CVS-1459 Features

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Contents

UM Purpose

This document contains detailed electrical and mechanical information for the National Instruments CVS-1459.

About the NI CVS-1459

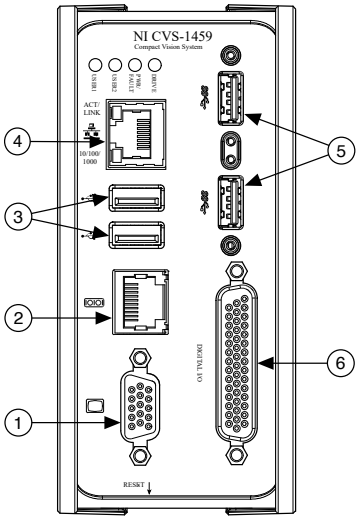
The NI CVS-1459 is a compact vision system that acquires, processes, and displays images from USB3 Vision cameras. The NI CVS-1459 provides multiple digital input/output (I/O) options for communicating with external devices to configure and start an inspection and to indicate results.

Hardware Overview

The NI CVS-1459 front panel consists of a VGA port, RJ50 serial port, two USB 2.0 ports, a 10/100/1000 Ethernet port, and ports.

The NI CVS-1459 front panel also includes LEDs for communicating system status and a 44-pin Digital I/O port. The Digital I/O port offers 8 isolated inputs, 8 isolated outputs, 2 bidirectional differential I/O (RS-422) or single-ended input lines that can be used with a quadrature encoder, and 8 bidirectional TTL lines.

Figure 1. NI CVS-1459 Front Panel Connectors



1. VGA Connector
2. RS-232/RS-485 Serial Port
3. USB 2.0 Ports
4. Gigabit Ethernet Port
5. USB3 Vision Ports
6. 44-pin Digital I/O Connector

Connector Pinouts

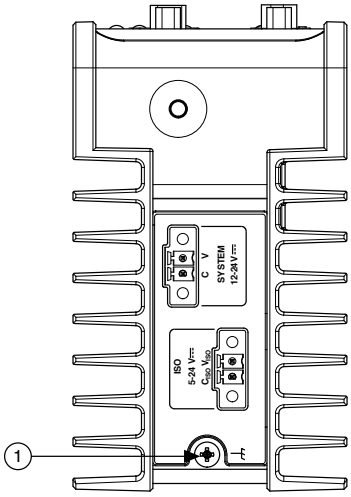
The NI CVS-1459 provides the following connectors.

Chassis Grounding Screw

Use the grounding screw to connect the chassis to earth ground. An earth ground connection is optional.

Note An earth ground connection does not connect C or C_{ISO} to earth ground.

Figure 2. Chassis Grounding Screw



1. Chassis Grounding Screw

Power Input Connectors

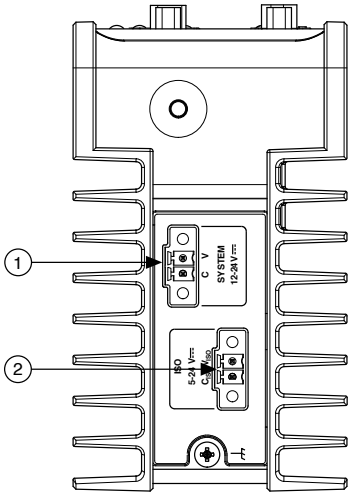
The NI CVS-1459 requires a power supply to power the system. If needed for your application, an additional power source is required to power the isolated outputs.

The same power supply may be used for both the system power and isolated outputs power if isolation is not required and the power supply meets the voltage and power requirements for both inputs. Refer to the ***NI CVS-1459 Specifications*** for power requirements.

NI recommends the following power supply for the NI CVS-1459.

Power Supply	Part Number
NI PS-15 Industrial Power Supply, to power the system or isolated outputs	781093-01

Figure 3. Power Connectors



1. System Power Connector
2. Isolated Outputs Power Connector

Table 1. Power Connector Terminals

Terminal	Description
C	Common signal
V	System power (12-24 VDC)
C_{ISO}	Isolated common signal
V_{ISO}	Power for isolated outputs (5-24 VDC)

Ethernet Ports

The NI CVS-1459 provides one standard Gigabit Ethernet network port and four Gigabit Ethernet ports with Power over Ethernet (PoE). The Ethernet ports provide a connection between the NI CVS-1459, a network, and other Ethernet devices. The NI CVS-1459 automatically detects the speed of the connection and configures itself accordingly.

If a PoE-capable device is plugged into an Ethernet port with PoE, the NI CVS-1459 automatically supplies power to the device. When the NI CVS-1459 supplies PoE, the LED that corresponds to the port illuminates. When you unplug a PoE device, PoE is automatically disabled. You can use non-PoE Ethernet devices with PoE-enabled Gigabit Ethernet ports.

A CAT 5e or CAT 6 1000Base-T Ethernet cable is required to achieve 1,000 Mbps (Gigabit) Ethernet performance. CAT 5 Ethernet cables are not guaranteed to meet the necessary requirements. While CAT 5 cables may appear to work at 1,000 Mbps, CAT 5 cables can cause bit errors, resulting in degraded or unreliable network performance.

(Windows only) The network Ethernet port provides Wake-on-LAN functionality from the power off state when associated with the Intel® driver. Wake-on-LAN must be enabled in the Power Management tab of the Intel I210 Gigabit Network Connection Properties dialog for the primary Ethernet port in Device Manager. The NI GigE Vision driver (NI-GEV) does not support Wake-on-LAN. The Ethernet ports with PoE do not support Wake-on-LAN.

Figure 4. Ethernet Port Pin Locations (IP20)

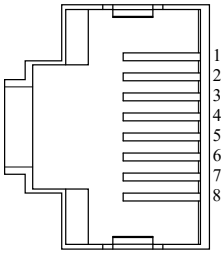


Table 2. Ethernet Port Pin Descriptions

Pin	Fast Ethernet (100 Mbps)	Gigabit Ethernet	
		MDI	MDI-X
1	TX+	BI_DA+	BI_DB+
2	TX-	BI_DA-	BI_DB-
3	RX+	BI_DB+	BI_DA+
4	No Connect	BI_DC+	BI_DD-
5	No Connect	BI_DC-	BI_DD-
6	RX-	BI_DB-	BI_DA-
7	No Connect	BI_DD+	BI_DC+
8	No Connect	BI_DD-	BI_DC-

USB 2.0 Ports

The USB ports support common USB peripheral devices such as USB flash drives, USB

hard drives, USB-to-IDE adapters, keyboards, mice, and USB cameras.

Figure 5. USB 2.0 Pin Locations (IP20)

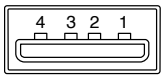


Table 3. USB 2.0 Port Pin Descriptions

Pin	Signal Name	Signal Description
1	VBUS	Cable Power (+5 VDC)
2	D-	USB Data -
3	D+	USB Data +
4	GND	Ground for power return

RS-485/422/232 Serial Port

The NI CVS-1459 has a single serial port that can operate in either RS-485/422 mode or RS-232 mode. Set the serial port mode in the BIOS setup utility.

The serial port is a 10-position RJ50 modular jack, which can connect to serial devices, such as PLCs, scanners, and lighting devices.

NI recommends the following serial cables for the NI CVS-1459.

Cable	Part Number
RJ50 10-position modular plug to DB-9 serial cable	182845-01 for 1 meter cable
	182845-02 for 2 meter cable
	182845-03 for 3 meter cable

Figure 6. RS-485/422/232 Serial Port Pin Locations (IP20)

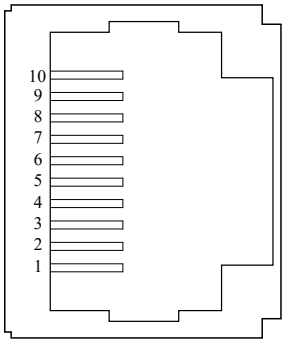


Table 4. RS-485/422/232 Serial Port Pin Descriptions

Pin	RS-485/422 Mode	RS-232 Mode
1	No Connect	No Connect
2	TXD-	Unused
3	TXD+	Unused
4	No Connect	No Connect
5	No Connect	No Connect
6	RXD-	GND
7	RXD+	Unused
8	Unused	TXD
9	Unused	RXD
10	GND	Unused

Using the Serial Port in Windows

The default serial communications driver for Windows is installed on the NI CVS-1459. The serial port appears in the operating system as COM2. This driver is provided by Microsoft with all Windows installations.

Use the default serial driver when the serial port is configured to RS-232 mode in the BIOS. The default serial driver can also be used when the serial port is configured to RS-485 in Four-Wire or Auto wire modes.

The default serial driver does not allow the wire mode to be changed at run time and it does not allow the RS-485 transceivers to be controlled manually. For full control of

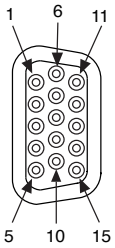
the RS-485 serial port, the NI-Serial for Windows driver must be installed. The serial mode, whether RS-232 or RS-485, must be configured in the BIOS regardless of the driver used.

Refer to the National Instruments website at ni.com to download NI-Serial. Install NI-Serial 15.0 or later.

VGA Port

Use the VGA port to connect a monitor to the NI CVS-1459. Use any standard 15-pin VGA cable to access the VGA port. The VGA port has a maximum resolution of 1920 x 1200 at 60 Hz.

Figure 7. VGA Port Pin Locations



Pin	Signal Name	Signal Description
1	RED	Red analog video signal
2	GREEN	Green analog video signal
3	BLUE	Blue analog video signal
4	RESERVED	Reserved
5	GND	Ground reference
6	RED RETURN	Ground reference
7	GREEN RETURN	Ground reference
8	BLUE RETURN	Ground reference
9	PWR	5 V power for DDC
10	GND	Ground return for power
11	NC	No connect
12	DDC_D	Data signal of serial communication

Pin	Signal Name	Signal Description
13	HSYNC	Horizontal synchronization signal
14	VSYNC	Vertical synchronization signal
15	DDC_C	Clock signal of serial communication

USB3 Vision Ports

The NI CVS-1459 provides two standard A USB 3.0 ports to acquire images from two USB3 Vision cameras simultaneously. The USB ports also support common USB mass-storage devices such as USB flash drives, USB-to-IDE adapters, keyboards, and mice.

Figure 8. USB3 Vision Port Pin Locations

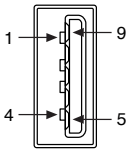


Table 5. USB3 Vision Connector Signals

Pin	Signal Name	Signal Description
1	VBUS	Power
2	D-	USB 2.0 differential pair
3	D+	
4	GND	Ground for power return
5	StdA_SSRX-	SuperSpeed receiver differential pair
6	StdA_SSRX+	
7	GND_DRAIN	Ground for signal return
8	StdA_SSTX-	SuperSpeed transmitter differential pair
9	StdA_SSTX+	

Digital I/O Port

The 44-pin Digital I/O port on the NI CVS-1459 offers 8 isolated inputs, 8 isolated outputs, 2 bidirectional differential I/O (RS-422) or single ended input lines which can

be used with a quadrature encoder, and 8 bidirectional TTL lines. The Digital I/O port can be connected to any appropriate shielded device or connector block using a shielded cable. Refer to the following image and table for pin locations and functions.

Figure 9. 44-pin Digital I/O Connector

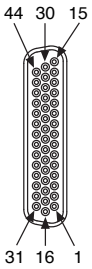


Table 6. Digital I/O Pin Descriptions

Pin Number	Signal	Description
1	Diff 0+	Bidirectional RS-422 I/O (positive side), or quadrature encoder phase A+
2	GND	Digital ground reference for TTL and differential I/O
3	TTL 0	Bidirectional TTL I/O
4	TTL 1	Bidirectional TTL I/O
5	GND	Digital ground reference for TTL and differential I/O
6	TTL 2	Bidirectional TTL I/O
7	TTL 3	Bidirectional TTL I/O
8	GND	Digital ground reference for TTL and differential I/O
9	Diff 1+	Bidirectional RS-422 I/O (positive side), or quadrature encoder phase B+
10	V_{ISO}	Isolated power voltage reference output
11	C_{ISO}	Common ground reference for isolated inputs and outputs
12	Iso Out 0	General purpose isolated output
13	Iso Out 1	General purpose isolated output
14	C_{ISO}	Common ground reference for isolated inputs and outputs
15	Iso Out 4	General purpose isolated output
16	Diff 0-	Bidirectional RS-422 I/O (negative side), or quadrature encoder phase A-

Pin Number	Signal	Description
17	GND	Digital ground reference for TTL and differential I/O
18	TTL 4	Bidirectional TTL I/O
19	TTL 5	Bidirectional TTL I/O
20	GND	Digital ground reference for TTL and differential I/O
21	TTL 6	Bidirectional TTL I/O
22	TTL 7	Bidirectional TTL I/O
23	GND	Digital ground reference for TTL and differential I/O
24	Diff 1-	Bidirectional RS-422 I/O (negative side), or quadrature encoder phase B-
25	V_{ISO}	Isolated power voltage reference output
26	C_{ISO}	Common ground reference for isolated inputs and outputs
27	Iso Out 2	General purpose isolated output
28	Iso Out 3	General purpose isolated output
29	C_{ISO}	Common ground reference for isolated inputs and outputs
30	Iso Out 5	General purpose isolated output
31	Iso In 0	General purpose isolated input
32	Iso In 1	General purpose isolated input
33	C_{ISO}	Common ground reference for isolated inputs and outputs
34	Iso In 2	General purpose isolated input
35	Iso In 3	General purpose isolated input
36	C_{ISO}	Common ground reference for isolated inputs and outputs
37	Iso In 4	General purpose isolated input
38	Iso In 5	General purpose isolated input
39	C_{ISO}	Common ground reference for isolated inputs and outputs
40	Iso In 6	General purpose isolated input
41	Iso In 7	General purpose isolated input
42	C_{ISO}	Common ground reference for isolated inputs and outputs

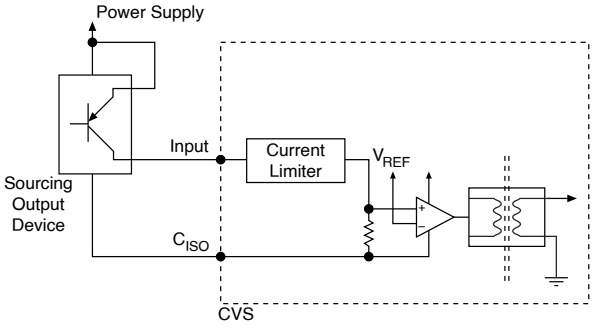
Pin Number	Signal	Description
43	Iso Out 6	General purpose isolated output
44	Iso Out 7	General purpose isolated output

Wiring an Isolated Input

You can wire an isolated input to a sourcing output device.

Caution Do not allow the voltage on the isolated inputs to exceed . Doing so will damage the NI CVS-1459.

Figure 10. Connecting an Isolated Input to a Sourcing Output Device



Wiring an Isolated Output

The digital isolated output circuits source current to external loads.

When an inductive load, such as a relay or solenoid, is connected to an output, a large counter-electromotive force may occur at switching time due to energy stored in the inductive load. This flyback voltage can damage the outputs and the power supply.

To limit flyback voltages at the inductive load, install a flyback diode across the load. Mount the flyback diode as close to the load as possible. Use this protection method if you connect any of the isolated outputs on the NI CVS-1459 to an inductive load.

The following image shows an example of an isolated output wired to an external load with a flyback diode installed across the load.

Caution Do not draw more than 35 mA from each isolated output when V_{ISO} is 5 V. Do not draw more than 80 mA from each isolated output when V_{ISO} is 24 V.

Figure 11. Connecting an Isolated Output to an External Load

Connecting to Differential I/O

The NI CVS-1459 accepts differential (RS-422) line driver inputs. Each of the two differential I/O can be configured as an output. Use shielded cables for all applications. Unshielded cables are more susceptible to noise and can corrupt signals.

Figure 12. Quadrature Encoder/RS-422 Input/Output Circuit

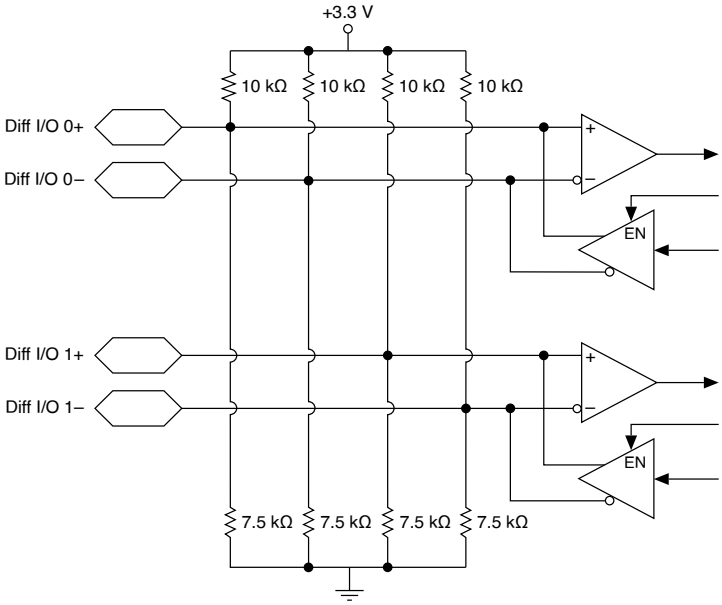


Figure 13. Connecting Differential Line Drivers

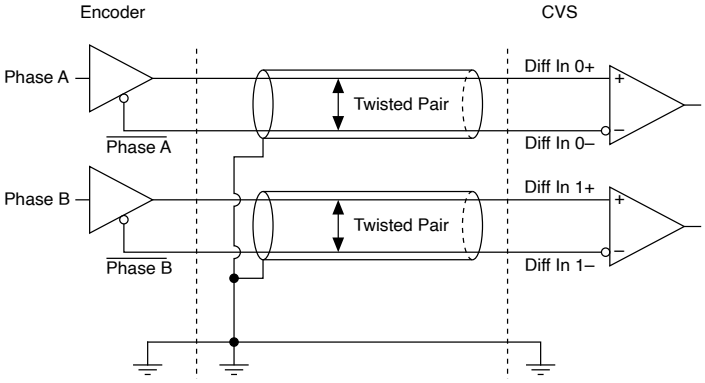
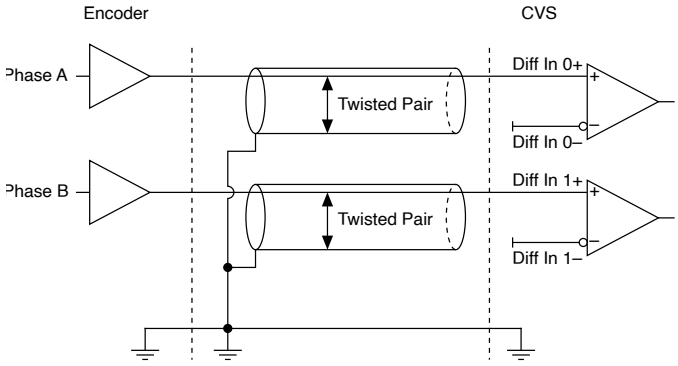


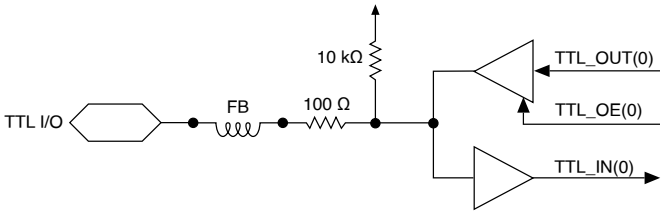
Figure 14. Connecting Single-Ended Line Drivers



TTL I/O

The following image shows the circuit for a bidirectional TTL I/O.

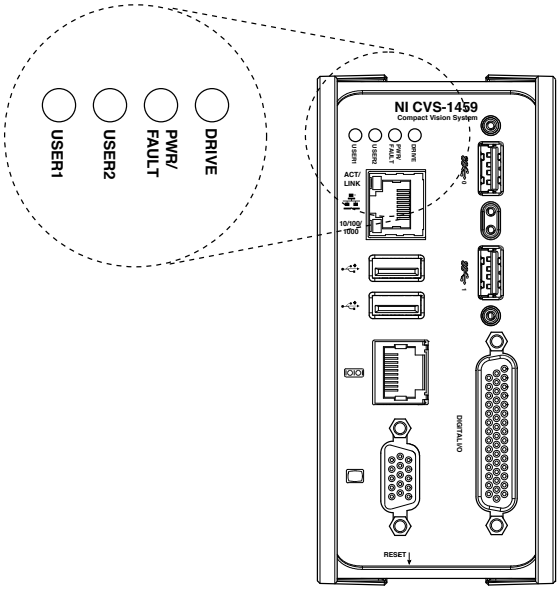
Figure 15. TTL Input/Output Circuit



LED Indicators

The NI CVS-1459 provides the following LED indicators.

Figure 16. LED Indicators



The following table describes the LEDs and indications.

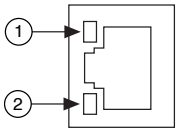
Table 7. LED Indications

LED	LED Color	LED State	Indication
Drive	Yellow	Solid	An internal drive is being accessed.
PWR/FAULT	—	OFF	The NI CVS-1459 is OFF. This is not an indication of whether power is applied or not.
	Green	Solid	The NI CVS-1459 is operating normally and is properly powered on.
	Red	Blinking	The NI CVS-1459 power-up sequence failed.
USER1/USER2	Green/Yellow	—	User-controlled LEDs that can be controlled using the NI System Configuration API.

Ethernet LEDs

The Gigabit Ethernet ports have the following LEDs.

Figure 18. LEDs for the Gigabit Ethernet Ports



1. Speed LED
2. Activity/Link LED

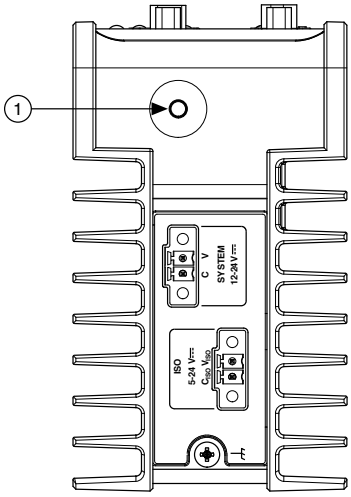
Table 8. Ethernet LED Indications

LED	Status	Indication
Speed	OFF	No link, or 10 Mbps link
	Green	100 Mbps link
	Amber	1,000 Mbps link
Activity/Link	OFF	No link has been established
	Solid	A link has been negotiated
	Blinking	Activity on the link

Using the RESET Button

Pressing the RESET button resets the processor and reboots the system.

Figure 18. RESET Button Locations



1. RESET Button

BIOS Configuration and System Recovery

You can change the configuration settings for the NI CVS-1459 in the BIOS setup utility. The BIOS is the low-level interface between the hardware and PC software that configures and tests your hardware when you boot the system. The BIOS setup utility includes menus for configuring settings and enabling features.

Most users do not need to use the BIOS setup utility. The system ships with default settings that work well for most configurations.

Entering BIOS Setup

Complete the following steps to start the BIOS setup utility.

1. Connect a monitor to one of the VGA connectors on the NI CVS-1459.
2. Connect a USB keyboard to one of the USB ports on the NI CVS-1459.
3. Power on or reboot the NI CVS-1459.
4. Immediately hold down the <Delete> key until the BIOS setup utility appears.

The Main setup menu is displayed when you first enter the BIOS setup utility.

BIOS Keyboard Navigation

Use the following keys to navigate through the BIOS setup:

- Left, right, up, and down arrows—Use these keys to move between different setup menus. Press <Esc> to exit a submenu. Be sure number lock is off to use the numeric keypad arrows.
- <Enter>—Use this key to either open a submenu or display all available settings for the highlighted configuration option.
- <Esc>—Use this key to return to a parent menu of a submenu or cancel an outstanding selection. At the main menu, use this key to exit the BIOS setup.
- <+> and <->—Use these keys to cycle between all available settings.
- <Tab>—Use this key to select time and date fields. When entering date and time and date information, you can also use the number keys to enter the time and date directly.
- <F9>—Use this key to load the optimal default values for BIOS configuration settings. The optimal default values are the same as the shipping configuration default values.

Press <F1> from any root menu to display more information about navigating the BIOS setup program.

Menu items listed in blue are changeable; menu items in gray are not changeable. A blue triangle next to a menu item indicates that the menu item contains a submenu.

Main Setup Menu

The Main setup menu reports the following configuration information:

- BIOS Version and Build Date—These values indicate the version of the controller BIOS and the date on which the BIOS was built.
- Embedded Firmware Version—This value identifies the built-in hardware capabilities.
- Processor Type, Base Processor Frequency, and Active Processor Cores—These values indicate the type of processor used in the controller, the speed of the processor, and the number of active processor cores.
- Total Memory—This value indicates the size of system RAM detected by the BIOS.

The Main setup menu includes System Date and System Time settings, which are the most commonly accessed and modified BIOS settings. These settings are stored in a battery-backed real-time clock. In the BIOS menu, use <+> and <-> in conjunction with <Enter> and <Tab> to change these values. You can also change these settings using NI-MAX or Vision Builder AI.

- System Date—This value controls the date.
- System Time—This value controls the time of day.

Advanced Menu

This menu contains BIOS settings that normally do not require modification. If you have specific problems such as unbootable disks or resource conflicts, you may need to examine these settings.

The Advanced setup menu includes the following submenus:

- SATA Configuration
- CPU Configuration
- Video Configuration
- Power/Wake Configuration
- AMT Configuration
- USB Configuration
- Serial Port Configuration

Power/Wake Configuration Submenu

The Power/Wake configuration submenu contains the power and wake settings for the NI CVS-1459. The factory default settings provide the most compatible and optimal configuration.

- Restore After Power Loss—This setting specifies the power state that the NI CVS-1459 should return to after power is lost. Valid values are **Stay Off** and **Turn On**. The default value is **Turn On**. When set to **Stay Off**, the NI CVS-1459 returns to the soft off power state after power is restored. When set to **Turn On**, the NI CVS-1459 powers on when power is restored.
- Power Button Off Behavior—This setting specifies how the system responds to the

power button. Valid options are **Normal** and **Disabled**. The default value is **Normal**. If the value is **Normal**, the system responds to the power button as defined by the OS. If the value is **Disabled**, pressing the power button has no effect when the system is on. When the system is in the soft off state, pushing the power button always powers on the system. This setting has no effect on the

Serial Port Configuration Submenu

Use this submenu to view the serial port configuration.

- RS485/RS232 Select—This setting selects the transceiver mode between RS-232 and RS-485. The default value is **RS485**.
- RS-485 Configuration—Use this menu to configure the RS-485/422 wire-mode. The default value is **Auto**.

SATA Configuration Submenu

Use this submenu to apply custom configurations to the internal disk drive of the NI CVS-1459. Normally, you do not need to modify these settings, as the factory default settings provide the most compatible and optimal configuration.

- SATA Controller(s)—Enables or disables the SATA controller. The default is **Enabled**.
  - SATA Port 0—Enables or disables SATA port 0.
  - SATA Port 1—Enables or disables SATA port 1.
  - SATA Port 3—Enables or disables SATA port 3.
- Onboard Storage—Lists the SATA disk drive and displays the size of the disk.

USB Configuration Submenu

Use the submenu to apply alternate configurations to the USB ports. Normally, you do not need to modify these settings, as the factory default settings provide the most compatible and optimal configuration possible.

- Legacy USB Support—Specifies whether or not legacy USB support is enabled. Legacy USB support refers to the ability to use a USB keyboard and mouse during system boot or in a legacy operating system such as DOS. The default is **Enabled**.

- Overcurrent Reporting—Enables or disables operating system notifications of USB overcurrent events. The default is **Disabled**.
- Transfer Timeout—Specifies the number of seconds the POST waits for a USB mass storage device to start. The default is **20** seconds.
- Device Reset Timeout—Specifies the maximum amount of time a device can take to properly report itself during the POST. The default value is **Auto**. Alternatively, the **Manual** override setting can be used to support slow USB devices.
- Mass Storage Devices—When USB storage is connected to the device, this menu lists each USB drive. You can set the emulation type of the USB storage. The options include Auto, Floppy, Forced FDD, Hard Disk, and CD-ROM. The default is **Auto**.

Boot Menu

This screen displays the boot order of devices associated with the NI CVS-1459 and allows you to configure the boot settings.

The Boot setup menu includes the following submenus:

- Boot Settings Configuration—Use this setting to access the **Boot Settings Configuration** submenu.
- PXE Network Boot—This setting specifies whether or not the PXE network boot agent is enabled. The default value is **Disabled**. To enable this setting, you must select **Enable** and then select **Save & Exit** to restart the device. When this setting is enabled, the Intel Boot Agent is visible in the Boot Option Priorities menu. This allows you to boot from a PXE server on the local subnet. Note that the Intel Boot Agent device names are preceded by **IBA GE Slot** in the **Boot Option Priorities** menu.
- Boot Option Priorities—These settings specify the order in which the BIOS attempts to boot from bootable devices, including the local hard disk drive, removable devices such as USB flash disk drives or USB CD-ROM drives, or the PXE network boot agent. The BIOS will first attempt to boot from the device associated with **Boot Option #1**, followed by **Boot Option #2** and **Boot Option #3**. If multiple boot devices are not present, the BIOS setup utility will not display all of these configuration options. To select a boot device, press <Enter> on the desired configuration option and select a boot device from the resulting menu. You can also disable individual boot options by selecting **Disabled**.

Note For each detected drive, the boot option may list a UEFI option and an option without UEFI. This depends on whether the drive supports booting with UEFI, legacy BIOS, or both. If a drive is not displayed as a boot option, use the Drive or Device BBS Priorities setting to change the relative priority of the drive.

Boot Settings Configuration Submenu

- Setup Prompt Timeout—This setting specifies the amount of time the system waits for a BIOS Setup menu keypress (the <Delete> key) in units of a second. The default value is **1** for a delay of one second.
- Bootup NumLock State—This setting specifies the power-on state of the keyboard NumLock setting. The default value is **On**.

Device BBS Priority Submenus

The following submenus will be displayed if one or more bootable devices of the corresponding type is present:

- Hard Drive BBS Priorities
- CD/DVD ROM Drive BBS Priorities
- Floppy Drive BBS Priorities
- Network Device BBS Priorities

Hard Drive BBS Priorities Submenu

- Boot Option #1, Boot Option #2, Boot Option #3—These settings specify the boot priority of hard drive devices. The highest priority device is displayed on the main **Boot Option Priorities** list. Optionally, each device can also be **Disabled** if the device should never be used as a boot device.

CD/DVD ROM Drive BBS Priorities Submenu

- Boot Option #1, Boot Option #2, Boot Option #3—These settings specify the boot priority of CD/DVD ROM drive devices. The highest priority device is displayed on the main **Boot Option Priorities** list. Optionally, each device can also be **Disabled** if

the device should never be used as a boot device.

Floppy Drive BBS Priorities Submenu

- Boot Option #1, Boot Option #2, Boot Option #3—These settings specify the boot priority of network devices. The highest priority device is displayed on the main **Boot Option Priorities** list. Optionally, each device can also be **Disabled** if the device should never be used as a boot device.

Network Device BBS Priorities Submenu

- Boot Option #1, Boot Option #2, Boot Option #3—These settings specify the boot priority of network devices. The highest priority device is displayed on the main **Boot Option Priorities** list. Optionally, each device can also be **Disabled** if the device should never be used as a boot device.

Save & Exit Menu

The Save & Exit setup menu includes all available options for exiting, saving, and loading the BIOS default configuration. You can also press <F9> to load BIOS default settings and <F10> to save changes and exit setup.

The Save & Exit setup menu includes the following settings:

- Save Changes and Reset—Any changes made to BIOS settings are stored in NVRAM. The setup utility then exits and reboots the controller.
- Discard Changes and Reset—Any changes made to BIOS settings during this session since the last save are discarded. The setup utility then exits and reboots the controller.
- Save Changes—Any changes made to BIOS settings during this session are committed to NVRAM. The setup utility remains active, allowing further changes.
- Discard Changes—Any changes made to BIOS settings during this session since the last save are discarded. The BIOS setup continues to be active.
- Restore Defaults—This option restores all BIOS settings to the factory default. This option is useful if the controller exhibits unpredictable behavior due to an incorrect or inappropriate BIOS setting. The <F9> key can also be used to select this option.

- Save as User Defaults—This option saves a copy of the current BIOS settings as the User Defaults. This option is useful for preserving custom BIOS setup configurations.
- Restore User Defaults—This option restores all BIOS settings to the values last saved as user defaults.
- Boot Override—This option lists all possible bootable devices and allows the user to override the **Boot Option Priorities** list for the current boot. If no changes have been made to the BIOS setup options, the system will continue booting to the selected device without first rebooting. If BIOS setup options have been changed and saved, a reboot is required and the boot override selection will not be valid.

Restoring the Windows Operating System

You can restore the Windows operating system on the hard drive of the NI CVS-1459 from the reinstallation DVD shipped with device.

Note Restoring the operating system erases the contents of the hard drive. Back up any files you want to keep before restoring the hard drive.

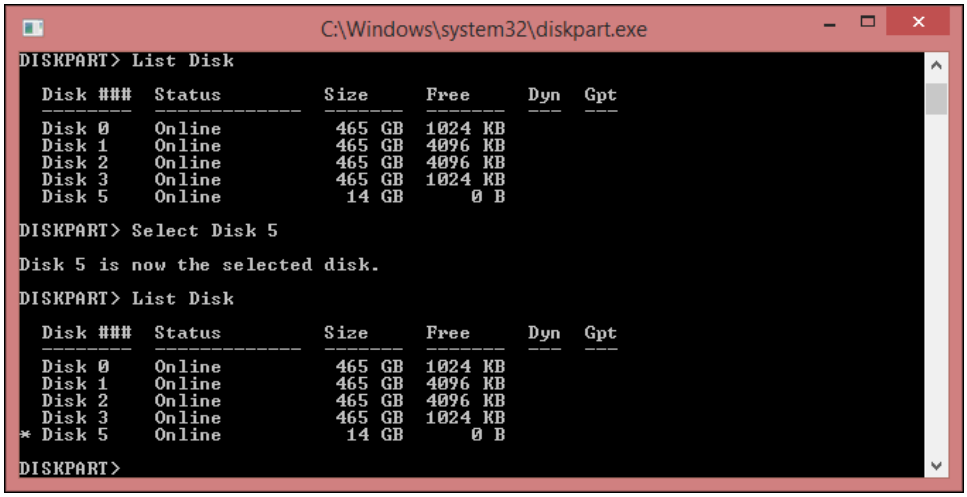
Creating a Bootable USB Flash Drive

You can create a bootable USB flash drive from the reinstallation DVD if you do not have a USB DVD drive to connect to the NI CVS-1459. The USB flash drive must be at least 8 GB. Ensure the USB flash drive appears as a Removable Drive in Windows. Avoid using drives that appear as Fixed Disk drives. Complete the following steps to prepare the USB flash drive for recovery.

Note If you have an external USB DVD drive, you can use the external DVD drive to restore Windows without creating a bootable USB flash drive. Proceed to the next section if you are using an external DVD drive.

1. Insert the USB flash drive into a computer with a DVD drive running Windows, and wait for the flash drive to be recognized.
2. Open a command prompt as an administrator.
3. Type `diskpart.exe` and press <Enter>.

4. Type `list disk` and press <Enter>.
5. Identify the drive number that corresponds to the USB flash drive.
6. Type `select disk x`, where x is the drive number of the USB flash drive, and press <Enter>. For example, in the following image, the USB flash drive is disk number 5. The command is `select disk 5`.



> **Caution** Following this process will delete all data on the USB flash drive.

7. Type `clean` and press <Enter>. This command deletes all data from the USB flash drive.
8. Type `create partition primary` and press <Enter>.
9. Type `active` and press <Enter>
10. Type `format fs=ntfs quick` and press <Enter> to format the USB flash drive.
11. Type `assign letter free volume letter`, where free volume letter is a letter not currently associated with any disk drives. For example, `assign letter K`.
12. Copy the contents of the reinstallation DVD to the root of the USB flash drive. The USB flash drive is now bootable and will install Windows.

Reinstalling Windows

Complete the following steps to use the recovery media to install Windows.

1. Connect the bootable USB flash drive to one of the USB ports on the NI CVS-1459.

Or connect an external DVD drive to one of the USB ports on the NI CVS-1459 and insert the recovery DVD into the external drive.
2. Connect a USB hub to the other USB port on the NI CVS-1459. Connect a keyboard and mouse to the USB hub. If a USB hub is not available, the keyboard can be used to navigate the recovery software.
3. Power on the NI CVS-1459.
4. Press the <F10> key on the keyboard.
5. Select the bootable USB flash drive or the DVD drive.
6. Press any key to boot from the recovery media.
7. Follow the on-screen instructions to format the hard drive and install the operating system.

After restoring the operating system, reinstall any software and drivers onto the NI CVS-1459.

Mounting the NI CVS-1459

This section provides information for creating a custom mount for the NI CVS-1459. If you do not want to create a custom mount, a panel and DIN rail mount kit for the NI CVS-1459 is available from National Instruments (part number 781740-01).

Caution If you choose not to mount the NI CVS-1459 on a DIN rail or flat surface, do not position the NI CVS-1459 with the heat sinks resting on any surface. Doing so may cause the NI CVS-1459 device to overheat. Refer to the ***NI CVS-1459 Specifications*** for temperature specifications.

The following figures provide dimensional drawings and clearance information for the NI CVS-1459.

Figure 19. Front View with Dimensions in inches [millimeters]

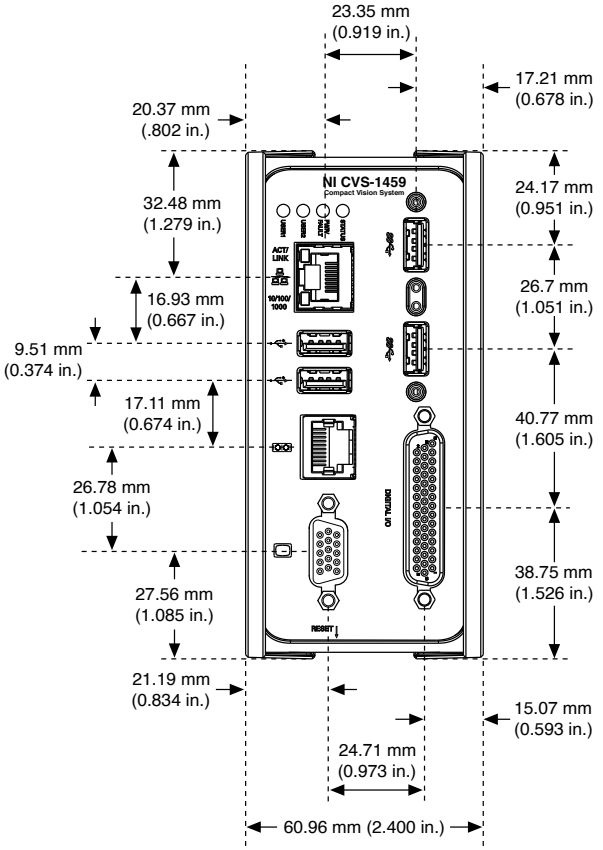


Figure 20. Back View with Dimensions in inches [millimeters]

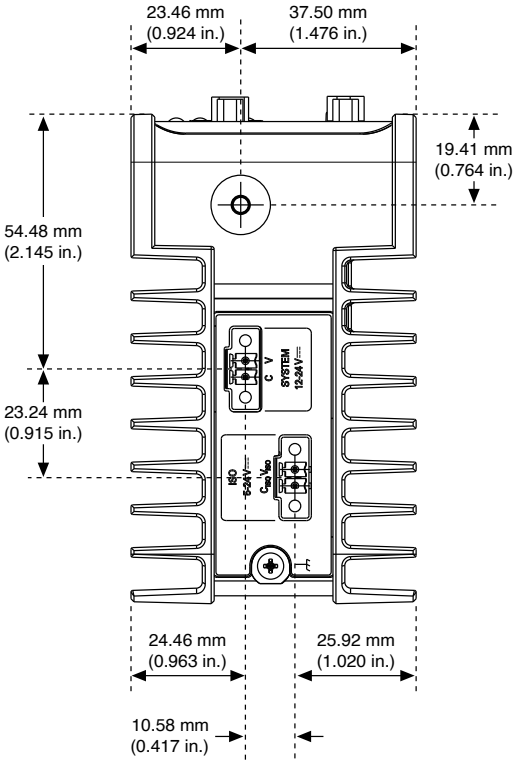


Figure 21. Side View with Dimensions in inches [millimeters]

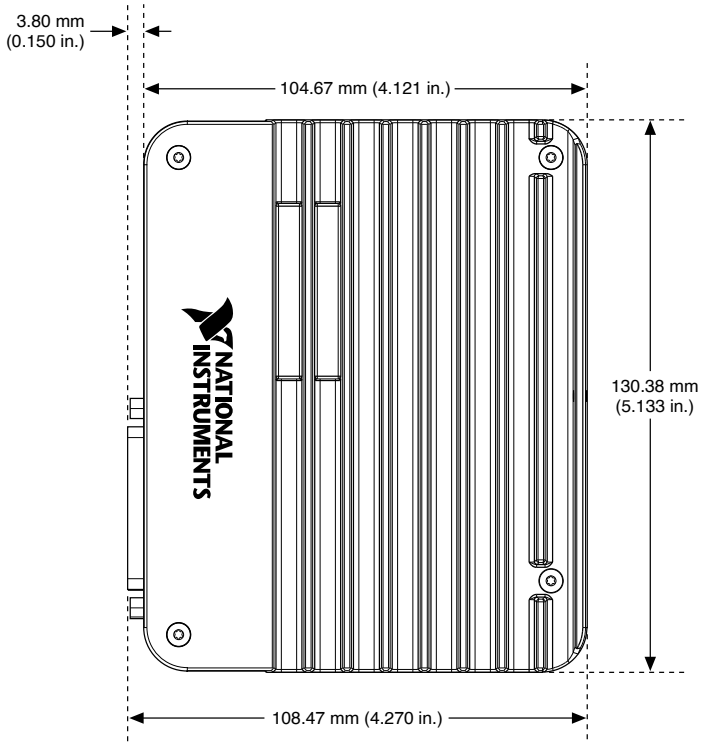
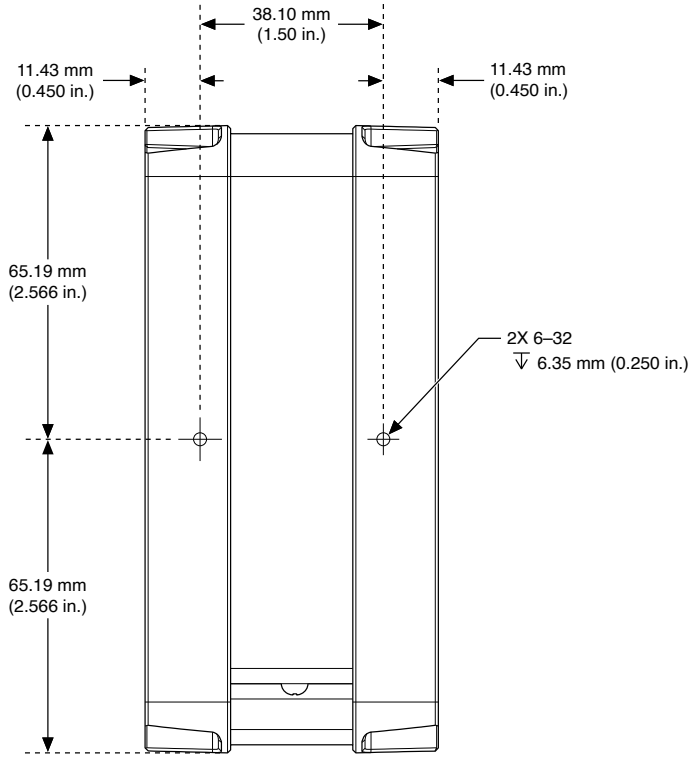


Figure 22. Bottom View with Dimensions in inches [millimeters]



Securing the NI CVS-1459 to a Mount

1. Align the screw holes of the mounting bracket with the holes on the back of the NI CVS-1459.
2. Insert 6-32 screws and tighten them 0.28 N · m (3.5 lb · in) until they are secure. Ensure the heads of the screws are flush with the mounting bracket.

Figure 23. Securing a Mounting Bracket to the Device

Figure 24. Mounting Bracket Dimensions

Clearance Requirements

The NI CVS-1459 installation must meet the following space and cabling clearance requirements for optimum cooling:

- Allow 76.2 mm (3.0 in.) on the top and bottom of the NI CVS-1459 for air circulation.
- Allow 50.8 mm (2.0 in.) on the sides of the NI CVS-1459 for air circulation.
- Allow enough space in front of the NI CVS-1459 to connect cables.

Figure 25. Clearance Requirements for the NI CVS-1459

Troubleshooting

Where to Go Next

The following documents and resources contain information you may find helpful as you use the NI CVS-1459 in an application. Refer to the National Instruments Product Manuals Library at ni.com/manuals for the most recent versions of product documentation.

- ***NI CVS-1459 Specifications***—Contains detailed specifications for the NI CVS-1459.
- ***NI CVS-1459 Getting Started Guide***—Explains how to install and configure the software necessary to use the NI CVS-1459, and how to get started using the hardware.
- ***NI CVS I/O Accessory User Manual***—Contains installation and operation

instructions for the NI CVS I/O Accessory.

NI Services

Visit ni.com/support to find support resources including documentation, downloads, and troubleshooting and application development self-help such as tutorials and examples.

Visit ni.com/services to learn about NI service offerings such as calibration options, repair, and replacement.

Visit ni.com/register to register your NI product. Product registration facilitates technical support and ensures that you receive important information updates from NI.

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