



# ***PXD 222 DIGITIZER***

## **OPERATOR'S MANUAL**

NOVEMBER 2001



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Rev A

1101



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## *First Things...First*

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### WHEN YOUR DIGITIZER IS DELIVERED

#### Check That You Have Everything

Verify that all items on the packing list or invoice copy have been shipped to you. (The items are also listed below.) Contact your nearest LeCroy customer service center or national distributor if anything is missing or damaged. If there is something missing or damaged, and you do not contact us immediately, we cannot be responsible for replacement.

The following is shipped with the standard PXD 222 Digitizer:

- *Performance or Calibration Certificate*
- *Quick Reference Guide*
- *CD ROM*

**NOTE:** The warranty below replaces all other warranties, expressed or implied, including but not limited to any implied warranty of merchantability, fitness, or adequacy for any particular purpose or use. LeCroy shall not be liable for any special, incidental, or consequential damages, whether in contract or otherwise. The customer is responsible for the transportation and insurance charges for the return of products to the service facility. LeCroy will return all products under warranty with transport prepaid.

#### Be Sure To Read This Warranty

The PXD 222 Digitizer is warranted for normal use and operation, within specifications, for a period of one year from shipment. LeCroy will either repair or, at our option, replace any product returned to one of our authorized service centers within this period. However, in order to do this we must first examine the product and find that it is defective due to workmanship or materials and not due to misuse, neglect, accident, or abnormal conditions or operation.

Spare and replacement parts, and repairs, all have a 90-day warranty.

The digitizer's firmware has been thoroughly tested and is presumed to be functional. Nevertheless, it is supplied without warranty of any kind covering detailed performance. Products not made by LeCroy are covered solely by the warranty of the original equipment manufacturer.

## PXD 222 Digitizer

### Take Advantage Of Maintenance Agreements

We offer a variety of services under the heading of Maintenance Agreements. These give extended warranty and allow you to budget maintenance costs after the initial one-year warranty has expired. Installation, training, enhancements, and on-site repairs — among other services — are available through special supplemental support agreements. Inquire at your LeCroy customer service center or national distributor.

### Obtain Assistance

Help with installation, calibration, and the use of your PXD 222 Digitizer scope in a range of applications is also available from your customer service center.

### Return a Product for Service or Repair

If you do need to return a LeCroy product, identify it by its model and serial numbers. Describe the defect or failure, and provide your name and contact number.

For factory returns, use a Return Authorization Number (RAN), obtainable from customer service. Attach it so that it can be clearly seen on the outside of the shipping package to ensure rapid forwarding within LeCroy.

Return those products requiring only maintenance to your customer service center.

**NOTE: If you need to return your digitizer, use the original shipping carton. If this is not possible, the carton used should be rigid. The digitizer should be packed so that it is surrounded by a minimum of four inches (10cm) of shock absorbent material.**

Within the warranty period, transportation charges to the factory will be your responsibility, while products under warranty will be returned to you with transport prepaid by LeCroy. Outside the warranty period, you will have to provide us with a purchase order number before the work can be done. You will be billed for parts and labor related to the repair work, as well as for shipping.

You should prepay return shipments. LeCroy cannot accept COD (Cash On Delivery) or Collect Return shipments. We recommend using air freight.

### Stay Up-to-Date

To maintain your PXD 222 Digitizer's performance within specifications, have us calibrate it at least once a year. LeCroy offers state-of-the-art technology by continually refining and improving the instrument's capabilities and operation. We frequently update both firmware and software during service, free of charge during warranty.

***First Things...First***

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**SAFETY INFORMATION**

**Safety Symbols**

Where the following symbols appear on the PXD 222 Digitizer's front or rear covers, or in this manual, they alert you to important safety considerations.

**WARNING**            Incorrect operation or failure to heed warnings may result in death or serious injury. If a **WARNING** is indicated, do not proceed until its conditions are understood and met.

**CAUTION**            Incorrect operation or failure to heed cautions may result in injury or damage to equipment. If a **CAUTION** is indicated, do not proceed until its conditions are understood and met.



Refer to accompanying documents (for safety related information).

See elsewhere in this manual whenever this symbol is present, as indicated in the Table of Contents.



Earth (Ground) Terminal

## PXD 222 Digitizer

### Warnings



#### WARNING

To avoid electrical shock or fire if the digitizer input is connected to more than 42 V peak (30 V rms) or on circuits of more than 4800 VA:

- Use only insulated voltage probes, test leads, and adapters.
- Before use, inspect voltage probes, test leads, and accessories for mechanical damage and replace when damaged.
- Remove all probes, test leads, and accessories that are not in use.
- Do not connect the ground spring to voltages higher than 42 V peak (30 V rms) from earth ground.
- When measuring in a CAT II environment, do not apply to any input voltages that differ by more than 300 V from earth ground.
- When measuring in a CAT II environment, do not apply to the isolated inputs voltages that differ by more than 300 V from each other.
- Do not apply input voltages above the rating of the instrument. Use caution when using 1:1 test leads because the probe tip voltage will be directly transmitted to the test tool.
- Do not use exposed metal BNC or banana plug connectors.
- Do not insert metal objects into connectors.
- Before connecting any input voltages, the unit must be properly installed in the PXI rack.
- Disconnect the applied voltage(s) before disconnecting probes, BNC leads, test leads, or accessories.
- Always use the digitizer only in the manner specified

Voltage ratings mentioned in the warnings are given as limits for "working voltage." They represent VAC rms (50–60 Hz) for AC sine wave applications and as VDC for DC applications.

Overvoltage Category II refers to local distribution level, which is applicable to appliances and portable equipment.

The terms "isolated" and "electrically floating" are used in this manual to indicate a measurement in which the digitizer input BNC or banana jack is connected to a voltage different from earth ground.

The isolated input connectors have no exposed metal and are fully insulated to protect against electrical shock.

## ***First Things...First***

The BNC connectors can be independently connected to a voltage above earth ground for isolated (electrically floating) measurements and are rated up to 300 V rms (CAT II) above earth ground.

### **If Safety Features are Impaired**

Whenever it is likely that safety has been impaired, the digitizer must be shut down, the PXI chassis disconnected from the line power, and the digitizer removed from the PXI chassis. The matter should then be referred to qualified personnel. Safety is likely to be impaired if, for example, the digitizer fails to perform the intended measurements or shows visible damage. Before use, inspect the test leads for mechanical damage and replace damaged test leads!



### **WARNING**

**Use of the digitizer in a manner not specified may impair the protection provided by the equipment.**

### **Care and Maintenance**

The exterior of the digitizer should be cleaned only with a soft cloth moistened with water or isopropyl alcohol.

The use of abrasive agents, strong detergents, or other solvents may damage the probe.

Ensure that the input receptacles are free of debris before inserting connection accessories.

All repair and maintenance should be referred to qualified service personnel.

Do not use the digitizer if any part is damaged.

## PXD 222 Digitizer

### INSTALL AND POWER UP THE DIGITIZER

**Prior to inserting the PXD 222 Digitizer into your chassis**, you should install the necessary software components on your system. To use the PXD 222 IVI driver, you will need to install the following:

- IVI Engine (v1.65 or greater)
- NI-VISA (v2.5 Runtime version)
- PXD 222 IVI Instrument Driver

To run examples provided on the PXD 222 CDROM (including the Quick-Start demo and LabWindows™/CVI Getting Started Examples) you should also install:

- Measurement and Automation Explorer (included with NI-DAQ™ 6.8.1)
- LabWindows™/CVI Run-time Engine (included with the Quick-Start demo installation)

All of these components are included on the CDROM. Use the following instructions to install these components on any Windows operating system in order to run the LeCroy Quick Start Demo and Example programs.

#### Install NI Software Components

Install the following NI software components.<sup>1</sup> For detailed information about installing this software, please visit the National Instruments Web site, <http://www.ni.com> and search for NI-DAQ™ 6.8.1 in their Downloads section

**1. Install NI-DAQ™ version 6.8.1**

Installing this software will also install National Instrument's Measurement and Automation Explorer (MAX). We do not suggest using NI-DAQ™ 6.9.2 because it includes a bug that can prevent recognition of the PXD 222 and other PXI instruments. After installation, confirm that you have a MAX icon on your desktop. According to the "About Max..." dialog box, the MAX version should be version 2.0.3.17.

**2. Install NI-VISA Run-time version 2.5**

Installing this software will also install the LabWindows™/CVI Run-Time Engine, which is a necessary component.

**3. Install IVI Engine 1.8.3**

The IVI Engine software is necessary when you are using IVI drivers. Visit <http://www.ni.com/ivi> and <http://www.ivifoundation.org> for more information about the IVI standard.

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1. Each component is protected by copyright © 2001 by National Instruments Corporation, all rights reserved.

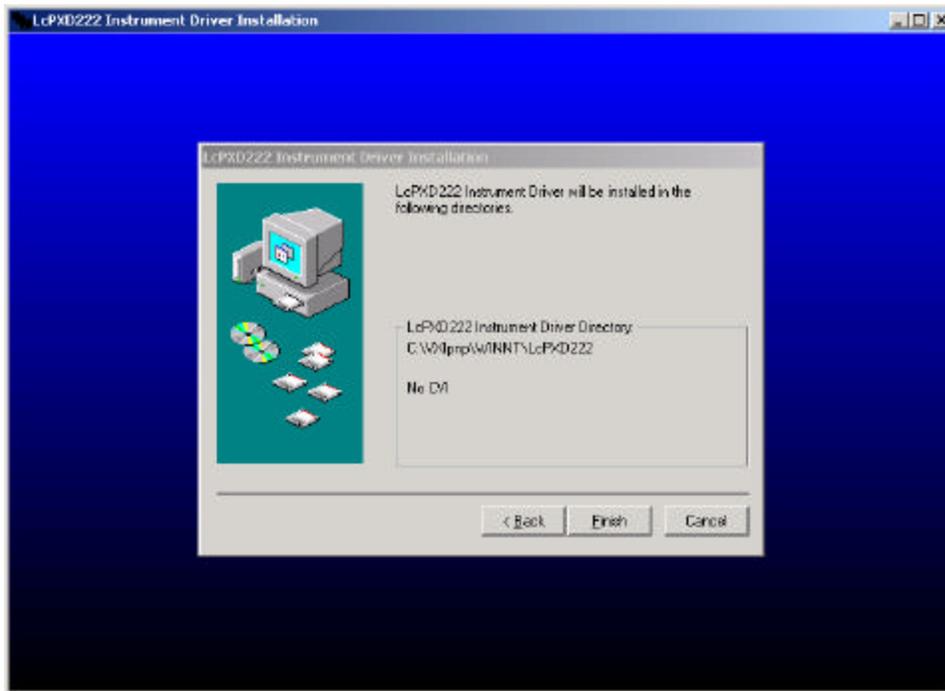
***First Things...First*****Install LcPXD222 Instrument Driver**

1. Run the setup.exe file from the PXD 222 Instrument Driver directory on the CDROM. The following screen appears:



## PXD 222 Digitizer

2. Full Installation is the suggested option. After you select **OK**, the following screen appears:



3. If Labwindows™/CVI is loaded on your computer, the installation program will put the driver files within the standard CVI directory structure.
4. Click **Finish** to complete the Instrument Driver Installation. You are now ready to proceed with the installation of the PXD 222 Digitizer.

**First Things...First****Install the PXD 222 Digitizer**

1. Shut down the instrument and install the digitizer in the PXI chassis slot by first inserting the digitizer's card edge into the front module guides (top and bottom). Slide the digitizer to the rear of the mainframe with the injector/ejector handle pushed down.
2. When you begin to feel resistance, push up on the injector/ejector handle to fully seat the digitizer in the chassis.
3. Secure the digitizer to the front panel of the chassis with the mounting screws.
4. Cover any open slots in the PXI chassis to ensure proper air flow.



5. Power up the chassis. (If you are connecting to the chassis via an MXI-3 connection, power up the computer after powering up the chassis.)

**CAUTION**

**Overheating will result if any slots in the PXI chassis remain open. Cover all open slots to ensure proper air flow.**

## PXD 222 Digitizer

6. Windows 9x, Win2000, and NT5.0 will recognize that you have a new PCI device installed, and will prompt you for instructions on installing the device driver. (NT4.0 users should follow the procedure described below). Choose to search manually for the device driver for your operating system; it can be found on the CDROM, within a subfolder under "PXD 222 Device Drivers." When prompted, navigate to the folder for your operating system. Windows will install the device driver, and the PXD 222 should at this point be visible in the Device Manager screen for your operating system. For Windows9x users, you will see the following sequence of dialog boxes.



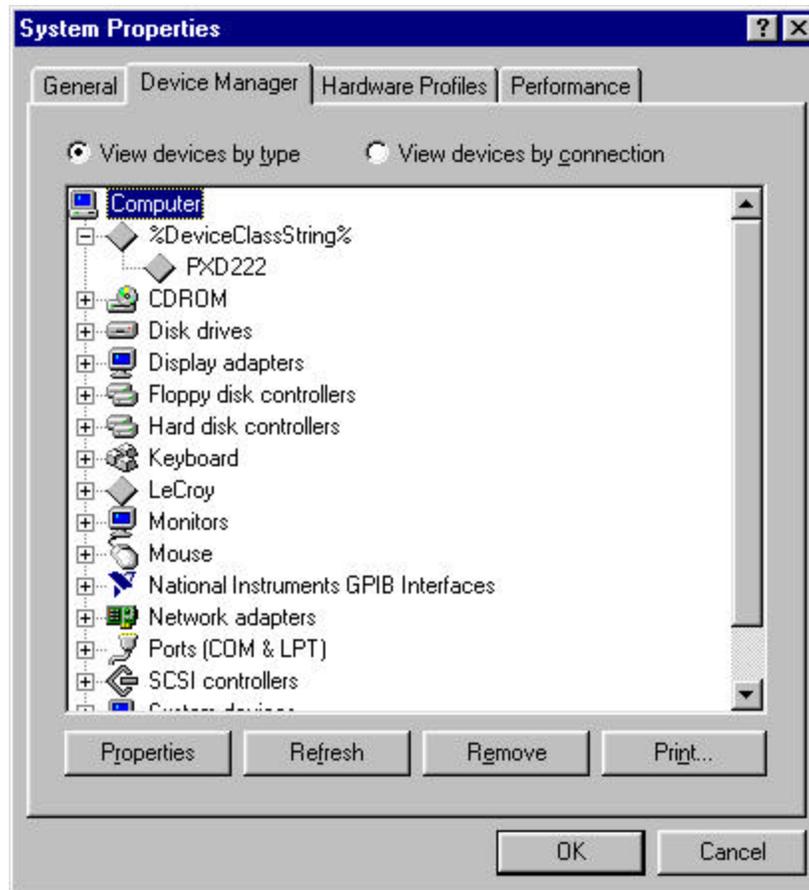
*First Things...First*

## PXD 222 Digitizer



**First Things...First**

7. Windows 9x, NT5, and Win2000 users can confirm that the PXD 222 Digitizer is properly recognized by the OS by viewing the Device Manager. This can be found within the "System" control panel option.



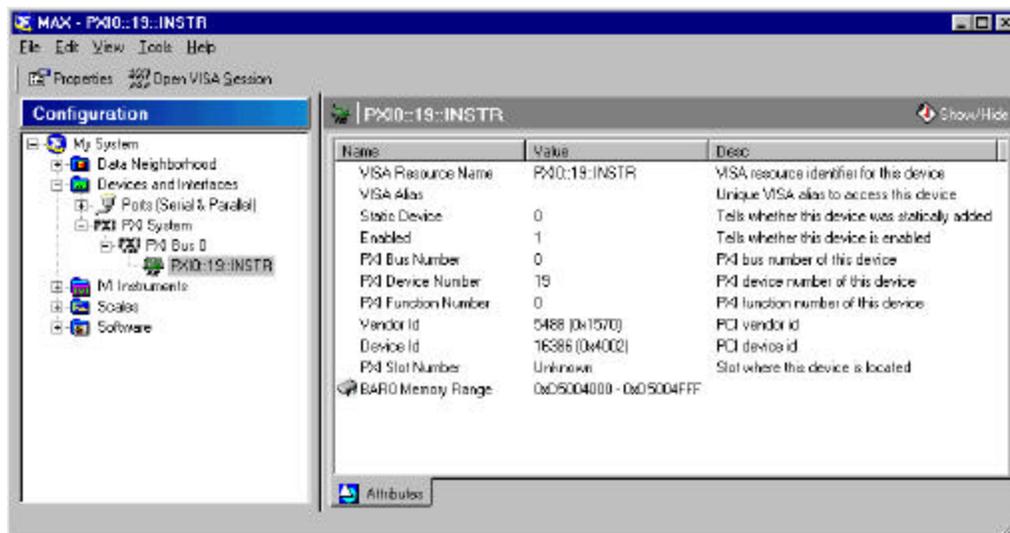
8. Windows NT4.0 Users: Copy the file "PXD222 Device Drivers\winNt4.0\LcPXD222\_NT4.inf" to the WinNT\inf directory. Right-click on the file, and select "Install" to install the driver.

## PXD 222 Digitizer

### Launch Measurement and Automation Explorer (MAX)

1. Launch Measurement and Automation Explorer, and refresh the device list by pressing F5.
2. If the PXD 222 Digitizer is not found, or there is no “PXI System” list within the “Device and Interfaces” folder, select “Update MAX driver support...” from the Tools menu.
3. Reboot when prompted, launch MAX, and refresh again by pressing F5. The PXD 222 Digitizer will now appear in the list.

**Note:** the string “PXI0::19::INSTR” in the illustration below is the VISA Resource Name MAX has assigned to the PXD 222 Digitizer. The actual name assigned will vary based on the PCI bus number and slot where the PXD 222 Digitizer is installed.

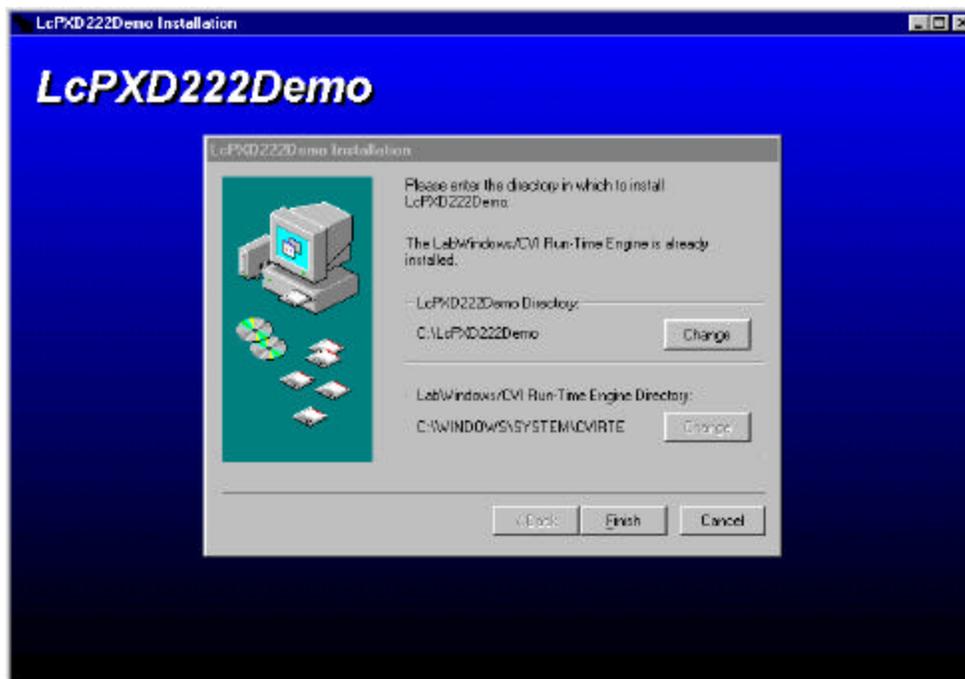


Measurement and Automation Explorer with PXD 222 Digitizer recognized

## *First Things...First*

### **Install Quick-Start Application Software**

This software is intended to be a tool for you to test operation of the module, and for simple triggering and viewing of signals. This application is described in the “Operation” section of this manual.



### **Copy Complementary Files onto Your Hard Drive (optional)**

These files include the Getting Started LabWindows™/CVI example programs, and the driver help files for CVI and VisualBasic.

## **PXD 222 Digitizer**

### **Install LcIVIScopeDemo (optional)**

This LcIVIScopeDemo program illustrates the use of the Basic IVI Scope Class Drivers to control the PXD 222 Digitizer. To use this demo, you will need to install the BICDSetup.exe installation program provided on the CD-ROM (also currently available from National Instruments at no charge). Then you will need to create a new “IVI Instruments” setup in MAX using the Logical Names wizard. This process modifies the IVI.INI file; examples of the file for Win98 and Win2000 systems are provided on the CD-ROM. Make a backup of your existing IVI.INI file and copy the example file into the VXIPNP/niivi directory. Perform a Refresh (F5) in MAX to see the new IVI Instrument setup.

Prior to running the IVIScope demo program, make sure that the link to the PXD 222 DLL is correct. Open MAX, and right-click on the LcPXD 222 Digitizer selection under “IVI Instruments ? Instrument Drivers.” This will open up the properties window for the driver. Verify that the “File” selection is set to the LcPXD222\_32.dll file. (The parser in MAX may not have read the directory structure accurately.) Click “Browse” and navigate to the location of the DLL on your system. Most installations will place this file within the VXIPNP/Win\*\*/Bin directory path, where “\*\*” is either “95” or “NT”.

Once the set-up is correct, you can use the IVIScope demo program. This program is similar to the Quick-Start Demo but uses the basic IVI class driver subroutine names. For more information about the IVI architecture and IVI class drivers, visit <http://www.ni.com/ivi>.

§ § §

## Operation

### INTRODUCTION

This section is intended to give you an understanding of the standard acquisition, triggering, and measurement features of the PXD 222 Digitizer. Detailed descriptions of how to operate the PXD222 Digitizer can be found in the Driver Help file.

#### A. Acquisition Modes

The PXD 222 Digitizer has two modes of operation NORMAL and MIN/MAX. These are defined as follows:

**NORMAL:** In Normal mode, the PXD 222 Digitizer operates as a typical digitizer. The module will digitize the input signals during a specified time window and create a data array with the digitized data that can be read out by the controller. The user programs the number of points (maximum of 1000) as well as the time window to be digitized. The maximum sample rate is 2.5 GS/s, and will vary depending on the time window setting. Table 1 gives the sample rates that are achieved.

**MIN/MAX:** There are two MIN/MAX modes, which are referred to as **Glitch Capture** and **Scope Record**. In these modes, the PXD 222 Digitizer outputs two arrays; a MIN array with the minimum values detected during each sample interval, and a MAX array with the maximum value detected during each sample interval. Here's how it works. In MIN/MAX mode, the time window is divided into sampling intervals. During each interval, the digitizer oversamples the input at high speed (see tables 2 and 3 on the following pages) and stores the MIN and MAX values in data arrays. This technique allows you to detect and record glitches in the waveform that would not be found if only 1 sample were taken during each sampling interval. The Acquisition type is programmed by means of the function **LcPXD222\_ConfigureAcquisitionType**. (**Note:** This mode is sometimes also referred to as a Peak Detect mode.)

When in Min/Max mode, and for time windows of 10 seconds or less, the digitizer is in Glitch Capture Mode, and will record MIN/MAX arrays of roughly 255 points. For time ranges of 11 seconds and higher, the digitizer is in Scope Record Mode, and will store min-max arrays of roughly 27kpts.

#### Understanding the difference between Normal and MIN/MAX modes

Take an example where the time window is set to 1 ms. In Normal mode, the time between samples would be 1  $\mu$ s ( $1 \text{ ms}/1000 = 1 \mu\text{s}$ ), corresponding to a sample rate of 1 MS/s because exactly one sample is acquired per sample interval in this mode.

When setting the time window to 1 ms in MIN/MAX mode, the sampling interval is approximately 4  $\mu$ s. This is roughly 4X longer than the corresponding value in Normal mode because 255 points are stored instead of 1000. The PXD 222 Digitizer, however does not take only 1 sample in this 4  $\mu$ s time interval, but instead samples at the higher speed of 20 MS/s. Of the 80 samples that are taken ( $20\text{MS/s} * 4 \mu\text{s} = 80$ ), the min and max points are retained. This is done for each of the 255 time intervals to create the Min and Max data arrays.

**PXD 222 Digitizer****Table 1: Normal Mode Time Windows, Intervals, and Sample Rates**

Time Window	Sampling Time Interval for Each Point	Real Time Sampling Rate	Nominal # of Samples <sup>a</sup>
100 ns	400 ps	2.5 GS/s	250
200 ns	400 ps	2.5 GS/s	500
500 ns	2 ns	500 MS/s	250
1 $\mu$ s	2 ns	500 MS/s	500
2 $\mu$ s	2 ns	500 MS/s	1000
5 $\mu$ s	10 ns	100 MS/s	500
10 $\mu$ s	10 ns	100 MS/s	1000
20 $\mu$ s	20 ns	50 MS/s	1000
50 $\mu$ s	50 ns	20 MS/s	1000
100 $\mu$ s	200 ns	5 MS/s	500
200 $\mu$ s	200 ns	5 MS/s	1000
500 $\mu$ s	500 ns	2 MS/s	1000
1 ms	1 $\mu$ s	1 MS/s	1000
2 ms	2 $\mu$ s	500 kS/s	1000
5 ms	5 $\mu$ s	200 kS/s	1000
10 ms	10 $\mu$ s	100 kS/s	1000
20 ms	20 $\mu$ s	50 kS/s	1000
50 ms	50 $\mu$ s	20 kS/s	1000
100 ms	100 $\mu$ s	10 kS/s	1000
200 ms	200 $\mu$ s	5 kS/s	1000
500 ms	500 $\mu$ s	2 kS/s	1000
1 s	1 ms	1 kS/s	1000
2 s	2 ms	500 S/s	1000
5 s	5 ms	200 S/s	1000
10 s	10 ms	100 S/s	1000

a. # of points will vary slightly from the nominal value

**Operation****Table 2: Glitch Capture Mode Time Windows, Intervals, and Sample Rates**

Time Window	Sampling Time Interval for Each Point	Real Time Sampling Rate <sup>a</sup>
100 ns	400 ps	2.5 GS/s
200 ns	800 ps	2.5 GS/s
500 ns	2 ns	2.5 GS/s
1 $\mu$ s	4 ns	2 GS/s
2 $\mu$ s	8 ns	1 GS/s
5 $\mu$ s	20 ns	200 MS/s
10 $\mu$ s	40 ns	100 MS/s
20 $\mu$ s	80 ns	50 MS/s
50 $\mu$ s	200 ns	20 MS/s
100 $\mu$ s	400 ns	20 MS/s
200 $\mu$ s	800 ns	20 MS/s
500 $\mu$ s	2 $\mu$ s	20 MS/s
1 ms	4 $\mu$ s	20 MS/s
2 ms	8 $\mu$ s	20 MS/s
5 ms	20 $\mu$ s	20 MS/s
10 ms	40 $\mu$ s	20 MS/s
20 ms	80 $\mu$ s	20 MS/s
50 ms	200 $\mu$ s	20 MS/s
100 ms	400 $\mu$ s	20 MS/s
200 ms	800 $\mu$ s	20 MS/s
500 ms	2 ms	20 MS/s
1 s	4 ms	20 MS/s
2 s	8 ms	20 MS/s
5 s	20 ms	20 MS/s
10 s	40 ms	20 MS/s

- a. Waveform is oversampled at the real time sampling rate. Within each time interval, the minimum and maximum values are stored. A total of roughly 27 kpts are stored in the MIN and MAX arrays.

## PXD 222 Digitizer

**Table 3: Scope Record Mode Time Windows, Intervals, and Sample Rates**

Time Window	Sampling Time Interval for Each Point	Real Time Sampling Rate <sup>a</sup>
11 s	400 $\mu$ s	20 MS/s
22 s	800 $\mu$ s	20 MS/s
55 s	2 ms	20 MS/s
110 s	4 ms	20 MS/s
220 s	8 ms	20 MS/s
9 min	20 ms	20 MS/s
18 min	40 ms	20 MS/s
36 min	80 ms	20 MS/s
90 min	200 ms	20 MS/s
3 h	400 ms	20 MS/s
6 h	800 ms	20 MS/s
9 h	1200 ms	20 MS/s
18 h	2400 ms	20 MS/s
36 h	4800 ms	4 MS/s

a. Waveform is oversampled at the real time sampling rate. Within each time interval, the minimum and maximum values are stored.

### B. Run Modes

The digitizer can be set to run in either **Continuous** or **Single-shot** mode. This is done through the function `LcPXD222_ConfigureInitiateContinuous`.

### C. Trigger Modes

The PXD 222 Digitizer supports the following trigger types: EDGE, GLITCH, WIDTH, TV, and IMMEDIATE.

**EDGE:** An edge trigger occurs when the trigger signal crosses the specified trigger level with the specified slope. The trigger level and slope are configured with the function `LcPXD222_ConfigureEdgeTriggerSource`.

**GLITCH:** A glitch trigger occurs when the trigger signal has a pulse width that is less than the glitch width. The trigger does not actually occur until the edge of the pulse that corresponds to the specified glitch width and polarity crosses the trigger level. The trigger level is configured with the function `LcPXD222_ConfigureGlitchTriggerSource`.

## Operation

**WIDTH:** A width trigger occurs when the oscilloscope detects a positive or negative pulse width between or, optionally, outside the width thresholds. The trigger does not actually occur until the edge of a pulse that corresponds to the specified width thresholds and polarity crosses the trigger level. The width thresholds, whether to trigger on pulse widths that are within or outside the width thresholds, the polarity of the pulse, and the trigger level are configured with the function **LcPXD222\_ConfigureWidthTriggerSource**.

**TV:** The PXD 222 Digitizer can trigger on NTCS, PAL and SECAM video signals. The TV signal type, the field and line number on which to trigger, and the signal polarity are configured with the function **LcPXD222\_ConfigureTVTriggerSource**.

**IMMEDIATE:** In this mode, the oscilloscope does not wait for trigger event and instead immediately begins the digitization process.

### D. PXD 222 DIGITIZER WAVEFORM MEASUREMENTS

The PXD 222 Digitizer performs the following waveform measurements:

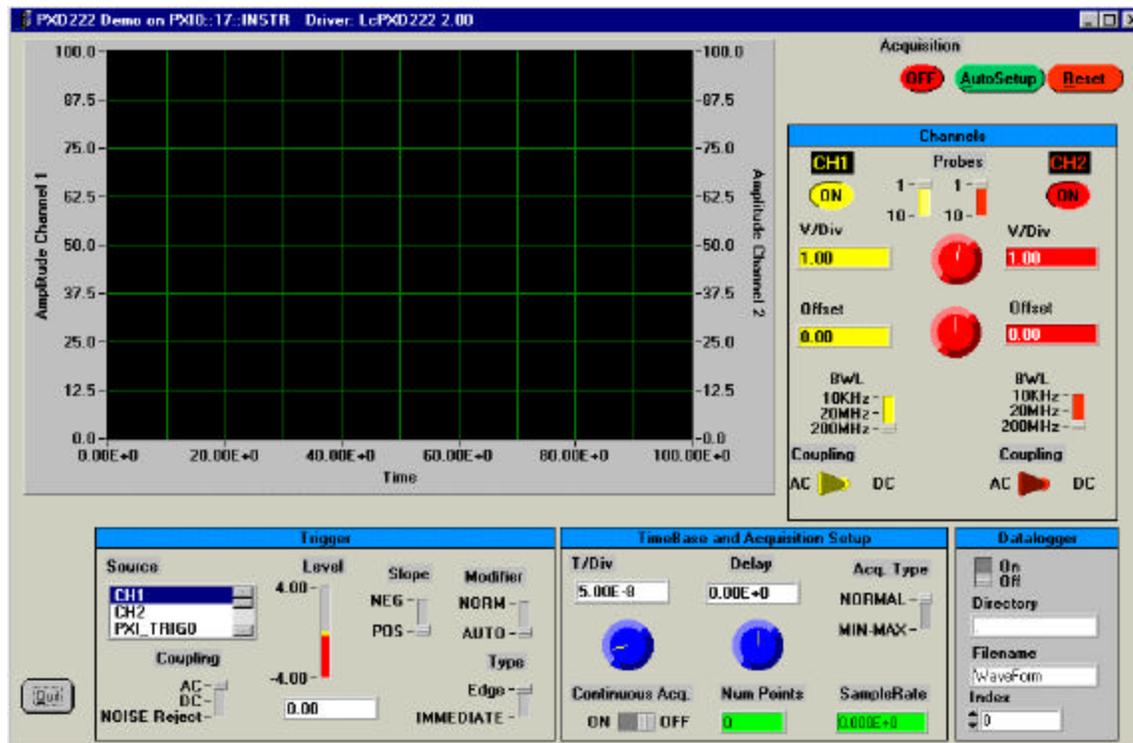
Mean Voltage	LCPXD222_VAL_VOLTAGE_AVERAGE
RMS Voltage (AC)	LCPXD222_VAL_VOLTAGE_RMS
True RMS Voltage (AC+DC)	LCPXD222_VAL_VOLTAGE_TRUE_RMS
Peak to Peak voltage	LCPXD222_VAL_VOLTAGE_PEAK_TO_PEAK
Maximum Peak voltage	LCPXD222_VAL_VOLTAGE_MAX
Minimum Peak voltage	LCPXD222_VAL_VOLTAGE_MIN
Neg Duty Cycle percentage	LCPXD222_VAL_DUTY_CYCLE_NEG
Pos Duty Cycle percentage	LCPXD222_VAL_DUTY_CYCLE_POS
Frequency	LCPXD222_VAL_FREQUENCY
Neg Pulse Width	LCPXD222_VAL_WIDTH_NEG
Pos Pulse Width	LCPXD222_VAL_WIDTH_POS
Phase Difference	LCPXD222_VAL_PHASE

To read out a waveform measurement, use the **LcPXD222\_ReadWaveformMeasurement** function. To read back both the measurement and the waveform, call the function.

**LcPXD222\_FetchWaveform** after calling **LcPXD222\_ReadWaveformMeasurement**.

## PXD 222 Digitizer

### PXD 222 DIGITIZER QUICK START APPLICATION SOFTWARE



#### Soft Front Panel

The PXD 222 Digitizer Quick Start Application software has the following features:

- Graphic Display with independent vertical axis for each digitizer input channel
- Acquisition section including autosetup and reset
- Channels section with independent control of probe attenuation, Volts/Div, Offset, Bandwidth limit, and coupling
- Timebase section including Time/Div, Delay and acquisition type as well as indicators for the number of points per acquisition and the sample rate
- Trigger section with source, coupling, slope, type, and level selectors
- Data Logger section

## Operation



**Acquisition:** The "Acquisition" indicator is green when data is being acquired and red when the acquisition is stopped.

**AutoSetup:** The **AutoSetup** feature lets the digitizer display complex, unknown signals automatically. This function optimizes the position, range, time base, and triggering.

**Reset:** The **Reset** feature will reset the PXD 222 Digitizer hardware and the software application to a default state.



**Hint:** Typing values is easier than using the knob.

**En CH1 and En CH2:** The enable channel 1 and enable channel 2 buttons are used to turn on and off channels 1 and 2 respectively. The color of the buttons matches the color of the trace.

**CH1 and CH2 Probes:** The BNC inputs to the digitizer do not include automatic probe sensing. The CH1 and CH2 Probe switch should be set to **10** when a 10:1 probe is connected to the channel input, but it should be set to **1** when there is a direct connection.

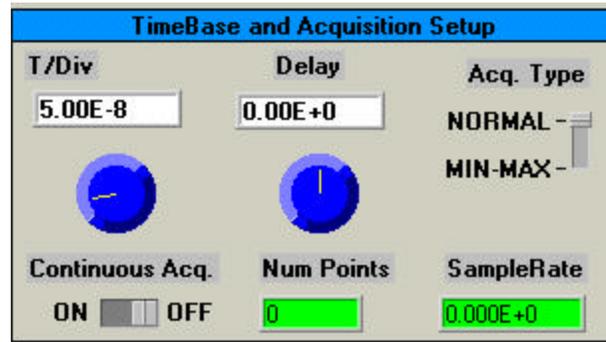
**V/Div. CH1 and CH2:** Set the volts per division for each input independently by using the **V/Div** knob or by typing a value in the V/Div control box. The **V/Div** knob will change color depending on the channel selected: yellow when channel 1 is selected and red when channel 2 is selected. These colors also match the trace colors in the graphic display.

## PXD 222 Digitizer

**Offset CH1 and CH2:** Set the Offset for each input independently using the **Offset** knob or by typing a value in the Offset control box. The **Offset** knob will change color depending on the channel selected: yellow when channel 1 is selected and red when channel 2 is selected. These colors also match the trace colors in the graphics display.

**Bandwidth Limit CH1 and CH2:** To suppress high frequency noise on waveforms, you can limit the bandwidth of the digitizer by selecting a **10 kHz** or **20 MHz** filter. This function smooths the displayed waveform by blocking frequencies above the filter's limit.

**Coupling CH1 and CH2:** Each channel of the digitizer is set to **DC** coupled by default so that AC and DC voltages appear on the display. Select **AC** coupling when you wish to observe a small signal that rides on a DC signal. Clicking the switch control toggles the selection.



**T/Div:** The time per division is set by using the **T/Div** knob or by typing a value in the T/Div control box. The digitizer automatically adapts itself to use the maximum sampling rate whenever the timebase is changed.

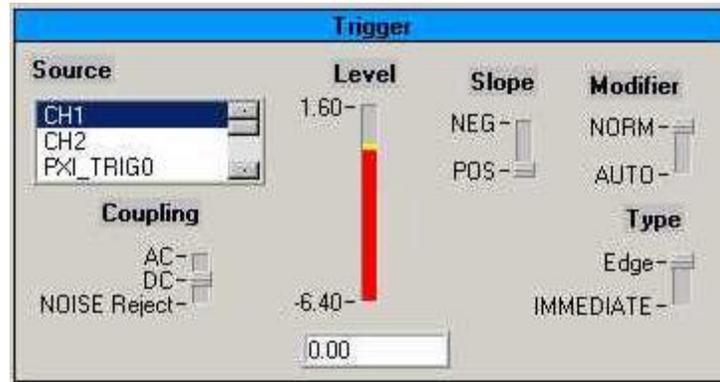
**Delay:** Turn the **Delay** knob to adjust the horizontal position and the amount of pre-trigger, as desired.

**Acquisition Type:** In **NORMAL** type, each acquisition is a fixed number of points depending on the timebase; and the time between points is the inverse of the sample rate. In **Min-Max** type an oversampling technique is used to detect peaks. This acquisition type is useful for detecting glitches on slow timebase settings. See the Operation chapter for more information.

**Number of Points:** This is an indicator that displays the number of points in each acquisition. This will vary automatically depending on the T/Div and Acquisition type.

**Sample Rate:** This is an indicator that displays the sample rate for each acquisition. This will vary automatically depending on the T/Div and Acquisition type.

## Operation



**Source:** The trigger source for the digitizer may be either of the input channels or the PXI Trigger and Star Trigger lines on the PXI backplane.

**Coupling:** This sets the trigger coupling for the input channels. **DC** is used when all the signal frequency components are coupled to the trigger circuit. When **AC** is selected the signal is capacitively coupled, DC levels are rejected, and frequencies below 50 Hz are attenuated. **NOISE Reject** is a filter that will help reduce jitter when triggering on noisy waveforms.

**Level:** Defines the source voltage at which the trigger circuit will generate an event.

**Slope:** Determines the direction of the trigger voltage transition used to generate a particular trigger event.

**Modifier:** In **NORM** mode the digitizer will acquire while there is a valid trigger. In **AUTO** mode the trace will automatically be displayed regardless of a valid trigger. When a valid trigger is present in auto mode, the digitizer will behave as if in normal mode.

**Type:** **Edge** type requires a valid trigger edge. **IMMEDIATE** type will force a trigger even if the trigger conditions are not met.

**On/off:** turns datalogging on and off.

**Directory:** Sets the directory for storing waveforms. Entering a period sets the current directory of the Quick-Start Demo; entering another value (e.g., "Test 1") creates a new folder called "Test1" referenced from the current directory.

**Filename:** Sets prefix for filename.

**Index:** An auto-incrementing index is appended to the above filename. When the datalogger is turned on, and the program is in continuous Acquisition mode, each waveform will be stored.

## ***PXD 222 Digitizer***

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### **USING THE PXD 222 DIGITIZER IVI INSTRUMENT DRIVERS**

Your CD-ROM includes several example programs written in LabWindows/CVI using the PXD 222 IVI driver. Even if you are not using CVI, the ".c" files provide practical examples that will help you learn how to program the PXD 222 Digitizer.

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## Specifications

### PXD 222 DIGITIZER SPECIFICATIONS

**NOTE:** Specifications are subject to change without notice.



#### VERTICAL SYSTEM

**Bandwidth** (DC coupled): 200 MHz (−3dB)

**Lower Frequency Limit** (AC coupled):

with 10:1 probe..... < 2 Hz (−3dB)

direct (1:1) ..... < 5 Hz (−3dB)

**Rise Time:** 1.7 ns

**Analog Bandwidth Limiters:** 20 MHz and 10 kHz

**Input Coupling:** AC, DC

**Full Scale ranges:**

direct (1-2-5 sequence) ..... 40 mV to 800 V

with 10:1 probe..... 400 mV to 8000 V

**Positioning (% of full range):** 100%

**Input Impedance on BNC:**



DC Coupled..... 1 Mohms (±1%) // 15 pF (±2 pF)

**Max. Input Voltage**

with 10:1 probe..... 1000 V CAT II

direct (1:1) ..... 300 V CAT II

(For detailed specifications, see “SAFETY”)

**Vertical Accuracy:** ±2% of full range

**Digitizer Resolution:** 8 bits, separate digitizer

#### HORIZONTAL SYSTEM

**Maximum Time Base Speed:** 400 ps/sample

**Minimum Time Base Speed:** 4.8 s/sample (scope record mode)

**Real Time Sampling Rate (for both inputs simultaneously):**

400 ps to 80 ns/S ..... up to 2.5 GS/s

## PXD 222 Digitizer

40 ns to 2.4 s/S .....20 MS/s

4.8 s/S ..... 4 MS/s

(See the chapter on Operation for more information.)

**Acquisition Modes:** Real Time, Single Sweep

**Normal Acquisition Mode:**

Record size ..... up to 1000 samples/ch

Record time span ..... 100 ns to 10 s

**Glitch Capture Mode:**

Record size .....250 points (Min. and Max data arrays returned)

Recorded time span .....50  $\mu$ s to 10 s; detects glitches as fast as 50 ns by  
oversampling waveform

Sample rate ..... up to 2.5 GS/s

**Scope Record Size:**

Record size .....27 points (Min. and Max data arrays returned)

Sample rate ..... up to 20 MS/s

## TRIGGER

**Trigger Modes:** Automatic, Edge, Video, Pulse Width

**Trigger Delay:** up to +25000 samples

**Pre Trigger View:** 2500 samples

**Max. Delay:** 10 s

**Edge Trigger:**

Mode ..... On Trigger, Single Shot

Source ..... Ch1, Ch2, PXI\_TRIG[0,1,2...7], PXI\_STAR[0,1,2...7]

Slope ..... Positive, Negative

**Trigger Level Control Range:**

Input Ch1, Ch2 ..... 100% of full range

PXI\_TRIG[0,1,2...7] ..... fixed C-mos Cpci-level

PXI\_STAR[0,1,2...7] ..... fixed C-mos Cpci-level

## Specifications

### Trigger Sensitivity Ch1 and Ch2:

DC to 5 MHz.....	5 mV or 6.25% of full range
@ 200 MHz .....	12.5% of full range
@ 250 MHz .....	25.0% of full range

### Video Trigger:

Standards.....	PAL, PAL+, NTSC, SECAM
Modes .....	Lines, Line Select, Field 1, or Field 2
Source.....	Ch 2
Polarity .....	Positive, Negative
Sensitivity (sync level) .....	8.75% of full range

### Pulse Width Trigger:

Screen Update .....	On Trigger, Single Shot
Trigger Conditions .....	< T, > T, approximately equal to T ( $\pm 10\%$ ), not equal to T ( $\pm 10\%$ )
Source.....	Ch2
Polarity .....	Positive or negative pulse
Pulse Time Adj. Range .....	0.25 to 10 samples with a maximum resolution of 50 ns

### Auto Set/ Range:

Autoranging attenuators and timebase; automatic triggering with automatic source selection. The autorange must be switched on or off.

If autorange is on, all auto functions are active until an **autorange off** command is executed.

### Modes:

Normal.....	15 Hz to max. bandwidth
Low Frequency.....	1 Hz to max. bandwidth

### Minimum Amplitude Ch 1, Ch 2

DC to 1 MHz.....	20 mV
1 MHz to max. bandwidth.....	40 mV

**PXD 222 Digitizer****PHYSICAL DIMENSIONS**

Height.....3 U (13.3 cm, 5.25 in.)  
 Width .....2 slots (3.9 cm, 1.56 in.)  
 Weight.....0.77 kg (1.7 lb.)

**POWER REQUIREMENTS**

Input voltage at cPCI connector ..... 5 V  $\pm$ 10%  
 Input current..... 1.6 A

**ENVIRONMENTAL CONDITIONS****Temperature**

Operating .....0 °C to 50 °C (32 °F to 122 °F) with specified cooling of PXI  
 rack (indoor use only)  
 Non-Operating .....-40 °C to +71 °C

**Humidity**

Operating .....5% to 95% max. RH (non-condensing) up to 30 °C; upper  
 limit derates to 45% RH (non-condensing) at 40 °C (104 °F)  
 Non-operating .....5% to 95% max. RH (non-condensing) up to 30 °C; upper  
 limit derates to 45% RH (non-condensing) at 60 °C (140 °F)

**Altitude**

Operating .....4600 m (15,092 ft.)  
 Non-operating ..... 12,000 m (39,377 ft.)

**Altitude**

Conforms to MIL-PRF-28800 Class 3

## Specifications

### SAFETY



The LeCroy PXD 222 Digitizer is designed for measurements on 300 V Category II Installations, Pollution Degree 2, per:

EN 61010-1:1993 + A2:1995

CAN/CSA-C22.2 No.1010.1-92

UL3111-1



**Max. Input Voltages:**

Input Ch 1 and Ch 2 directly..... 300 V CAT II

Input Ch 1 and Ch 2 via 10:1 probe ..... 1000 V CAT II



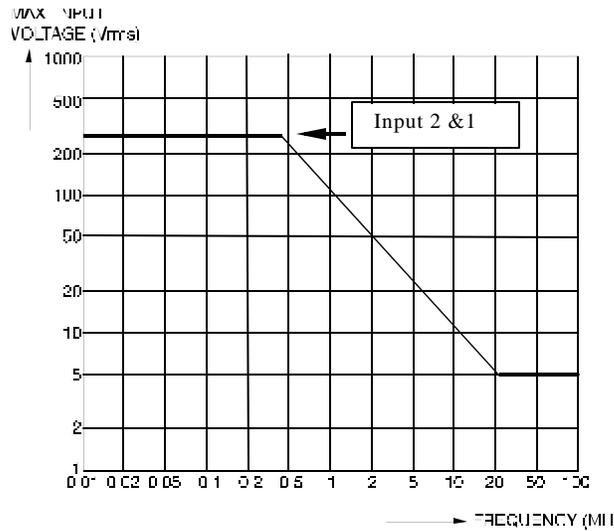
**Max. Floating Voltage:**

From any terminal to ground..... 300 V CAT II

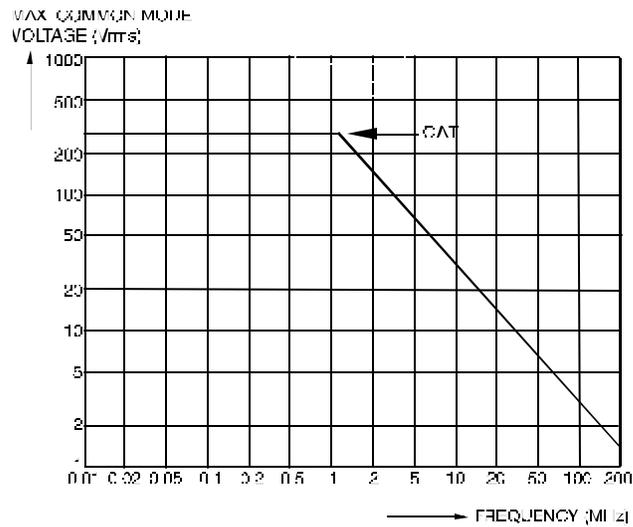
Between any terminal..... 300 V CAT II

Voltage ratings are given as “working voltage.” They should be read as VAC rms (50–60 Hz) for AC sine wave applications and as VDC for DC applications.

## PXD 222 Digitizer



**Max. Input Voltage v.s. Frequency**



**Safe Handling: Max. Input Voltage between Scope References 1 and 2 and between Scope References and safety ground**

## Specifications

### CERTIFICATIONS

CE approved, UL & cUL recognized

**CE Declaration of Conformity:** The PXD 222 Digitizer meets requirements of the EMC Directive 89/336/EEC for Electromagnetic Compatibility and Low Voltage Directive 73/23/EEC for Product Safety.

EMC Directive:	EN 61326-1:1997 +A1:1998	
	EMC requirements for electrical equipment for measurement, control, and laboratory use.	
Electromagnetic Emissions:	EN55022:1998, Class B	Radiated emissions
Electromagnetic Immunity:	EN 61000-4-2:1995 +A1:1998*	Electrostatic Discharge
	EN 61000-4-3:1996 +A1:1998*	RF Radiated Electromagnetic Field
	EN 61000-4-4:1995*	Electrical Fast Transient/Burst
	EN 61000-4-5:1995*	Surges
	EN 61000-4-6:1996*	RF Conducted Electromagnetic Field

\* Meets Performance Criteria "B" limits – during the disturbance, product undergoes a temporary degradation or loss of function of performance which is self recoverable.



#### CAUTION

**EMC specifications are only valid if the unit is properly installed in a CE compliant PXI chassis, as described in the Installation procedure.**

## **PXD 222 Digitizer**

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Low Voltage Directive:

EN 61010-1:1993 +A2:1995

Safety requirements for electrical equipment for measurement, control, and laboratory use.

The PXD 222 Digitizer has been qualified to the following EN61010-1 category:

300 V Installation (Overvoltage) Category II

Pollution Degree 2

Protection Class I

UL and cUL Recognized:

UL Standard: UL 3111-1

Canadian Standard: CSA-C22.2 No. 1010.1-92

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