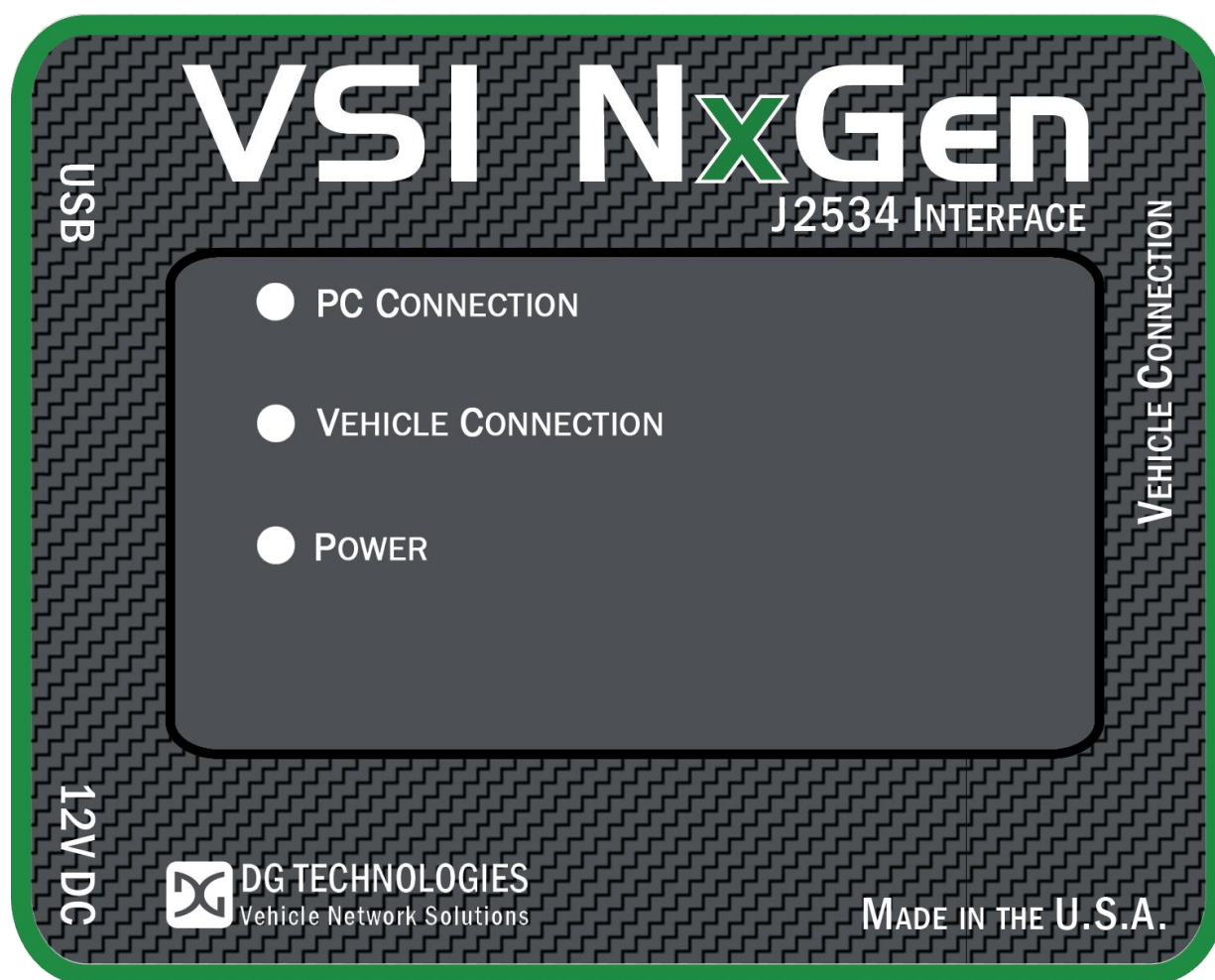




VSI NxGen

User Manual



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This document describes DG Technologies VSI NxGen. The VSI NxGen is a SAE J2534 Pass-Thru device with its primary purpose to program automotive ECUs (Electronic Control Units).

The VSI NxGen is also useful for vehicle diagnostics, development, general design, hardware-in-the-loop simulation and anywhere communications with a vehicle network are required.

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The accompanying software, provided for use with the VSI NxGen, is also copyrighted. Permission is granted to copy this software for back-up purposes only.

IMPORTANT

To ensure your success with this product, it is essential that you read this document carefully before using the hardware.

Damage caused by misuse of the hardware is not covered under product warranty. When using this manual, please remember the following:

- This manual may be changed, in whole or in part, without notice.
- DG assumes no responsibility for any damage resulting from the use of this hardware or software.
- Specifications presented herein are provided for illustration purposes only and may not accurately represent the latest revisions of hardware, software or cabling.
- No license is granted, by implication or otherwise, for any patents or other rights of DG or of any third party.

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1. Introduction

How it works: A PC is connected to a vehicle through the VSI NxGen “Pass-Thru device” to the OBD-II J1962 connector and on to the ECUs. The VSI NxGen provides the translation interface between the PC and the vehicle or module.

The user software application on the PC sends and receives data to the vehicle using the DG Technologies VSI NxGen.

Provides support for: the most current version of the J2534 API (Version 04.04) and D-PDU API (for GM Only).

Supports the following protocols:

- CAN (ISO 11898, J2284)
- CAN FD
- FTCAN
- Single-Wire CAN
- ISO15765
- ISO 9141
- ISO 14230
- J1850 PWM (Ford SCP)
- J1850 VPW (both GM Class 2 and Chrysler)
- SCI

Features:

- USB 2.0 connection to a PC for fast downloads. (Operates at full network speed with fast and efficient data transfers.)
- Connects to a vehicle with an OBDII cable or a custom cable.
- Runs the SAE J1699 Vehicle Validation software.
- On or off-board J2534 module programming.
- Programming voltages – 5 to 20 V in 100 mV steps.
- Useful for diagnostics or module development.

1.1 VSI NxGen hardware specifications

Dimensional	Height:	4.375 in
	Width:	6.625 in.
	Depth:	1.312 in.
Weight	VSI NxGen tool:	13.3 oz.
	OBD II cable:	10.9 oz.
Electrical	Nominal Voltage:	12 VDC
	Maximum Voltage:	27 VDC
	Current consumption:	Less than 200 mA at 12 VDC
	Temperature range:	- 40 C to + 85 C

1.2 Power Connector

The VSI NxGen can be powered via either a power jack (12V DC) **OR** via the supplied OBD II cable attached to the vehicle. (See 1.3.1 for more information on 12V DC usage)

WARNING: The VSI NxGen **SHOULD NOT** be powered via the power jack **AND** the supplied OBD II cable **SIMULTANEOUSLY**. Connecting to multiple power sources may cause damage to the hardware.

1.2.1 Powering up the hardware

Once a power source has been connected, the POWER LED should light green. See Section 1.3.4 for details.

1.2.2 Vehicle network connection

The vehicle network connection can be made by using the supplied OBD II cable or by a custom cable to the hardware's DB-25 (female) connector.

1.3 Hardware overview

The following figures show the external features of the VSI NxGen:

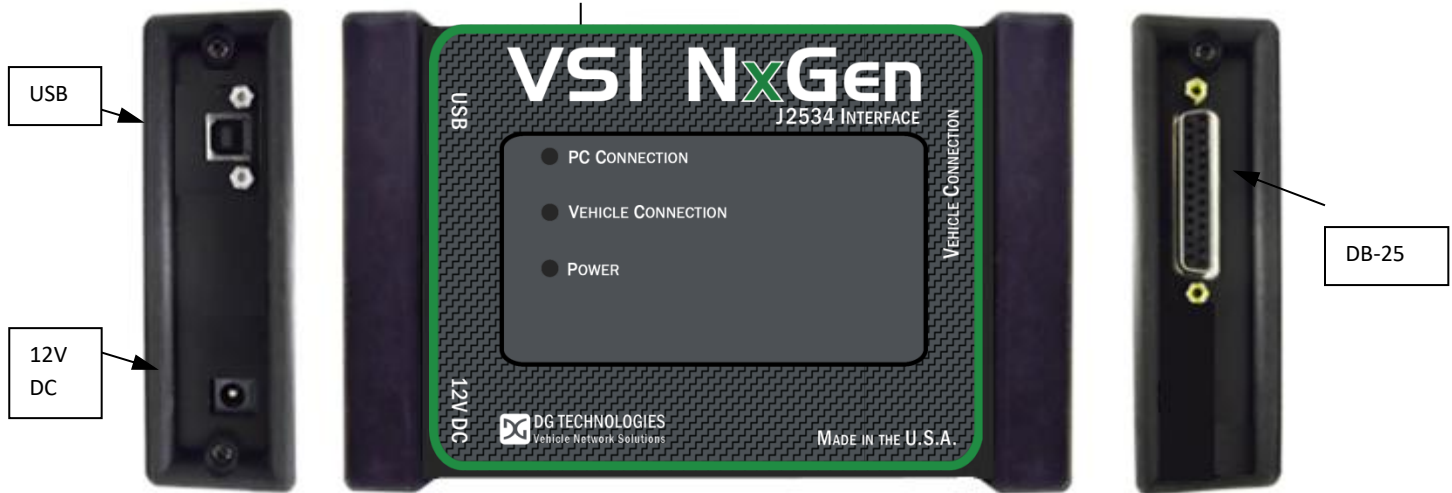


Figure 1: VSI-NxGen Front & Side Views

1.3.1 DB-25

This is the connector where the OBDII cable connects and powers the VSI NxGen from the vehicle connection.

1.3.2 USB

This is where the USB cable connects to the device to the PC.

1.3.3 12V DC

This is the external 12 volt Power Connector.

1.3.4 Status Indicators

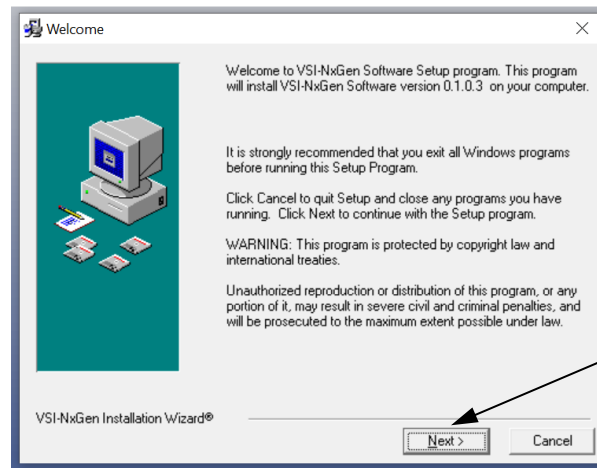
The VSI NxGen has three status LEDs that indicate activity of the following functions:

- **PC Connection** – Indicates that the VSI NxGen has established a connection to the PC, and if the link is “active.”
- **Vehicle Connection** – Indicates that the vehicle network connection is established / active.
- **Power** – Indicates that the VSI NxGen is connected to a power supply (either via the jack plug or through a vehicle connection), and whether the unit is operating properly.

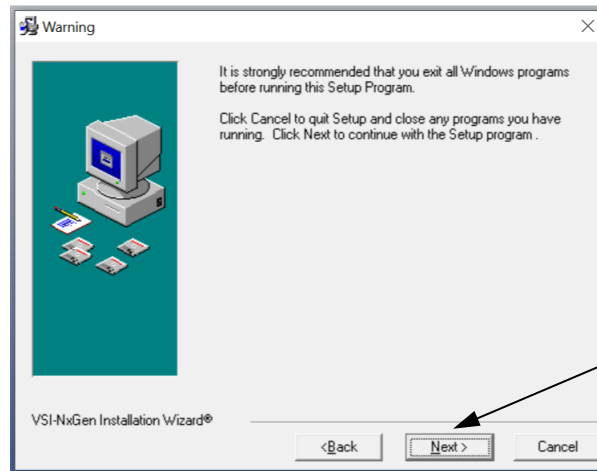
1.3.5 Status Indicators Table

LED Name	LED State	Description
PC Connection	Off	PC has not initialized communication with VSI NxGen via the USB data link.
	On (Solid Red)	PC has initialized communication with VSI NxGen via the USB or Bluetooth data link. No bus activity.
	On (Alternating Red / Green)	Activity on the PC- VSI NxGen connection via USB or Bluetooth data link.
Vehicle Connection	Off	No vehicle network protocol channel has been initialized for use.
	On (Red)	One or more vehicle network protocol channels have been initialized for use. No bus activity.
	On (Alternating Red / Green)	There is activity on one or more vehicle network protocol channels.
Power	Off	No power supplied to the VSI NxGen unit.
	On (Solid Green)	Unit is powered either via the vehicle connector or the external power jack. Unit is operating properly.
	On (Solid Red)	Unit is powered either via the vehicle connector or the external power jack. Unit is not operating properly.
Bootloader Missing	All LED's Off	If unit is properly powered up the unit must be serviced
Bootloader New SW Image Needed	All LED's Blue	The Reflash Utility is needed
Bootloader Reflash in Progress	All LED's Blink	The Reflash Utility is running
Bootloader Manual Reboot Needed	All LED's Green	The user must power cycle the unit. This should not normally happen
Table 1: LED Descriptions		

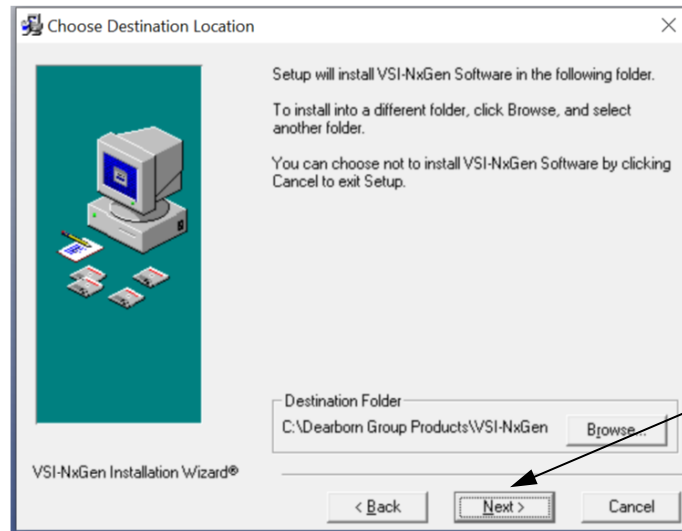
2. Software Setup



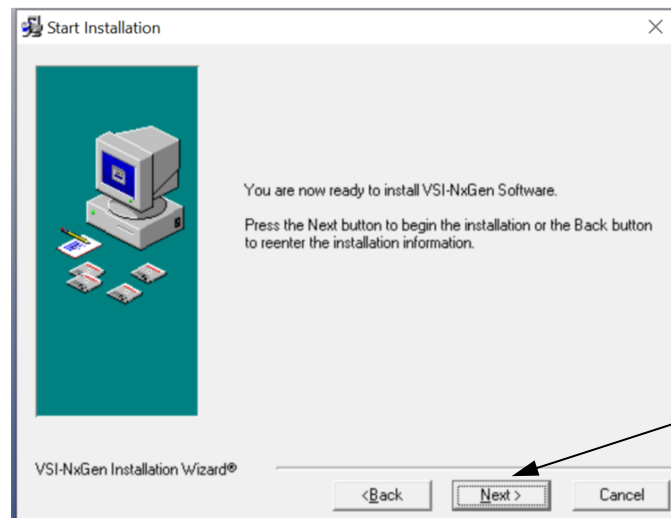
1. If it does not start automatically, locate the “Setup_VSINxGen.EXE” file and double-click on it to start the software setup, and then click “Next”.



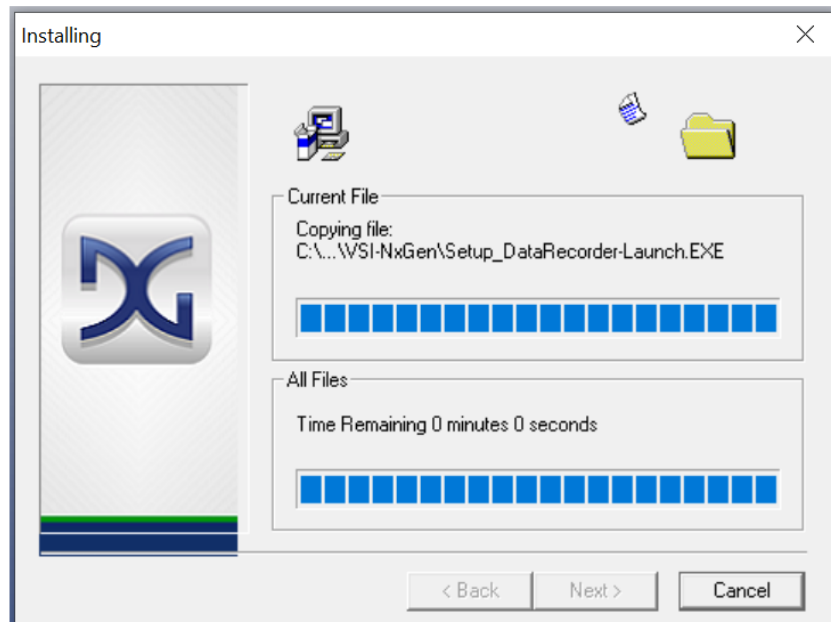
2. Exit all open Windows programs and click “Next” to continue.



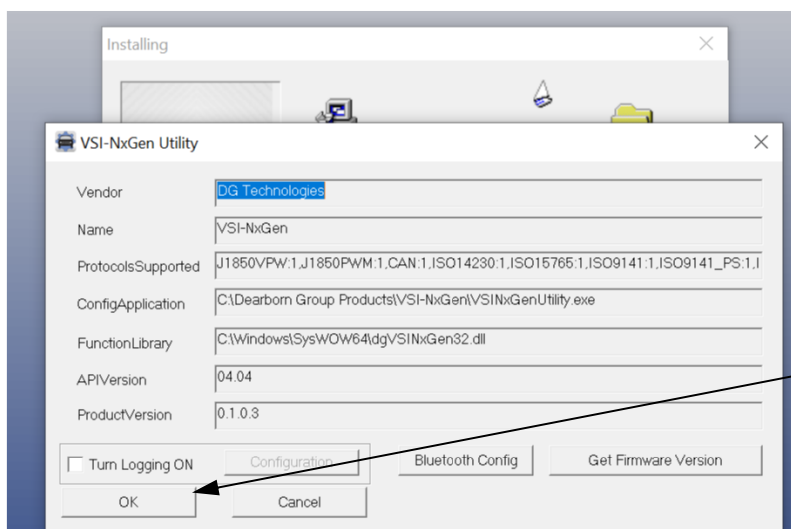
3. Choose Destination Location for the installation. The default location is C:\Dearborn Group Products\VSINxGen. Click “Next” to continue.



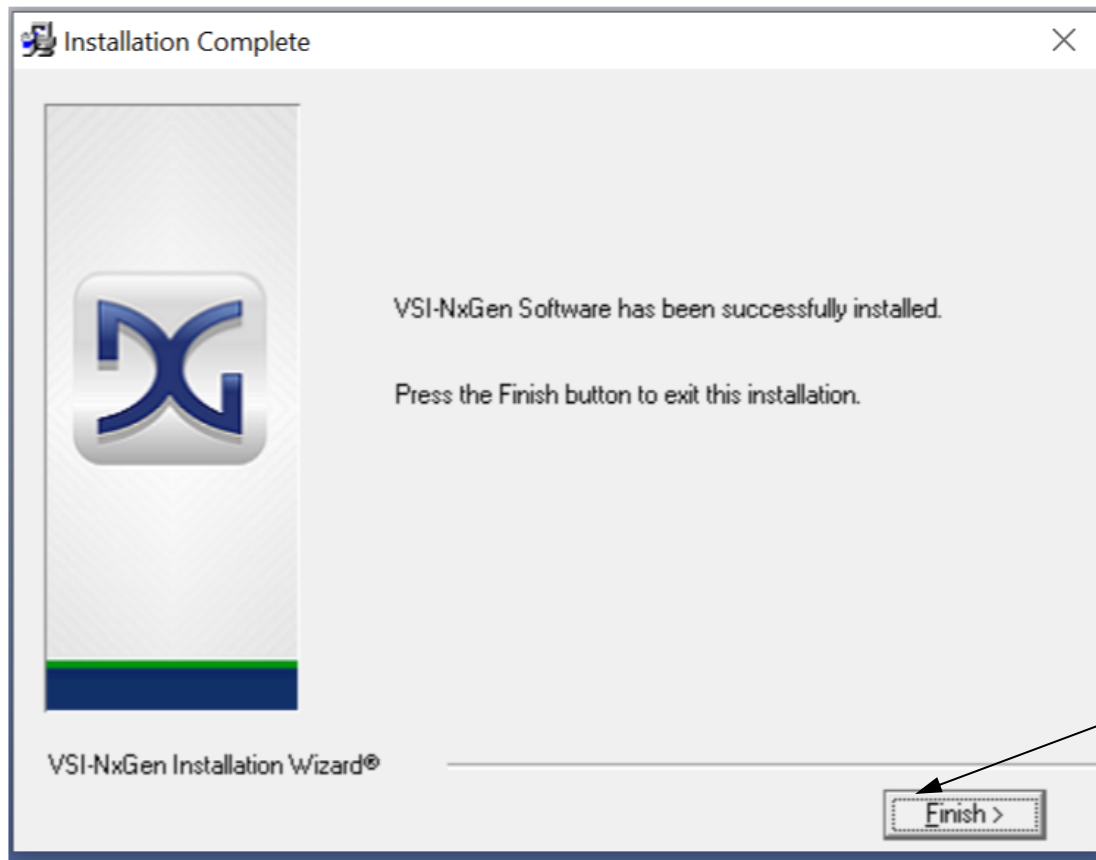
4. Click “Next” to continue.



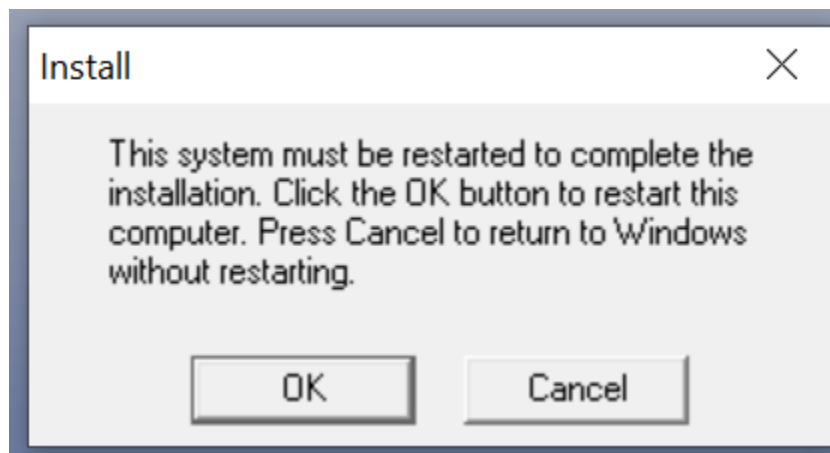
5. Please ensure that you do not have the VSI NxGen hardware connected to the PC's USB port. Click "OK" to continue.



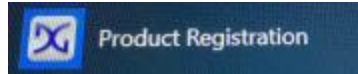
6. Click OK to continue.



7. Installation is complete. Click "Finish".



8. Click OK to restart your computer.



9. From the Start menu click on Product Registration.
10. Select Yes when prompted to make changes to your device.

DG Technologies - User Registration Form

Your PC must have internet access and be connected to a DG Technologies tool with power for this process to complete.
Should you not have both you can call 248-888-2000 to complete this process over the phone.

Submitting this form will extend your standard one year warranty by an additional year and give you access to future product updates.

Name

Company

Address

City

State/Province

Zip/Postal Code

Country


Phone

Email

Device Name

Serial Number

Serial Number located on back of tool white sticker

 **DG TECHNOLOGIES**
Vehicle Network Solutions

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Farmington Hills, MI 48335
248.888.2000
www.dgtech.com
sales@dgtech.com

11. From the Registration screen, complete the necessary information and select Register to complete the process.

3. Hardware Configuration

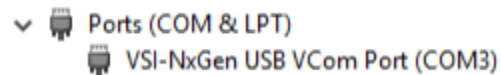
3.1 First Time Hardware Connection to the PC

For Windows 10, an automatic installation will take place. For Windows Vista or 7, 64-bit, a screen will display in the lower right corner of the screen indicating automatic driver installation.

Note: For Windows Vista or 7 32-bit ONLY, see below:

A failure to have the NextGen VSI device install on Windows 7 is caused by a change MS made for Windows 7. It can be addressed by taking the following steps:

- Remove the NextGen VSI device from being plugged into a USB cable of the PC
- At the Windows 'Start' menu, enter cmd.exe in the 'Search' box
- In the list that is presented, right click on a cmd.exe and select 'Run as administrator'
- At the command prompt, enter the following commands: o cd \Dearborn Group Products\USBDeviceDrivers\VSINextGen\64Bit o InstallUSBSERSYS.bat
- Plug in the NextGen VSI device into a USB cable connected to the PC. From the device Manager, it should appear as:



.. the COMx designation will vary depending on the presence of other COM devices installed on your system



Step 1: Connect the VSI NxGen to a power source (Power adapter or powered from the OBD II cable). Note: do not power unit from multiple sources. Power LED must be a solid Green. Connect USB Cable to PC.

In some versions of Windows, the final step in driver installation is automatic. In others, the Windows Found New Hardware Wizard will run to finalize driver installation. This can take a few moments to come up.

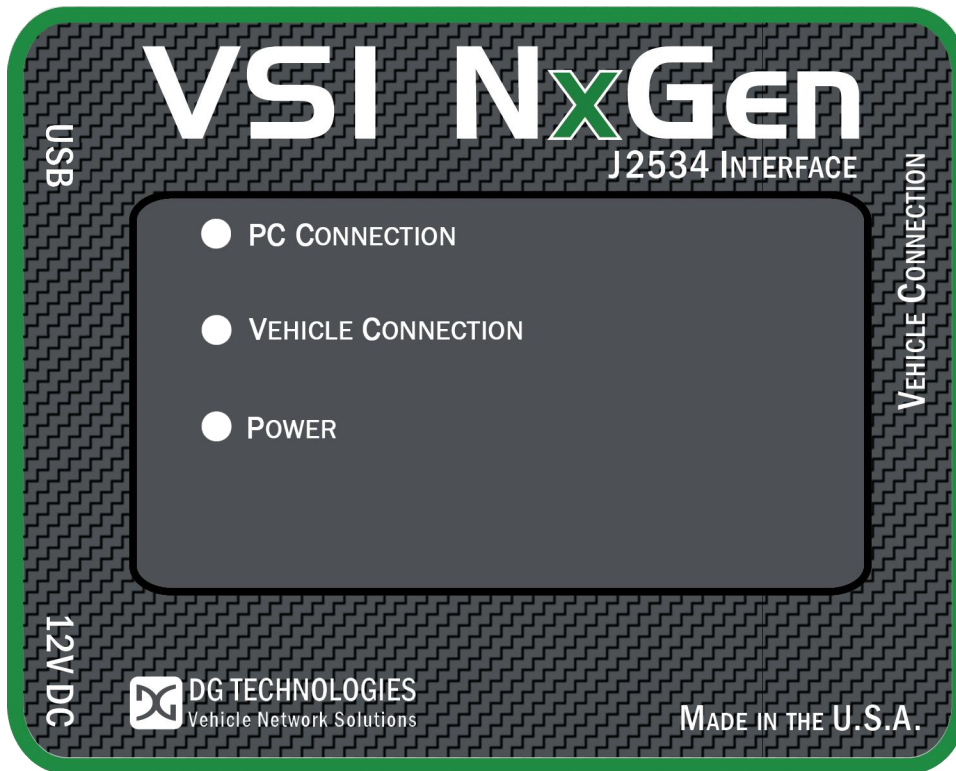


Step 2: Select “Install the software automatically” or “Yes now – and every time I connect a new device” and click “Next”.



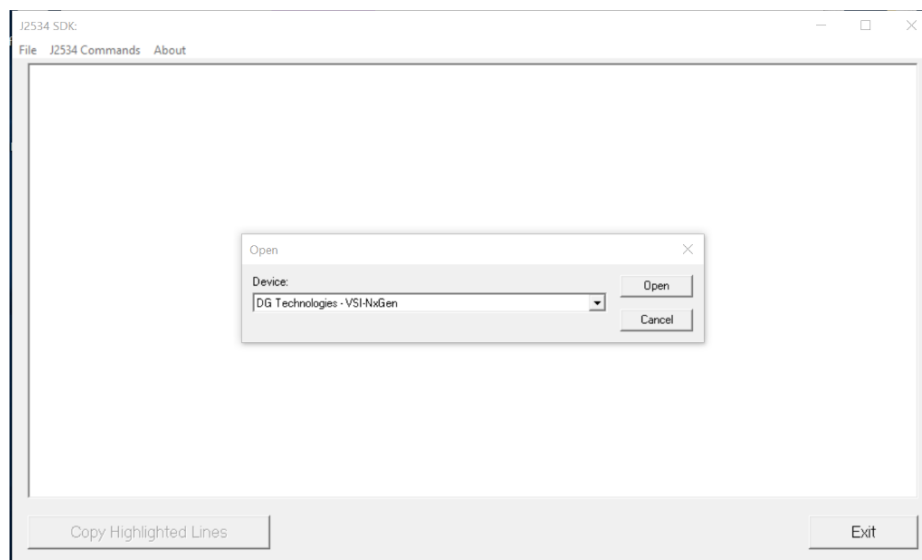
Step 3: Click “Finish”.

3.2 Typical Hardware Connection to the PC



Step 1: Connect the VSI NxGen to a power source (12V Power adapter **or** powered from the OBD II cable). Note: Do not power unit from multiple sources. Power LED must be a solid GREEN.

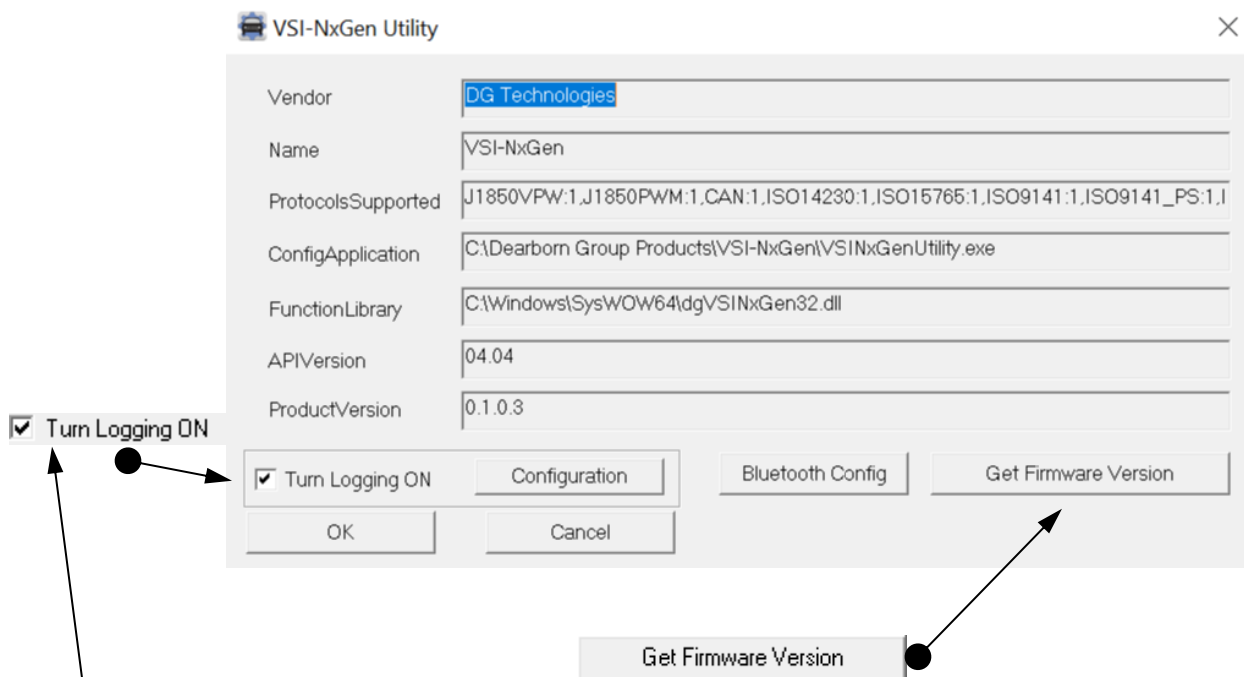
Step 2: Connect the VSI NxGen's USB cable to the PC that the software was installed on and note that the Power LED is a solid **Green** and the PC Connection LED is a solid **Red**.



Step 3: Connect the OBDII cable provided to the vehicle or using an application such as the DG 2534 SDK (Software Development Kit), shown on previous page, a user can open a link to the hardware and connect with a protocol to a Vehicle or an Electronic Control Module (ECU). Note: after this connection, the Vehicle Connection LED is a solid RED.

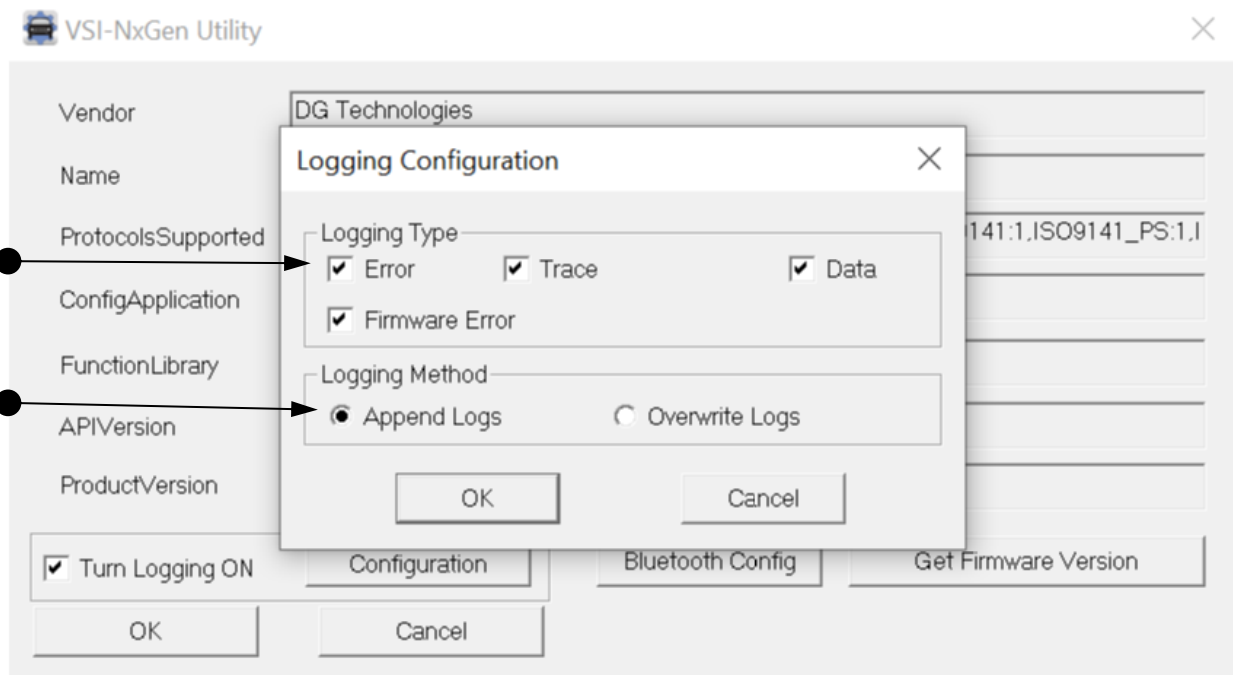
3.3 Hardware Configuration Information

By running the “VSI NxGen Config Utility”, located in Start > All Programs > DGTech VSINxGen, a user can find out Hardware version, protocol support, and other information.



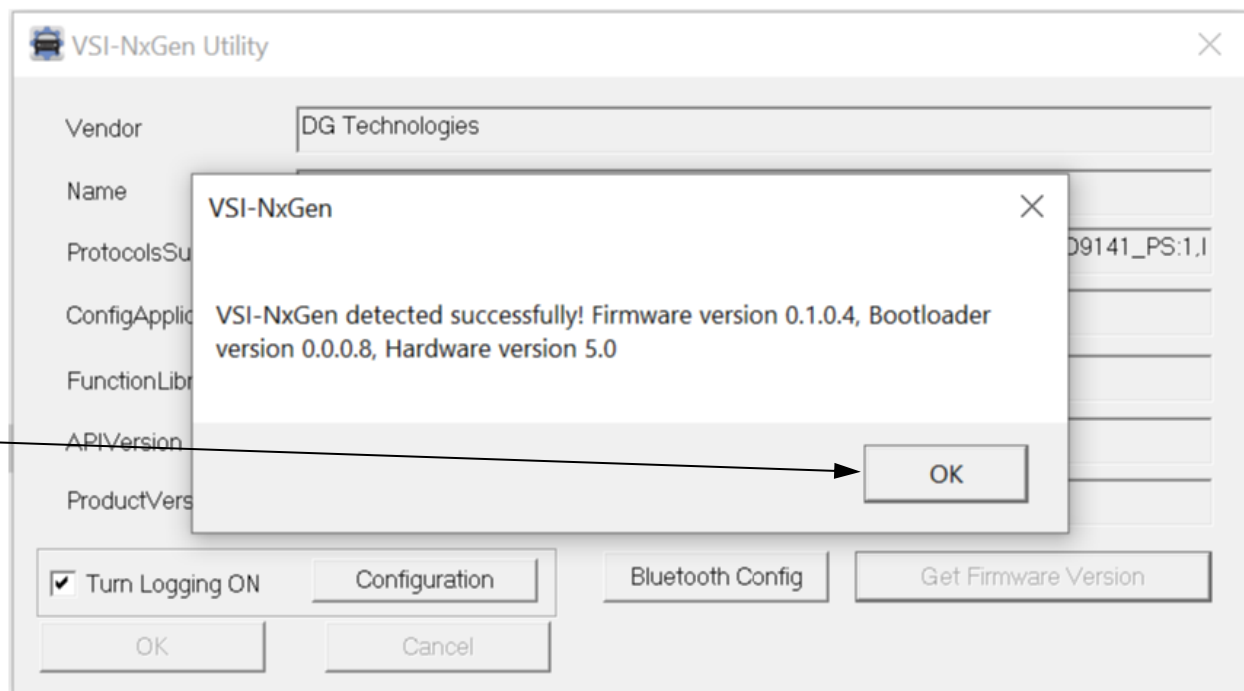
The “Get Firmware Version” button provides the Firmware version of the VSI NxGen hardware. Note: Do not have any other application running that uses the J2534 library.

- The “Turn Logging ON” checkbox enables the Configuration button. The Configuration button enables the user to set “Logging Type” and “Logging Method” to create VSI NxGen DLL log. Note: Do not have any other application running that uses the J2534 library.



Protocols Supported: J1850VPW, J1850PWM, CAN, ISO9141, ISO14230, ISO15765, SCI_A_ENGINE:1, SCI_A_TRANS:1, SCI_B_ENGINE:1, SCI_B_TRANS:1, SWCAN_ISO15765_PS, SWCAN_PS, GM_UART_PS

VSI NxGen Version



4. Software

4.1 VSI NxGen Validation Utility

Please refer to the “DG VSI NxGen Validation Utility User Guide” found in: Start>Programs>Dearborn Group Products>VSI-2534>Documentation.

4.2 DG Diagnostics OBDII

Please refer to the DG Diagnostics OBDII User Guide found in: Start>Programs>Dearborn Group Products>VSI NxGen>Documentation.

4.3 Software Development Kit (SDK)

Please refer to the “DG J2534 SDK Manual” found in: Start>Programs>Dearborn Group Products>VSI NxGen>Documentation.

4.4 Software Update

DG Update is an application that is installed with your VSI NxGen drivers. It will run (by default) once every 30 days and will keep you up to date with the latest versions of drivers for all your DG Technologies products. With this application running regularly and [Automatic Firmware Update](#) turned on, this will keep your VSI NxGen up-to-date with drivers and firmware. DG recommends our customers keep up to date so that your OEM and component manufacturer diagnostic applications run smoothly.

DO NOT DISCONNECT POWER FROM THE VSI NxGen DURING AN UPDATE!!!

The utility will run once every 30 days as a user logs on. This value is configurable, but defaults to 30 days. It can also be invoked manually from the Windows Start Menu:

Start → DGTech Utilities → DG Update

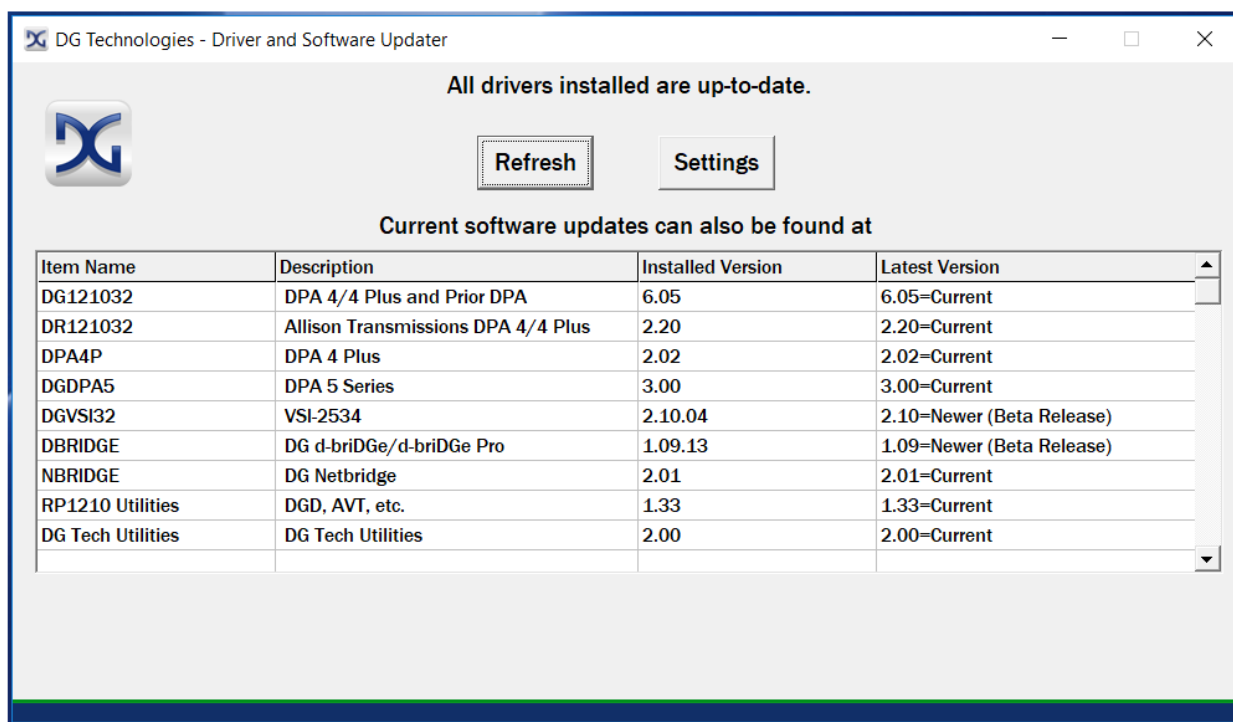
DG Update – Internet Connection Required

The DG Update utility depends on successfully connecting to the Internet (to one of DG's servers) to retrieve the latest version information and to download the latest drivers and applications if necessary.

Many companies install firewalls and virus protection and these may block the DG server queries and responses. If you are connected to the Internet and have issues running DG Update (getting **Unable to connect to the internet to check for updates** messages), ensure that your firewall or virus protection will allow a connection to the Internet.

4.5 DG Update – Main Update Screen

The main screen appears looking like this. Depending on which products are installed on your PC, the grid will display pertinent information about them. When selecting DG Update from the Windows Start Menu, this is the first screen to appear.

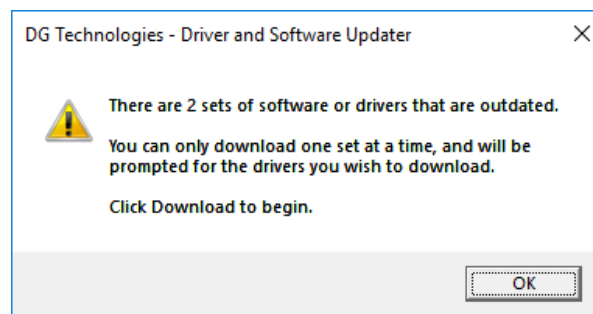


Main screen with all drivers / software up to date

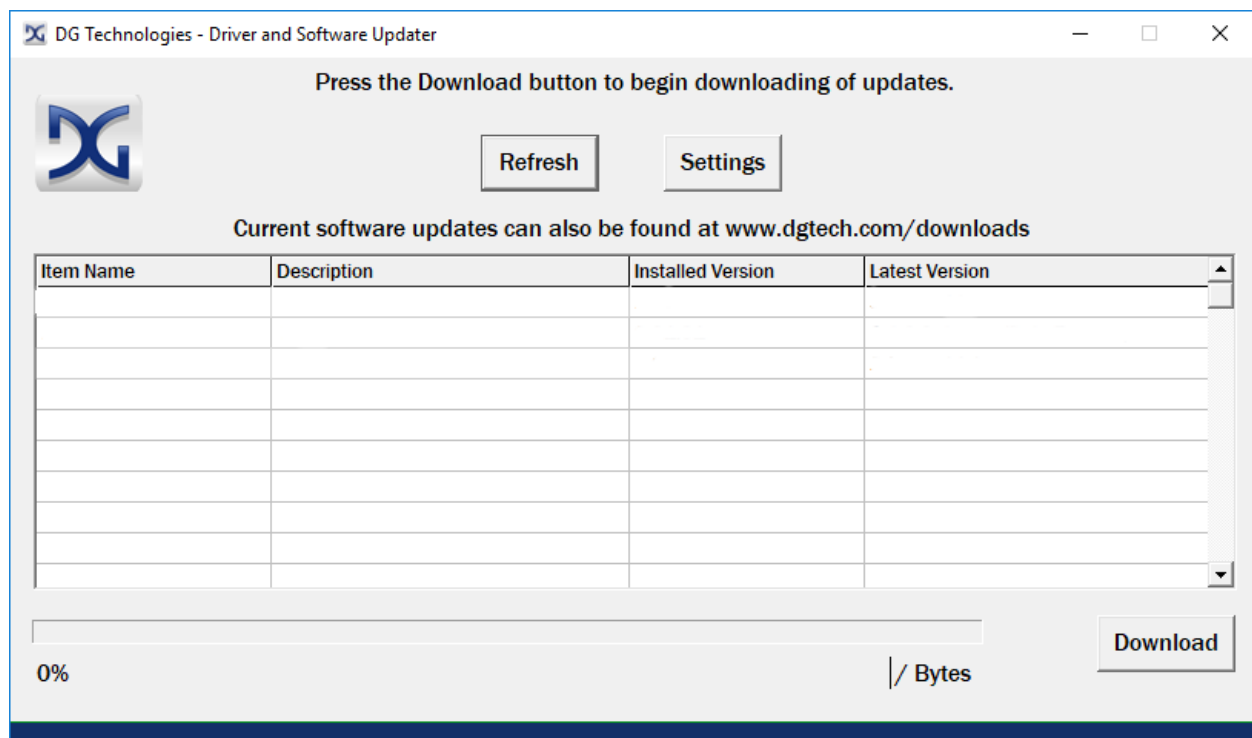
Connect your PC to the Internet and click the **Refresh** button. Due to the nature of TCP/IP communications, errors connecting or sending/receiving of data are slow to appear, however the user will eventually be notified if there was a problem.

If the check for updates was successful, the second column of the grid will display information returned from the DG server showing the most current versions. Should an install be out of date the color of the row will be red.

4.6 Successful Connect – Update Available



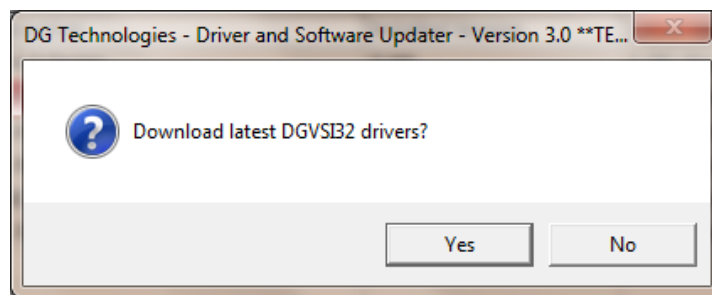
Out of date message box



Progress bar and Download button shown

The user will be presented with a prompt notifying them that there are updates available. Only if updates are available will the **Download** button and progress bar show up on the screen. The progress bar will keep you informed of the download progress should you choose to download the latest drivers by clicking the **Download** button.

When you click the **Download** button, you will be prompted to confirm starting of the download.



Prompt asking if drivers should be downloaded

Note: The DG Update application can only download and install one item at a time. The user will be prompted for which ever one they want to update first.

After choosing **Yes**, the program will download the drivers and update the progress bar while doing so. Once the drivers have been downloaded, the application will unzip them and start the installation process. The dialog box will go away after the install has been started.

Do not disconnect your VSI NxGen or shut down your computer until installation is complete

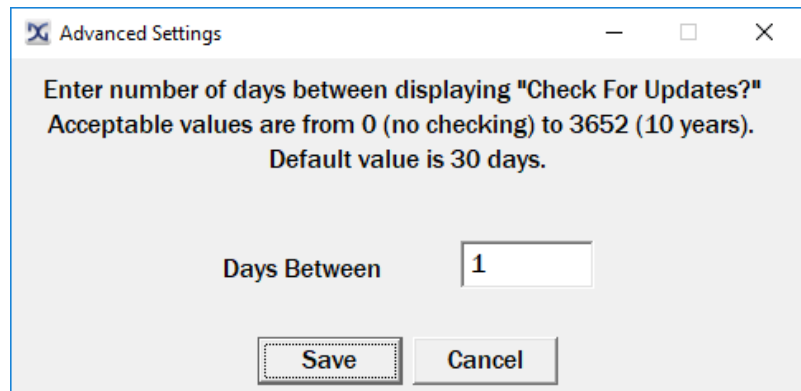
After the drivers have been downloaded (to the Windows temp directory – if you wish to save them for other machines), they will be unzipped and the program will exit right after starting the new driver installation. Follow the installation instructions in the appropriate User Manual.

4.7 Advanced Settings – Setting Default Time for Check for Updates

If you want to turn off, or alter the timeout period where the user is prompted to check for updates (the dialog below), press the **Settings** button. The advanced settings dialog box will be displayed. To turn off the checking prompt, set the value to 0 (zero). Otherwise, you can set the number of days between checks.



Small dialog box that appears in the system tray



Advanced settings screen

4.8 Firmware Update

Keeping your tools firmware up to date is very important. This gives you access to the latest protocols and updates for your tool. In most cases the drivers installed on your computer come with automatic firmware update enabled. This feature tells the driver to make sure that the firmware in the unit is up to date. If the firmware is old, you will be automatically notified every time the tool is connected with any software. If you are using a USB connection, you will be given the option of starting the upgrade automatically.

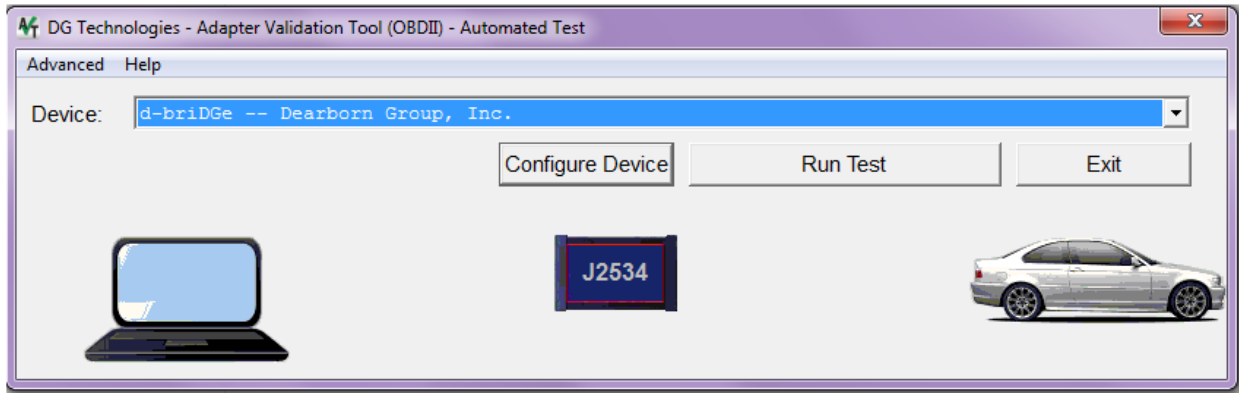
4.9 Checking the Firmware Version

The first step in a manual firmware update is to find which version of firmware you have. Even though automatic firmware update comes defaulted to on, there may be a time when you need to update your firmware manually. The first step in a manual firmware update is to find which version of firmware you have. You can use the AVT utility after connecting the VSI NxGen to a power source.

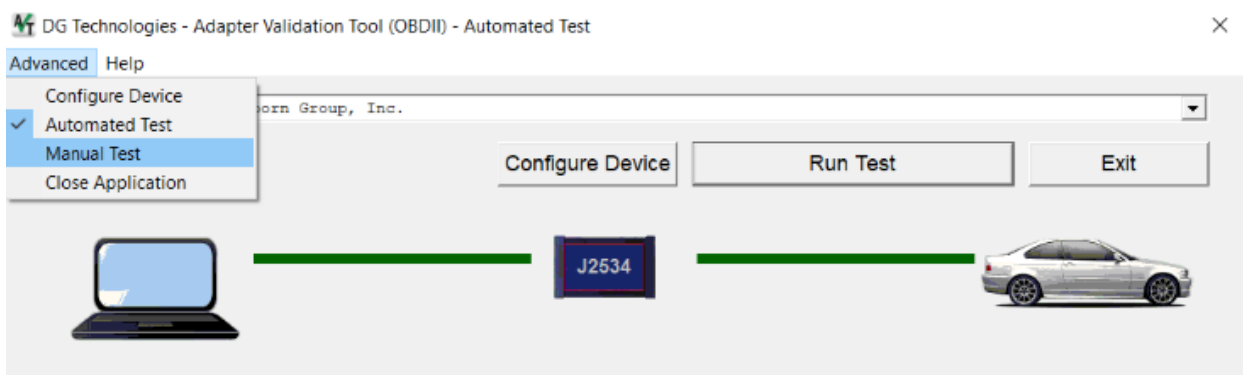
Start → DGTech Utilities → Adapter Validation Tool

AVT (OBDII) – Adapter Validation Tool for Light and Medium-Duty Vehicles

This selection covers VSI NxGen.



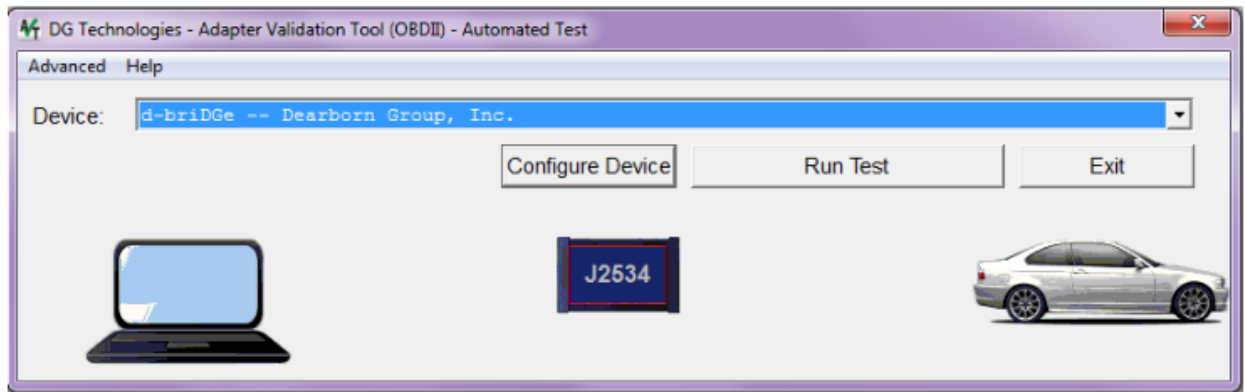
Select **Configure Device**.



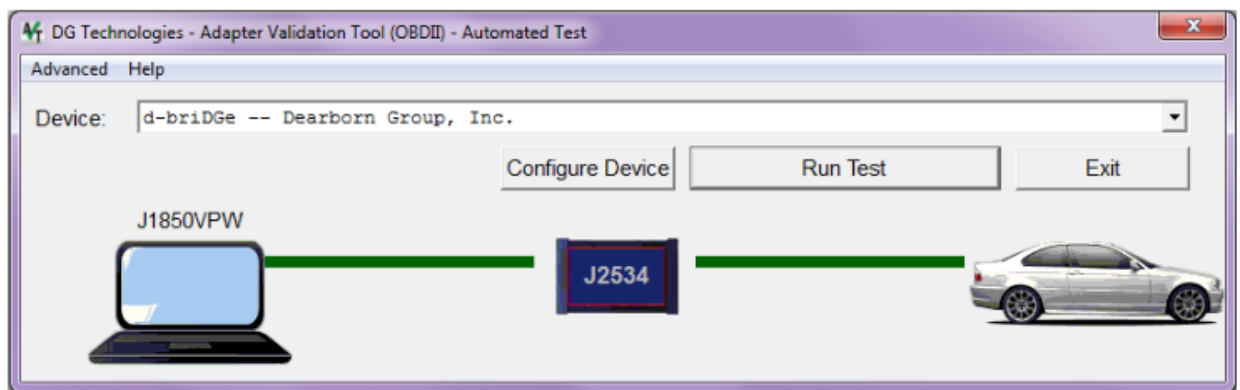
Advanced Selection

Allows switching between the **Automated** and **Manual Tests**. You can also **Configure** your VSI NxGen or **Close** the Application from this menu.

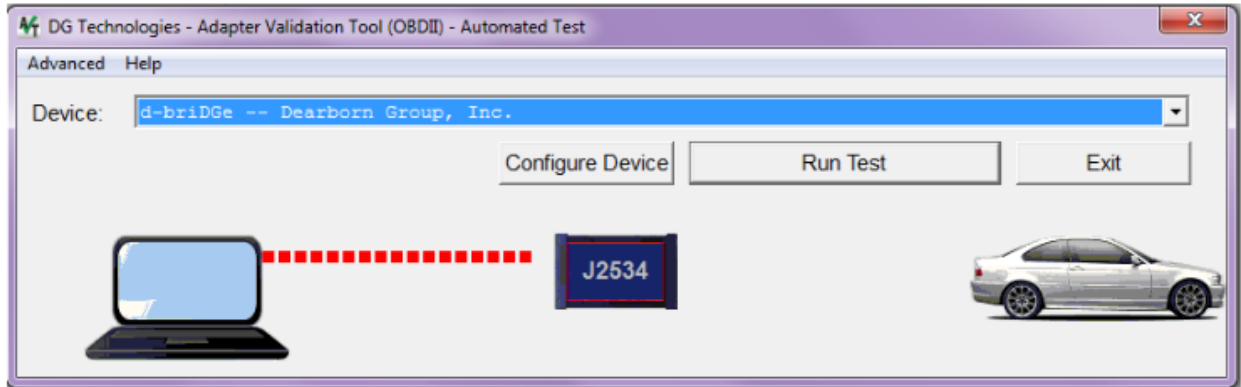
- ❑ **Device** Green Line from device (tool) to vehicle indicates a successful test
- ❑ **Protocol** OBD II
 - Using the **OBD II** protocol selection means that AVT will attempt to connect using all OBDII protocols that the selected adapter supports (i.e. J1850VPW, ISO9141, ISO14230, ISO15765, etc.) and with all OBDII options and OBDII speeds for that protocol (i.e. CAN 1Mb 11-bit, CAN 1Mb 29-bit, CAN 500Kb 11-bit, CAN 500Kb 29-bit, etc.). DG recommends using the OBDII protocol setting initially since all vehicles after 1996 must support an OBDII protocol.
 - You can also use a specific protocol and AVT will connect using all speeds and options for that individual protocol.
- Ensure proper connections of Diagnostic Tool to vehicle and PC.
- Turn ignition key to “On” and click on **Run Test**.



- This is a Pass/Fail test. Upon completion of a successful test, you will see the screen below. The two green lines indicate that communication from the VSI NxGen and the PC was successful as well as the communication from the VSI NxGen and the vehicle was successful. Vehicle protocol that was detected is also displayed.
- Click on **Exit** when done.



JVT Test Outcomes



- This screen indicates a communication problem between the VSI NxGen and the PC.
 - Ensure both connections at each end of USB cable, between the VSI NxGen and the PC, are secure.
 - Ensure VSI NxGen was properly installed on PC and possibly re-install.
 - Ensure the VSI NxGen is powered with power light illuminated.
 - If problem persists, try a different cable.

- This screen indicates a communication problem between the VSI NxGen and the PC.
 - Ensure both connections at each end of the OBDII cable between the VSI NxGen and the vehicle are secure.
 - Ensure vehicle ignition key is "On" and that VSI NxGen is powered.
 - If problem persists, ensure the J1962 OBD II connector wiring and other vehicle wiring is connected correctly and securely. Keep in mind, it may be an issue on the vehicle itself.

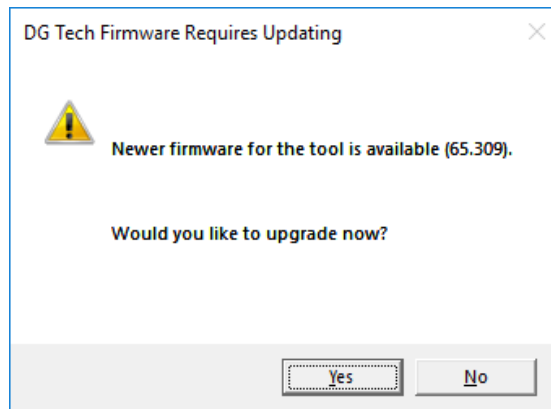
AVT Test Outcomes

If after following the **Test Results Discussion and Next Steps** screen, you cannot get the adapter to read data, contact DG technical support.

Choose the correct *Vendor* and *Device* from the drop-down menus. Then select the *Test Connections* button. The API, DLL, and Firmware information is displayed in the box.

By default, the auto firmware update setting in the registry should be set so that if new firmware is available you will be notified when a connection to the tool is opened. If new firmware is available for the unit attached, the auto update process will be presented with the following prompt. The auto update process **ONLY** works over a wired connection. If you are using a wireless connection to the tool, you will only be notified of the existence of new firmware.

A USB connection to upgrade the firmware is required. When one is available you will be able to perform an update at that time.

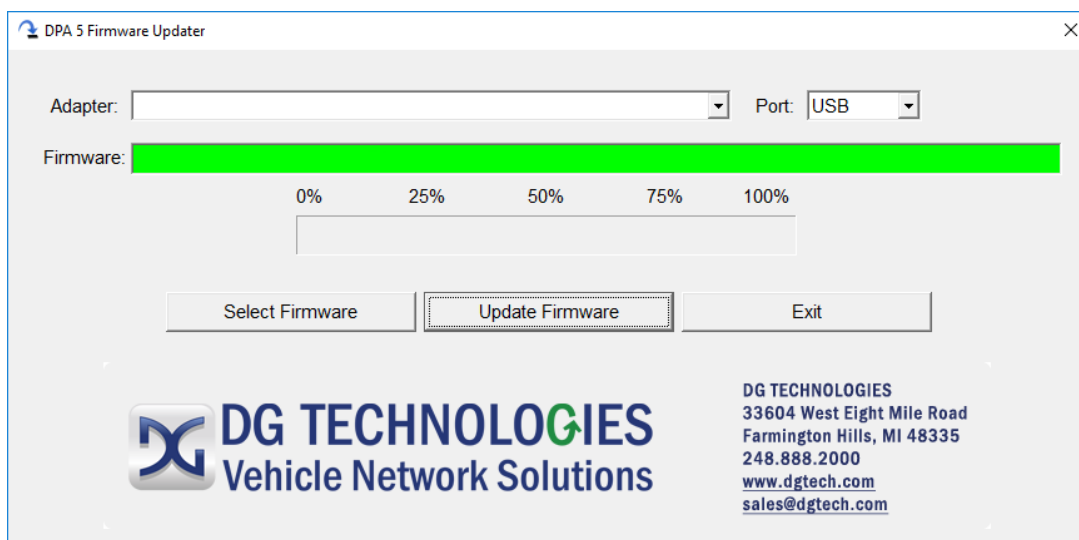


Automatic Firmware Update Dialog Box

Launch the VSI NxGen Firmware Updater Program Manually

1. Stop all applications that are using the VSI NxGen (if any).
2. Start the VSI NxGen Firmware Updater program:

Start → VSINxGen → VSINxGen Firmware Updater



Firmware Updater GUI

3. Select the correct firmware file (the latest version is already selected by default). If the firmware file exists, the Firmware box will turn **green**.
 - a. NOTE: Firmware files are in separate sub-directories under the Utilities directory where the VSI NxGen drivers are installed, typically:
C:\ DGTech\ VSINxGen\Utilities\ VSINxGen Firmware\
4. Click on the **Update Firmware** button and select **Yes**, if you receive a warning dialog.
5. After the download is finished, disconnect power from the VSI NxGen, wait 5 seconds and then reconnect power.

After you have finished installing the Windows device drivers you can begin using your VSI NxGen. If the ***Automatic Firmware Update*** option is on, every time you connect to the VSI NxGen the drivers check to see if a newer version of firmware is available. If a newer version is available, you will be prompted to upgrade to that version. Select **Yes** and the upgrade process begins automatically. After the firmware update, restart your application.

**DO NOT DISCONNECT POWER FROM THE VSI NxGen DURING A
FIRMWARE UPDATE!!! ALLOW THE UPDATE TO FINISH OR YOU WILL
HAVE TO MANUALLY UPDATE THE FIRMWARE!**

Appendix A. Technical Support and Return Merchandise Authorization (RMA)

Technical Support

After reading and following the troubleshooting and validation procedures in this document please check the FAQ page at www.dgtech.com/faqs. If you are still not able to resolve an issue, please feel free to contact DG technical support. For users in the United States, technical support is available from 9 a.m. to 5 p.m. Eastern Time. You may also fax or e-mail your questions to us. For prompt assistance, please include your voice telephone number and the serial number located on the back of your VSI NxGen.

DG Technologies Technical Support



Phone: (248) 888-2000

Fax: (248) 888-9977

E-mail: techsupp@dgtech.com

Web site: www.dgtech.com/tech-support

Users not residing in the United States should contact your local DG representative or e-mail techsupp@dgtech.com

Return Merchandise Authorization (RMA)

If technical support has deemed that there may be a physical problem with your VSI NxGen, you will be issued you an RMA number. You would then return the product along with any documentation of ownership you have (proof of purchase/price) to the following address:

Appendix B. Warranty Information and Limitation Statements

Warranty Information

DG Technologies, Inc. the VSI NxGen is warranted against defects in materials and workmanship for two (2) years following date of shipment. Cables (both USB and vehicle) are warranted for 90 days.

DG Technologies will, at its option, repair or replace, at no cost to the customer, products which prove to be defective during the warranty period, provided the defect or failure is not due to misuse, abuse, or alteration of the product. The customer is responsible for shipment of the defective product to DG. This warranty does not cover damage to any item that DG Technologies, determines has been damaged by the customer's abuse, misuse, negligence, improper assembly, modification, or operation of the product.

A Return Merchandise Authorization (RMA) number must be issued to the customer by our Technical Support Department at (248) 888-2000 and must be included with the product being returned (for more details, see section *Return Merchandise Authorization (RMA)*). A VSI NxGen is warranted for 90 days after a warranty repair, or to end of the original factory warranty period, whichever is longer.

Limitation Statements

General Limitation and Risk Assignment

To the maximum extent permitted by applicable law, DG Technologies and its suppliers provide support services on an “as-is” basis and disclaim all other warranties and conditions not specifically stated herein, whether express, implied or statutory, including, but not limited to, any warranties of merchantability or fitness for a particular purpose, lack of viruses, accuracy or completeness of responses, results, lack of negligence or lack of workmanlike effort, and correspondence to description. The user assumes the entire risk arising out of the use or performance of the device, its operating system components, and any support services.

Exclusion of Incidental, Consequential and Certain Other Damages

To the maximum extent permitted by applicable law, in no event shall DG Technologies or its suppliers be liable for any special, incidental, indirect or consequential damages whatsoever, including but not limited to: damages for loss of profit, loss of confidential or other information; business interruption; personal injury; loss of privacy, failure to meet any duty (including good faith or of reasonable care); negligence; and any other pecuniary or other loss related to the use of or the inability to use the device, components or support services or the provision of or failure to provide support services or otherwise in connection with any provision, even if DG Technologies or any supplier has been advised of the possibility of such damages.

Limitation of Liability and Remedies

Notwithstanding any damages that you might incur for any reason whatsoever (including, without limitation, all damages referenced above and all direct or general damages), in no event shall the liability of DG Technologies and any of its suppliers exceed the price paid for the device. The user assumes the entire risk and liability from the use of this device.

Right to Revise or Update without Notice

DG Technologies reserves the right to revise or update its products, software and/or any or all documentation without obligation to notify any individual or entity.

Governance

The user agrees to be governed by the laws of the State of Michigan, USA, and consents to the jurisdiction of the state court of Michigan in all disputes arising out of or relating to the use of this device.

Contact

Please direct all inquiries to:

DG Technologies
33604 West 8 Mile Road
Farmington Hills, MI 48335
Phone (248) 888-2000
Fax (248) 888-9977

Appendix C. FCC and Certification Industry Canada Information

If your VSI NxGen is equipped with dual radio Bluetooth/WiFi the following applies:

The VSI NxGen has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. The VSI NxGen uses and generates radio frequency energy. If not installed and used in accordance with the instructions, it may cause harmful interference to radio communications. If the VSI NxGen does cause harmful interference to radio or television reception, which can be determined by turning the affected equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving and/or sending antennas.
- Increase the separation between the VSI NxGen and the affected receiving equipment.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

This product complies with FCC OET Bulletin 65 radiation exposure limits set forth for an uncontrolled environment.

Industry Canada

Operation of the VSI NxGen is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

Changes not expressly approved by DG Technologies, Inc. to the VSI NxGen could void the user's authority to operate the VSI NxGen.

The following are the VSI NxGen Bluetooth details as required to be published by the FCC.

Operating Frequency	2.4GHz
Power Output Maximum	< 4.4dBi
Contains Transmitter Module FCC ID:	QOQWT11
Transmitter Bluetooth QDID	B012647

Appendix D – List of Acronyms Used in this Document

Various acronyms have been used throughout this document.

Acronym	Description
API	Application Programming Interface
CAN	Controller Area Network
DG	DG Technologies
ID	Identification
ISO	International Standards Organization
LED	Light Emitting Diode
OBD	On Board Diagnostics
OEM	Original Equipment Manufacturer
PC	Personal Computer
RAM	Random Access Memory
SAE	Society of Automotive Engineers
TMC	Technology and Maintenance Council
UAC	User Account Control
USB	Universal Serial Bus
VDA	Vehicle Datalink Adapter