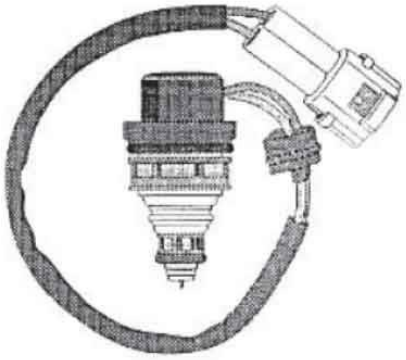
1333F
FUEL INJECTION
O-RING

1199F
UPPER INJECTOR
O-RING

1335F
INJECTOR
SEAL

1431F
INJECTOR
SEAL

85-353
FUEL INJECTOR
PINTLE CAP
(Bosch, Nippondenso)



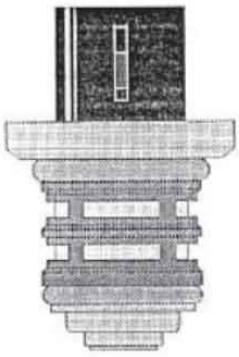
GEO / SUZUKI
INJECTOR STYLE

G1589
LOWER INJECTOR
O-RING

G1590
UPPER INJECTOR
O-RING

30-95
LOWER FUEL
INJECTOR FILTER

30-94
UPPER FUEL
INJECTOR FILTER

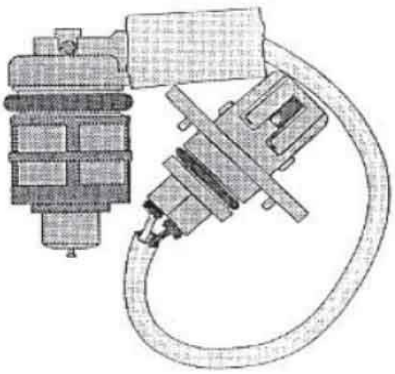


FORD CFI
SINGLE UNIT

G1454
LOWER INJECTOR
O-RING

G1455
UPPER INJECTOR
O-RING

30-77
FUEL INJECTOR
FILTER



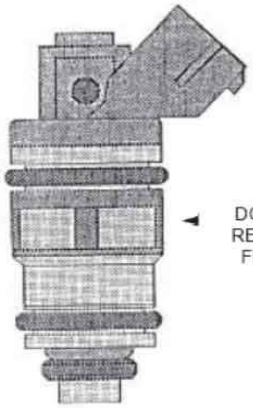
NIPPONDENSO
TBI (With green Filter)

G1589
LOWER INJECTOR
O-RING

G1587
LOWER INJECTOR
O-RING

G1590
UPPER INJECTOR
O-RING

G1588
LOWER INJECTOR
O-RING



TOYOTA STYLE
INJECTOR

1448F
PLASTIC INJECTOR
SEAL (Flat End)

1447F
FUEL INJECTOR
SEAL

1445F
FUEL INJECTOR
O-RING

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