TELEDYNE LECROY
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Operator's Manual

ZD200 Differential Probe

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November, 2020

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Table of Contents

Safety Instructions **1**
Introduction **2**
Key Features 2
Standard Accessories 3
Probe Operation **4**
Handling the Probe 4
Connecting the Probe to an Oscilloscope 4
Connecting the Probe to the Test Circuit 4
Operation with an Oscilloscope 5
Auto Zero 5
Care and Maintenance **6**
Cleaning 6
Calibration Interval 6
Service Strategy 6
Replacement Parts 6
Performance Verification **7**
Required Test Equipment 7
Preliminary Procedure 9
Functional Check 9
Verification Procedure 10
ZD200 Test Record 11
Reference Material **12**
Certifications 12
Returning a Product for Service 14
Technical Support 15

Warranty

Teledyne 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, Teledyne 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 Teledyne 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. Teledyne 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. Teledyne LeCroy shall not be liable for any special, incidental, or consequential damages, whether in contract or otherwise.

Safety Instructions

This section contains instructions that must be observed to keep this oscilloscope accessory operating in a correct and safe condition. You are required to follow generally accepted safety procedures in addition to the precautions specified in this section. **The overall safety of any system incorporating this accessory is the responsibility of the assembler of the system.**

Symbols

These symbols may appear on the probe body or in this manual to alert you to important safety considerations.

CAUTION. Potential for damage to probe or instrument it is connected to. Attend to the accompanying information to protect against personal injury or damage. Do not proceed until conditions are fully understood and met.

ELECTROSTATIC DISCHARGE (ESD) HAZARD. The probe is susceptible to damage if anti-static measures are not taken.

DOUBLE INSULATION

Precautions

Connect and disconnect properly. Connect probe to the measurement instrument before connecting the test leads to a circuit/signal being tested.

Use only within operational environment listed. Do not use in wet or explosive atmospheres.

Use indoors only.

Keep product surfaces clean and dry.

Be careful with sharp tips. The tips may cause bodily injury if not handled properly.

Do not operate with suspected failures. Do not use the probe if any part is damaged. Cease operation immediately and sequester the probe from inadvertent use.

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 90 % for temperatures up to 31° C decreasing linearly to 50 % relative humidity at 40° C

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

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 a variety of Teledyne LeCroy oscilloscopes running MAUI firmware version 6.4.1.x or later. See the oscilloscope product page at teledynelecroy.com/oscilloscopes for probe compatibility.

With the ProBus interface, the ZD200 probe becomes an integral part of the oscilloscope, able to 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 Features

Key Benefits	Features
1 MOhm input resistance Low input capacitance Wide dynamic range ProBus interface	Small, low mass probe head is designed for ease of use and high performance. Probe tip socket fits easily onto 0.025 inch square pins for direct access to test points. Several available adaptors connect directly to the probe socket. Complete accessory kit.

Standard Accessories

The ZD200 probe is provided with numerous accessories to make probing different test points easier than ever. The probe is also supplied with an Operator's Manual and a Certificate of Calibration.

Accessory	Quantity	Description
Hook Clips	2	
Micro-Grabbers	2	Ideal for connecting to small IC legs or very tightly spaced pins
Micro-IC Grabbers	2	
Straight Tips	6	Designed to connect to the smallest vias and small test points. Fits in either probe socket.
12.8mm and 16.8mm Dual Pin Sets	2 ea.	
5cm and 10cm Extension Leads	2 ea.	Have 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.
Y Leadset	1	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 an Oscilloscope

The ZD200 probe has been designed for use with Teledyne LeCroy 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.

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.

Operation with an Oscilloscope

When the ZD200 probe is connected to any compatible Teledyne 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

Auto Zero corrects for DC offset drifts that naturally occur from thermal effects in the amplifier. The probe incorporates Auto Zero capability to remove the DC offset from the probe's amplifier output to improve the measurement accuracy.

Auto Zero is invoked manually from the ZD200 dialog that appears when the probe is connected to the oscilloscope.

Always perform Auto Zero after the probe is warmed up (recommended warm-up time is 20 minutes). Depending on the measurement accuracy desired and/or changes in ambient temperature where the probe is located, it may be necessary to perform Auto Zero more often. If the probe is disconnected from the oscilloscope and reconnected, repeat Auto Zero after a suitable warm-up time.

CAUTION: Disconnect the probe from the circuit before Auto Zero, or else any DC component that is part of the Signal to be measured will be zeroed out.

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.

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

Calibration Interval

The recommended calibration interval is one year. The Performance Verification procedure should be performed as the first part of calibration.

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 Teledyne 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.

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

This procedure can be used to verify the warranted characteristics of the ZD200 High Impedance Active Probe. It tests LF Attenuation Accuracy.

The recommended calibration interval for the ZD200 probe is one year. Complete the performance verification as the first step of annual calibration. Results can be recorded on a photocopy of the Test Record provided.

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

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

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.

NOTE: The function generator used in this Performance Verification Procedure is used for making relative measurements. Because the output of the generator is measured with an oscilloscope in this procedure, it is not required to calibrate the generator.

The warranted characteristics of the ZD200 are valid at any temperature within the Operating Environment listed in this manual (p.2). 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.

List of Required Test Equipment.

Description	Minimum Requirement	Example Equipment
Digital Oscilloscope	ProBus Interface Windows with software version 6.4.1.5 or later	Teledyne LeCroy HDO6000, WaveRunner 8000, WavePro 7 Zi-A
Digital Multimeter (DMM) with test probe leads	**4.5 digit** **DC: 0.1% Accuracy** **AC: 0.1% Accuracy**	Keysight 34401A Fluke 8842A-09
Function Generator	Sine Wave output amplitude adjustable to 14.14 Vp-p (5 Vrms) into 1 MΩ at 70 Hz	Keysight 33120A Stanford Research Model DS340
BNC Coaxial Cable (2)	Male to Male, 50 Ω, 36" Cable	Pomona 2249-C-36 Pomona 5697-36
BNC Tee Connector	Male to Dual Female	Pomona 3285
Calibration Fixture	ProBus Extender Cable	Teledyne LeCroy PROBUS-CF01
Terminator, Precision BNC	50 Ω ± 0.05%	Teledyne LeCroy TERM-CF01
Banana Plug Adapter (2)	Female BNC to Dual Banana Plug	Pomona 1269
BNC to Mini-grabber	BNC Male to Mini-grabber Cable, 36"	Pomona 5187-C-36

Preliminary Procedure

NOTE: The correct operation of the ZD200 controls requires software version 6.4.1.x or higher. The oscilloscope software version can be verified by selecting Utilities > Utilities Setup > Status. Contact your local Teledyne LeCroy representative or visit teledynelecroy.com if the software in your oscilloscope requires updating.

1. Connect the ZD200 probe to the female end of the PROBUS-CFO1. Connect the male end of the PROBUS-CFO1 to oscilloscope C1.
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, and fill in the necessary data.

Functional Check

The functional check will verify the basic operation of the probe functions. Perform the Functional Check prior to the Performance Verification.

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** descriptor box to open the **C1** dialog.
3. Verify that the probe is sensed and displayed on the tab behind the C1 dialog.

Verification Procedure

LF Attenuation Accuracy

1. Install the BNC to dual-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 dual-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. 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.

ZD200 Test Record

Technician:_____

Date:_____

Equipment Used

Item	Model	Serial Number	Cal Due Date
Oscilloscope			
Function Generator			
Digital Multimeter			
Probe			
Lead			
Tip			

Test Record, LF Attenuation Accuracy

Step	Description	Results
5	DMM AC Voltage	V
6	DMM AC Voltage/10	V
12	DMM AC Voltage	V
13	**Gain Error**, (Test Limit ≤ ± 1.0%)	%

Permission is granted to photocopy this page to record the results of the Performance Verification procedure. The test limits are included in each step. Record measurements and intermediate calculations that support the limit check under "Results". Create a new record for each probe, lead, and tip combination.

Reference Material

Certifications

Teledyne LeCroy certifies compliance to the following standards as of the date of publication. For the current certifications, see the EC Declaration of Conformity shipped with your product.

EMC Compliance

EC Declaration of Conformity - EMC

The probe meets intent of EC Directive 2014/30/EU for Electromagnetic Compatibility. Compliance was demonstrated to the following specifications as listed in the Official Journal of the European Communities:

IEC/EN 61326-1:2013 EMC requirements for electrical equipment for measurement, control, and laboratory use[1]

Electromagnetic Emissions:
IEC/EN 55011/A1:2010 Radiated and Conducted Emissions Group 1 Class A[2] [3]

Electromagnetic Immunity:
IEC/EN 61000-4-2:2009 Electrostatic Discharge, 4 kV contact, 8 kV air, 4 kV vertical/horizontal coupling planes [4]

IEC/EN 61000-4-3/A2:2010 RF Radiated Electromagnetic Field, 3 V/m, 80-1000 MHz; 3 V/m, 1400 MHz - 2 GHz; 1 V/m, 2 GHz - 2.7 GHz

1 To ensure compliance with applicable EMC standards, use high-quality shielded interface cables.

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

3 Emissions which exceed the levels required by this standard may occur when the probe is connected to a test object.

4 Meets Performance Criteria “B” limits of the standard: during disturbance, product undergoes a temporary degradation or loss of function or performance which is self-recoverable.

European Contact:
Teledyne GmbH, European Division
Im Breitspiel 11c
D-69126 Heidelberg
Germany
Tel: (49) 6221 82700

AUSTRALIA & NEW ZEALAND DECLARATION OF CONFORMITY - EMC

The probe complies with the EMC provision of the Radio Communications Act per the following standards, in accordance with requirements imposed by the Australian Communication and Media Authority (ACMA):

AS/NZS CISPR 11:2009/A1:2010, IEC 55011:2009/A1:2010 Radiated and Conducted Emissions, Group 1, Class A.

Australia / New Zealand Contacts:*

RS Components Pty Ltd.
Suite 326 The Parade West
Kent Town, South Australia 5067

RS Components Ltd.
Units 30 & 31 Warehouse World
761 Great South Road
Penrose, Auckland, New Zealand

* Visit teledynelecroy.com/support/contact for the latest contact information.

Safety Compliance

EC DECLARATION OF CONFORMITY – LOW VOLTAGE

The probe meets the intent of EC Directive 2014/35/EU for Product Safety. Compliance was demonstrated to the following specifications as listed in the Official Journal of the European Communities:

IEC/EN 61010-031:2015 Safety requirements for electrical equipment for measurement, control and laboratory use – Part 031: Safety requirements for handheld probe assemblies for electrical measurement and test.

Environmental Compliance

END-OF-LIFE HANDLING

The probe is marked with this symbol to indicate that it complies with the applicable European Union requirements to Directives 2012/19/EU on Waste Electrical and Electronic Equipment (WEEE).

The probe 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 Teledyne LeCroy product, visit teledynelecroy.com/recycle.

RESTRICTION OF HAZARDOUS SUBSTANCES (ROHS)

The product and its accessories conform to the 2011/65/EU RoHS2 Directive inclusive of any further amendments or modifications of said Directive.

Returning a Product for Service

Contact your local Teledyne LeCroy service center for calibration or other service. If the product cannot be serviced on location, the service center will give you a Return Material Authorization (RMA) code and instruct you where to ship the product. All products returned to the factory must have an RMA.

Return shipments must be prepaid. Teledyne LeCroy cannot accept COD or Collect shipments. We recommend air-freighting. Insure the item you're returning for at least the replacement cost.

1. Remove all accessories from the probe.
2. Pack the probe in its case. If possible, include all tips. Do not include the manual.
3. Pack the case in its original shipping box, or an equivalent carton with adequate padding to avoid damage in transit.
4. Mark the outside of the box with the shipping address given to you by Teledyne LeCroy. Be sure to add the following:
    - ATTN:<*RMA code assigned by Teledyne LeCroy*>
    - FRAGILE
5. **If returning a probe to a different country:** contact Teledyne LeCroy Service for instructions on completing your import/export documents.

Extended warranty, calibration and upgrade plans are available for purchase. Contact your Teledyne LeCroy sales representative to purchase a service plan.

For a complete list of Teledyne LeCroy offices by country, including our sales and distribution partners, visit: **teledynelecroy.com/support/contact.**

Technical Support

Live Support

Registered users can contact their local Teledyne LeCroy service center at the number listed on our website. You can also request Technical Support via the website at:

teledynelecroy.com/support/techhelp

Resources

Teledyne LeCroy publishes a free Technical Library on its website. Manuals, tutorials, application notes, white papers, and videos are available to help you get the most out of your Teledyne LeCroy products. Visit:

teledynelecroy.com/support/techlib

Service Centers

For a complete list of offices by country, including our sales and distribution partners, visit:

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Teledyne LeCroy
700 Chestnut Ridge Road
Chestnut Ridge, NY, 10977, USA

Sales and Service:
Ph: 800-553-2769 / 845-425-2000
FAX: 845-578-5985
contact.corp@teledynelecroy.com

Support:
Ph: 800-553-2769
customersupport@teledynelecroy.com

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700 Chestnut Ridge Road
Chestnut Ridge, NY 10977
USA

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