

**MSO2000B and DPO2000B Series
Oscilloscopes
Installation and Safety
Instructions**



071-3078-01

Tektronix

**MSO2000B and DPO2000B Series
Oscilloscopes
Installation and Safety
Instructions**

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- In North America, call 1-800-833-9200.
- Worldwide, visit www.tektronix.com to find contacts in your area.

Table of Contents

| | |
|--|----|
| Preface | 1 |
| Accessories and Replaceable Parts | 1 |
| Documentation | 4 |
| General Safety Summary | 5 |
| Compliance Information | 7 |
| EMC Compliance | 7 |
| Safety Compliance | 9 |
| Environmental Considerations | 11 |
| Operating Requirements | 12 |
| Electrical Ratings | 14 |
| Input Ratings | 14 |
| Environmental Ratings | 15 |
| Physical Specifications | 15 |
| Installation Procedure | 16 |
| Power-On and Power-Off Procedure | 18 |
| Functional Check | 19 |
| Compensating a Passive Voltage Probe | 20 |
| Application Module Free Trial | 21 |
| Upgrading Firmware | 22 |
| Connecting Your Oscilloscope to a Computer | 23 |
| Getting Acquainted with the Oscilloscope | 24 |
| Front-Panel Menus and Controls | 24 |
| Front-Panel Connectors | 31 |
| Side-Panel Connector | 31 |
| Rear-Panel Connectors | 32 |
| まえがき | 33 |
| アクセサリと交換部品 | 33 |
| マニュアル | 37 |
| 安全にご使用いただくために | 38 |
| 適合性に関する情報 | 40 |
| EMC 適合性 | 40 |
| 安全性 | 42 |
| 環境への配慮 | 44 |
| 動作の要件 | 45 |
| 電気定格 | 47 |
| 入力定格 | 47 |
| 環境要件 | 48 |
| 物理仕様 | 48 |

| | |
|------------------------------|-----|
| インストール手順 | 49 |
| 電源投入、電源切断の手順 | 51 |
| 機能チェック | 52 |
| 受動電圧プローブの補正 | 53 |
| アプリケーション・モジュールの無料トライアル | 54 |
| ファームウェアのアップグレード | 55 |
| オシロスコープとコンピュータの接続 | 56 |
| オシロスコープの概要 | 57 |
| フロント・パネル・メニューとコントロール | 57 |
| フロント・パネル・コネクタ | 64 |
| サイド・パネル・コネクタ | 65 |
| リア・パネル・コネクタ | 65 |
| 前言 | 68 |
| 附件和可更换部件 | 68 |
| 文档 | 72 |
| 常规安全概要 | 73 |
| 符合性信息 | 76 |
| EMC 符合性 | 76 |
| 安全符合性 | 78 |
| 环境注意事项 | 80 |
| 操作要求 | 81 |
| 电气额定值 | 83 |
| 输入额定值 | 83 |
| 环境额定值 | 84 |
| 物理技术规格 | 84 |
| 安装步骤 | 85 |
| 开机和关机步骤 | 87 |
| 功能检查 | 88 |
| 补偿无源电压探头 | 89 |
| 应用模块免费试用 | 90 |
| 升级固件 | 91 |
| 将示波器连接到计算机 | 92 |
| 熟悉示波器 | 92 |
| 前面板菜单和控制 | 92 |
| 前面板连接器 | 99 |
| 侧面板连接器 | 99 |
| 后面板连接器 | 100 |

Preface

This manual describes the installation and operation of the following oscilloscopes:

| | | |
|----------|----------|----------|
| DPO2002B | DPO2004B | DPO2012B |
| DPO2014B | DPO2022B | DPO2024B |
| MSO2002B | MSO2004B | MSO2012B |
| MSO2014B | MSO2022B | MSO2024B |

- Important safety precautions to avoid injury and prevent damage to this product or any products connected to it
- EMC (electromagnetic compliance), safety, and environmental standards with which the product complies
- Voltage, power, and environmental requirements to use the product
- Installation procedure
- Power-on and power-off procedure
- Front- and rear-panel controls and connectors

Accessories and Replaceable Parts

Standard Accessories

| Accessory | Description | Tektronix part number |
|--|---|-----------------------|
| <i>DPO2000B and MSO2000B Series Oscilloscopes Installation and Safety Instructions</i> | Provides safety and compliance information along with hardware installation instructions to present the associated safety warnings. This manual is available in English, Simplified Chinese, and Japanese | 071-3078-XX |
| <i>DPO2000B and MSO2000B Series Oscilloscopes Documentation CD</i> | Electronic versions of documents, including the Programmer Manual and the Technical Reference. | 063-4472-XX |
| <i>Tektronix OpenChoice Desktop PC Communications CD</i> | Productivity, analysis, and documentation software. | 063-4402-XX |
| Calibration certificate documenting traceability to national metrology institute(s), and ISO9001 quality system registration | | — |

Standard Accessories, (cont.)

| Accessory | Description | Tektronix part number |
|--|--|-----------------------|
| Front panel overlay | French (Option L1) | 335-2020-00 |
| | Italian (Option L2) | 335-2021-00 |
| | German (Option L3) | 335-2022-00 |
| | Spanish (Option L4) | 335-2023-00 |
| | Japanese (Option L5) | 335-2024-00 |
| | Portuguese (Option L6) | 335-2025-00 |
| | Simple Chinese (Option L7) | 335-2026-00 |
| | Traditional Chinese (Option L8) | 335-2027-00 |
| | Korean (Option L9) | 335-2028-00 |
| | Russian (Option L10) | 335-2029-00 |
| For DPO2000B and MSO2000B series: Probes | For models \geq 100 MHz bandwidth: One 200 MHz, 10X passive voltage probe with 10 M Ω input resistance per channel | TPP0200 |
| | For models < 100 MHz bandwidth: One 100 MHz, 10X passive voltage probe with 10 M Ω input resistance per channel | TPP0100 |
| For MSO2000B series: Digital probe | One, 16-channel digital probe | P6316 |
| For MSO2000B series: Accessories pouch | Pouch that attaches to the handle for carrying probes and other accessories. | 016-2008-00 |
| Five year warranty | For details, refer to the warranty in the front of the electronic (PDF) user manual | — |
| Power cord | North America (Option A0) | 161-0348-00 |
| | Universal Euro (Option A1) | 161-0343-00 |
| | United Kingdom (Option A2) | 161-0344-00 |
| | Australia (Option A3) | 161-0346-00 |
| | Switzerland (Option A5) | 161-0347-00 |
| | Japan (Option A6) | 161-0342-00 |
| | China (Option A10) | 161-0341-00 |
| | India (Option A11) | 161-0349-00 |
| | Brazil (Option A12) | 161-0356-00 |
| | No power cord or AC adapter (Option A99) | — |

Optional Accessories

| Accessory | Description | Tektronix part number |
|---|---|-----------------------|
| DPO2EMBD | The embedded serial triggering and analysis module enables triggering on packet level information on I ² C and SPI serial buses, as well as bus views, bus decoding, search tools, and packet decode tables with timestamp information | DPO2EMBD |
| DPO2AUTO | The automotive serial triggering and analysis module enables triggering on packet level information on CAN and LIN serial buses, as well as bus views, bus decoding, search tools, and packet decode tables with timestamp information | DPO2AUTO |
| DPO2COMP | The computer triggering and analysis module enables triggering on RS-232, RS-422, RS-485 and UART serial buses, search tools, bus views, bus decoding in hex, binary, and ASCII, and decode tables with timestamp information | DPO2COMP |
| DPO2CONN | The connectivity module adds an Ethernet port for remote programmability and a Video Out port to display the oscilloscope screen on an external monitor | DPO2CONN |
| NEX-HD2HEADER | Adapter that routes the channels from a Mictor connector to 0.1 inch header pins | NEX-HD2HEADER |
| TekVPI probes that work with MSO/DPO2000B Series oscilloscopes Note: These probes require the use of the TekVPI external power adapter listed below. | Visit the Oscilloscope Probe and Accessory Selector Tool on the Tektronix website at www.tektronix.com | |
| TekVPI external power adapter | Supplies external power to a TekVPI probe | 119-7465-XX |
| TPA-BNC Note: This adapter requires the use of the TekVPI external power adapter listed above. | TekVPI to TekProbe II BNC Adapter | TPA-BNC |
| Deskew pulse generator | Deskew pulse generator and signal source with TekVPI oscilloscope interface | TEK-DPG |
| Power measurement deskew and calibration fixture | Converts TEK-DPG pulse generator output into a series of test point connections | 067-1686-00 |
| TEK-USB-488 Adapter | GPIB to USB Adapter | TEK-USB-488 |
| Rackmount kit | Adds rackmount brackets | RMD2000 |
| Soft transit case | Case for carrying an oscilloscope | ACD2000 |
| Hard transit case | Traveling hard case, which requires use of the soft transit case (ACD2000) | HCTEK4321 |
| <i>DPO2000B and MSO2000B Series Oscilloscopes Service manual</i> | Service information on DPO2000B and MSO2000B series oscilloscopes | 077-0737-XX |
| <i>DPO2000B and MSO2000B Series Oscilloscopes Application Module Installation</i> | Describes how to install application modules in DPO2000B and MSO2000B series oscilloscopes | 071-2330-XX |

Documentation

The following table lists the documentation that is available for the product and shows where you can find it: in a printed manual, on the product documentation CD-ROM, or on the Tektronix Web site at www.tektronix.com.

Table 1: Product documentation

| Item | Purpose | Location |
|---|---|--|
| Installation and Safety Instructions (this manual) | Provides safety and compliance information along with hardware installation instructions to present the associated safety warnings. This manual is available in English, Japanese, and Simplified Chinese | Printed manual and also available in electronic format at www.tektronix.com/manuals |
| User Manual | Provides operation and application information. This manual is available in English, French, Italian, German, Spanish, Japanese, Portuguese, Simplified Chinese, Traditional Chinese, Korean, and Russian | Product Documentation CD and available at www.tektronix.com/manuals |
| Specifications and Performance Verification Technical Reference | Specifications and procedures for checking instrument performance. | Product Documentation CD and available at www.tektronix.com/manuals |
| Programmer Manual | Command reference for remotely controlling the instrument. | Product Documentation CD and available at www.tektronix.com/manuals |
| Service Manual | Provides information about adjustments, repair, and replaceable parts. | Available at www.tektronix.com/manuals |

General Safety Summary

Review the following safety precautions to avoid injury and prevent damage to this product or any products connected to it.

To avoid potential hazards, use this product only as specified.

Only qualified personnel should perform service procedures.

While using this product, you may need to access other parts of a larger system. Read the safety sections of the other component manuals for warnings and cautions related to operating the system.

To Avoid Fire or Personal Injury

Use Proper Power Cord. Use only the power cord specified for this product and certified for the country of use.

Connect and Disconnect Properly. Do not connect or disconnect probes or test leads while they are connected to a voltage source.

Connect and Disconnect Properly. De-energize the circuit under test before connecting or disconnecting the current probe.

Ground the Product. This product is grounded through the grounding conductor of the power cord. To avoid electric shock, the grounding conductor must be connected to earth ground. Before making connections to the input or output terminals of the product, ensure that the product is properly grounded.

Observe All Terminal Ratings. To avoid fire or shock hazard, observe all ratings and markings on the product. Consult the product manual for further ratings information before making connections to the product.

Connect the probe reference lead to earth ground only.

Do not apply a potential to any terminal, including the common terminal, that exceeds the maximum rating of that terminal.

Power Disconnect. The power cord disconnects the product from the power source. Do not block the power cord; it must remain accessible to the user at all times.

Do Not Operate Without Covers. Do not operate this product with covers or panels removed.

Do Not Operate With Suspected Failures. If you suspect that there is damage to this product, have it inspected by qualified service personnel.

Avoid Exposed Circuitry. Do not touch exposed connections and components when power is present.

Do Not Operate in Wet/Damp Conditions.

Do Not Operate in an Explosive Atmosphere.

Keep Product Surfaces Clean and Dry.

Provide Proper Ventilation. Refer to the manual’s installation instructions for details on installing the product so it has proper ventilation.

Terms in this Manual These terms may appear in this manual:



WARNING. *Warning statements identify conditions or practices that could result in injury or loss of life.*



CAUTION. *Caution statements identify conditions or practices that could result in damage to this product or other property.*

Symbols and Terms on the Product

These terms may appear on the product:

- DANGER indicates an injury hazard immediately accessible as you read the marking.
- WARNING indicates an injury hazard not immediately accessible as you read the marking.
- CAUTION indicates a hazard to property including the product.

The following symbol(s) may appear on the product:



CAUTION
Refer to Manual



Protective Ground
(Earth) Terminal



Chassis Ground



Standby

Compliance Information

This section lists the EMC (electromagnetic compliance), safety, and environmental standards with which the instrument complies.

EMC Compliance

EC Declaration of Conformity – EMC

Meets intent of Directive 2004/108/EC for Electromagnetic Compatibility. Compliance was demonstrated to the following specifications as listed in the Official Journal of the European Communities:

EN 61326-1:2006, EN 61326-2-1:2006. EMC requirements for electrical equipment for measurement, control, and laboratory use.^{1 2 3}

- CISPR 11:2003. Radiated and conducted emissions, Group 1, Class A
- IEC 61000-4-2:2001. Electrostatic discharge immunity
- IEC 61000-4-3:2002. RF electromagnetic field immunity⁴
- IEC 61000-4-4:2004. Electrical fast transient/burst immunity
- IEC 61000-4-5:2001. Power line surge immunity
- IEC 61000-4-6:2003. Conducted RF immunity⁵
- IEC 61000-4-11:2004. Voltage dips and interruptions immunity⁶

EN 61000-3-2:2006. AC power line harmonic emissions

EN 61000-3-3:1995. Voltage changes, fluctuations, and flicker

European Contact.

Tektronix UK, Ltd.
Western Peninsula
Western Road
Bracknell, RG12 1RF
United Kingdom
United Kingdom

- ¹ This product is intended for use in nonresidential areas only. Use in residential areas may cause electromagnetic interference.
- ² Emissions which exceed the levels required by this standard may occur when this equipment is connected to a test object.
- ³ To ensure compliance with the EMC standards listed here, high quality shielded interface cables should be used.
- ⁴ Trace bloom not exceeding 4 divisions pk-to-pk may be induced under the conditions of the IEC 61000-4-3 test.
- ⁵ Trace bloom not exceeding 1 division pk-to-pk may be induced under the conditions of the IEC 61000-4-6 test.
- ⁶ Performance Criterion C applied at the 70%/25 cycle Voltage-Dip and the 0%/250 cycle Voltage-Interruption test levels (IEC 61000-4-11).

7 Add text here to list inrush current information.

**Australia / New Zealand
Declaration of
Conformity – EMC**

Complies with the EMC provision of the Radiocommunications Act per the following standard, in accordance with ACMA:

- CISPR 11:2003. Radiated and Conducted Emissions, Group 1, Class A, in accordance with EN 61326-1:2006 and EN 61326-2-1:2006.

Australia / New Zealand contact.

Baker & McKenzie
Level 27, AMP Centre
50 Bridge Street
Sydney NSW 2000, Australia

Safety Compliance

EC Declaration of Conformity – Low Voltage

Compliance was demonstrated to the following specification as listed in the Official Journal of the European Communities:

Low Voltage Directive 2006/95/EC.

- EN 61010-1: 2001. Safety requirements for electrical equipment for measurement control and laboratory use.

U.S. Nationally Recognized Testing Laboratory Listing

- UL 61010-1:2004, 2nd Edition. Standard for electrical measuring and test equipment.

Canadian Certification

- CAN/CSA-C22.2 No. 61010-1:2004. Safety requirements for electrical equipment for measurement, control, and laboratory use. Part 1.

Additional Compliances

- IEC 61010-1: 2001. Safety requirements for electrical equipment for measurement, control, and laboratory use.

Equipment Type

Test and measuring equipment.

Safety Class

Class 1 – grounded product.

Pollution Degree Description

A measure of the contaminants that could occur in the environment around and within a product. Typically the internal environment inside a product is considered to be the same as the external. Products should be used only in the environment for which they are rated.

- Pollution Degree 1. No pollution or only dry, nonconductive pollution occurs. Products in this category are generally encapsulated, hermetically sealed, or located in clean rooms.
- Pollution Degree 2. Normally only dry, nonconductive pollution occurs. Occasionally a temporary conductivity that is caused by condensation must be expected. This location is a typical office/home environment. Temporary condensation occurs only when the product is out of service.
- Pollution Degree 3. Conductive pollution, or dry, nonconductive pollution that becomes conductive due to condensation. These are sheltered locations where neither temperature nor humidity is controlled. The area is protected from direct sunshine, rain, or direct wind.
- Pollution Degree 4. Pollution that generates persistent conductivity through conductive dust, rain, or snow. Typical outdoor locations.

Pollution Degree Pollution Degree 2 (as defined in IEC 61010-1). Note: Rated for indoor use only.

Installation (Overvoltage) Category Descriptions Terminals on this product may have different installation (overvoltage) category designations. The installation categories are:

- Measurement Category IV. For measurements performed at the source of low-voltage installation.
- Measurement Category III. For measurements performed in the building installation.
- Measurement Category II. For measurements performed on circuits directly connected to the low-voltage installation.
- Measurement Category I. For measurements performed on circuits not directly connected to MAINS.

Overvoltage Category Overvoltage Category II (as defined in IEC 61010-1)

Environmental Considerations

This section provides information about the environmental impact of the product.

Product End-of-Life Handling

Observe the following guidelines when recycling an instrument or component:

Equipment Recycling. Production of this equipment required the extraction and use of natural resources. The equipment may contain substances that could be harmful to the environment or human health if improperly handled at the product's end of life. In order to avoid release of such substances into the environment and to reduce the use of natural resources, we encourage you to recycle this product in an appropriate system that will ensure that most of the materials are reused or recycled appropriately.



This symbol indicates that this product complies with the applicable European Union requirements according to Directives 2002/96/EC and 2006/66/EC on waste electrical and electronic equipment (WEEE) and batteries. For information about recycling options, check the Support/Service section of the Tektronix Web site (www.tektronix.com).

Mercury Notification. This product uses an LCD backlight lamp that contains mercury. Disposal may be regulated due to environmental considerations. Please contact your local authorities or, within the United States, refer to the E-cycling Central Web page (www.eiae.org) for disposal or recycling information.

Restriction of Hazardous Substances

This product has been classified as Monitoring and Control equipment, and is outside the scope of the 2002/95/EC RoHS Directive.

Operating Requirements

This section provides the specifications that you need to know to operate your product safely and correctly. Refer to the complete product specifications in the MSO/DPO2000B Technical Reference for additional information.

DPO2000B and MSO2000B Series Oscilloscopes

Power Supply Input Voltage: 100 V to 240 V \pm 10%

Power Supply Input Power Frequency:
50/60 Hz at 100 V to 240 V
400 Hz at 115 V

Power Consumption: 80 W maximum

Input Voltage (between the signal and reference): 300 V_{RMS} CAT II

Installation Category II - for measurements performed on circuits directly connected to the low-voltage installation



Figure 1: MSO2000B series



Figure 2: DPO2000B series

**TPP0100 or a TPP0200
Passive Probe**

Single-ended voltage probe (ground referenced): 300 V_{RMS} CAT II safety requirements
Installation Category II - for measurements performed on circuits directly connected to the low-voltage installation

Temperature:

Operating: -10 °C to +55 °C (+14 °F to +131 °F)

Nonoperating: -51 °C to +71 °C (-60 °F to +160 °F)

Pollution Degree: 2, Indoor use only

Humidity: 5% to 95% RH

**MSO2000B Series
Oscilloscope with a P6316
Digital Probe**

Threshold Accuracy: $\pm(100 \text{ mV} + 3\% \text{ of threshold})$

Threshold Range: $\pm 20 \text{ V}$

Maximum nondestructive input signal to probe: $\pm 40 \text{ V peak}$

Minimum signal swing: $500 \text{ mV}_{\text{peak-to-peak}}$

Input resistance: 101 k Ω

Input capacitance: 8.0 pF

Temperature:

Operating: 0 °C to +50 °C (+32 °F to +122 °F)

Nonoperating: -20 °C to +60 °C (-4 °F to +140 °F)

Altitude:

Operating: 3,000 m (9,843 ft) maximum

Nonoperating: 12,000 m (39,370 ft) maximum

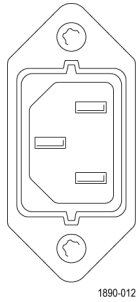
Pollution Degree: 2, Indoor use only

Humidity:

5% to 95% relative humidity

Electrical Ratings

Power Requirements



Power connector

The instrument has the following power requirements:

- A single-phase power source with one current-carrying conductor at or near earth-ground (the neutral conductor).

NOTE. *Systems with both current-carrying conductors live with respect to ground (such as phase-to-phase in multiphase systems) are not recommended as power sources.*

- The mains supply frequency must be 50 or 60 Hz.
- The mains supply voltage must be in the range from 100 to 240 V_{AC}.



WARNING. *To reduce risk of fire and shock, ensure the mains supply voltage fluctuations do not exceed 10% of the operating voltage range.*

Fuses Only the line conductor is fused for over-current protection. The fuse is internal and not user replaceable. Do not attempt to replace the fuse. If you suspect the fuse has blown, return the instrument to an authorized service center for repair.

Batteries The instrument does not contain any user-replaceable batteries.

Input Ratings

Table 2: Maximum input voltage

| Input | Rating |
|---|--|
| At front-panel BNC connector | 300 V RMS, Installation Category II; derate above 4 MHz to 6 V RMS at 200 MHz. |
| At the P6316 probe input, not at the instrument input | ±40 V peak |

Environmental Ratings

Table 3: Environmental specifications

| Characteristic | Description | |
|----------------|----------------|--|
| Temperature | Operating | 0 °C to + 50 °C |
| | Nonoperating | -20 °C to +60 °C |
| Humidity | Operating | High: 40 °C to 50 °C, 10% to 60% RH Low: 0 °C to 40 °C, 10% to 90% RH |
| | Nonoperating | High: 40 °C to 60 °C, 5% to 60% RH Low: 0 °C to 40 °C, 5% to 90% RH |
| Altitude | Operating | 3,000 m (9,842 ft) |
| | Nonoperating | 12,000 m (39,370 ft) |
| Cooling | 50 mm (2 inch) | |



CAUTION. To ensure proper cooling, keep the sides and rear of the oscilloscope clear of obstructions.

Physical Specifications

Table 4: Physical specifications

| Characteristic | Description | |
|----------------|-------------|---|
| Dimensions | Height | 175 mm (6.885 inches), including the feet but not the handle |
| | Width | 377 mm (14.85 inch) |
| | Depth | 134 mm (5.3 inch), from the feet to the front of the knobs 139 mm (5.47 inch), from the feet to the front of the front cover |
| Weight | Net | 3.6 kg (7 lbs 14 oz), stand-alone oscilloscope |
| | Shipping | |

Cleaning Inspect the oscilloscope and probes as often as operating conditions require. To clean the exterior surface, perform the following steps:

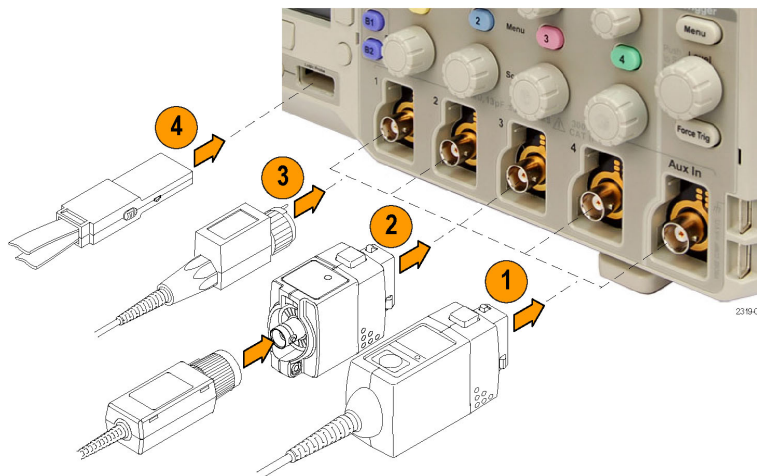
1. Remove loose dust on the outside of the oscilloscope and probes with a lint-free cloth. Use care to avoid scratching the clear glass display filter.
2. Use a soft cloth dampened with water to clean the oscilloscope. Use an aqueous solution of 75% isopropyl alcohol for more efficient cleaning.



CAUTION. To avoid damage to the surface of the oscilloscope or probes, do not use any abrasive or chemical cleaning agents.

Installation Procedure

Connecting Probes The oscilloscope supports probes with the following:



1. Tektronix Versatile Probe Interface (TekVPI)

These probes support two-way communication with the oscilloscope through on-screen menus and remotely through programmable support. The remote control is useful in applications like an ATE (automated test environment) where you want the system to preset probe parameters.

NOTE. For more information on the many probes available for use with MSO2000B and DPO2000B Series oscilloscopes, visit the *Oscilloscope Probe and Accessory Selector* tool on the Tektronix website.

2. TPA-BNC Adapter

The TPA-BNC Adapter allows you to use Tek Probe II probe capabilities, such as providing probe power, and passing scaling and unit information to the oscilloscope.

NOTE. To use a TekVPI probe and a TPA-BNC adapter, connect a TekVPI external power adapter (Tektronix part number 119-7465-XX) to the side panel **Probe Power** connector.

3. Plain BNC Interfaces

Some probes use TekProbe capabilities to pass the waveform signal and scaling to the oscilloscope. Other probes only pass the signal and there is no communication.

4. Digital Probe Interface (MSO2000B series only)

The P6316 probe provides 16 channels of digital (on or off state) information.

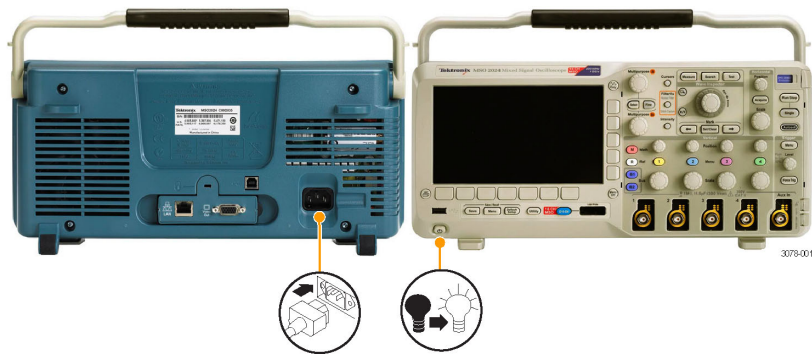
For more information on the many probes available for use with DPO2000B and MSO2000B series oscilloscopes, refer to www.tektronix.com.

Power-On and Power-Off Procedure

This instrument operates from a single-phase power source with the neutral conductor at or near earth ground. The line conductor is fused for over-current protection. A protective ground connection through the grounding conductor in the power cord is essential for safe operation.

- Power-On**
1. Connect the supplied power cord to the rear-panel power connector.
 2. Press the power button on the instrument front-panel and the instrument will turn on.

NOTE. *The Standby button on the front-panel does not disconnect mains power. Only the power cord at the rear of the product can disconnect mains power.*



- Power-Off**
1. Press the power button on the instrument front-panel to turn the instrument off.
 2. If you want to remove power completely, disconnect the power cord from the rear-panel of the instrument.



Functional Check

Perform this quick functional check to verify that your oscilloscope is operating correctly.

1. Connect the oscilloscope power cable as described in *Powering On the Oscilloscope*. (See page 18, *Power-On and Power-Off Procedure*.)
2. Power on the oscilloscope.



3. Connect the proper TPP0100 or TPP0200 probe tip and reference lead to the **PROBE COMP** connectors on the oscilloscope.



4. Push **Default Setup**.



5. Push **Autoset**. The screen should now display a square wave, approximately 5 V at 1 kHz.



NOTE. For best performance, it is recommended that you set the Vertical scale to 1 V.

If the signal appears but is misshapen, perform the procedures for compensating the probe. (See page 20.)

If no signal appears, rerun the procedure. If this does not remedy the situation, have the oscilloscope serviced by qualified service personnel.

Compensating a Passive Voltage Probe

Whenever you attach a passive voltage probe for the first time to any input channel, compensate the probe to match it to the corresponding oscilloscope input channel.

To properly compensate your passive probe:

1. Follow the steps for the functional check. (See page 19.)
2. Check the shape of the displayed waveform to determine if your probe is properly compensated.



Figure 3: Properly compensated

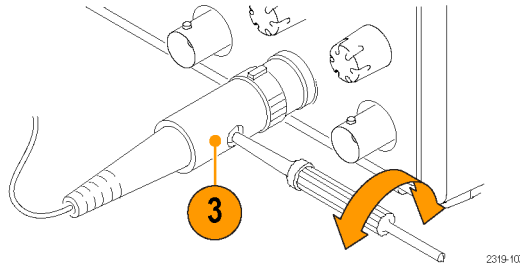


Figure 4: Under compensated



Figure 5: Over compensated

3. If necessary, adjust your probe. Repeat as needed.



Quick Tips Use the shortest possible ground lead and signal path to minimize probe-induced ringing and distortion on the measured signal.

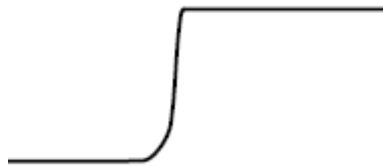


Figure 6: Signal with a short ground lead



Figure 7: Signal with a long ground lead

Application Module Free Trial

A 30-day free trial is available for all application modules not installed in your oscilloscope. The trial period begins when you power on the oscilloscope for the first time.

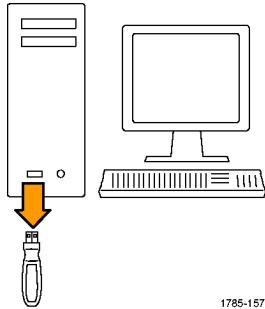
After 30 days, you must purchase the module if you want to continue using the application. To see the date when your free trial period expires, push the front panel **Utility** button, push the lower-bezel **Utility Page** button, use multipurpose knob **a** to select **Config**, and push the lower-bezel **About** button.

Upgrading Firmware

To upgrade the firmware of the oscilloscope:

1. Open up a Web browser and go to www.tektronix.com/software. Proceed to the software finder. Download the latest firmware for your oscilloscope on your PC.

Unzip the files and copy the firmware.img file into the root folder of a USB flash drive.



2. Power off your oscilloscope.
3. Insert the USB flash drive into the front-panel USB port on your oscilloscope.
4. Power on the oscilloscope. The oscilloscope automatically recognizes and installs the replacement firmware.

If the oscilloscope does not install the firmware, rerun the procedure. If the problem continues, try a different model of USB flash drive. Finally, if needed, contact qualified service personnel.

NOTE. Do not power off the oscilloscope or remove the USB flash drive until the oscilloscope finishes installing the firmware.

5. Power off the oscilloscope and remove the USB flash drive.
6. Power on the oscilloscope.
7. Push **Utility**.
8. Push **Utility Page**.
9. Turn multipurpose knob **a** and select **Config**.
10. Push **About**. The oscilloscope displays the firmware version number.
11. Confirm that the version number matches that of the new firmware.

NOTE. For more information on updating the firmware, refer to the electronic (PDF) MSO/DPO2000B User Manual.

Connecting Your Oscilloscope to a Computer

You may want to document your work for future reference. Instead of saving screen images and waveform data to a USB flash drive and generating a report later, you may want to get a copy of the image or waveform data directly from a remote PC for analysis. You may also want to control an oscilloscope at a remote location from your computer.

Two ways to connect your oscilloscope to a computer are through the VISA (Virtual Instrument Software Architecture) drivers and the e*Scope Web-enabled tools. Use VISA to communicate with your oscilloscope from your computer through a software application. Use e*Scope to communicate with your oscilloscope through a Web browser.

NOTE. For more information on connecting your oscilloscope to a computer, including instructions on how to save screen images and waveform data, refer to the electronic (PDF) MSO/DPO2000B User Manual.

Getting Acquainted with the Oscilloscope

Front-Panel Menus and Controls

The front panel has buttons and controls for the functions that you use most often. Use the menu buttons to access more specialized functions.

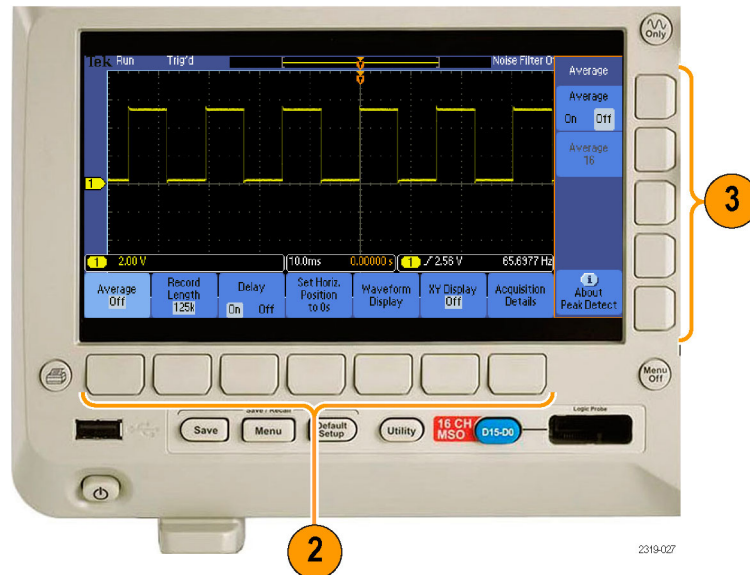
Using the Menu System

To use the menu system:

1. Push a front-panel menu button to display the menu that you want to use.



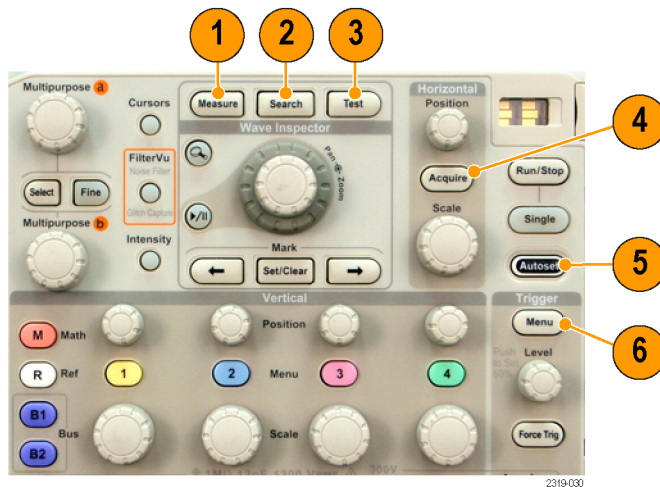
2. Push a lower-bezel button to select a menu item. If a pop-out menu appears, turn multipurpose knob **a** to select the desired choice. If a pop-up menu appears, press the button again to select the desired choice.



3. Push a side-bezel button to choose a side-bezel menu item.
 If the menu item contains more than one choice, push the side-bezel button repeatedly to cycle through the choices.
 If a pop-out menu appears, turn multipurpose knob **a** to select the desired choice.

Using the Menu Buttons

Use the menu buttons to perform many functions in the oscilloscope.



1. **Measure.** Push to perform automated measurements on waveforms or to configure cursors.
2. **Search.** Push to search through an acquisition for user-defined events/criteria.
3. **Test.** Push to activate advanced or application-specific testing features.
4. **Acquire.** Push to set the acquisition mode and adjust the record length.
5. **Autoset.** Push to perform an automatic setup of oscilloscope settings.
6. **Trigger Menu.** Push to specify trigger settings.
7. **Utility.** Push to activate the system utility functions, such as selecting a language or setting the date/time.
8. **Save / Recall Menu.** Push to save and recall setups, waveforms, and screen images to internal memory, or a USB flash drive.
9. **Channel 1, 2, 3, or 4 Menu.** Push to set vertical parameters for input waveforms and to display or remove the corresponding waveform from the display.
10. **B1 or B2.** Push to define and display a serial bus if you have the appropriate module application keys. The DPO2AUTO module supports CAN and LIN buses. The DPO2EMBD module supports I²C and SPI. The DPO2COMP module supports RS-232, RS-422, RS-485, and UART buses.

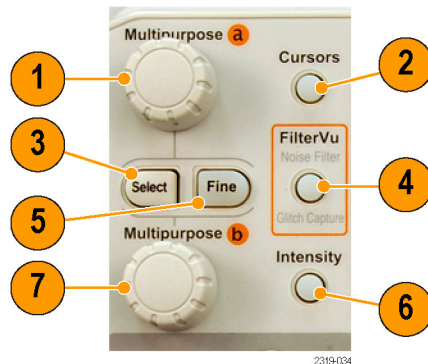
Parallel bus support is available on MSO2000B products.

Also, push the **B1** or **B2** button to display or remove the corresponding bus from the display.

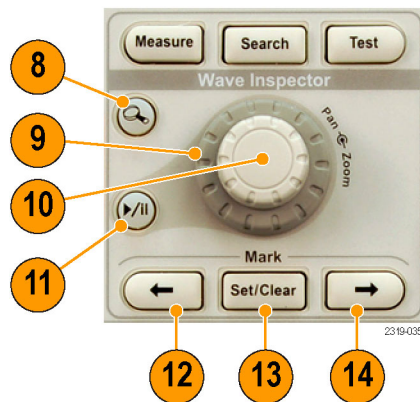
11. **R.** Push to manage reference waveforms, including the display or removal of each reference waveform from the display.
12. **M.** Push to manage the math waveform, including the display or removal of the math waveform from the display.

Using Other Controls

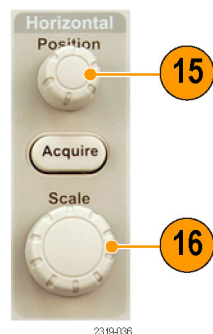
These buttons and knobs control waveforms, cursors, and other data input.



1. Turn the upper multipurpose knob **a**, when activated, to move a cursor, to set a numerical parameter value for a menu item, or to select from a pop-out list of choices. Push the **Fine** button to toggle between coarse and fine adjustment.
Screen icons tell you when **a** or **b** are active.
2. **Cursors.** Push once to activate the two vertical cursors. Push again to turn on the two vertical and two horizontal cursors. Push again to turn off all cursors.
When the cursors are on, you can turn the multipurpose knobs to control their position.
3. **Select.** Push to activate special functions.
For example, when using the two vertical cursors (and no horizontal ones are visible), you can push this button to link or unlink the cursors. When the two vertical and two horizontal cursors are both visible, you can push this button to make either the vertical cursors or the horizontal cursors active.
4. **FilterVu.** Push to filter unwanted noise from your signal and still capture glitches.
5. **Fine.** Push to toggle between making coarse and fine adjustments with the vertical and horizontal position knobs, the trigger level knob, and many operations of multipurpose knobs **a** and **b**.
6. **Intensity.** Push to enable multipurpose knob **a** to control waveform display intensity and knob **b** to control graticule intensity.
7. Turn the lower multipurpose knob **b**, when activated, to move a cursor or set a numerical parameter value for a menu item. Push **Fine** to make adjustments more slowly.



8. **Zoom** button. Push to activate zoom mode.
9. **Pan** (outer knob). Turn to scroll the zoom window through the acquired waveform.
10. **Zoom** (inner knob). Turn to control the zoom factor. Turning it clockwise zooms in further. Turning it counterclockwise zooms out.
11. **Play-pause** button. Push to start or stop the automatic panning of a waveform. Control the speed and direction with the pan knob.
12. ← **Prev**. Push to jump to the previous waveform mark.
13. **Set/Clear Mark**. Push to establish or delete a waveform mark.
14. → **Next**. Push to jump to the next waveform mark.

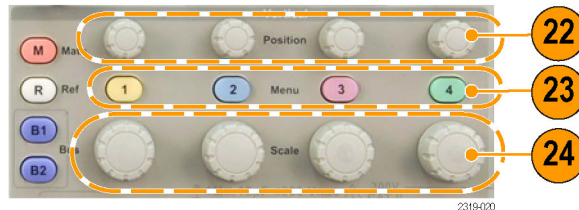


15. **Horizontal Position**. Turn to adjust the trigger point location relative to the acquired waveforms. Push **Fine** to make smaller adjustments.
16. **Horizontal Scale**. Turn to adjust the horizontal scale (time/division).



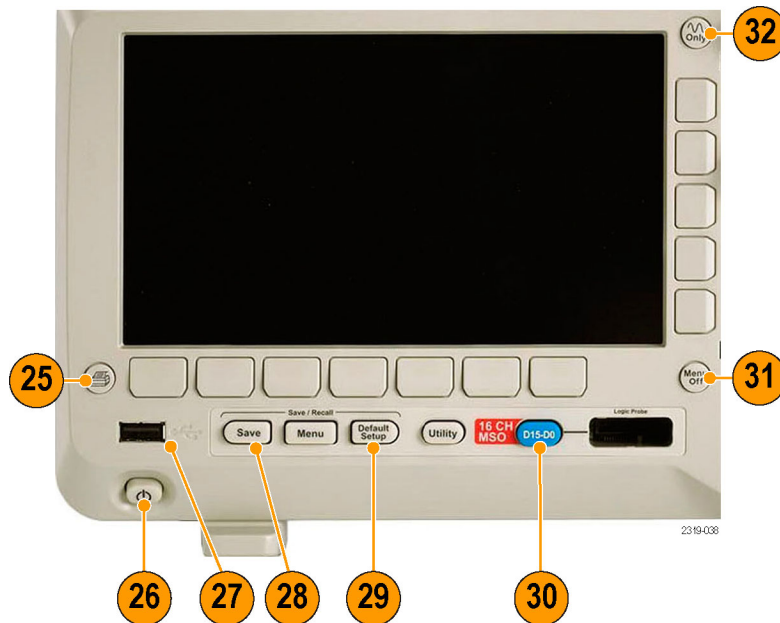
2319-037

17. **Run/Stop.** Push to start or stop acquisitions.
18. **Single.** Push to make a single acquisition.
19. **Autoset.** Push to automatically set the vertical, horizontal, and trigger controls for a usable, stable display.
20. **Trigger Level.** Turn to adjust the trigger level.
Push Level to Set 50%. Push the Trigger level knob to set the trigger level to the midpoint of the waveform.
21. **Force Trig.** Push to force an immediate trigger event.



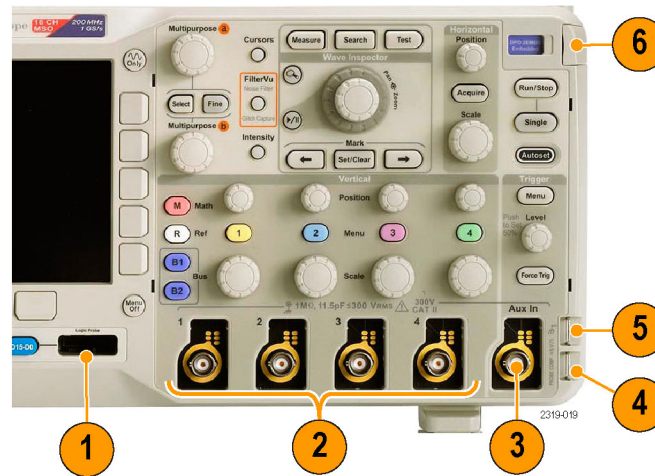
2319-020

22. **Vertical Position.** Turn to adjust the vertical position of the corresponding waveform. Push **Fine** to make smaller adjustments.
23. **1, 2, 3, 4 Menu.** Push to display or remove the corresponding waveform from the display and access the vertical menu.
24. **Vertical Scale.** Turn to adjust the vertical scale factor of the corresponding waveform (volts/division).



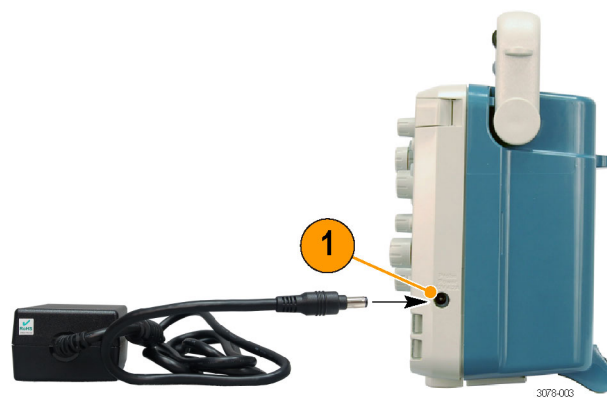
- 25. **Print.** Push to print to a PictBridge printer.
- 26. **Power switch.** Push to power on or off the oscilloscope.
- 27. **USB 2.0 Host port.** Insert a USB peripheral to the oscilloscope, such as a keyboard or a flash drive.
- 28. **Save.** Push to perform an immediate save operation. The save operation uses the current save parameters, as defined in the Save / Recall menu.
- 29. **Default Setup.** Push to perform an immediate restore of the oscilloscope to the default settings.
- 30. **D15 - D0.** Push to display or remove the digital channels from the display, and to access the digital channel setup menu (MSO2000B series only).
- 31. **Menu Off.** Push to clear a displayed menu from the screen.
- 32. **Waveform Only.** Push to remove menu and readout information from the screen so the oscilloscope only displays the waveform or bus. Push a second time to recall the previous menu and readout information.

Front-Panel Connectors



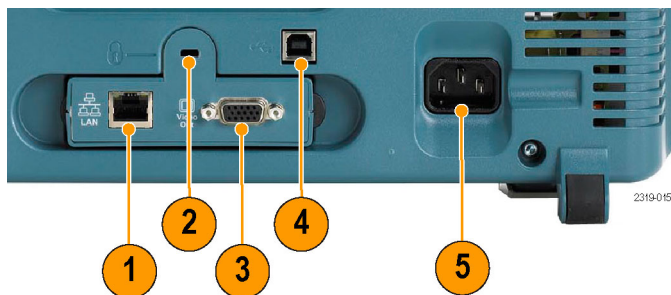
1. Digital Probe Connector (MSO2000B series only).
2. Channel 1, 2, (3, 4). Channel inputs with TekVPI Versatile Probe Interface.
3. **Aux In**. Trigger level range is adjustable from +12.5 V to -12.5 V.
4. **PROBE COMP**. Square wave signal source to compensate probes
Output voltage: 0 V to 5 V, Frequency: 1 kHz
5. Ground.
6. Application Module Slots.

Side-Panel Connector



1. TekVPI external power supply connector. Use the connector for the TekVPI external power supply (Tektronix part number 119-7465-XX) when additional power is needed for TekVPI probes.

Rear-Panel Connectors



1. **LAN.** Use the LAN (Ethernet) port (RJ-45 connector) to connect the oscilloscope to a 10/100 Base-T local area network. The port is available on the optional connectivity module (DPO2CONN).
2. **Lock.** Use to secure the oscilloscope and optional connectivity module.
3. **Video Out.** Use the Video Out port (DB-15 female connector) to show the oscilloscope display on an external monitor or projector. The port is available on the optional connectivity module (DPO2CONN).
4. **USB 2.0 Device port.** Use the USB 2.0 Full Speed Device port to connect a PictBridge compatible printer, or for direct PC control of the oscilloscope using USBTMC protocol.

NOTE. The cable connected from the USB 2.0 Device port to the host computer must meet the USB2.0 specification for high speed operation when connected to a high speed host controller.

5. **Power input.** Attach to an AC power line with integral safety ground.