LeCroy

Instruction Manual

ZD200 Differential Probe

ZD200 Differential Probe

Instruction Manual

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Warranty

LeCroy warrants this oscilloscope accessory for normal use and operation within specification for a period of one year from the date of shipment. Spare parts, replacement parts and repairs are warranted for 90 days.

In exercising its warranty, LeCroy, at its option, will either repair or replace any assembly returned within its warranty period to the Customer Service Department or an authorized service center. However, this will be done only if the product is determined by LeCroy's examination to be defective due to workmanship or materials, and the defect is not caused by misuse, neglect, accident, abnormal conditions of operation, or damage resulting from attempted repair or modifications by a non-authorized service facility.

The customer will be responsible for the transportation and insurance charges for the return of products to the service facility. LeCroy will return all products under warranty with transportation charges prepaid.

This warranty replaces all other warranties, expressed or implied, including but not limited to any implied warranty of merchantability, fitness or adequacy for any particular purposes or use. LeCroy shall not be liable for any special, incidental, or consequential damages, whether in contract or otherwise.

Internet: www.lecroy.com

Manufactured under an ISO 9000 Registered Quality Management System. Visit www.lecroy.com to view the certificate.		This electronic product is subject to disposal and recycling regulations that vary by country and region. Many countries prohibit the disposal of waste electronic equipment in standard waste receptacles. For more information about proper disposal and recycling of your LeCroy product, please visit **www.lecroy.com/recycle**.

ZD200-GSM-REVA

919314-00 Rev A

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Introduction

The ZD200 Differential Probe is ideally suited for automotive and serial data signals. The wide dynamic range (+/- 20V differential) and 1 MOhm input resistance make the ZD200 ideally suited for a wide range of applications.

The ZD200 probe can be used with LeCroy's WaveSurfer, WaveRunner, WavePro, and WaveMaster series platforms with firmware version 6.4.1.x or later.

With the ProBus interface, the ZD200 probe becomes an integral part of the oscilloscope. The probe can be controlled from the oscilloscope's front panel. The oscilloscope provides power to the probe, so there is no need for a separate power supply or batteries.

Key Benefits

The ZD200 probe features:

- 1 MOhm input resistance
- Low input capacitance
- Wide dynamic range
- ProBus interface
- Complete accessory kit consisting of 3 sets of grabbers, one alligator clip, 2 sets of leads and 2 tip options for probing a variety of test points

Standard Accessories

The ZD200 probe is shipped with the following standard accessories:

Standard Accessory	Quantity
Straight Tip	6
Hook Clip	2
Y Leadset	1
Micro IC Clips	2
Micro-Grabbers	2
Extension Leads (5 cm)	2
Extension Leads (10 cm)	2
Dual Pin Set (12.8 mm)	2
Dual pin set (16.8 mm)	2
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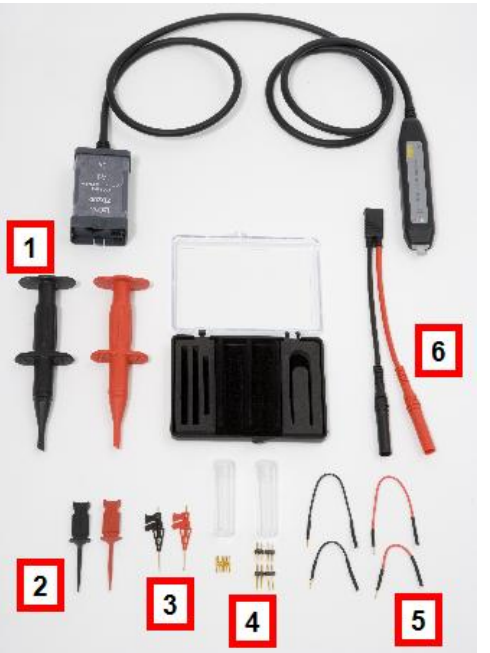
Certificate of Calibration	1

Features and Accessories

The ZD200 probe is provided with numerous features and accessories to make probing and connecting to different test points easier than ever.

- The small, low mass probe head is designed for ease of use and high performance.
- The probe tip socket fits easily onto 0.025 inch square pins for direct access to test points. Several different adapters are available which connect directly in the probe socket.

The following image shows the standard accessories for the ZD200 probe:



Num	Part	Description
1	Hook Clips	
2	Micro-Grabbers	The micro- and mini-grabbers are ideal for connecting to small IC legs or pins very tightly spaced.
3	Micro IC Grabbers	The micro- and mini-grabbers are ideal for connecting to small IC legs or pins very tightly spaced.
4	Straight Tips and Dual Pin Sets	The Straight Tip and Dual Pin Sets are designed to connect to the smallest vias and small test points. Fits in either probe socket.
5	Extension Leads	This lead has a socket on one end and a square pin on the other to connect to the input or ground socket of the probe body, and may be used for general purpose probing.
6	Y Lead Adapter	This lead is used for both ground and input lead simultaneously. It has two sockets on one end for connection to the provided hook clips and two square pins on the other and may be used for general purpose probing.

Probe Operation

Handling the Probe

The ZD200 probe is a precision test instrument. Exercise care when handling and storing the probe. Always handle the probe by the probe body or compensation box. Avoid putting excessive strain or exposing the probe cable to sharp bends.

ESD Sensitive: The tips of the ZD200 probes are sensitive to Electrostatic Discharge (ESD). Avoid causing damage to the probe by always following anti-static procedures (wear wrist strap, etc.) when using or handling the probe.

Connecting the Probe to a LeCroy Oscilloscope

The ZD200 probe has been designed for use with LeCroy's WaveSurfer, WaveRunner, WaveMaster, and WavePro platforms equipped with the ProBus interface. When you attach the probe output connector to the oscilloscope's input connector, the oscilloscope recognizes the probe, provides proper termination and activates the probe control functions in the user interface.

Operation with a LeCroy Oscilloscope

When the ZD200 probe is connected to any compatible LeCroy oscilloscope, the displayed scale factor and measurement values are automatically adjusted.

Control through the oscilloscope's interface can be found on the channel dialog that corresponds with the connected probe. Refer to your oscilloscope's manual for specific operation instructions.

Turning the **Volts/Div** knob controls the oscilloscope's scale factor to give full available dynamic range up to 5 V/div.

Auto Zero Operation

The scope software includes a feature to null the probe's residual offset voltage. The probe should be disconnected from any signal and the Auto Zero button on the probe menu pressed. This will measure any residual offset in the probe and remove it from the measurement.

Connecting the Probe to the Test Circuit

To maintain the high performance capability of the probe in measurement applications, care must be exercised in connecting the probe to the test circuit. Increasing the parasitic capacitance or inductance in the input paths may introduce a "ring" or slow the rise time of fast signals. Input leads which form a large loop area will pick up any radiated electromagnetic field which passes through the loop and may induce noise into the probe input.

Using one of the available accessories makes the ZD200 probe with its small profile and low mass head ideally suited for applications in dense circuitry.

Care and Maintenance

Cleaning

The exterior of the probe and cable should be cleaned, using a soft cloth moistened with water. The use of abrasive agents, strong detergents, or other solvents may damage the probe. Always ensure that the input leads are free of debris.

The probe case is not sealed and should never be immersed in any fluid.

Calibration Interval

The recommended calibration interval is one year. (Performance Verification and Adjustment Procedures are included in this manual.)

Service Strategy

The ZD200 probe utilizes fine pitch surface mount devices. It is therefore impractical to attempt to repair in the field. Defective probes must be returned to a LeCroy service facility for diagnosis and exchange. Defective probes under warranty are repaired or replaced. A probe that is not under warranty can be exchanged for a factory refurbished probe for a modest fee. You must return the defective probe in order to receive credit for the probe core.

Returning a Probe for Calibration or Service

Return a probe for calibration or service by contacting your local LeCroy sales representative. They tell you where to return the product. All returned products should be identified by both **model** and **serial number**. Provide your **name** and **contact number**, and a **description of the defect or failure** (if possible).

Products returned to the factory require a **Return Material Authorization (RMA)** acquired by contacting your nearest LeCroy sales office, representative or the North America Customer Care Center.

- Return shipment should be prepaid.
- LeCroy cannot accept COD or Collect Return shipments.
- We recommend air-freighting.

Note: It is important that the RMA be clearly shown on the outside of the shipping package for prompt redirection to the appropriate department.

Use the following steps for a smooth product return.

1. Contact your local LeCroy sales or service representative to obtain a Return Material Authorization.
2. Remove all accessories from the probe. Do not include the manual.
3. Pack the probe in its case, surrounded by the original packing material (or equivalent) and box.
4. Label the case with a tag containing
    - The RMA
    - Name and address of the owner
    - Probe model and serial number

- Description of failure

5. Package the probe case in a cardboard shipping box with adequate padding to avoid damage in transit.
6. Mark the outside of the box with the shipping address given to you by the LeCroy representative; be sure to add the following:
    - ATTN: <RMA assigned by the LeCroy representative>
    - FRAGILE
7. Insure the item for the replacement cost of the probe.
8. Ship the package to the appropriate address.

Returning a Probe to a Different Country

Note: Be sure to properly mark shipments returned for service from a different country to avoid customs duty for a full purchase price of a new probe or accessory.

In addition to the items mentioned in the previous topic, mark shipments returned for service as a **Return of US manufactured goods for warranty repair/recalibration**. If there is a cost involved in the service, put the cost of the service in the value column and the original value of the product at time of purchase in the body of the invoice marked **For insurance purposes only**.

Be very specific as to the reason for shipment. Duties may have to be paid on the value of the service.

Replacement Parts

The probe connection accessories and other common parts can be ordered through the North America Customer Care Centers.

Replacement Part	Part Number
Accessory Kit	PACC-ZD007
Y-Lead Adapter	PACC-ZD008

Performance Verification

Performance Verification Overview

This procedure can be used to verify the warranted characteristics of the ZD200 High Impedance Active Probe.

The recommended calibration interval for the model ZD200 is one year. The complete performance verification procedure should be performed as the first step of annual calibration. Test results can be recorded on a photocopy of the Test Record provided in Appendix A at the end of the manual.

Performance verification can be completed without removing the probe covers or exposing the user to hazardous voltages. There are no adjustments.

This procedure tests LF Attenuation Accuracy.

Required Test Equipment

The following table lists the test equipment and accessories (or their equivalents) that are required for performance verification of the ZD200 Probe.

This procedure has been developed to minimize the number of calibrated test instruments required.

Only the parameters listed in boldface in the Minimum requirements column must be calibrated to the accuracy indicated.

Because the input and output connector types may vary on different brands and models of test instruments, additional adapters or cables may be required.

Description	Minimum Requirement	Test Equipment Examples
Digital Oscilloscope	ProBus Interface; Windows-based with software version 6.4.1.5 or later	LeCroy WaveRunner Xi, WavePro Zi or WaveSurfer Xs
Digital Multimeter (DMM) with test probe leads	4.5 digit DC: 0.1% Accuracy AC: 0.1% Accuracy	Agilent Technologies 34401A or Fluke 8842A-09
Function Generator	Sine Wave output amplitude adjustable to 14.14 Vp-p (5 Vrms) into 1 MΩ at 70 Hz	Agilent Technologies 33120A or Stanford Research Model DS340
Power Supply	0-12 V, settable to 10 mV	HP E3611A
BNC Coaxial Cable (2 ea.)	Male to Male, 50 Ω, 36" Cable	Pomona 2249-C-36 or Pomona 5697-36
BNC Tee Connector	Male to Dual Female	Pomona 3285
Calibration Fixture	ProBus Extender	LeCroy PROBUS-CF01

Description	Minimum Requirement	Test Equipment Examples
	Cable	
Terminator, Precision, BNC	50 Ω ± 0.05%	LeCroy TERM-CF01
Banana Plug Adapter (2 ea.)	Female BNC to Dual Banana Plug	Pomona 1269
BNC to Mini-grabber	BNC Mail to Mini-grabber Cable, 36”	Pomona 5187-C-36

List of Required Equipment

Preliminary Procedure

1. Connect the ZD200 probe to the female end of the ProBus Extension Cable. Connect the male end of the ProBus Extension Cable to channel 1 of the oscilloscope.
2. Turn the oscilloscope on and allow at least 30 minutes warm-up time for the ZD200 and test equipment before performing the Verification Procedure.
3. Turn on the other test equipment and allow them to warm up for the manufacturer’s recommended timeframe.
4. While the instruments are reaching operating temperature, make a photocopy of the Performance Verification Test Record (located in Appendix A), and fill in the necessary data.
5. Select the channel to which the probe is connected. Set the oscilloscope scale factor to 20 mV/div.

6. Disconnect the ProBus Extender Cable from the oscilloscope. Verify that the scale factor changes from 20 mV/div to 2 mV/div.
7. Reconnect the ProBus extender Cable to the oscilloscope.

The warranted characteristics of the ZD200 are valid at any temperature within the Environmental Characteristics listed in the Specifications. However, some of the other test equipment used to verify the performance may have environmental limitations required to meet the accuracy needed for the procedure. Be sure that the ambient conditions meet the requirements of all the test instruments used in this procedure.

Note: The correct operation of the ZD200 controls requires software version 6.4.1.5 or higher. The software version in the test oscilloscope can be verified by selecting **Utilities, Utilities Setup...** from the menu bar, then the **Status** tab.

Contact your local LeCroy representative or visit www.lecroy.com if the software in your oscilloscope requires updating.

Functional Check

The functional check will verify the basic operation of the probe functions.

It is recommended that the Functional Check be performed prior to the Performance Verification Procedure.

1. Return to the factory default settings by:
   a. Selecting **File**, **Recall Setup...** from the menu bar.
   b. Then touching the **Recall Default** button.
2. Touch the **C1** trace label to open the **C1 Vertical Adjust** dialog.
3. Verify that the probe sensed (ZD200) is displayed as a dialog tab.

Verification Procedure

A. LF Attenuation Accuracy

1. Install the BNC to 2 banana plug into the DMM voltage inputs.
2. Connect the signal generator output to the to 2 banana plug on the DMM.
3. Set the DMM to read AC volt and set the range to AUTO.
4. Set the signal generator to output a 100 Hz sine wave with amplitude 2 Vrms.
5. Read the AC voltage measured by the DMM and record on the test data sheet.
6. Divide this value by 10 and record on the test data sheet.
7. Remove the BNC cable and BNC to 2 banana adapter from the signal generator and DMM.
8. Install the precision 50Ω termination on the DMM voltage inputs.

9. Connect the PROBUS-CF01 BNC male output (the probe end) to the precision 50Ω termination BNC input. The probe should remain powered.
10. Install the straight tips on the ZD200 inputs.
11. Connect the signal generator output to the ZD200 inputs using the BNC to mini-grabber cable.
12. Read the voltage from the DMM and record this value on the test data sheet.
13. Record the calculated error to two decimal places (±0.xx%) as "Gain Error" in the test record.
14. Verify that the error is less than ±1.0 %.

This completes the Performance Verification of the ZD200. Complete and file the Test Record, as required to support your internal calibration procedure.

Apply suitable calibration label to the ZD200 housing as required.

Reference Material

Specifications

Note: Specifications are subject to change without notice.

Please refer to the LeCroy website at www.lecroy.com for detailed specification information.

Contact LeCroy for Support

Use the following regional contacts to find the appropriate support location nearest you.

Whether you're looking for sales or technical support, our staff can provide assistance with installation, calibration, and product knowledge regarding a full-range of our software applications and accessories.

You can also find contact information for our offices on the LeCroy Web site shown for the following regions:

<table>
<tr><th colspan="2">Contact Your Local LeCroy Office for Sales and Technical Assistance</th></tr>
<tr><td colspan="2">United States and Canada
Phone (Sales, Applications, and Service): 1-800-553-2769 (options 1, 2, and 3, respectively) or 845-425-2000
Fax (Sales, Applications, and Service): 845-578-5985
Email (Sales, Applications, and Service): contact.corp@lecroy.com
Web Site: www.lecroy.com/</td></tr>
<tr><td>Korea - Seoul
Phone (Sales and Support): ++ 82 2 3452 0400Fax (Sales and Support): ++ 82 2 3452 0490
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Fax (Sales and Support): + 41 22 719 2230</td></tr>
</table>

Contact Your Local LeCroy Office for Sales and Technical Assistance	
	Email (Sales and Support): contact.sa@lecroy.com **Web Site**: www.lecroy.com/europe
China **Phone (Sales and Support)**: ++86 28- 86527180 / 7181 / 7182 **Fax (Sales and Support)**: +86 28-8652 7183 **Email (Sales and Support)**: george.ni@lecroy.com	***Singapore*** **Phone (Sales and Support)**: ++ (65) 64424880 **Fax (Sales and Support)**: ++ (65) 64427811 **Email (Sales and Support)**: jimmy.ong@lecroy.com
Taiwan **Phone (Sales and Support)**: (886) 2 8226 1366 **Fax (Sales and Support)**: (886) 2 8226 1368 **Email (Sales and Support)**: sales_twn@lecoln.com.tw **Web Site**: www.lecoln.com.tw	***Tokyo*** **Phone (Sales and Support)**: ++ 81 3 3376 9400 **Fax (Sales and Support)**: ++ 81 3 3376 9587 **Web Site**: www.lecroy.com/japan

Safety Symbols

The following symbols appear on the accessory or in this manual and indicate important safety considerations.

Refer to information near this symbol to protect against personal injury or damage to the instrument.

The CAUTION sign indicates a potential hazard. It calls attention to a procedure, practice or condition, which, if not followed, could possibly cause damage to the equipment. If a CAUTION is indicated, do not proceed until its conditions are fully understood and met.

The ESD sign indicates a potential hazard. It calls attention to the susceptibility of the equipment to Electrostatic Discharge (ESD) induced damage if anti-static measures are not taken.

Operating Environment

The accessory is intended for indoor use and should be operated in a clean, dry environment. Before using this product, ensure that its operating environment is maintained within these parameters:

Temperature: 5 to 40 °C.

Humidity: Maximum relative humidity 80 % for temperatures up to 31 °C decreasing linearly to 50 % relative humidity at 40 °C.

Altitude: Up to 10,000 ft (3,048 m).

Note: Direct sunlight, radiators, and other heat sources should be taken into account when assessing the ambient temperature.

Safety Requirements

CAUTION

Avoid personal injury or damage to your accessory or any equipment connected to it by reviewing and complying with the following safety precautions:

- **Use only as intended**. The accessory is intended to be used only with the compatible LeCroy instruments. Use of the accessory and/or the equipment it is connected to in a manner other than specified may impair the protection mechanisms.
- **Connect and disconnect properly**. Avoid damage through excessive bending of cables and other equipment.
- **Do not use in wet/damp or explosive atmospheres**.
- **For indoor use only**. The accessory is intended for indoor use and should be operated in a clean, dry, environment.
- **Do not operate with suspected failures**. Do not use the product if any part is damaged. All maintenance should be referred to qualified service personnel.
- **Keep product surfaces clean and dry**.
- **Completely assemble the measurement instrument before circuit/signal contact**. Connect probe to the measurement instrument before connecting the probe test leads to a circuit/signal being tested.
- **Do not apply a voltage to any input that exceeds the maximum rating of that input**. Refer to the Specifications on LeCroy website at **www.lecroy.com** for detailed information.
- **Be careful with sharp tips**. Handle the probe with care as it has sharp tips that may cause bodily injury if not handled properly.

Compliance Information

This LeCroy accessory is CE Compliant and bears the CE mark.

CE Declaration of Conformity

This ZD200 Probe meets intent of the European Council Directive 2006/95/EEC for Product Safety and 2004/108/EEC for Electromagnetic Compatibility. Compliance was demonstrated to the following specifications as listed in the Official Journal of the European Communities:

- EN 61010-031:2002 Safety requirements for electrical equipment for measurement, control, and laboratory use.

  Part 031: Safety requirements for the hand-held probe assemblies for electrical measurement and test.

  The design of the differential probe has been verified to conform to EN 61010-031 safety standard per the following limits:

  - Installation (Overvoltage) Category I: Refers to signal level which is applicable for equipment measuring terminals that are connected to source circuits in which measures are taken to limit transient voltages to an appropriate low level.
  - Pollution Degree 2: Refers to an operating environment where normally only dry non-conductive pollution occurs. Occasionally a temporary conductivity caused by condensation must be expected.
- EN 61326-1:2006, EN 61326-2-1:2006 EMC requirements for electrical equipment for measurement, control and laboratory use.
  - EN 55011/A2:2002 Radiated and Conducted Emissions, Group 1, Class A *

- EN 61000-4-2:2001 Electrostatic Discharge Immunity (±4 kV contact discharge, ±4 kV air discharge, ±4 kV vertical/horizontal coupling planes)
- EN 61000-4-3:2006 RF Radiated Electromagnetic Field Immunity (3 V/m, 80 MHz to 1 GHz; 3 V/m, 1.4 GHz to 2 GHz; 1 V/m, 2 GHz to 2.7 GHz , 80% amplitude modulated with 1 kHz sinewave)

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* This product is intended for use in nonresidential areas only. Use in residential areas may cause electromagnetic interference.

Appendix A - Performance Verification Test Record

This record can be used to record the results of measurements made during the performance verification of the ZD200 Probe. Photocopy this page and record the results on the copy. File the completed record as required by applicable internal quality procedures. The section in the test record corresponds to the parameters tested in the performance verification procedure. The numbers preceding the individual data records correspond to the steps in the procedure requiring the recording of data.

Results to be recorded in the column labeled **Test Result** are the actual specification limit check. The test limits are included in all of these steps. Other measurements and the results of intermediate calculations that support the limit check are to be recorded in the column labeled **Intermediate Results**.

Permission is granted to reproduce these pages for the purpose of recording test results.

Note: Use a new Test Record for each tested probe, probe tip module, and lead assembly.

Items Tested

Item	Serial Number	Date	Technician
ZD200			

Equipment Used

Instrument	Model	Serial Number	Calibration Due Date
Oscilloscope			
Digital Multimeter			
Function Generator			

Note: The function generator used in this Performance Verification Procedure is used for making relative measurements. The output of the generator is measured with a DMM or oscilloscope in this procedure. Thus, the generator is not required to be calibrated.

Test Record

LF Attenuation Accuracy

Step	Description	Intermediate Data
A-5	Generator Output Voltage	V
A-6	Expected Output Voltage	V
A-12	Measured Output Voltage	V
A-13	**Gain Error**, top range (Test Limit ≤ ± 1.0%)	%

Thank you for purchasing a ZD200 Differential Probe.

LeCroy

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