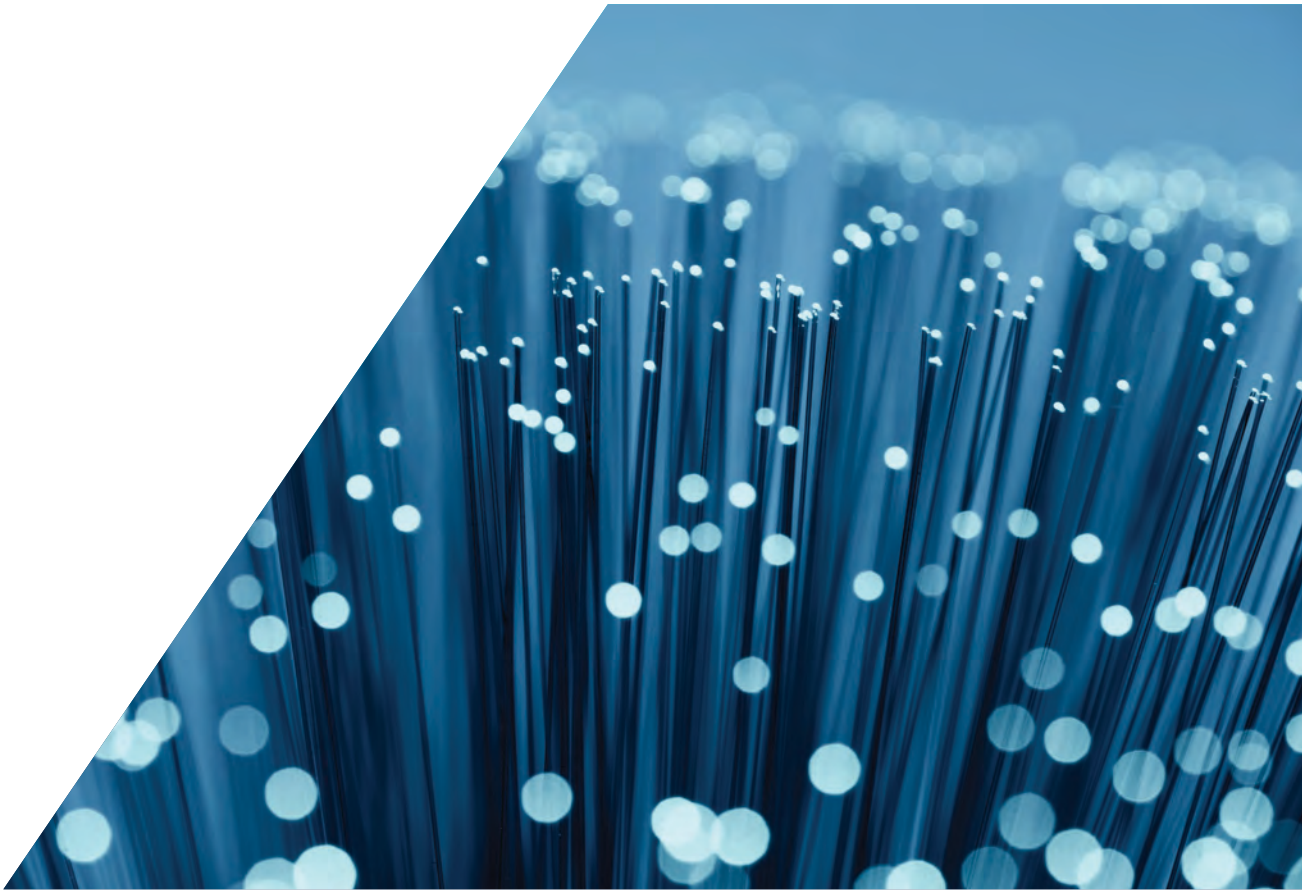
Tektronix®

MP5103

Modular Precision Test System

USER MANUAL



077-1894-01 November 2025

MP5103 Modular Precision Test System

User Manual

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These are the original instructions in English.

Contacting Tektronix

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Beaverton, OR 97077
USA

For product information, sales, service, and technical support:

In North America, call 1-800-833-9200.

Worldwide, visit www.tek.com to find contacts in your area.

Safety precautions

The following safety precautions should be observed before using this product and any associated instrumentation. Although some instruments and accessories would normally be used with nonhazardous voltages, there are situations where hazardous conditions may be present.

This product is intended for use by personnel who recognize shock hazards and are familiar with the safety precautions required to avoid possible injury. Read and follow all installation, operation, and maintenance information carefully before using the product. Refer to the user documentation for complete product specifications.

If the product is used in a manner not specified, the protection provided by the product warranty may be impaired.

The types of product users are:

Responsible body is the individual or group responsible for the use and maintenance of equipment, for ensuring that the equipment is operated within its specifications and operating limits, and for ensuring that operators are adequately trained.

Operators use the product for its intended function. They must be trained in electrical safety procedures and proper use of the instrument. They must be protected from electric shock and contact with hazardous live circuits.

Maintenance personnel perform routine procedures on the product to keep it operating properly, for example, setting the line voltage or replacing consumable materials. Maintenance procedures are described in the user documentation. The procedures explicitly state if the operator may perform them. Otherwise, they should be performed only by service personnel.

Service personnel are trained to work on live circuits, perform safe installations, and repair products. Only properly trained service personnel may perform installation and service procedures.

Tektronix products are designed for use with electrical signals that are measurement, control, and data I/O connections, with low transient overvoltages, and must not be directly connected to mains voltage or to voltage sources with high transient overvoltages. Measurement Category II (as referenced in IEC 60664) connections require protection for high transient overvoltages often associated with local AC mains connections. Certain Tektronix measuring instruments may be connected to mains. These instruments will be marked as category II or higher.

Unless explicitly allowed in the specifications, operating manual, and instrument labels, do not connect any instrument to mains.

Exercise extreme caution when a shock hazard is present. Lethal voltage may be present on cable connector jacks or test fixtures. The American National Standards Institute (ANSI) states that a shock hazard exists when voltage levels greater than 30 V RMS, 42.4 V peak, or 60 VDC are present. A good safety practice is to expect that hazardous voltage is present in any unknown circuit before measuring.

Operators of this product must be protected from electric shock at all times. The responsible body must ensure that operators are prevented access and/or insulated from every connection point. In some cases, connections must be exposed to potential human contact. Product operators in these circumstances must be trained to protect themselves from the risk of electric shock. If the circuit is capable of operating at or above 1000 V, no conductive part of the circuit may be exposed.

Do not connect switching cards directly to unlimited power circuits. They are intended to be used with impedance-limited sources. NEVER connect switching cards directly to AC mains. When connecting sources to switching cards, install protective devices to limit fault current and voltage to the card.

Before operating an instrument, ensure that the line cord is connected to a properly-grounded power receptacle. Inspect the connecting cables, test leads, and jumpers for possible wear, cracks, or breaks before each use.

When installing equipment where access to the main power cord is restricted, such as rack mounting, a separate main input power disconnect device must be provided in close proximity to the equipment and within easy reach of the operator.

For maximum safety, do not touch the product, test cables, or any other instruments while power is applied to the circuit under test. ALWAYS remove power from the entire test system and discharge any capacitors before connecting or disconnecting cables or jumpers, installing or removing switching cards, or making internal changes, such as installing or removing jumpers.

Do not touch any object that could provide a current path to the common side of the circuit under test or power line (earth) ground. Always make measurements with dry hands while standing on a dry, insulated surface capable of withstanding the voltage being measured.

For safety, instruments and accessories must be used in accordance with the operating instructions. If the instruments or accessories are used in a manner not specified in the operating instructions, the protection provided by the equipment may be impaired.

Do not exceed the maximum signal levels of the instruments and accessories. Maximum signal levels are defined in the specifications and operating information and shown on the instrument panels, test fixture panels, and switching cards.

When fuses are used in a product, replace with the same type and rating for continued protection against fire hazard.

Chassis connections must only be used as shield connections for measuring circuits, NOT as protective earth (safety ground) connections.

If you are using a test fixture, keep the lid closed while power is applied to the device under test. Safe operation requires the use of a lid interlock.

If a  screw is present, connect it to protective earth (safety ground) using the wire recommended in the user documentation.

The  symbol on an instrument means caution, risk of hazard. The user must refer to the operating instructions located in the user documentation in all cases where the symbol is marked on the instrument.

The  symbol on an instrument means warning, risk of electric shock. Use standard safety precautions to avoid personal contact with these voltages.

The  symbol on an instrument shows that the surface may be hot. Avoid personal contact to prevent burns.

The  symbol indicates a connection terminal to the equipment frame.

If this  symbol is on a product, it indicates that mercury is present in the display lamp. Please note that the lamp must be properly disposed of according to federal, state, and local laws.

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. 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.

The symbol indicates that this product complies with the applicable European Union requirements according to Directives 2012/19/EU and 2006/66/EC on waste electrical and electronic equipment (WEEE) and batteries. For information about recycling options, check the Tektronix Web site (www.tek.com/productrecycling).

The **WARNING** heading in the user documentation explains hazards that might result in personal injury or death. Always read the associated information very carefully before performing the indicated procedure.

The **CAUTION** heading in the user documentation explains hazards that could damage the instrument. Such damage may invalidate the warranty.

The **CAUTION** heading with the  symbol in the user documentation explains hazards that could result in moderate or minor injury or damage the instrument. Always read the associated information very carefully before performing the indicated procedure. Damage to the instrument may invalidate the warranty.

Instrumentation and accessories shall not be connected to humans.

Before performing any maintenance, disconnect the line cord and all test cables.

To maintain protection from electric shock and fire, replacement components in mains circuits — including the power transformer, test leads, and input jacks — must be purchased from Tektronix. Standard fuses with applicable national safety approvals may be used if the rating and type are the same. The detachable mains power cord provided with the instrument may only be replaced with a similarly rated power cord. Other components that are not safety-related may be purchased from other suppliers as long as they are equivalent to the original component (note that selected parts should be purchased only through Tektronix to maintain accuracy and functionality of the product). If you are unsure about the applicability of a replacement component, call a Tektronix office for information.

Unless otherwise noted in product-specific literature, Tektronix instruments are designed to operate indoors only, in the following environment: Altitude at or below 2,000 m (6,562 ft); temperature 0 °C to 50 °C (32 °F to 122 °F); and pollution degree 1 or 2.

To clean an instrument, use a cloth dampened with deionized water or mild, water-based cleaner. Clean the exterior of the instrument only. Do not apply cleaner directly to the instrument or allow liquids to enter or spill on the instrument. Products that consist of a circuit board with no case or chassis (e.g., a data acquisition board for installation into a computer) should never require cleaning if handled according to instructions. If the board becomes contaminated and operation is affected, the board should be returned to the factory for proper cleaning/servicing.

This product may contain a small installed lithium metal button cell. Please properly dispose of or recycle the cell at its end of life according to local government regulations.

This product may contain one or more type CR lithium batteries. According to the state of California, CR lithium batteries are classified as perchlorate materials and require special handling. See http://www.dtsc.ca.gov/hazardouswaste/perchlorate for additional information.

If present, the small lithium primary button cell contained in this equipment does not exceed 1 gram of lithium metal content per cell, and the cell type has been shown by the manufacturer to comply with the applicable requirements of the UN Manual of Tests and Criteria Part III, Sub-section 38.3. Consult your carrier to determine which lithium battery transportation requirements are applicable to your configuration, including to its re-packaging and re-labeling, prior to reshipment of the product by any mode of transport.

Safety Precautions version April 2025

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Introduction

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Welcome

Thank you for choosing a Tektronix product.

The MP5103 mainframe is a high-density, low-profile (1U), rack-mounted mainframe instrument suitable for production test, measurement, and power supply applications.

The MP5103 has three module slots for multichannel source-measure units (SMUs) and power supply units (PSUs), allowing you to easily add and remove instruments to meet dynamic test configurations.

The test system can be used in a variety of test applications, including validation and automated production workflow for semiconductor and optoelectronics as well as LED and chipset characterization in military, government, and consumer settings.

The modules described in this manual include:

- **MPSU50-2ST**: 2-channel, 50 W, 50 V, 5 A modular PSU
- **MSMU60-2**: 2-channel 30 W, 60 V, 1.5 A modular SMU
- **MSMU200-2**: 2-channel 30 W, 200 V, 1.5 A modular SMU (subject to availability)

Introduction to this manual

This manual provides installation, instrument description, operation, installation validation, and maintenance information for the MP5103 and modules.

More information about the MP5103 and modules are available at tek.com.

Extended warranty

Additional years of warranty coverage are available on many products. These valuable contracts protect you from unbudgeted service expenses and provide additional years of protection at a fraction of the price of a repair. Extended warranties are available on new and existing products. Contact your local Tektronix office, sales partner, or distributor for details.

Contact information

If you have any questions after you review the information in this documentation, please contact your local Tektronix office, sales partner, or distributor. You can also call the Tektronix corporate headquarters (toll-free inside the U.S. and Canada only) at 1-800-833-9200. For worldwide contact numbers, visit tek.com/contact-tek.

General ratings

The general ratings for the MP5103 and modules are listed in the following table.

Category	Specification
Input power	100 V AC to 240 V AC, 50 Hz or 60 Hz
Current rating	**MP5103:** 1 kVA **Modules:** See PSU output terminal ratings (on page 26) and SMU output terminal ratings (on page 26)
Input and output connections	See the Instrument description (on page 23) section of this manual
Environmental conditions	**For indoor use only** **Altitude:** Maximum 2000 meters (6562 feet) above sea level **Operating:** ■ **MP5103:** 0 °C to 50 °C, maximum 70% relative humidity up to 35 °C; derate 3% relative humidity/°C, 35 °C to 50 °C ■ **Modules:** Refer to datasheet for model-specific information **Storage:** −25 °C to 65 °C **Pollution degree:** 1 or 2

Installation

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Unpack and inspect

Your instrument was inspected both electrically and mechanically before shipment. Upon receiving the instrument, unpack all items from the shipping carton and check for any obvious damage that may have occurred during transit. Retain and use the original packaging materials if reshipment is necessary.

To unpack and inspect your instrument:

1. Inspect the box for damage.
2. Open the top of the box.
3. Remove the contents.
4. Inspect the module for any obvious signs of physical damage.
5. Report any damage to the shipping agent immediately.

Mainframe and module weights

- **Mainframe:** 12.8 kg (28 lb)
- **Module, average:** 1.25 kg (2.75 lb)

Lift and carry the MP5103

WARNING

The MP5103 requires two people to lift, move, and install. Failure to recognize and observe standard safety precautions could result in personal injury.

Do not lift the MP5103 instrument alone and do not lift the instrument using the front bezel or handles. Lifting the instrument by the front bezel or handles can cause instrument damage.

Handling precautions

Make sure to handle instruments carefully. Do not touch connectors or electrical contacts. Contamination from foreign materials such as dirt, dust, and body oils can substantially lower leakage resistances, which will degrade instrument performance.

WARNING

The information in this section is intended only for qualified personnel. Do not perform these procedures unless you are qualified. Failure to recognize and observe standard safety precautions could result in personal injury or death due to electric shock.

Airflow

The MP5103 has side air intakes and rear and side exhaust vents. All sides must be unobstructed to allow for airflow and to dissipate heat.

Excessive heat could damage the MP5103 and degrade its performance. Only operate the MP5103 in an environment where the ambient temperature does not exceed 50 °C.

CAUTION

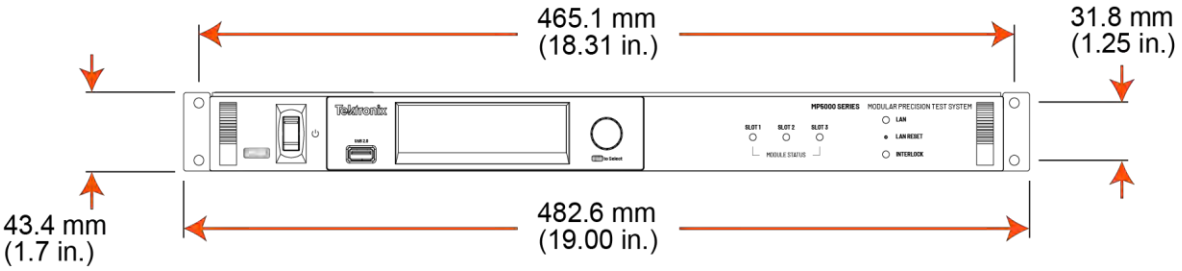
To prevent damaging heat build-up and ensure specified performance, use the following guidelines.

- **The side vents and rear and side outlet fans must be unobstructed to properly dissipate heat. Even partial blockage could impair proper cooling.**
- **Do not position any devices adjacent to the MP5103 that force air (heated or unheated) toward it.**
- **When rack mounting the MP5103, make sure there is adequate airflow around all sides of the instrument to ensure proper cooling. Adequate airflow enables air temperatures within approximately 25.4 mm (1 in.) of the MP5103 surfaces to remain within specified limits under all operating conditions.**
- **The right side of the MP5103 has a cool air intake. It is recommended that there is 18 °C to 28 °C air available at the left and right sides of the instrument. The rear and left sides of the MP5103 also contain exhaust outlets.**
- **If you rack mount high power-dissipation equipment next to the MP5103, it could cause excessive heating. To produce specified MP5103 accuracies, maintain the specified ambient temperature around the intake vents of the MP5103. In rack configurations with convection cooling only (not recommended), place the hottest, nonprecision equipment in the rack as far above the MP5103 as practical.**
- **If the MP5103 is installed in a closed cabinet, the cabinet should have forced-air cooling provided at no less than 730 CFM.**
- **There must be at least 152.4 mm (6 in.) of space for exhaust vents at rear of mainframe.**

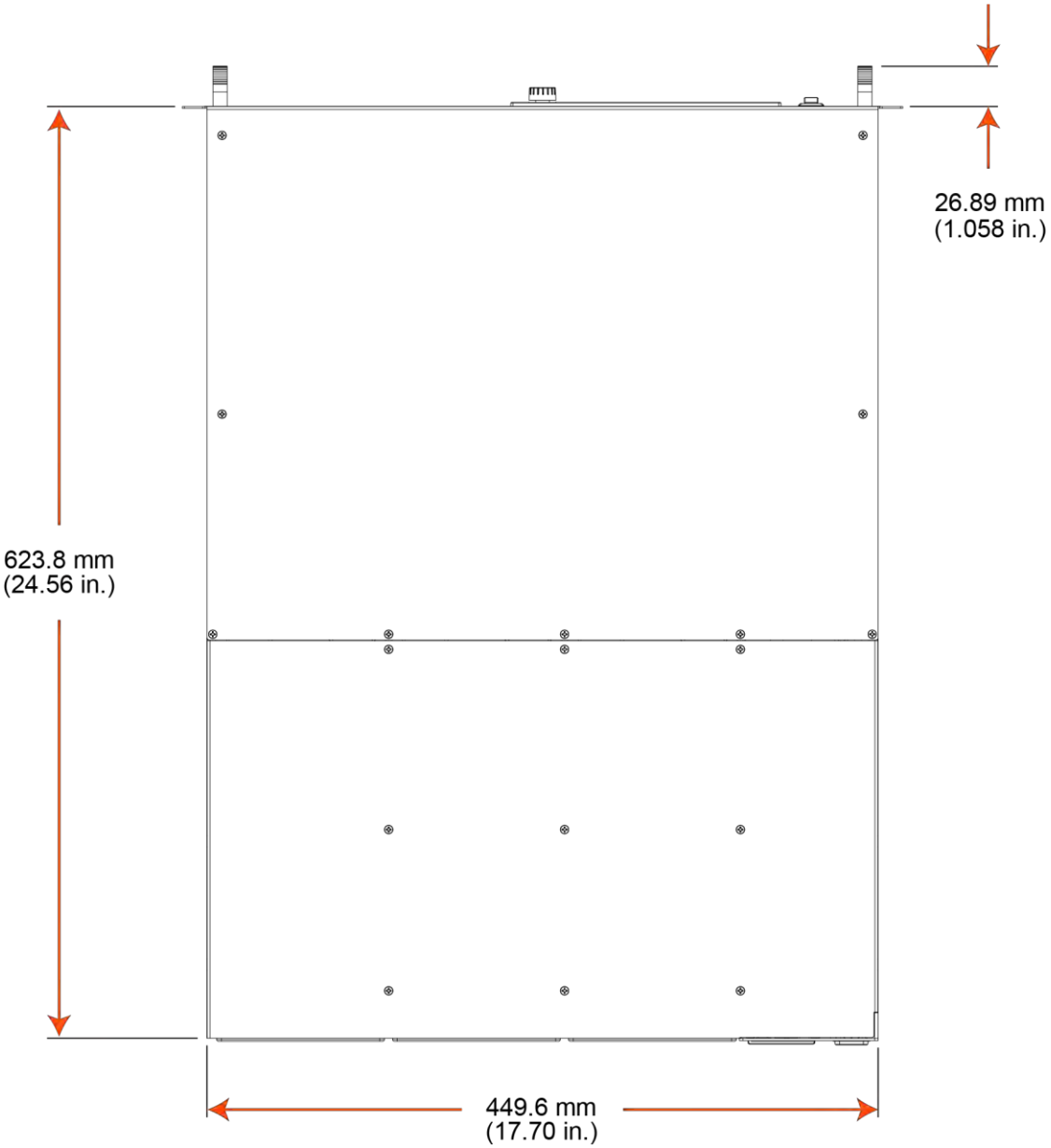
Dimensions

The following figures show the MP5103 and module dimensions.

MP5103 dimensions front view



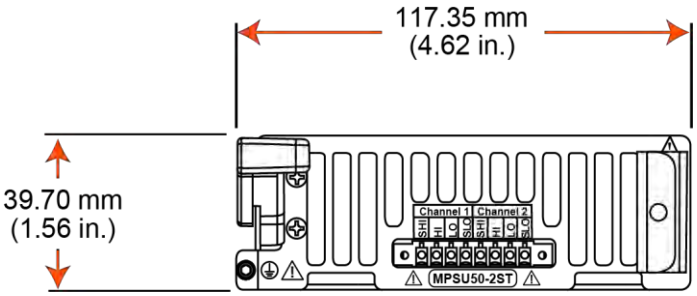
MP5103 dimensions top view



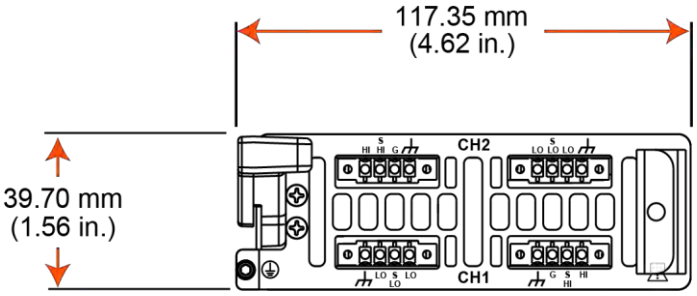
Module dimensions output panel view

The following are examples of modules that can be used with the MP5103, along with the dimensions when viewed from the output panel.

The output panel of the MPSU50-2ST is shown in the following figure.

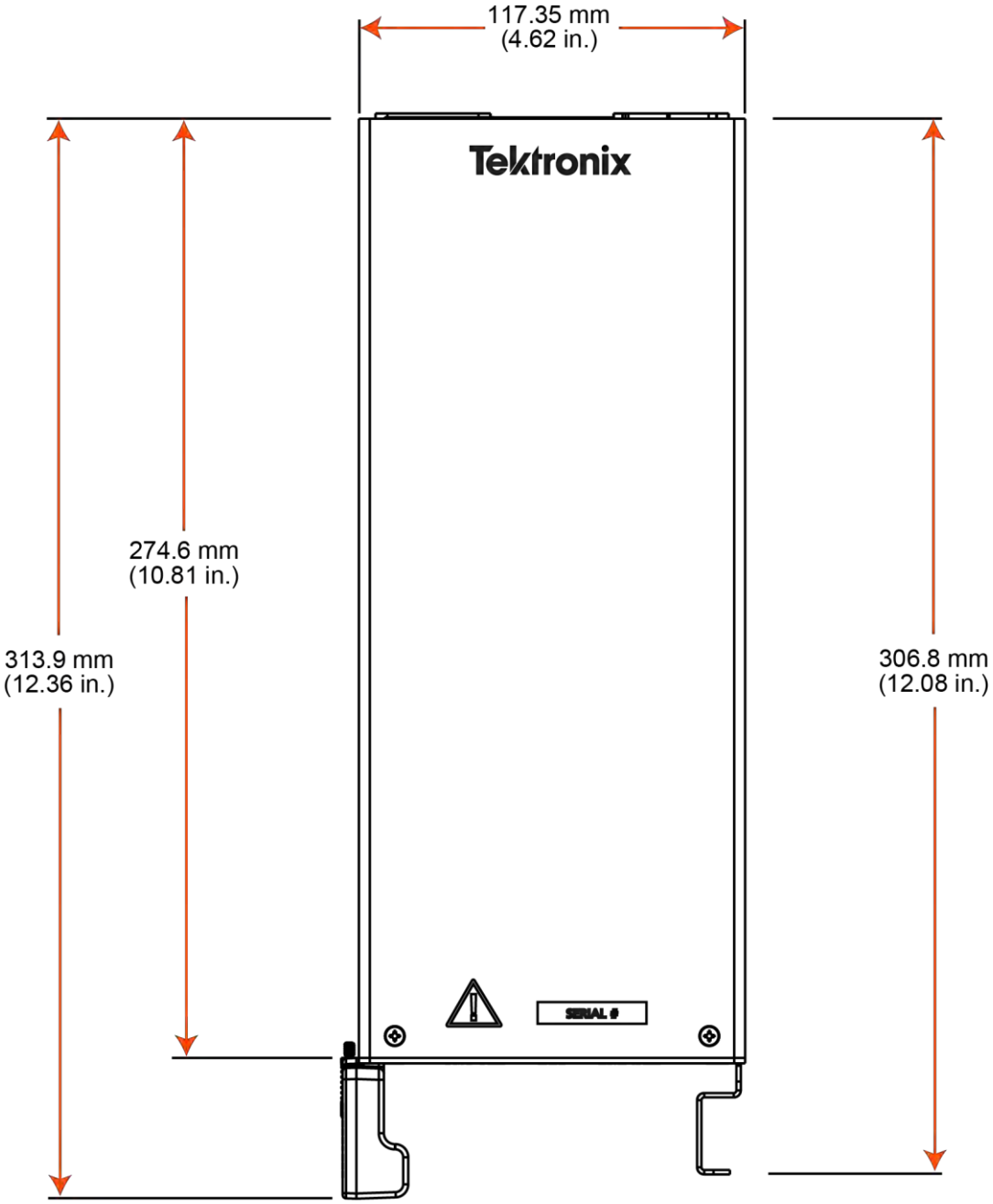


The output panel of the MSMU60-2 and MSMU200-2 is shown in the following figure.



Module dimensions top view

The following graphic illustrates the dimensions for a mainframe module when viewed from the top. Module dimensions are identical, regardless of instrument type.

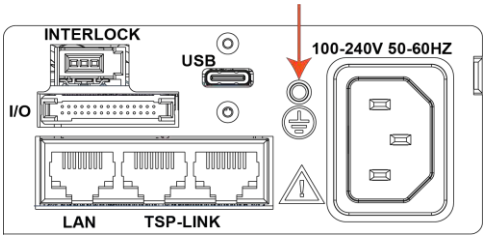


Supply connection and grounding requirements

Before operating the mainframe, make sure that the line cord is connected to a properly grounded, appropriately-rated power receptacle. Inspect the connecting cables, test leads, and jumpers for possible wear, cracks, or breaks before each use.

When you install equipment where access to the main power cord is restricted, such as in a rack, a separate main input power disconnect device must be provided in close proximity to the equipment and within easy reach of the operator.

Your MP5103 includes a grounding cable for connection to protective earth (safety ground). Connect one lugged end of this cable to the grounding screw on the rear panel of your MP5103, as shown in the following figure.



MP5103 installation

The MP5103 is intended to be mounted in a rack only. For detailed instructions, refer to the documentation for the Model 4299-15 Fixed Rack-Mount Kit, available from tek.com.

Any other rack-mount kits or methods do not guarantee or provide the presumption of a safe installation.

WARNING

Rack mounting the MP5103 requires two people. Failure to recognize and observe standard safety precautions could result in personal injury.

Interlock installation

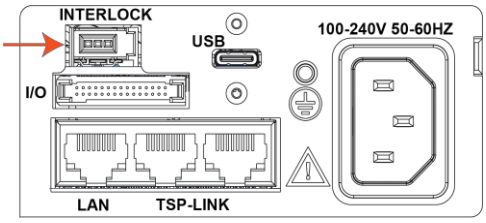
The MP5103 provides an interlock circuit. This circuit includes a switch that is normally-open and must be asserted (closed) to enable the outputs or make measurements with installed modules.

When the interlock is asserted, the green front-panel INTERLOCK indicator is illuminated.

WARNING

The MP5103 interlock circuit must be positively activated to enable the output of installed modules. The interlock helps facilitate safe operation of the equipment in a test system. Bypassing the interlock could expose the operator to hazardous voltages that could result in personal injury or death.

The switch circuit can be installed on the lid of a test fixture, the enclosure of a semiconductor prober or device handler, or on the door or doors of a test equipment rack. The circuit opens when an access door is opened and closes when the door is closed.



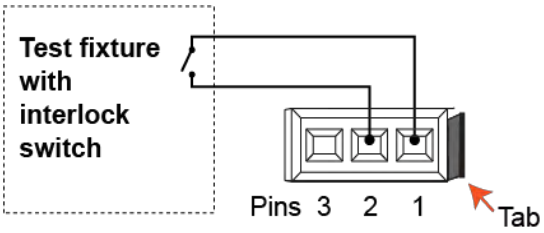
You can use the interlock connector supplied with your MP5103 to make the interlock connection, though you must supply the connection wire. The recommended wire is:

- 20 AWG to 24 AWG copper alloy
- 7 to 19 bare and tinned strands
- 0.25 mm^2 to 0.50 mm^2
- Flexible vinyl, semi-flexible vinyl, polyethylene, x-linked polyethylene, or PTFE

To ensure proper interlock operation, the combined resistance of the external interlock switch and connection wires must be less than 10 Ω when the switch is closed.

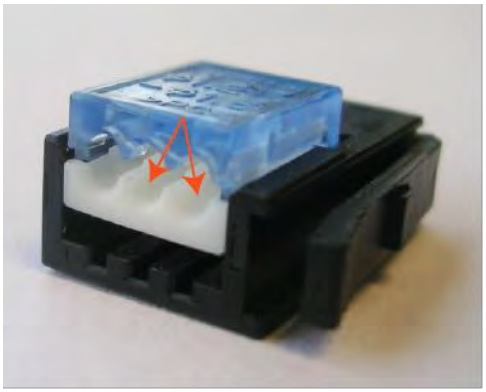
The interlock pin locations and connections are shown in the following figure. The pins are:

- Pin 3: Earth and chassis ground
- Pin 2: Interlock
- Pin 1 (next to tab): +6 V DC out (current limited)



To assemble the interlock:

1. Insert the wires into the connector at the locations shown in the following graphic.



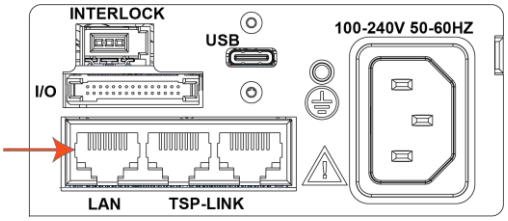
2. Use a pair of pliers to squeeze the connector sections together.

You cannot disassemble the connector and reuse it. The replacement part number is CS-1616-3, Safety Interlock Mating Connector, or 3M part number 37103-A165-00E MB

Connect the LAN cable

Use a LAN crossover cable (RJ-45, plug to plug) or a straight-through cable to connect your equipment. The MP5103 includes a cable that you can use for LAN communications.

The following figure shows the location of the LAN port on the rear panel of the instrument. Connect the LAN cable between this connection and the LAN port on your computer, LAN switch, or network.



Install or remove a module with the mainframe powered off

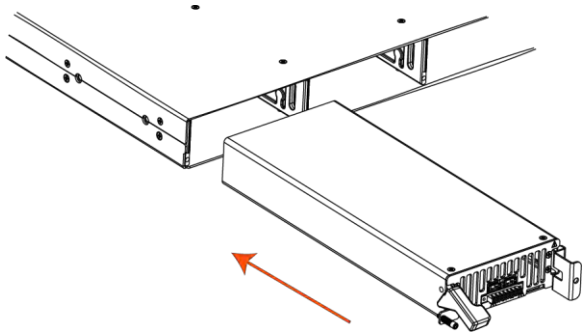
This topic details installation or removal of a module with the mainframe powered off and modules disconnected from any device under test (DUT).

WARNING

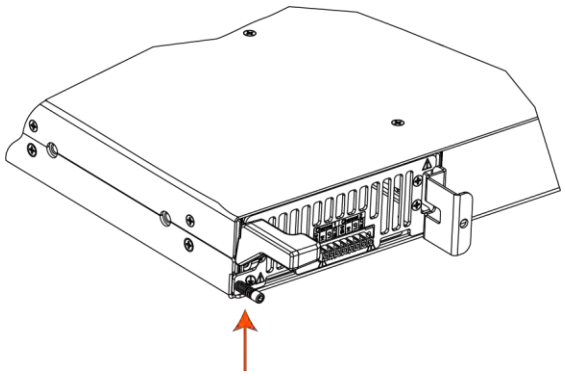
Hazardous voltages may be present on the output and guard terminals. To prevent electrical shock that could cause injury or death, NEVER make or break connections to the MP5103 modules while the slot is powered on. Power down the slot before handling cables connected to the outputs. Verify that there is no voltage on the module's terminals before making connections between the module and the DUT. Placing the output in standby mode does not guarantee that the outputs are not powered if a hardware or software fault occurs. For the safest operation, power down the MP5103 mainframe before making or breaking connections to the MP5103 modules.

To install a module:

1. Remove the module cover slot, if necessary.
2. Place the module into an empty slot, then push inward until the module is seated.



3. Use a tool that matches the screw head type to fasten the module retention screw to 4 in. lb (0.45 n-m).



WARNING

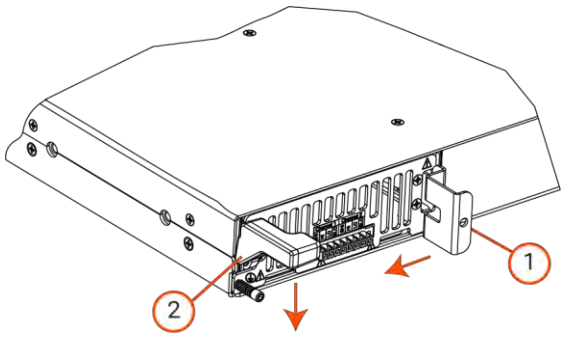
The module retention screw must be securely fastened to provide proper safety ground for the module. All modules must be secured in the mainframe with this screw to prevent death or serious injury due to electric shock.

When you turn on the instrument, the LED indicator for the module slot on the front of the mainframe should be solid green. See the following table for more LED indicator color descriptions.

LED color	Description
Off	There is no module in the slot.
Solid green	The module is running and all outputs are off.
Solid blue	The module is running and some outputs are on.
Flashing amber	The module is powering up or powering down.
Solid amber	The module powered down in a known good condition. The module is safe to remove.
Flashing red	The module encountered a fatal condition and the module is powering down.
Solid red	The module encountered a fatal condition and it is powered off. The module is safe to remove.
Alternating red and green	The module is in a temporary unusable condition such as thermal shutdown. In this state, the module is powered up and the outputs are off, but the outputs cannot be turned on until the shutdown condition is resolved.

To remove a module:

1. Make sure that the mainframe is powered off.
2. Loosen the module retention screw.
3. While pressing inward on the spring bracket on the right of the module, press down on the release lever.

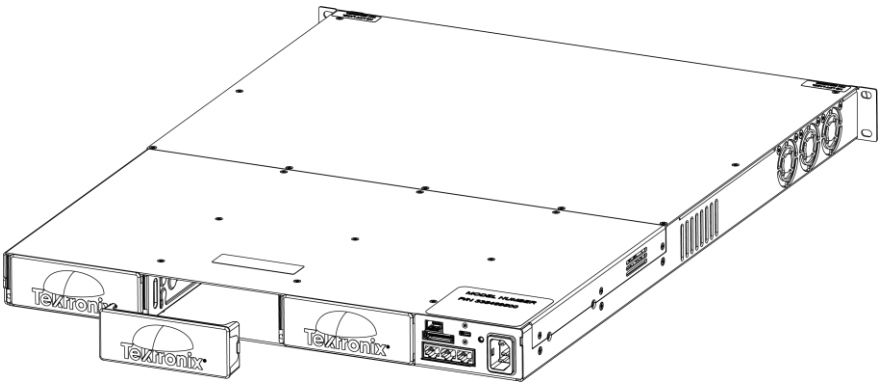


1	Spring bracket
2	Release lever

4. Slide the module out and away from the mainframe.
5. If you are not installing another module in its place, install a cover over the empty module slot. See Slot covers (on page 21) for more information.

Slot covers

Install slot covers over unused module slots to maintain proper instrument ventilation and operating temperatures and to prevent foreign objects from contaminating the slots.



Turn the instrument on or off

WARNING

The power cord supplied with the MP5103 contains a separate protective earth (safety ground) wire for use with grounded outlets. When proper connections are made, the instrument chassis is connected to power-line ground through the ground wire in the power cord. In addition, a chassis ground connection is provided through a screw on the rear panel. This terminal should be connected to a known protective earth. In the event of a failure, not using a properly grounded protective earth and grounded outlet may result in personal injury or death due to electric shock.

Do not replace detachable mains supply cords with inadequately rated cords. Failure to use properly rated cords may result in personal injury or death due to electric shock.

To prevent any human contact with a live conductor, connections to the DUT must be fully insulated and the final connections to the DUT must only use safety-rated safety-jack-socket connectors that do not allow bodily contact.

CAUTION

Operating the instrument on an incorrect line voltage may cause damage to the instrument, possibly voiding the warranty.

NOTE

On some sensitive or easily damaged devices under test (DUTs), the instrument power-up and power-down sequence can apply transient signals to the DUT that may affect or damage it. When testing this type of DUT, it is recommended that you do not make final connections to the DUT until the instrument has completed its power-up sequence and is in a known operating state. Disconnect the DUT from the instrument before turning the instrument off. Only qualified personnel, as identified by the responsible body, should make these connections.

WARNING

To prevent any human contact with a live conductor, connections to the DUT must be fully insulated and the final connections to the DUT must only use safety-rated safety-jack-socket connectors that do not allow bodily contact.

The MP5103 operates from a line voltage of 100 V to 240 V at a frequency of 50 Hz or 60 Hz. Line voltage is automatically sensed. Make sure the operating voltage in your area is compatible.

Follow the procedure below to connect the MP5103 to line power and turn on the instrument.

To turn the MP5103 on or off:

1. Before you plug in the power cord, make sure that the front-panel **POWER** switch is in the off (O) position.
2. Connect the socket end of the supplied power cord to the AC receptacle on the rear panel.
3. Connect the other end of the power cord to a grounded AC outlet.
4. Press the front-panel **POWER** switch to place it in the on (I) position.
5. To turn your instrument off, press the front-panel **POWER** switch to place it in the off (O) position.

Warmup period

The MP5103 and any installed modules should be turned on and allowed to warm up for at least 30 minutes.

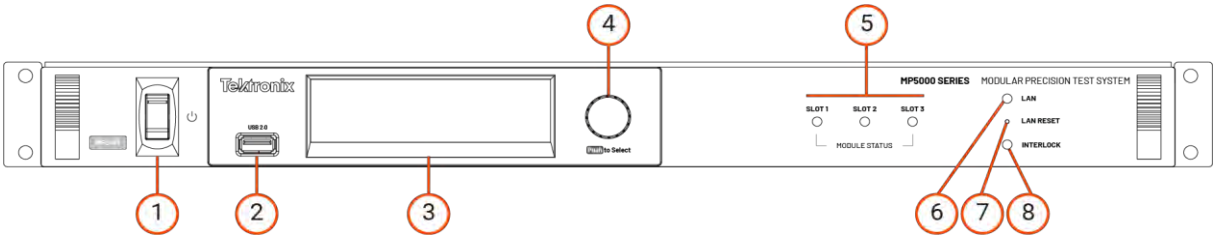
Instrument description

In this section:

MP5103 front panel.....23
MP5103 rear panel 24
Module output panel 24
Module interface panel.....27

MP5103 front panel

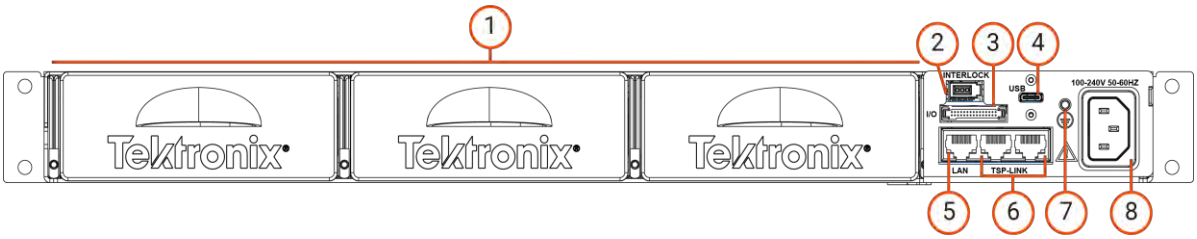
The front panel of the MP5103 is shown in the following figure. The description of the controls, USB port, and indicators follow the figure.



1	Power/reset switch	The power switch turns the instrument on or off. The indicator is illuminated when the instrument is on. The power switch powers all modules.
2	USB-A port	USB Type A connection. You can use this connection to upgrade the firmware or load scripts from a USB flash drive.
3	Display	The MP5103 has a touchscreen display. The screen auto-dims after 10 minutes of inactivity.
4	Navigation wheel	Turn the navigation wheel to scroll to highlight a value or menu option on the display. Press the wheel to select the highlighted choice or edit the selected field.
5	Module status indicators	The module status indicators display the status of the module slots. When viewed from the front panel of the mainframe, the order of indicators matches the order of slots.
6	LAN indicator	Illuminates when the instrument is connected to a local area network (LAN).
7	LAN RESET	Reverts the LAN settings and the instrument password to default values. Insert a straightened paper clip or a similar thin, rigid object to reset the LAN.
8	INTERLOCK indicator	Illuminates when the interlock circuit is asserted, which means that instrument outputs can be turned on and measurements can be made.

MP5103 rear panel

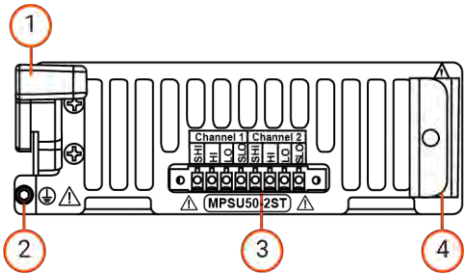
The rear panel of the MP5103 is shown in the following figure. The description of the connectors and other panel details follow the figure.



1	Slots (shown with slot covers)	You can install a module into any of the three slots. When you are facing the rear panel of the mainframe, the slots are numbered from right to left, with slot 1 nearest to the interlock, digital I/O, and LAN connectors. Each slot has two rows of 140-pin differential signal connectors and 4-pin power connectors to interface with modules.
2	Interlock connector	5 V system safety interlock connection.
3	I/O connector	30-pin connector. Includes eighteen digital input or output pins.
4	USB-C port	USB 3.0 Type C connection with optional panel-mount screw connectors for security. You can use this connection for communication, control, and data transfer.
5	LAN connector	1 GB LAN port.
6	TSP-Link connectors	TSP-Link system expansion interface.
7	Grounding screw	Connects to protective earth (safety ground).
8	Power connector	Connect the line cord to the power receptacle and a grounded AC power outlet.

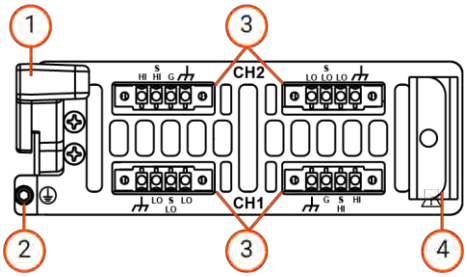
Module output panel

The output panel of the MPSU50-2ST is shown in the following figure.



1	Release lever	The release lever at the top left of the output panel of the module assists with removing a module.
2	Retention screw	The module retention screw at the bottom-left of the output panel of the module must be tightened after inserting a module and loosened before removing a module.
3	MPSU50-2ST output terminals	The output terminals of the MPSU50-2ST provide connections for SENSE HI, SENSE LO, SOURCE HI, and SOURCE LO for each channel
4	Spring bracket	The spring bracket ensures that the module is fully seated and locked into the mainframe. It is also used to release a module when removing it from the mainframe.

The output panel of the MSMU60-2 and MSMU200-2 is shown in the following figure.

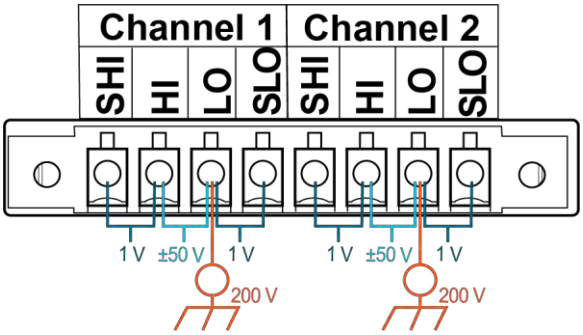


1	Release lever	The release lever at the top left of the output panel of the module assists with removing a module.
2	Retention screw	The module retention screw at the bottom-left of the output panel of the module must be tightened after inserting a module and loosened before removing a module.
3	MSMU60-2 and MSMU200-2 output terminals	The output terminals of the MSMU60-2 and MSMU200-2 provide connections for SENSE HI, SENSE LO, FORCE HI, FORCE LO, GUARD, and chassis ground.
4	Spring bracket	The spring bracket ensures that the module is fully seated and locked into the mainframe. It is also used to release a module when removing it from the mainframe.

PSU output terminal ratings

MPSU50-2ST

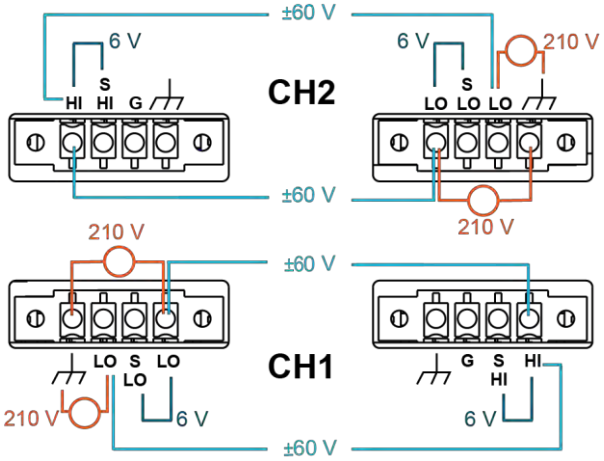
Terminal	Maximum voltage
LO to chassis ground	200 V
HI to LO	50 V
HI to S HI or LO to S LO	1 V



SMU output terminal ratings

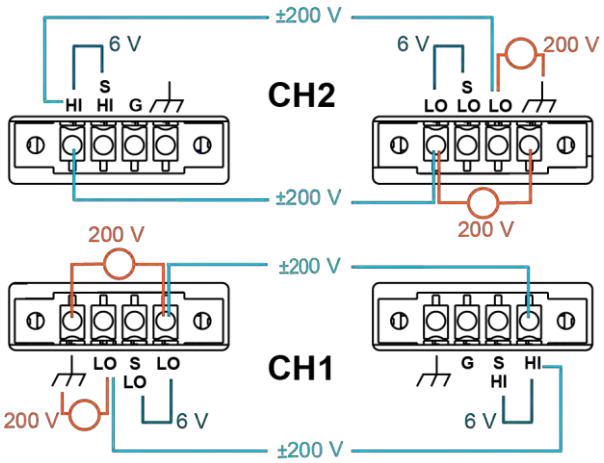
MSMU60-2 voltage ratings

Terminal	Maximum voltage
LO to chassis ground	210 V
HI to LO	60 V
HI to S HI or LO to S LO	6 V



MSMU200-2 voltage ratings

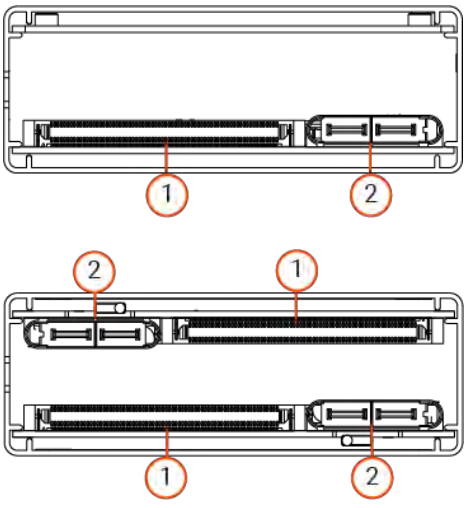
Terminal	Maximum voltage
LO to chassis ground	200 V
HI to LO	200 V
HI to S HI or LO to S LO	6 V



Module interface panel

Modules have 140-pin differential signal connectors and 4-pin power connectors that interface with the MP5103. Your module may have either one or two rows of connectors.

The MPSU50-2ST has one row of connectors, and the MSMU60-2 and MSMU200-2 have two rows of connectors.



1	140-pin signal connector
2	4-pin power connector

Operation and validation

In this section:

Introduction 28
Front-panel display and Home screen 28
LAN settings 29
Validate installation and operation 30

Introduction

NOTE

Make sure to review the Installation (on page 10) and Instrument description (on page 23) sections of this manual before operating the mainframe and modules.

The MP5103 mainframe must have at least one module installed to make measurements. The modules cannot operate unless installed in the mainframe.

This section describes basic operation, validation, and functional checks for the MP5103 mainframe and installed modules.

Front-panel display and Home screen

When the instrument is turned on, the Home screen is displayed on the touchscreen.

- **Mainframe:** Displays the real-time measurements being made for each module channel.
- **Channels:** Allows you to select a module slot, the module channel number, output levels, limits, ranges, and other module-specific settings.
- **Settings:** Includes options to update firmware and change the mainframe password.
- **Information icon:** Displays the mainframe manufacturer, model, serial number, and the firmware version. Information about each installed module is also available.

If you have connected an ethernet cable to an active port and LAN communications are enabled, the IP address of your mainframe is also displayed.

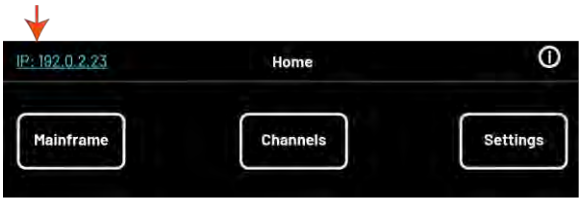
The front panel display turns off after 10 minutes of inactivity to prevent screen burn-in. Touch the display or turn the navigation wheel to return the display to normal brightness.

LAN settings

The MP5103 is shipped with LAN port communications disabled. To view active LAN settings or configure LAN communications, see the following instructions.

To view LAN settings:

1. From the Home screen, select the IP address of your instrument.



2. The current LAN configuration is displayed. Select **Config** to display additional LAN settings.

3. Configure any additional settings. The settings are only available if LAN is enabled.

NOTE

LAN communications with the MP5103 requires additional configuration. See the *MP5000 Series Programmer Manual* for more information.

4. Select **Home** to exit.

Validate installation and operation

Validate the installation and operation of your mainframe and installed modules before connecting a test device and additional instruments. The module used in this example is the MSMU60-2 Source Measure Unit.

WARNING

Floating a module channel above chassis ground with hazardous voltage (>40 V DC) at the LO or SLO terminals can result in hazardous voltage being present at the HI and SHI terminals whether the channel output is turned on or off. To avoid death or serious injury due to electric shock, always assume that hazardous voltage is present on all terminals when floating a module channel with voltage of greater than 40 V DC.

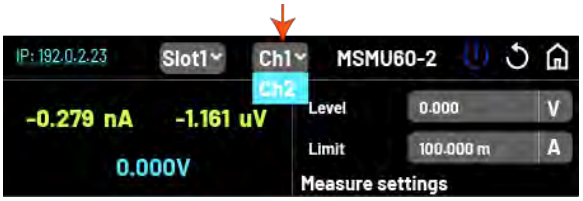
NOTE

Make sure that you have installed and asserted the mainframe interlock circuit before starting this procedure. To source and measure, the interlock circuit must be asserted (closed). See Interlock installation (on page 16) for more information.

To validate the installation of your mainframe and module:

1. Select **Channels** from the home screen. Information for channel 1 (**Ch1**) of the module installed in slot 1 (**SLOT1**) is displayed in this example.
2. Select the red output status indicator to turn on the output. The indicator turns blue, as shown in the following graphic. You will see measurements displayed for channel 1, which verifies that the module is functional.

3. Select **Ch2** from the channel selector.



4. Select the status indicator to turn on the output. Measurement readings are displayed for channel 2.
5. Select the output indicator to turn off the output. The output status indicator turns red.

To validate additional installed modules, select another slot (for example, **SLOT2** or **SLOT3**), and repeat the above steps.

Maintenance

In this section:

Introduction 31
Lithium battery 31
Clean the mainframe and modules 31
Clean the front-panel mainframe display 31
Upgrade the firmware 32

Introduction

This section provides maintenance information and procedures that can be done by the operator.

Lithium battery

The MP5103 contains a lithium battery. This battery is not replaceable by the user.

Clean the mainframe and modules

The MP5103 and modules require little periodic maintenance. However, take care to ensure that the chassis, power and output connectors, and cooling vents of the instruments remain clean and free of debris.

- Remove loose dust on the outside of the mainframe and modules with a lint-free cloth. Do not use compressed air, as this may force particulates inside of the instruments.
- Every six months or when debris is visible, use a vacuum cleaner with a brush attachment to clean all intake and exhaust screens on the mainframe and modules.
- Do not insert cleaning tools or attempt to clean the inside of a module.
- Liquids should be used for cleaning only in certain cases. See Clean the front-panel mainframe display (on page 31).

Clean the front-panel mainframe display

Clean the front-panel mainframe display with a soft, lint-free cloth. If more thorough cleaning is required, wipe the display with a 70% isopropyl alcohol solution. Do not use sprays directly on the display.

Upgrade the firmware

Use a USB flash drive to upgrade the firmware from the front panel for the mainframe and modules. The latest firmware is available from tek.com.

Make sure that the firmware is loaded onto your USB flash drive, then insert it into the USB port on the front of the mainframe before you begin.

The upgrade process is the same for the mainframe as it is for the modules. The following example demonstrates the firmware upgrade for the mainframe.

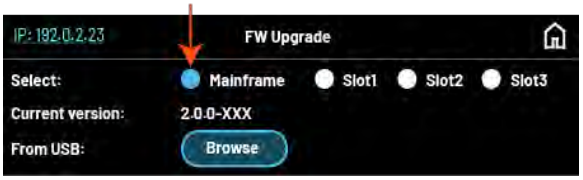
CAUTION

Do not remove the USB drive, turn off the instrument power, or otherwise interrupt the firmware upgrade process. Your instrument may become unresponsive and require factory service.

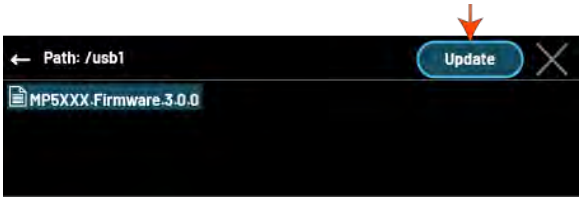
The following procedure upgrades a mainframe with firmware V1.0.1 or newer installed. If you need to upgrade from an older version, replace the first two steps in the following procedure by selecting **General info** from the home page and then the firmware download icon.

To upgrade the mainframe firmware (V1.0.1 and newer):

1. Select **Settings** from the mainframe home page.
2. Select **FW update**.
3. The FW Upgrade screen is displayed. Select **Mainframe**.



4. Select **Browse** to locate the new firmware file on your USB flash drive, then select it.
5. Select **Update**. The firmware may take several minutes to load.



6. Your instrument returns to the Home screen after the upgrade.

To confirm that the upgrade was successful, select **General Info** from the Home screen, then scroll to the Mainframe section to the verify the firmware version.