DAQ-LVIEW PnP

LabVIEW® Interfaces of NuDAQ Cards

Windows 98/NT/2000/XP/2003

User's Guide

LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

@Copyright 1998-2003 ADLI NK Technology Inc.

All Rights Reserved.

Manual Rev. 6.00: Nov 22, 2003

The information in this document is subject to change without prior notice in order to improve reliability, design and function and does not represent a commitment on the part of the manufacturer.

In no event will the manufacturer be liable for direct, indirect, special, incidental, or consequential damages arising out of the use or inability to use the product or documentation, even if advised of the possibility of such damages.

This document contains proprietary information protected by copyright. All rights are reserved. No part of this manual may be reproduced by any mechanical, electronic, or other means in any form without prior written permission of the manufacturer.

Trademarks

NuDAQ, NuIPC, DAQ-LVIEW and PCI series product names are registered trademarks of ADLINK Technology Inc. Other product names mentioned herein are used for identification purposes only and may be trademarks and/or registered trademarks of their respective companies.

LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

Getting Service From ADLINK

- **Customer Satisfaction is always the most important thing for ADLINK Tech Inc. If you need any help or service, please contact us and get it.**

ADLINK Technology Inc.			
Web Site	http://www.adlinktech.com		
Sales & Service	service@adlinktech.com		
Technical Support	NuDAQ	nudaq@adlinktech.com	
	NuDAM	nudam@adlinktech.com	
	NuIPC	nuipc@adlinktech.com	
	NuPRO	nupro@adlinktech.com	
TEL	+886-2-82265877	FAX	+886-2-82265717
Address	9F, No. 166, Jian Yi Road, Chungho City, Taipei, 235 Taiwan, R.O.C.		

- **Please inform or FAX us of your detailed information for a prompt, satisfactory and constant service.**

Detailed Company Information			
Company/Organization			
Contact Person			
E-mail Address			
Address			
Country			
TEL		FAX	
Web Site			
Questions			
Product Model			
Environment to Use	☐OS : _____ ☐Computer _____ ☐M/B : ☐CPU : ☐Chipset : ☐Bios : ☐Video Card : ☐Network Interface Card : ☐Other :		
Challenge Description			
Suggestions for ADLINK			

Contents

Introduction to DAQ-LVIEW PnP 1

1.1 OVERVIEW 1
1.2 USING DAQ-LVIEW PNP VIS IN LABVIEW 1
1.2 DAQ-LVIEW PNP PROGRAMMING 3

Device Driver Handling in Windows NT/98/2000/XP/2003 4

2.1 NT 4.0 DEVICE DRIVER 4
2.2 WIN2000/XP/2003 OR WIN98 DEVICE DRIVER 5

DAQ-LVIEW PnP Utilities 6

3.1 NUDAQ/DAQ-2000 REGISTRY/CONFIGURATION UTILITY (PCIUTIL/D2KUTIL) 6
3.2 NUDAQ DEVICE BROWSER 6

DAQ-LVIEW PnP VIs Overview 7

4.1 ANALOG INPUT VIS 7
4.1.1 Easy Analog Input VIs 7
4.1.2 Intermediate Analog Input VIs 8
4.2 ANALOG OUTPUT VIS 8
4.2.1 Easy Analog Output VIs 8
4.2.2 Intermediate Analog Output VIs 8
4.2.3 Advanced Analog Output VIs 8
4.3 DIGITAL I/O VIS 8
4.3.1 Easy Digital I/O VIs 8
4.3.2 Intermediate Digital I/O VIs 8
4.4 TIMER/COUNTER VIS 9
4.4.1 Easy Timer/Counter VIs 9
4.4.1 Intermediate Timer/Counter VIs 9
4.4.2 Advanced Timer/Counter VIs 9
4.5 CALIBRATION AND CONFIGURATION VIS 9
4.5.1 Calibration VIs 9
4.5.1 Other Calibration and Configuration VIs 9
4.6 SERVICE VIS 9

Distribution of Applications 10

5.1 WINDOWS NT 10
5.2 WINDOWS 98 10
5.3 WINDOWS 2000/XP/2003 10

LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

How to Use This Manual

This manual is designed to help you install the DAQ-LVIEW PnP, the LabVIEW driver for NuDAQ PCI-bus data acquisition cards. For the detail description of DAQ-LVIEW PnP VIs, please refer to DAQ-LVIEW PnP on-line help or PDF file format Function Reference. This manual is organized as follows:

- **Chapter 1, "Introduction to DAQ-LVIEW PnP" describes how to program your application by using DAQ-LVIEW PnP.**
- **Chapter 2, "Device Driver Handling in Windows 98/NT/2000/XP" describes how to configure the NuDAQ PCI cards Windows NT/98/2000/XP device driver.**
- **Chapter 3, "DAQ-LVIEW PnP Utilities" describes the utilities included in DAQ-LVIEW PnP software.**
- **Chapter 4, "DAQ-LVIEW PnP VIs Overview" briefly describes each VI in DAQ-LVIEW PnP.**

LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

1

Introduction to DAQ-LVIEW PnP

1.1 Overview

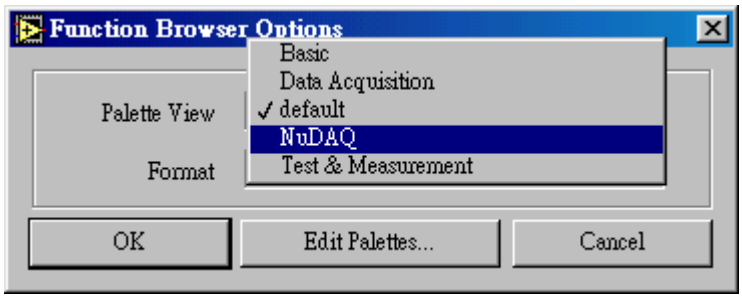
DAQ-LVIEW PnP VIs were designed for the LabVIEW 6.0 or later version. All VIs are stored in 6.0 format. The main idea of the DAQ-LVIEW PnP is to provide a set of VIs that is as close as possible to the National Instruments Data Acquisition Visual Instrument set.

To not conflict with the naming of the functions already present in LabVIEW, all DAQ-LVIEW PnP VIs have a "**PLV**" prefix. For example, the Analog Input Read VI is called "**`PLV AI Read`**".

1.2 Using DAQ-LVIEW PnP VIs in LabVIEW

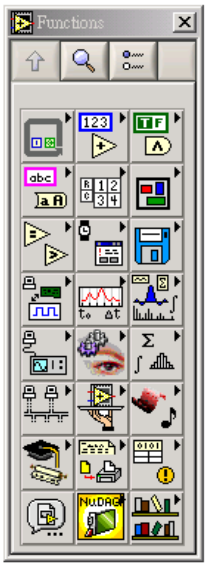
To use DAQ-LVIEW PnP VIs, you have to have LabVIEW 6.0 or later version.

Click the **Options** button in the **Controls** or **Functions** palette toolbar to display the **Function Browser Options** dialog box. Select ***NuDAQ*** view from the **Palette Set** pull-down menu. Click **OK**. The **Functions** palettes change to the ***NuDAQ*** view.



Then you can find DAQ-LVIEW PnP VIs in **NuDAQ** icon on the **Functions** palette.

LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000





The **NuDAQ** palette contains four subpalettes that contain the different classes of data acquisition VIs. The VIs are classified as follows:

- Analog Input VIs
- Analog Output VIs
- Digital I/O VIs
- Timer/Counter VIs
- Calibration and Configuration Vis
- Service VIs

Most of the VI subpalettes arrange the VIs in different levels, Easy, Intermediate, or Advanced, according to their functionality.

LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

1.2 DAQ-LVIEW PnP Programming

The chapter 4 *DAQ-LVIEW PnP VIs Overview* briefly describes each VI in DAQ-LVIEW PnP. All applications developed with DAQ-LVIEW PnP are compatible across Windows 98, Windows NT, and Windows 2000/XP.

You can find the detailed description of each VI by the following ways:

1. Select **Show Help** command of **Help** menu in LabVIEW. When you put the mouse cursor on DAQ-LVIEW PnP VI, LabVIEW will show the description of the VI.
2. PDF manual files in <Install Dir>\Manual directory.
3. Through DAQ-LVIEW PnP on-line help

LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

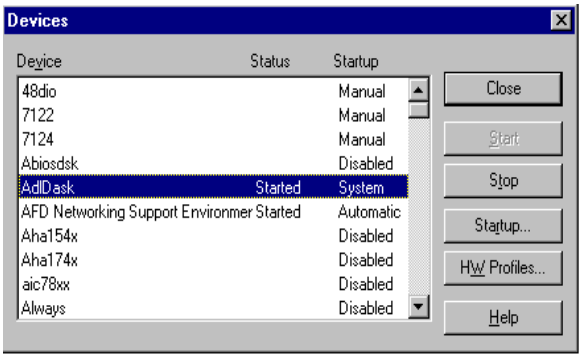
2

Device Driver Handling in Windows NT/98/2000/XP/2003

2.1 NT 4.0 Device Driver

Driver Status

After finishing the installation and re-entering Windows NT, make sure the PCI device drivers are already started. For DAQ-LVIEW PnP to be able to communicate with NuDAQ PCI-bus card, device driver AdlDask as well as the card's own device driver (e.g. PCI6208, PCI7200, PCI7230, PCI7234, PCI7250, PCI7248, PCI7296, PCI7300, PCI7432, PCI7433, PCI7434, PCI9111, PCI9112, PCI9113, PCI9114, PCI9118, or PCI9812, etc.) must be started. For DAQ-LVIEW PnP to be able to communicate with DAQ-2000 PCI-bus card, the card's own device driver (e.g. DAQ2010, DAQ2205, or DAQ-2501, etc.) must be started. You can open the "Control Panel", double-click "Devices", and a Devices window will be shown as below.



If the device status is none, you have to select the the decice and press the "Start" button.

Note: For NuDAQ seriew devices, the AdlDask driver must have been started as you press Start button to start the card's own device driver.

Driver Utility

DAQ-LVIEW PnP provides utilities, PCI Configuration utility (PciUtil and D2kUtil.exe). These utilities are used to register new PCI drivers, remove installed drivers and modify AI/AO/DI/DO continuous buffer of installed drivers. The allocated buffer sizes of AI, AO, DI, DO represent the sizes of contiguous Initially Allocated memory for continuous analog input, analog output, digital input, digital output respectively. Its unit is page KB, i.e. 1024 bytes. Device driver will try to allocate these sizes of memory at system startup time. If this size of memory is not able to get, driver will allocate as much memory as system can provide. The size of initially allocated memory is the maximum memory sizes that DMA or Interrupt transfer can be performed. It will induce an unexpected result in that DMA or Interrupt transfer performed exceeds the initially allocated size.

These PCI Configuration utilities are installed with DAQ-LVIEW PnP setup program and located in <InstallDir>\Util directory.

Using these utilities to install a new driver or set the size of continuous buffer, please refer to the chpater "NuDAQ PCI Configuration Utility" in the *NuDAQ PCI and NuIPC CompactPCI DAQ Cards Software Installation Guide*.

LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

2.2 Win2000/XP/2003 or Win98 Device Driver

Once Windows 98/2000/XP/2003 has started, the Plug and Play function of Windows 98/2000/XP/2003 system will find the new NuDAQ/NuIPC/DAQ-2000 cards. If this is the first time to install NuDAQ/NuIPC/DAQ-2000 cards in your Windows 98/2000/XP/2003 system, you will be informed to install the device driver. Please follow the procedures described in the section “Device Installation” of chapter “Windows 98/NT/2000/XP/2003” in the *NuDAQ PCI and NuIPC CompactPCI DAQ Cards Software Installation Guide* to install the device.

Driver Utility

DAQ-LVIEW PnP provides PCI Configuration Utilities (*PciUtil and D2kUtil.exe*). These utilities are used to ***set/change*** the allocated buffer sizes of AI, AO, DI and DO. The allocated buffer sizes of AI, AO, DI, DO represent the sizes of contiguous Initially Allocated memory for continuous analog input, analog output, digital input, digital output respectively. Its unit is page *KB*, i.e. 1024 bytes. Device driver will try to allocate these sizes of memory at system startup time. If this size of memory is not able to get, driver will allocate as much memory as system can provide. The size of initially allocated memory is the maximum memory size that DMA or Interrupt transfer can be performed. It will induce an unexpected result in that DMA or Interrupt transfer performed exceeds the initially allocated size.

These PCI Configuration utilities are installed with DAQ-LVIEW PnP, and located in <InstallDir>\Util directory.

Using these utilies ***set/change*** the buffer size, please refer to the chapter “NuDAQ PCI Configuration Utility” in the *NuDAQ PCI and NuIPC CompactPCI DAQ Cards Software Installation Guide*.

LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

3

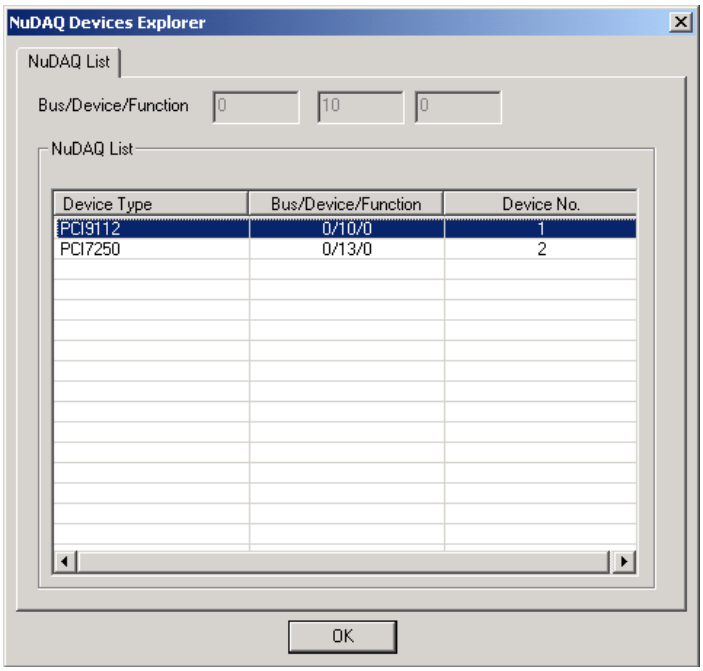
DAQ-LVIEW PnP Utilities

3.1 NuDAQ/DAQ-2000 Registry/Configuration utility (PciUtil/D2kUtil)

PciUtil and *D2kUtil* are used to ***register*** NuDAQ and DAQ-2000 PCI card drivers (Windows NT4 only), ***remove*** installed drivers (Windows NT4 only), and ***modify*** the allocated buffer sizes of AI, AO, DI and DO (Windows NT/2000/98/XP/2003). The default location of this utility is <InstallDir>\Util directory. Because it has been mentioned in the previous chapter, we will not introduce it here. Please refer to the chpater “NuDAQ PCI Configuration Utility” in the *NuDAQ PCI and NuIPC CompactPCI DAQ Cards Software Installation Guide*.

3.2 NuDAQ Device Browser

Device Browser (NuDAQConf.exe) displays the currently installed and detected NuDAQ hardwares. The default location of this utility is <InstallDir>\Util directory. The *NuDAQ device browser* main window is as the following figure:



The *Device Browser* main window contains three columns, *Device Type*, *Location (Bus/Device/Function)* and *Device Number*.

- Device Type: Type of NuDAQ board installed
- Location (Bus/Device/Function): The location the device is plugged into
- Device Number: Number of device at PCI bus (Starts from 1)

Using this utility, user can view all of the NuDAQ deivces connected to your system and get the device number corresponding to the device plugged on a specifed PCI slot.

LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

4

DAQ-LVIEW PnP VIs Overview

This chapter briefly describes each VI in DAQ-LVIEW PnP. The setup program detects the system (Windows NT, 2000/XP/2003, or 98), and installs the correct platform drivers to the system. All applications developed with DAQ-LVIEW PnP are compatible across Windows 98, Windows NT, and Windows 2000/XP/2003.

You can find the detailed description of each VI by the following ways:

1. Select **Show Help** command of **Help** menu in LabVIEW. When you put the mouse cursor on DAQ-LVIEW PnP VI, LabVIEW will show the description of the VI.
2. Through DAQ-LVIEW PnP on-line help
3. PDF manual files in <Install Dir>\Manual directory.

DAQ-LVIEW PnP VIs are grouped to the following classes:

- **Analog Input VIs**
  - Easy Analog Input VIs
  - Intermediate Analog Input VIs
- **Analog Output VIs**
  - Easy Analog Output VIs
  - Intermediate Analog output VIs
  - Advanced Analog Input VIs
- **Digital I/O VIs**
  - Easy Digital I/O VIs
  - Intermediate Digital I/O VIs
- **Timer/Counter VIs**
  - Intermediate Timer/Counter VIs
  - Advanced Timer/Counter VIs
- **Calibration and Configuration VIs**
  - Calibration VIs
  - Other Calibration and Configuration VIs
- **Service VIs**

4.1 Analog Input VIs

4.1.1 Easy Analog Input VIs

PLV AI Acquire Waveform: Acquires a specified number of samples at a specified sample rate from a single input channel and returns the acquired data.

PLV AI Acquire Waveforms: Acquires data from the specified channels and samples the channels at the specified scan rate.

LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

PLV AI Sample Channel: Measures the signal attached to the specified channel and returns the measured data.

PLV AI Sample Channels: Performs a single reading from each of the specified channels.

4.1.2 Intermediate Analog Input VIs

PLV AI Clear: The PLV AI Clear VI stops an acquisition associated with taskID in.

PLV AI Config: Configures an analog input operation for a specified set of channels.

PLV AI Read: Reads data from a buffered data acquisition.

PLV AI Single Scan: Returns one scan of data directly from the board analog input channels for a non-buffered acquisition.

PLV AI Start: Starts a buffered analog input operation.

4.2 Analog Output VIs

4.2.1 Easy Analog Output VIs

PLV AI Acquire Waveform: Generates a timed and buffered waveform for the given output channel at the specified update rate.

PLV AI Acquire Waveforms: Acquires data from the specified channels and samples the channels at the specified scan rate.

PLV AO Update Channel: Writes a specified value to an analog output channel.

PLV AO Update Channels: Writes values to each of the specified analog output channels.

4.2.2 Intermediate Analog Output VIs

PLV AO Clear: The PLV AO Clear VI stops an analog output generation associated with taskID.

PLV AO Config: Configures a buffered analog output operation.

PLV AO Start: Starts a buffered analog output operation.

PLV AO Wait: waits until the waveform generation of the task completes before returning.

PLV AO Write: writes data into the buffer for a buffered analog output operation.

4.2.3 Advanced Analog Output VIs

PLV AO Trigger and Gate Config: Configures the trigger conditions for analog output operations.

4.3 Digital I/O VIs

4.3.1 Easy Digital I/O VIs

PLV Read from Digital Line: Reads the logical state of a digital line on a digital channel that you configure.

PLV Read from Digital Port: Reads a digital channel that you configure.

PLV Write to Digital Line: Sets the output logic state of a digital line to high or low on a digital channel that you specify.

PLV Write to Digital Port: Outputs a decimal pattern to a digital channel that you specify.

4.3.2 Intermediate Digital I/O VIs

PLV DIO Clear: Stops an acquisition associated with taskID.

PLV DIO Config: Creates the taskID, establishes the handshake parameters, and allocates a buffer to hold the scans.

PLV DIO Read: Calls the VI to read data from the internal transfer buffer and returns the data read in pattern.

PLV DIO Start: Starts a buffered digital I/O operation.

PLV DIO Write: Writes digital output data to the internal transfer buffer.

LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

4.4 Timer/Counter VIs

4.4.1 Easy Timer/Counter VIs

PLV Count Events or Time: Configures one or two counters to count external events.

PLV Generate Delayed Pulse: Configures and starts a counter to generate a single pulse with the specified delay and pulse-width.

PLV Generate Pulse-Train: Configures the specified counter to generate a continuous pulse-train.

PLV Measure Pulse-Width or Period: Measures the pulse-width (length of time a signal is high or low) or period (length of time between adjacent rising or falling edges) of a TTL signal.

4.4.1 Intermediate Timer/Counter VIs

PLV Continuous Pulse Generator Config: Configures a counter to generate a continuous TTL pulse-train.

PLV Counter Divider Config: Configures the specified counter to divide a signal.

PLV Counter Read: Reads the counter or counters identified by task ID.

PLV Counter Start: Starts the counters identified by task ID.

PLV Counter Stop: Stops a count operation immediately or conditionally on an input error.

PLV Delayed Pulse Generator Config: Configures a counter to generate a single pulse with the specified delay and pulse-width.

PLV Down Counter or Divider Config: Configures the specified counter to count down or divide a signal.

PLV Event or Time Counter Config: Configures one or two counters to count external events.

PLV Pulse-Width or Period Measurement Config: Configures the specified counter to measure the pulse-width or period of a TTL signal.

PLV UpDown Counter Config: Configures one counter to count edges in the signal on the specified counter's SOURCE pin or the number of cycles of a specified internal timebase signal.

4.4.2 Advanced Timer/Counter VIs

PLV ICTR Control: This VI control counters on the NuDAQ devices that use 82C54 chip.

4.5 Calibration and Configuration VIs

4.5.1 Calibration VIs

PLV DAQ-2000 Series Calibrate: calibrates DAQ-2000 Series device.

4.5.1 Other Calibration and Configuration VIs

PLV Route Signal: routes an internal signal to the specified I/O connector or SSI bus line, or to enable clock sharing through the SSI bus clock line.

PLV SSI Control: Connects or disconnects trigger and timing signals between DAQ devices along the Real-Time System Integration (SSI) bus.

4.6 Service VIs

PLV Error Handler: explains a non-zero error codes and shows dialog box with information about error.

LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

5

Distribution of Applications

To install an application using DAQ-LVIEW PnP on another computer, you also must install the necessary driver files and supporting libraries on the target machine. You can create an automatic installer to install your program and all of the files needed to run that program or you can manually install the program and program files. Whichever installation method you choose, you must install the following files:

Note: Do not replace any files on the target computer if the file on the target computer has a newer version than the file you are installing.

5.1 Windows NT

- **LLB files:**

nudaq_pci.llb in \software\DAQ-LVIEW\w98nt2k\redist\llb

- **Required support DLLs:**

Pci-lv.dll in \software\DAQ-LVIEW\w98nt2k\redist\dll. This file should be copied to Winnt\system32 directory.

- **Driver files**

adldask.sys in \software\DAQ-LVIEW\w98nt2k\redist\wnt\drivers. This file should be copied to Winnt\system32\drivers directory.

The corresponding driver files in \software\DAQ-LVIEW\w98nt2k\redist\wnt\drivers, e.g. pci7200.sys for PCI-7200. These files should be copied to Winnt\system32\drivers directory.

Device configuration utility in \software\DAQ-LVIEW\w98nt2k\redist\wnt\pciutil.

5.2 Windows 98

- **LLB files:**

nudaq_pci.llb in \software\DAQ-LVIEW\w98nt2k\redist\llb

- **Required support DLLs:**

Pci-lv.dll in \software\DAQ-LVIEW\w98nt2k\redist\dll. This file should be copied to Windows\system directory.

- **Driver files**

The corresponding driver files in \software\DAQ-LVIEW\w98nt2k\redist\w98\drivers, e.g. pci7200.sys for PCI-7200. These files should be copied to Windows\system32\drivers directory.

The corresponding INF files in \software\DAQ-LVIEW\w98nt2k\redist\w98\inf, e.g. p7200.inf for PCI-7200. These files should be copied to Windows\inf directory.

Device configuration utility in \software\DAQ-LVIEW\w98nt2k\redist\w98\pciutil.

5.3 Windows 2000/XP/2003

- **LLB files:**

nudaq_pci.llb in \software\DAQ-LVIEW\w98nt2k\redist\llb

- **Required support DLLs:**

LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

Pci-lv.dll in \software\DAQ-LVIEW\w98nt2k\redist\dll. This file should be copied to Winnt\system32 directory.

- **Driver files**

The corresponding driver files in \software\DAQ-LVIEW\w98nt2k\redist\w2000\drivers, e.g. pci7200.sys for PCI-7200. These files should be copied to Winnt\system32\drivers directory.

The corresponding INF file in \software\DAQ-LVIEW\w98nt2k\redist\w2000\inf, e.g. p7200.inf for PCI-7200. These files should be copied to Winnt\inf directory.

Device configuration utility in \software\DAQ-LVIEW\w98nt2k\redist\w2000\pciutil.

LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000