

LENS[®] User Manual



Protected by

CYBERGUARD

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Document Version: 1.0
Document Date: March 31, 2026
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The LENS® has a robust set of features, capabilities and functions including CyberTech cybersecurity enhancements from DG Technologies and CyberGuard protection inside. It is also useful for vehicle ECU development, general design, hardware-in-the-loop simulation and anywhere bi-directional communications with a vehicle network are required.

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The accompanying software, provided for use with the LENS®, 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 Technologies 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 Technologies or of any third party.

This device complies with Part 15 of the FCC Rules. Operation 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.

This device contains FCC ID – XPYLILYWI IC 88595A-LILYWI

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This manual contains the following sections:

Section 1 – Introduction – Provides an overview of the manual, summarizing the contents of the remaining sections and appendices. Also, provides a reference to related documentation and technical support resources.

Section 2 – Hardware Overview / Getting Started – Describes key features of the LENS® hardware.

Section 3 – Configuring the Host PC Connections – Describes how to set up the USB and Ethernet connections, IP address and how to modify the LENS® TCP/IP parameters.

Section 4 – On Board Web Pages – Describes the onboard web page interface along with available utilities and their use.

1 Introduction

The LENS® hardware interface provides remote connectivity for multiplexed automotive and automation communication networks. These products use a Wi-Fi or USB connection to the user's PC to provide a high-speed user interface for applications such as diagnostics, monitoring, and troubleshooting, as well as for custom applications. An embedded Linux operating system and standard Transmission Control Protocol/Internet Protocol (TCP/IP) services ensure inter-connectivity with many existing PCs, workstations, and network hardware systems.

The LENS® includes the following features:

User Interface

- Self-hosted Web Interface

Hardware

- Processor: ARM Cortex A8, 1 GHz core speed
- RAM: 512 Mbytes SDRAM
- Internal storage: Micro SD card, up to 1TB (32GB standard)
- One OBDII Type 2 connector for connection to common vehicle diagnostic ports
- One USB device Type B connector for connection to a Host PC
- Four channels of high-speed CAN / CAN FD
- One channel DoIP compatible ethernet (Variant 1 or Variant 2)

Software

- Linux OS kernel 5.4.106 with Xenomai real-time extensions
- On-board web server
- TCP/IP support of standard services into the LENS®
- Vehicle network drivers and applications
- C/C++ compilers, Python 2, Python 3, PHP

Users can utilize one of DG's existing PC programs, or write their own client based or stand-alone applications for communication with the hardware.

The LENS® utilizes the Gryphon® Communication Protocol, which is a client/server communication protocol specification that defines the format of messages passed over a TCP connection between the LENS® and a client.

The Gryphon Protocol is supported by the open-source Wireshark network protocol analyzer program.
<https://www.wireshark.org/>

The LENS® also supports SocketCAN.

Typical applications for the LENS® include:

- PC-to-vehicle network adapter.
- Stand-alone node running custom applications.
- LAN gateway to one or more vehicle networks.
- End of line (EOL) test applications

2 Product Overview / Getting Started

Please read this section before using your hardware. It describes the hardware information necessary for successful installation and operation. Each section describes an individual hardware configuration. Once you understand your hardware connection, move to **Section 3** to connect to your PC via Wi-Fi or USB.

2.1 Contents of the LENS® Package

2.1.1 LENS® Hardware Provided:

- LENS® unit
- USB cable

2.1.2 LENS® Software Provided:

Installation program with:

- 64-bit C, C++ libraries and samples
- J2534 API and samples
- LENS® User Manual (PDF)
- Various utility programs
- Hercules analyzer software

The LENS® will power on when it is connected to a host PC via a USB cable.

After the LENS® has booted, in Windows file explorer a new USB mass storage drive will be displayed. This is labeled "LENS_USB". The USB mass storage drive will act like any other USB drive. Files can be copied to or from it.

Refer to the separate document, "Software Installation Quick Start Guide" for more information.

2.2 Hardware Specifications

2.2.1 LENS® Hardware Specifications

<i>Overall</i>	Height: 1 in.
<i>Dimensions:</i>	Width: 1.9 in.
	Length: 4.2 in.
<i>Weight:</i>	2.8 ounces
<i>Electrical:</i>	Typical current: = 250 mA at 12.0 VDC input = 600 mA at 5.0 VDC (USB Powered)
	Input voltages
	Minimum operational input voltage at OBD Connector: 6 VDC
	Maximum input voltage at OBD connector: 32 VDC
	Typical input voltage at USB connector: 5 VDC
<i>Operating temperature range:</i>	-20° C to +60° C
<i>Storage temperature range:</i>	-40° C to 105° C

2.2.2 Power Connection

The LENS® can be powered from two different sources ^{Note 1}

- The vehicle OBDII connector ^{Note 2}
- USB connection to a host PC ^{Note 3}

Note 1:

- Both power connections may be present at the same time with no harm to the unit.

Note 2:

- When powered from the vehicle OBD connector all functions are available.

Note 3:

- When the LENS® is powered by only the USB connection:
 - The HS CAN and DoIP circuitry will function.
 - The host PC's USB port (or powered USB hub) must provide a minimum of 600 mA for the Wi-Fi connection to function.

2.2.3 Vehicle Network Protocols Supported

The LENS® has 4 CAN channels and 1 DoIP Ethernet channel. These network channels are built into the LENS®. The CAN channels are dedicated to certain versions of CAN, as described below:

- CAN channels #1 to #4 support high speed CAN, including CAN FD.
- DoIP ethernet connections are controlled by software. Both DoIP option 1 and option 2 are supported.
- Detection and control of the DoIP activation line on OBD pin 8 is supported.

The pinout information for the vehicle connectors in your LENS® is shown in Table 2, and it also may be found in the internal web pages of the LENS®.

Hardware Overview

2.2.4 Powering Up the Hardware

Power is supplied to the LENS® by connecting a USB cable to your PC or by connecting the OBD connector to a vehicle with power on the OBD connector. The LENS® will automatically power on and begin the boot up process.

2.2.5 Status Indicators

There are three LED indicators on the top side of the PB. One green and two multi-colors (RGB). These LED indicators will provide information about the state of the LENS®.



Figure 1 - LENS® LED Indicators

LEDs

Action Name	LED State	Description
Normal Boot Up	3 Solid Green	LENS has initialized communication with PC.
Normal	1 Green 2 Blue	Normal operating condition.
Unit Identify Function	Alternating Red/Blue	Unit identify function has been triggered from web page – configuration> device name > Turn identify ON.
Reflash	1 Green 2 Purple	A Reflashing in progress
Error	1 Green 2 Red	Reflash failed or other error. Repeat procedure.

Table 1 – LED Color Functions

2.2.6 USB Type B Connector

The LENS® is equipped with a USB type B connector. The orange color of the USB connector indicates it is a high retention strength connector to minimize the chance of the USB cable becoming disconnected while in use. The single USB type B connector is intended to connect the LENS® to a host PC.

2.2.7 Protocol Connections

The vehicle bus signals are provided on the OBD connector. The pin out information is shown in Table 1. You can also access pin out information on the **“Pinouts” internal web page of the LENS®**.

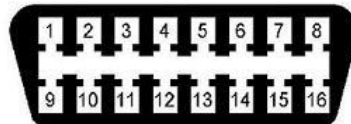


Figure 2 - LENS® OBD Connector

OBD2 Pin		CAN Mode			DOIP Mode 1	DOIP Mode 2
		SocketCAN	GCP Channel	Function	Ethernet pin	Ethernet pin
1		can4	4	CAN-H		RX+
2						
3		can3	3	CAN-H	RX+	
4	GND					
5	GND					
6		can1	1	CAN-H		
7	n/c					
8				VMON2	Activation	Activation
9		can4	4	CAN-L		RX-
10	n/c					
11		can3	3	CAN-L	RX-	
12		can2	2	CAN-H	TX+	TX+
13		can2	2	CAN-L	TX-	TX-
14		can1	1	CAN-L		
15	n/c					
16	VBATT					

Table 1 - OBD Connector Pinout

2.2.8 Installing the Lens Software

1. From the DG Website select Products→Engineers→Lens



2. Select:

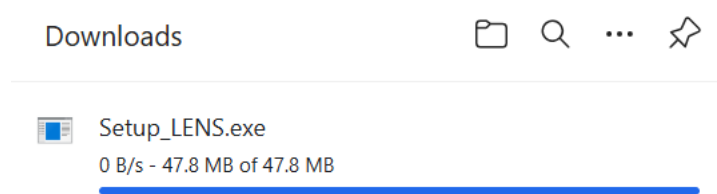
Figure 3 – Software Download Selection

3. Select LENS under Beacon, Lodestar & LENS.
4. Select **[DOWNLOAD]**



Figure 4 – Software Installation Screen

5. Downloading progress will be displayed:



6. Select **[Open File]**.
7. Select **[YES]**.

LENS – Installation Files

LENS Download:

- LENS Install



DGTech LENS - InstallShield Wizard

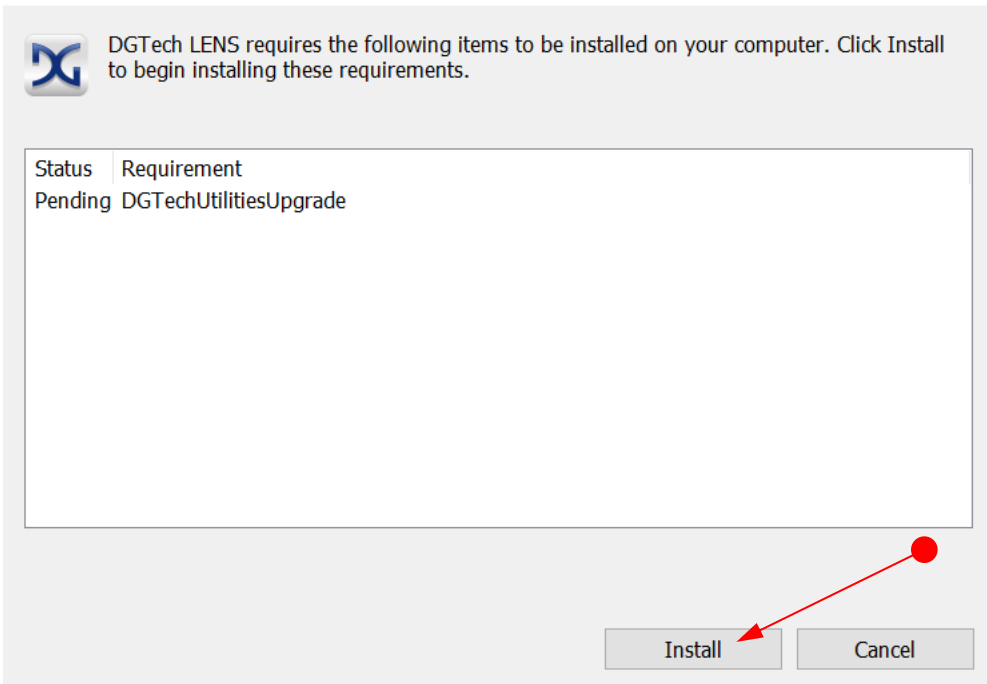


Figure 5 – InstallShield Wizard

8. Select **[Install]** from InstallShield Wizard.

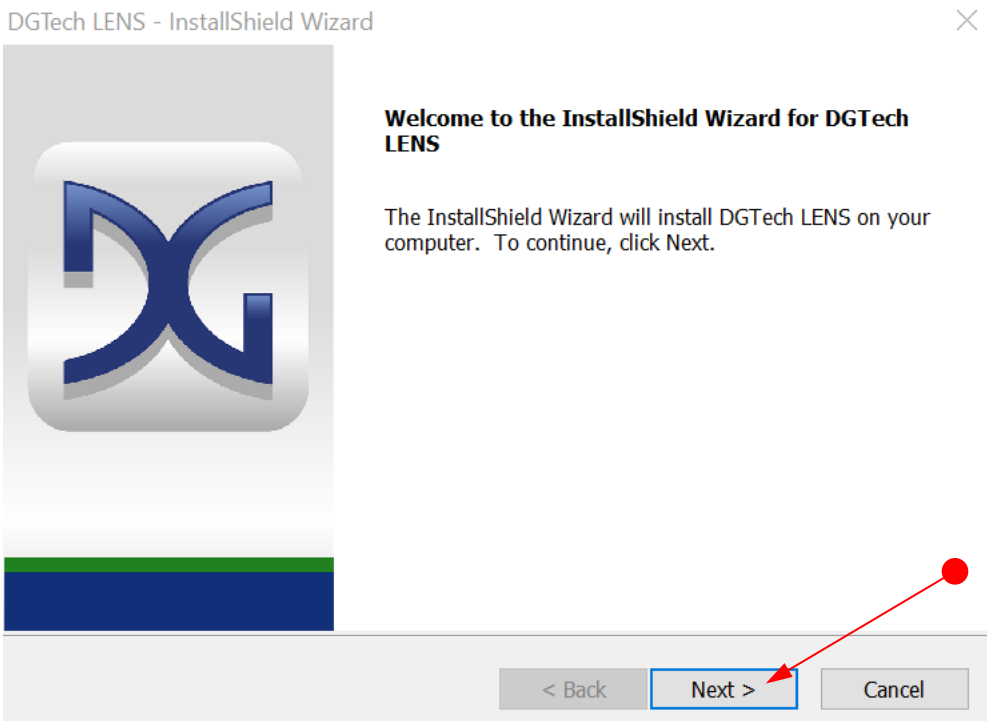


Figure 6 – InstallShield Wizard for the LENS

9. Select **[Next >]** from InstallShield Wizard.

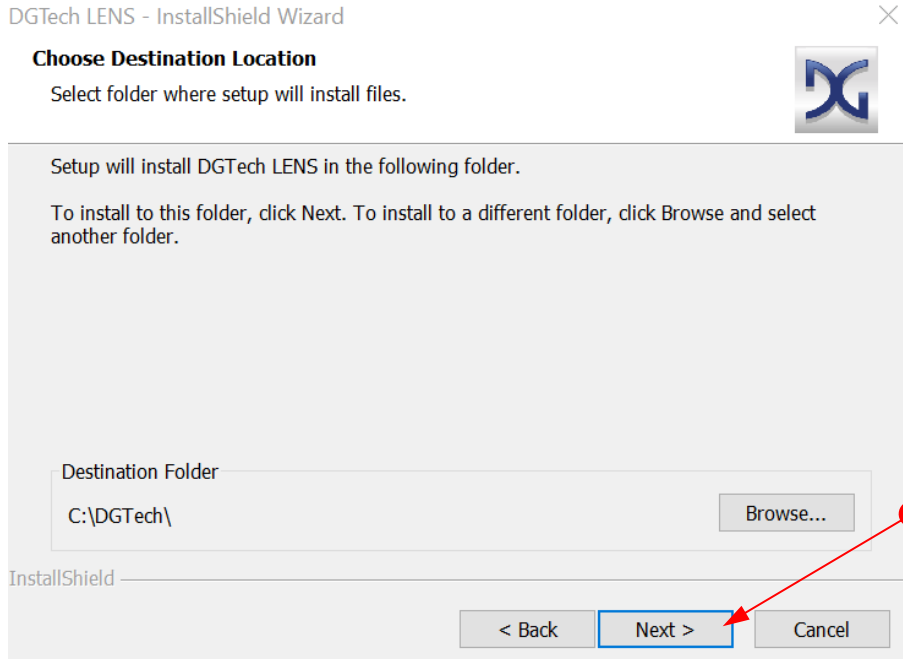


Figure 7 – Destination Folder Screen

10. The Destination Folder will be displayed. Follow on-screen instructions. Select **[Next >]** if correct Folder is displayed.

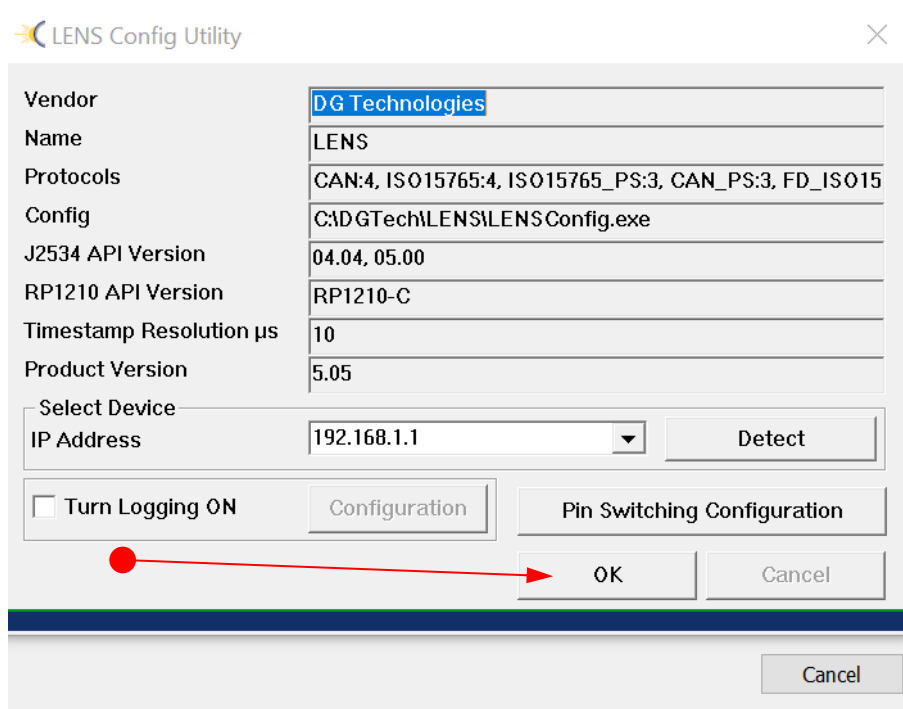
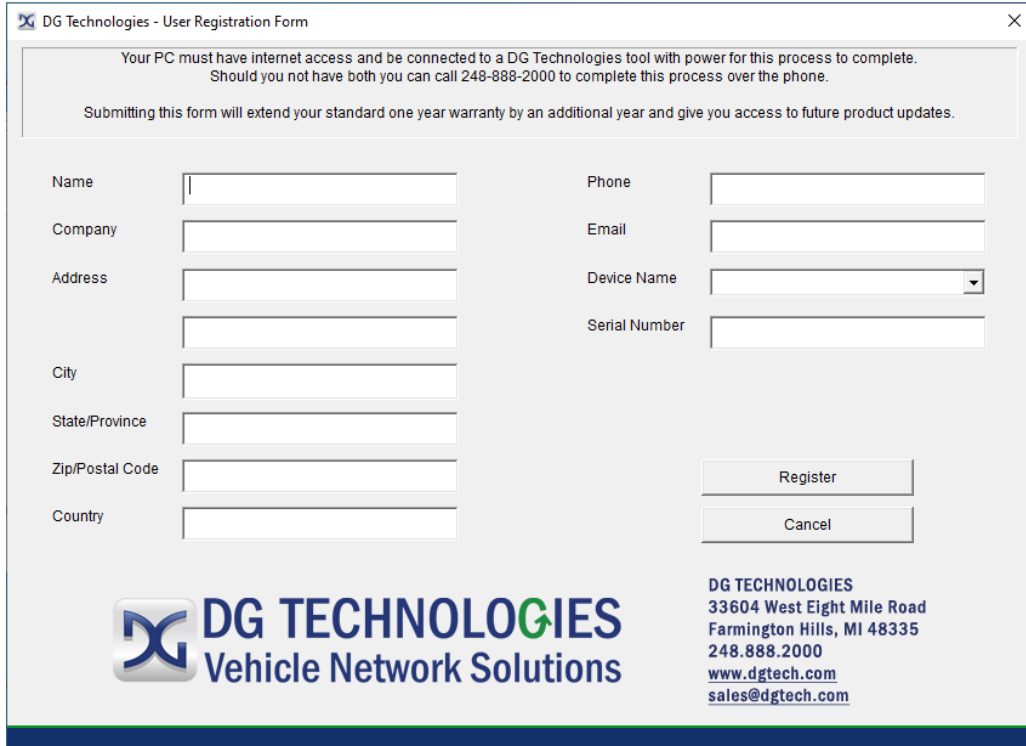


Figure 8 - Configuration Utility Screen


11. Select **[OK]**.


 A screenshot of a web browser window titled "DG Technologies - User Registration Form". The window contains a registration form with the following fields: Name, Company, Address (two lines), City, State/Province, Zip/Postal Code, Country, Phone, Email, Device Name (dropdown menu), and Serial Number. Below the form are "Register" and "Cancel" buttons. At the bottom left is the DG Technologies logo and "Vehicle Network Solutions" text. At the bottom right is contact information: "DG TECHNOLOGIES, 33604 West Eight Mile Road, Farmington Hills, MI 48335, 248.888.2000, www.dgtech.com, sales@dgtech.com".

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 Phone
 Company Email
 Address Device Name
 Serial Number
 City
 State/Province
 Zip/Postal Code
 Country


DG TECHNOLOGIES
 Vehicle Network Solutions

DG TECHNOLOGIES
 33604 West Eight Mile Road
 Farmington Hills, MI 48335
 248.888.2000
www.dgtech.com
sales@dgtech.com

Figure 9 - DGTech User Registration Form

- After all files are installed, you can register your tool with DG. When the Product Registration Form displayed above is submitted, you will receive the latest product update information.

3 Configuring the Host PC Connections

To access information externally from the hardware, a communication connection with the LENS® must be established via a USB or Wi-Fi link. This connection allows you to send and retrieve data, execute an onboard application, or run one of the DG applications.

3.1 USB Connection to the PC

Access to a PC with a USB connection is required. The LENS® supports a USB 2.0 high speed connection and has a full-sized USB type B connector for this connection.

A standard USB cable is provided with the LENS® package. This cable connects the USB port on the LENS® to the USB port on the host PC.

The LENS® uses RNDIS on the PC to provide a TCP/IP communication path between the LENS® and the PC over USB.

The USB connection for your Windows PC uses an RNDIS driver for communication. Your PC should automatically install the proper Windows driver for this. The USB connection will appear in Device Manager on your PC as a Network Connection, DG Technologies RNDIS Device.

4 The LENS® Internal Web Pages

DG Technologies hosts an internal web page that allows you to control many aspects of the LENS® and to obtain information about the LENS®. The following sections will walk you through the internal web pages and explain the various items. Note that due to feature enhancements and software updates you may see slightly different versions of the web pages described below.

You are able to communicate with the LENS® using a web browser. Link-local IP Addressing is used for the LENS® connection. For convenience, the LENS® may be addressed using a fixed multicast Domain Name System (DNS – Zeroconf) name. The LENS® Zeroconf name is printed on a label on the back of the LENS® and will be of the form (LENS@-xxxx.local). The four digits xxxx are the last four digits of the LENS® serial number.

Once connected, you will see the main page of the internal web pages. In the screen shown below, the user is connected to LENS® 5979 Local.

4.1 Home Page

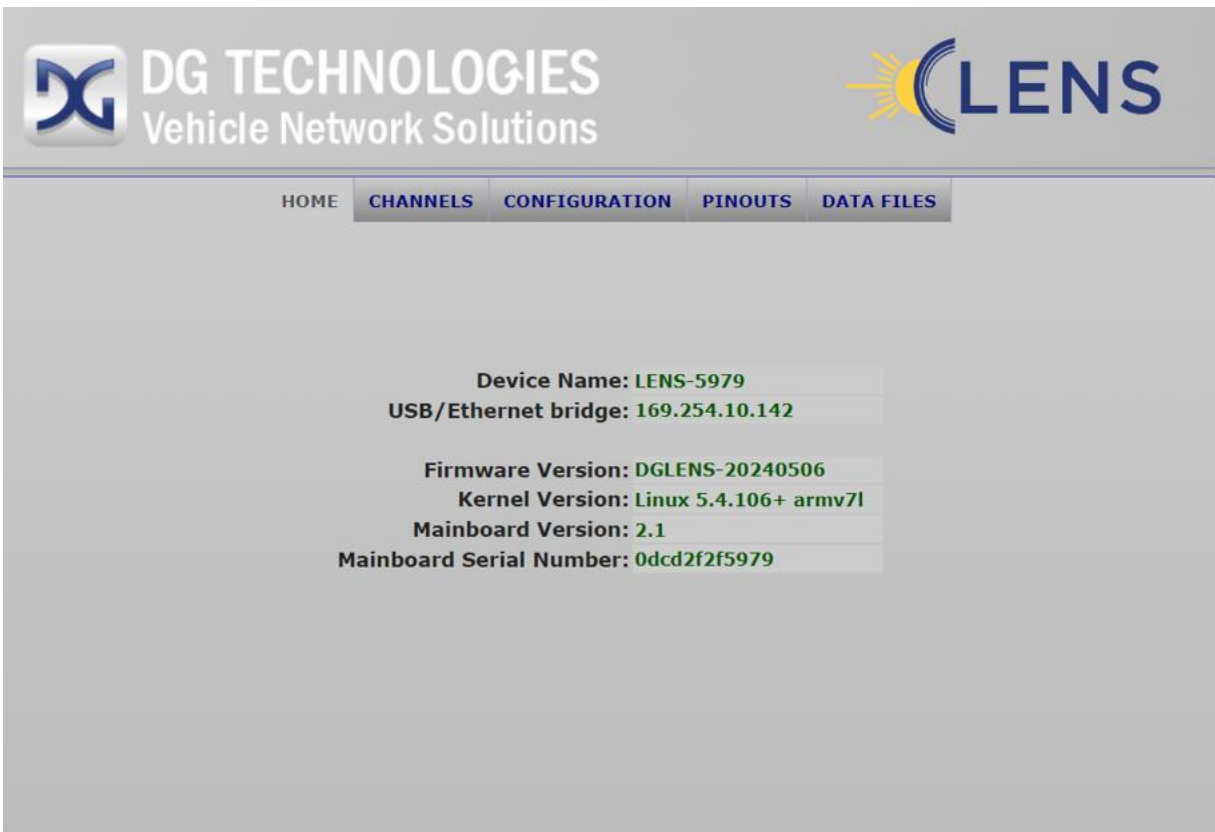


Figure 10 - LENS® Home Page

4.2 Installed Channels

DG TECHNOLOGIES
Vehicle Network Solutions

LENS

HOME CHANNELS CONFIGURATION PINOUTS DATA FILES

Installed Channels

Channel ID	Protocol	Version	Mode	Bitrate	Data Bitrate	Termination	Sample Point	Error Events	SJW
1 can1	CANFD	Ver:1.0	CAN/CAN-FD Mixed	500000	2000000	OFF	85%	OFF	1
2 can2	CANFD	Ver:1.0	CAN/CAN-FD Mixed	500000	2000000	ON	87.5%	OFF	1
3 can3	CANFD	Ver:1.0	CAN/CAN-FD Mixed	500000	2000000	ON	87.5%	OFF	1
4 can4	CANFD	Ver:1.0	CAN/CAN-FD Mixed	500000	2000000	ON	87.5%	OFF	1

Figure 11 – Channels Screen

Under the **Channels** tab is a listing of the protocol channels installed in the hardware.

4.3 Channels Set-up

CANFD Ver:1.0 Mode: CAN FD

Bitrate: 500000 Sample Point 0 % SJW 1
0 = Automatic

1 Data Bitrate: 0 Sample Point 0 % SJW 1
0 = Automatic

Termination: Error Events:

Cancel Apply Save as startup defaults

Figure 12 – Channels Set-up Screen

From the **Channels Set-up Screen**, the user may configure the following settings, by clicking **Configure** for the channel to be modified:

- Mode (CAN/CAN FD Mixed)
- Bitrate
- Sample point percentage
- SJW – software
- Termination – on or off
- Error reporting

4.3.1 Configuration Tab



Figure 13 – Configuration Tab

The **Configuration** tab is used for setting parameters for the LENS®. When entering the confirmation screen, you will be prompted to log in with a system administrator (sysadmin) username and password.

Note: All inputs are case sensitive. The default user name is **sysadmin**; the default password is **dglens**.

4.3.2 Login Screen

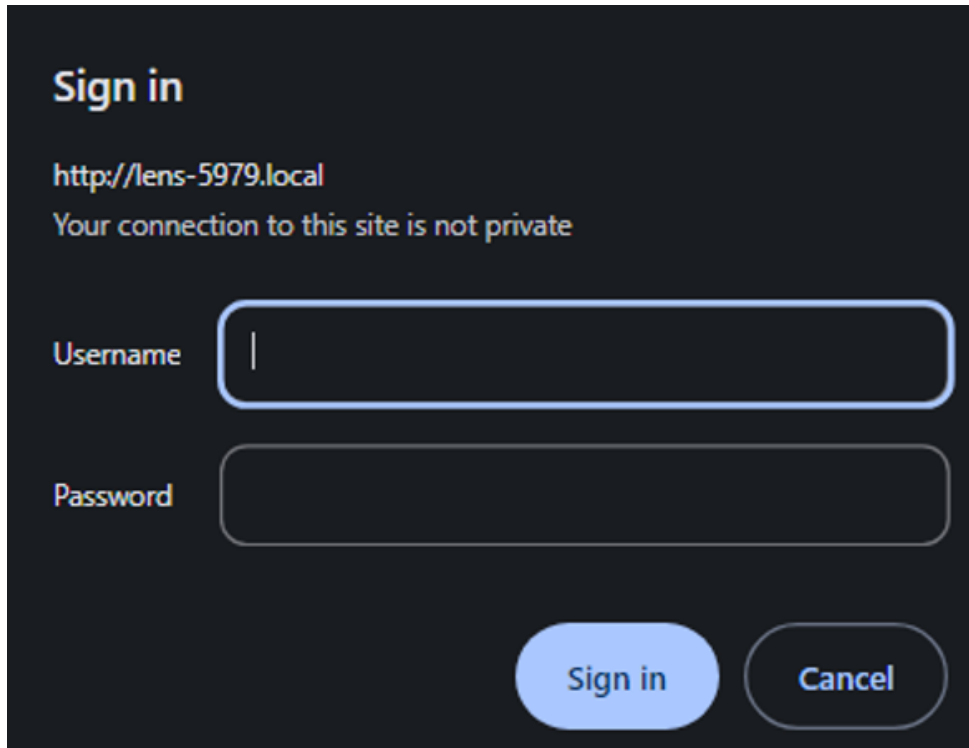


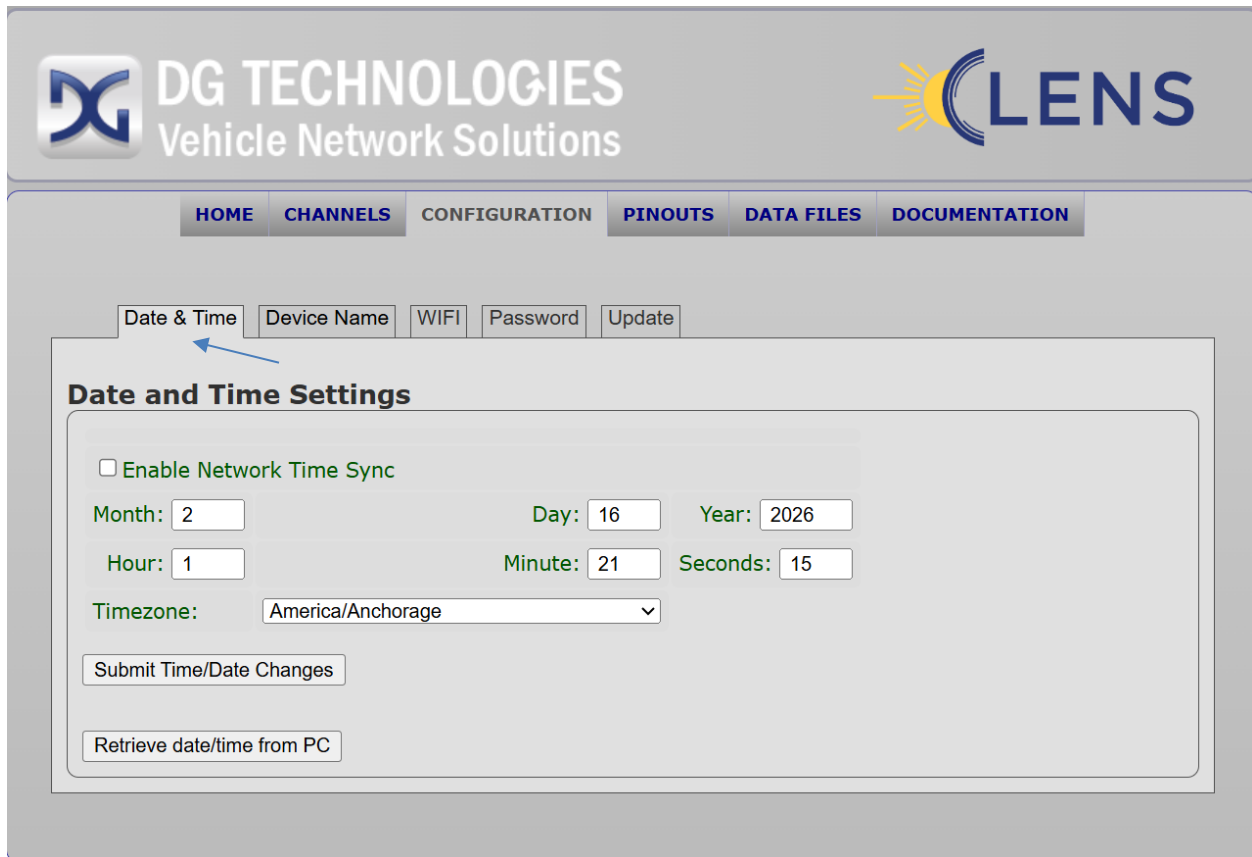
Figure 14 - LENS® Login Screen

Once logged in, the DG LENS® System Administration page appears. On this page, you may:

- Access the DG LENS® configuration page
- Configure the connection parameters
- Change the time and date
- Change the sysadmin password.

4.3.3 Date and Time Tab

- **Set Date and Time** – You can either have the LENS® take the date and time from the host PC, or you can enter the new values manually. When you are done updating the date and time click **Submit Date Changes**. The new values and confirmation will then appear on the display.
- The date and time settings are backed up by a small battery in the LENS®.
- If you check the box to **Enable Network Time Sync**, then the LENS® will sync the date and time with the host PC every time it connects to the PC. This requires an active internet connection and will overwrite any settings entered either manually or retrieved from the host PC.



The screenshot displays the LENS® configuration web interface. At the top, there is a header with the DG TECHNOLOGIES logo and 'Vehicle Network Solutions' text on the left, and the LENS® logo on the right. Below the header is a navigation menu with tabs for HOME, CHANNELS, CONFIGURATION, PINOUTS, DATA FILES, and DOCUMENTATION. The CONFIGURATION tab is active, and within it, the 'Date & Time' sub-tab is selected, indicated by a blue arrow. The 'Date and Time Settings' section contains the following elements:

- An unchecked checkbox labeled 'Enable Network Time Sync'.
- Input fields for 'Month: 2', 'Day: 16', and 'Year: 2026'.
- Input fields for 'Hour: 1', 'Minute: 21', and 'Seconds: 15'.
- A dropdown menu for 'Timezone:' set to 'America/Anchorage'.
- A 'Submit Time/Date Changes' button.
- A 'Retrieve date/time from PC' button.

Figure 15 - LENS® Time and Date Screen

4.3.4 Device Name Tab



Figure 16 - LENS® Name and Device Locator Screen

- **Zeroconf Name and Device Locator** – Provides Zeroconf (zero configuration networking) name change and device locator functionality. The name created is linked to the IP address for the unit.
- **Device Locator** -The Identify ON / OFF key is useful when more than one LENS® units are being used in the same proximity. With this function turned **ON**, the LED on the top of the enclosure will alternate red/blue to indicate which unit is being identified.
- **Other DG Devices Found on Network** - will display other DG Devices present on your network. If none are present, nothing will be displayed.

4.3.5 Wi-Fi Tab

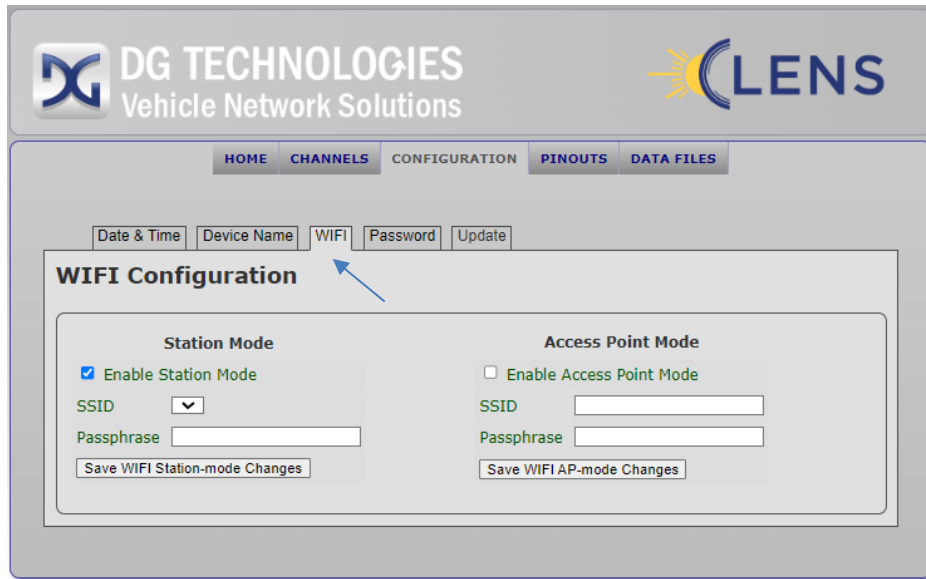


Figure 17 – WiFi Configuration Screen

On this screen you can set the network parameters for the Wi-Fi connection. The options available for Wi-Fi connection to networking a LENS[®] are as follows:

- Station Mode
- Access Point Mode

Both modes may be active at the same time.

4.3.6 Station Mode

If you will be utilizing Wi-Fi to connect the LENS[®] to an existing Wi-Fi network that has an existing DHCP server on it, the LENS[®] will take an IP address from your network's DHCP server.

When you click the box to **Enable Station Mode**, the LENS will search for available Wi-Fi networks, and this list will appear in the **SSID** dropdown menu. Select the Wi-Fi network that you want to join and enter the passphrase for that network. The passphrase will be retained by the LENS[®] for future sessions.

4.3.7 Access Point Mode

If you will be utilizing Wi-Fi and wish to have the LENS[®] act as an access point for a private network, then click the box to **Enable Access Point Mode**. Enter the **SSID** of the network you wish to create and enter a passphrase for that access point. The passphrase minimum length is 8 characters.

The LENS[®] will act as a DHCP server and generate IP addresses for any devices connecting to it.

The access point information is retained by the LENS[®] when powered off.

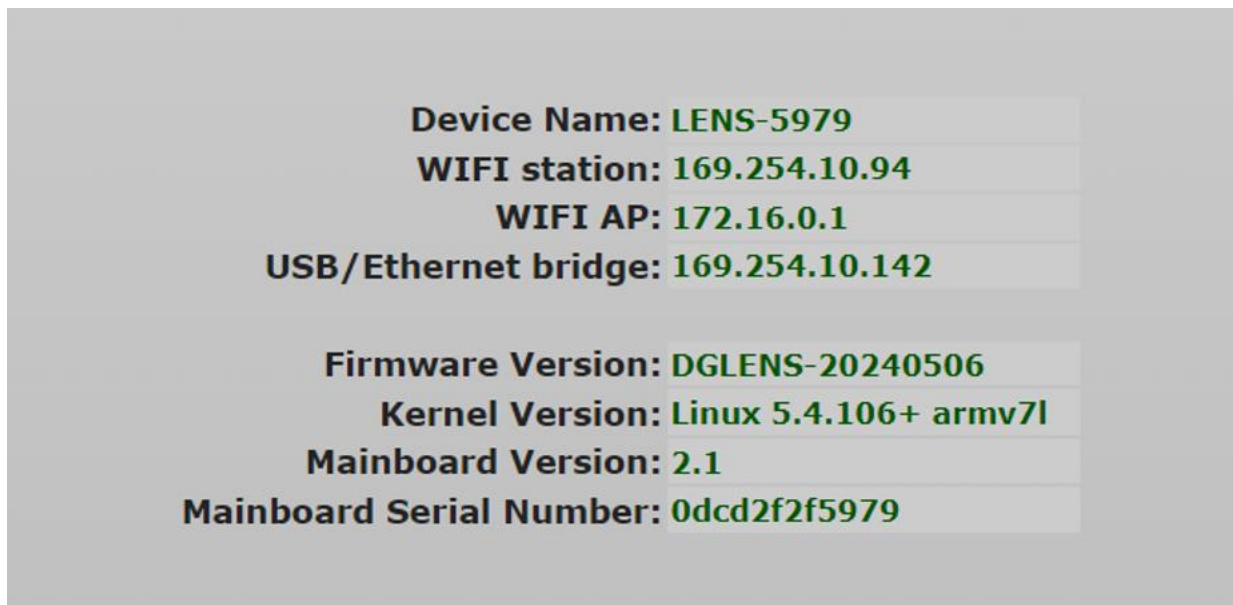


Figure 18 – Access Point Information Display on the Home Page

If Wi-Fi connections are enabled, the Wi-Fi addresses will be shown in the information presented on the home page.

4.3.8 Password Tab

The screenshot displays the LENS web interface. At the top left is the DG Technologies logo with the text 'DG TECHNOLOGIES Vehicle Network Solutions'. At the top right is the LENS logo. Below the header is a navigation bar with buttons for 'HOME', 'CHANNELS', 'CONFIGURATION', 'PINOUTS', and 'DATA FILES'. Underneath is a sub-menu with buttons for 'Date & Time', 'Device Name', 'WIFI', 'Password', and 'Update'. The 'Password' button is highlighted with a blue arrow. The main content area is titled 'Change Sysadmin Password' and contains the following text: 'This password controls access to this web page only! Use the **passwd** command from a login shell to change login passwords.' Below this text are two input fields: 'New password:' and 'Verify new password:'. At the bottom of the form are two buttons: 'Submit Password Change' and 'Reset'.

Figure 19– Change Sysadmin Password Screen

- **Change Sysadmin Password** – Enter a new sysadmin password and then click **Submit Password Change**.
- Clicking **Reset** will revert to the previous password.

Note: Only the **Sysadmin** password, **not the root password**, will change. If you change the sysadmin password and then lose that password, you will need to contact DG Technologies Tech Support for recovery assistance.

4.3.9 Update Firmware



Figure 20 – Update Firmware Screen

Update Firmware – From time to time, a firmware change may be released. These firmware updates may be used to add a new feature or program.

- To use the update feature, the new firmware patch will need to be downloaded to your host PC. Clicking on **Choose File** will allow you to browse on your host PC to find the update file.
- An update file will have a filename in the form of DGA8_Update_yyyymmdd.tgz, for example DGA8_Update_20231115.tgz
- Click on the update file and then click **Upload File** to begin the update process. A progress message will appear on the host PC to tell you when the process is complete. It usually only takes a few seconds to perform an update. After updating the firmware, a power cycle is required.

4.3.10 Pinouts Tab

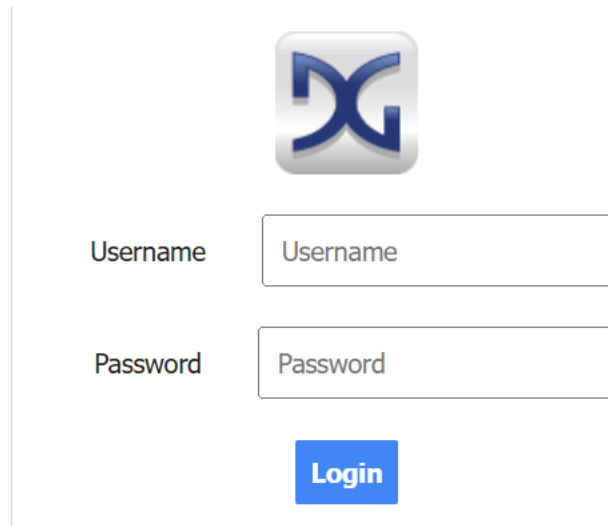
OBD2 Pin		CAN Mode			DOIP Mode 1	DOIP Mode 2
		SocketCAN	GCP Channel	Function	Ethernet pin	Ethernet pin
1		can4	4	CAN-H		RX+
2						
3		can3	3	CAN-H	RX+	
4	GND					
5	GND					
6		can1	1	CAN-H		
7	n/c					
8				VMON2	Activation	Activation
9		can4	4	CAN-L		RX-
10	n/c					
11		can3	3	CAN-L	RX-	
12		can2	2	CAN-H	TX+	TX+
13		can2	2	CAN-L	TX-	TX-
14		can1	1	CAN-L		
15	n/c					
16	VBATT					

Table 3 – Pinouts

Under the **Pinouts** tab is a list of all protocol channels with their associated pinouts and channel ID assignments.

4.4 Data Files Tab

When you navigate to the **Data Files** screen you will be prompted to log in with the **Data Files** username and password.



The login form features a square icon with a stylized blue 'X' and 'G' logo. Below the icon are two input fields: one for 'Username' and one for 'Password'. A blue 'Login' button is positioned below the password field.

Figure 21 – Log-In with Data Files (Username and Password)



Figure 22 - Data Files Selection

4.4.1 Login Screen

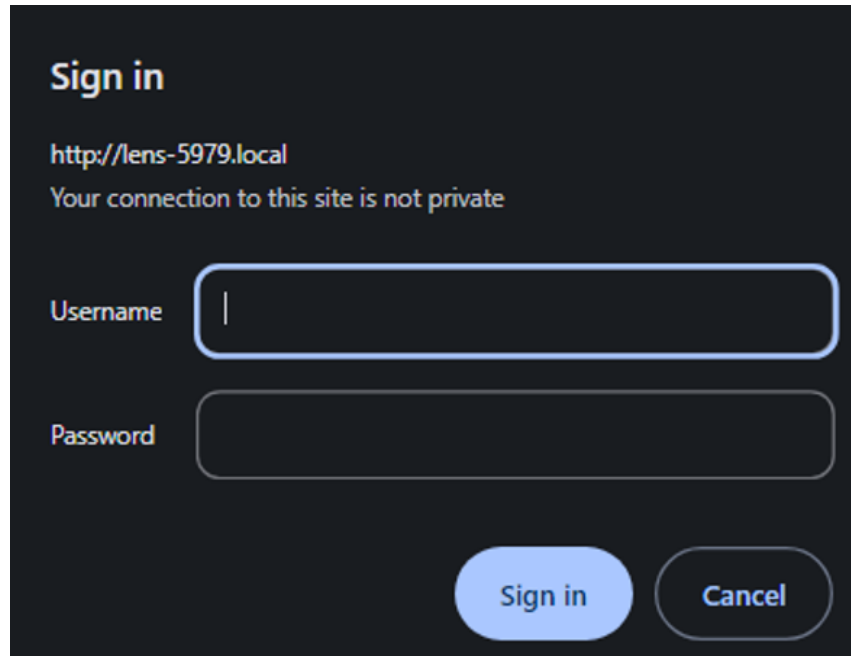


Figure 23 - Login Screen

The default Data Files username is “**data**”. The default password is “**dgbeacon**”.

4.5 Firmware Reflash

A Future Manual Update Will Provide Enhancements That Are Coming Soon.

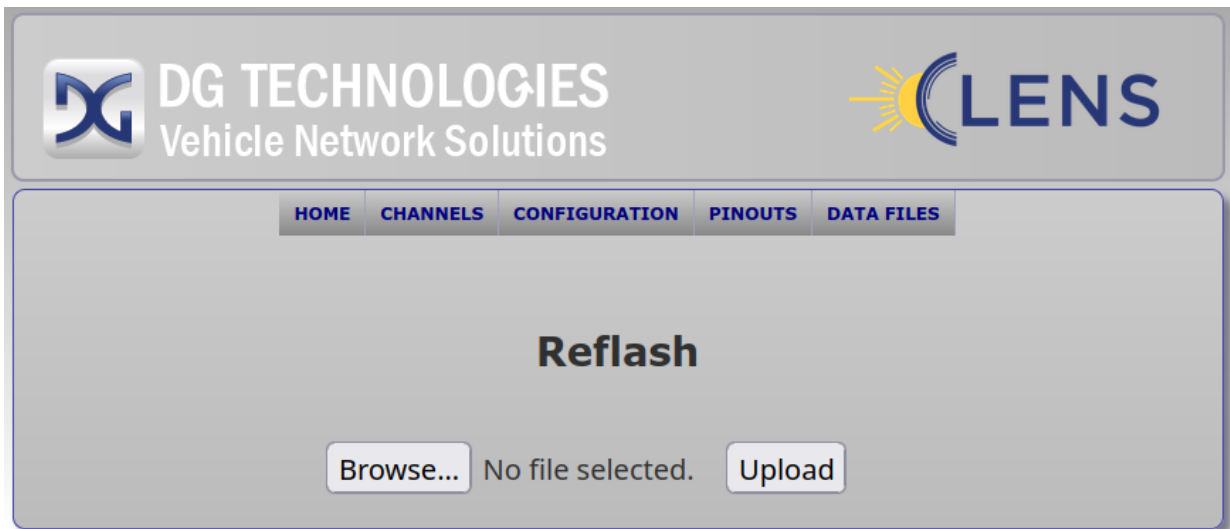


Figure 24 - Reflash Screen

4.6 Restore Defaults

To restore default LENS settings, navigate to the LENS unit's restore defaults web page with the URL of your device: Example: <http://LENS-xxxx.local/sysadmin/defaults.php>

You will be asked to log in. Use the system configuration user name and password (see section 4.3.1).



Figure 25 - Restore Defaults

Click the '**Restore system defaults on next reboot**' checkbox.

If you wish to cancel a pending reflash, navigate to the main device page and click '**Cancel Reflash**' in the top banner:

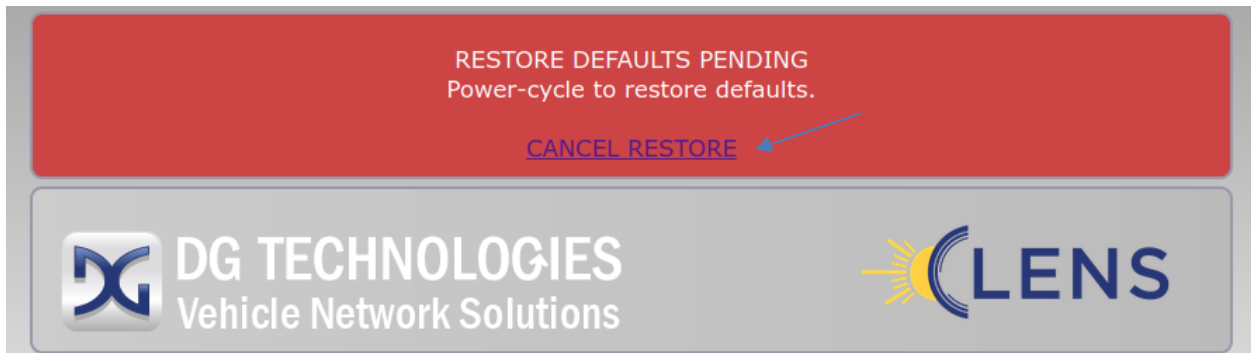


Figure 26 - Cancel Restore Defaults

Power-cycle the device to restore default settings.

LENS: Technical Information

- Gryphon Communication [Protocol](#)
- LENS [Hardware](#) Information
- LENS [Command-line utilities](#)

Examples, Source Code, and FAQs

- Unix client [example source code](#) (.tgz archive)
- C [header files](#) (.tgz archive)

Figure 27 – Documentation Selection

4.7 Documentation Selection

The Documentation screen provides you LENS Technical Information regarding the following:

- DG Gryphon Communications Protocol:

Contents:

Gryphon Communication Protocol [Frame Format](#)
Gryphon Communication Protocol [Source/Destination](#) specification
Gryphon Communication Protocol [Commands](#)
Gryphon Communication Protocol [C header files](#)
[Example](#) of client communication with

- LENS Hardware Information



Figure 28 – LENS Hardware Information

- LENS Command-line Utilities:



Figure 29 – LENS Utilities Information

Appendix A. Technical Support and Return Merchandise

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 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.



DG Technologies Technical Support

Phone: 1-248-888-2000

Fax: 1-248-888-9977

E-mail: techsupp@dgtech.com

Website: 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 LENS[®], you will be issued 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:



Product Repair Services
Attn: RMA# xxxxxxx
DG Technologies
33604 West Eight Mile Road
Farmington Hills, MI 48335

Appendix B. Warranty Information and Limitation Statements

Warranty Information

The DG Technologies LENS® is warranted against defects in materials and workmanship for two (2) years following the 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 as a result of 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 1-248-888-2000 and must be included with the product being returned (for more details, see section *Return Merchandise Authorization (RMA)*). A LENS® 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 Information

Please direct all inquiries to:

DG Technologies
33604 West Eight Mile Road
Farmington Hills, MI 48335
Phone 1-(248) 888-2000
Fax 1-(248) 888-9977

Appendix C. List of Acronyms Used in Document

Acronym	Description
API	Application Programming Interface
CAN	Controller Area Network
CAN FD	Controller Area Network Flexible Data
DG	DG Technologies
DoIP	Diagnostics over IP
DPDU API	Diagnostic Protocol Data Unit Application Programming Interface
DW CAN	Dual Wire Controller Area Network
Class2	GM's implementation of SAE J1850 Protocol
ECU	Electronic Control Unit.
FTCAN	Fault Tolerant Controller Area Network
FW	Firmware
ID	Identification
ISO	International Standards Organization
ISO14230	Keyword protocol running over UART
ISO9141	Serial Communication Protocol implemented in Ford & CARB
J2534	SAE Specification for Legislated Reprogramming Support
LED	Light Emitting Diode
KWP	Keyword Protocol
KWP2000	Keyword Protocol 2000 (ISO 14230)
OBD	On Board Diagnostics
OEM	Original Equipment Manufacturer
PC	Personal Computer
PWM	Pulse Width Modulation, used in Ford's implementation of J1850
RP1210	TMC recommended practice Windows Application Programming Interface (API)
RAM	Random Access Memory
SAE	Society of Automotive Engineers
SCI	Serial Communications Interface. DCX's proprietary UART based protocol
SCP	Standard Corporate Protocol, Ford's implementation of J1850 (J1850 PWM)
STG	Short to Ground
SWCAN	Single Wire Controller Area Network
TMC	Technology and Maintenance Council
UAC	User Account Control
USB	Universal Serial Bus
VBAT	Vehicle Battery
VDA	Vehicle Datalink Adapter
VNI	Vehicle Network Interface
VPW	Variable Pulse Width Modulation used in GM implementation of J1850