



**8 Series
Sampling Oscilloscope
Installation and Safety Instructions**





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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.

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Important safety information

This manual contains information and warnings that must be followed by the user for safe operation and to keep the product in a safe condition.

To safely perform service on this product, see the *Service safety summary* that follows the *General safety summary*.

General safety summary

Use the product only as specified. Review the following safety precautions to avoid injury and prevent damage to this product or any products connected to it. Carefully read all instructions. Retain these instructions for future reference.

This product shall be used in accordance with local and national codes.

For correct and safe operation of the product, it is essential that you follow generally accepted safety procedures in addition to the safety precautions specified in this manual.

The product is designed to be used by trained personnel only.

Only qualified personnel who are aware of the hazards involved should remove the cover for repair, maintenance, or adjustment.

Before use, always check the product with a known source to be sure it is operating correctly.

This product is not intended for detection of hazardous voltages.

Use personal protective equipment to prevent shock and arc blast injury where hazardous live conductors are exposed.

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.

When incorporating this equipment into a system, the safety of that system is the responsibility of the assembler of 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. Do not use the provided power cord for other products.

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. Do not disable the power cord grounding connection.

Power disconnect. The power cord disconnects the product from the power source. See instructions for the location. Do not position the equipment so that it is difficult to operate the power cord; it must remain accessible to the user at all times to allow for quick disconnection if needed.

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

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

Do not float the common terminal above the rated voltage for that terminal.

The measurement terminals on this product are not rated for connection to mains or Category II, III, or IV circuits.

Do not operate without covers. Do not operate this product with covers or panels removed, or with the case open. Hazardous voltage exposure is possible.

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

Do not operate with suspected failures. If you suspect that there is damage to this product, have it inspected by qualified service personnel.

Disable the product if it is damaged. Do not use the product if it is damaged or operates incorrectly. If in doubt about safety of the product, turn it off and disconnect the power cord. Clearly mark the product to prevent its further operation.

Before use, inspect voltage probes, test leads, and accessories for mechanical damage and replace when damaged. Do not use probes or test leads if they are damaged, if there is exposed metal, or if a wear indicator shows.

Examine the exterior of the product before you use it. Look for cracks or missing pieces.

Use only specified replacement parts.

Do not operate in wet/damp conditions. Be aware that condensation may occur if a unit is moved from a cold to a warm environment.

Do not operate in an explosive atmosphere.

Keep product surfaces clean and dry. Remove the input signals before you clean the product.

Provide proper ventilation. Refer to the installation instructions in the manual for details on installing the product so it has proper ventilation.

Slots and openings are provided for ventilation and should never be covered or otherwise obstructed. Do not push objects into any of the openings.

Provide a safe working environment. Always place the product in a location convenient for viewing the display and indicators.

Avoid improper or prolonged use of keyboards, pointers, and button pads. Improper or prolonged keyboard or pointer use may result in serious injury.

Be sure your work area meets applicable ergonomic standards. Consult with an ergonomics professional to avoid stress injuries.

Use care when lifting and carrying the product. This product is provided with a handle or handles for lifting and carrying.

Use only the Tektronix rackmount hardware specified for this product.

Service safety summary

The *Service safety summary* section contains additional information required to safely perform service on the product. Only qualified personnel should perform service procedures. Read this *Service safety summary* and the *General safety summary* before performing any service procedures.

To avoid electric shock. Do not touch exposed connections.

Do not service alone. Do not perform internal service or adjustments of this product unless another person capable of rendering first aid and resuscitation is present.

Disconnect power. To avoid electric shock, switch off the product power and disconnect the power cord from the mains power before removing any covers or panels, or opening the case for servicing.

Use care when servicing with power on. Dangerous voltages or currents may exist in this product. Disconnect power, remove battery (if applicable), and disconnect test leads before removing protective panels, soldering, or replacing components.

Verify safety after repair. Always recheck ground continuity and mains dielectric strength after performing a repair.

Terms in the 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.

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.

Symbols on the product



When this symbol is marked on the product, be sure to consult the manual to find out the nature of the potential hazards and any actions which have to be taken to avoid them. (This symbol may also be used to refer the user to ratings in the manual.)

The following symbols may appear on the product:



Compliance Information

This section lists the EMC (electromagnetic compliance), safety, and environmental standards with which the instrument complies. This product is intended for use by professionals and trained personnel only; it is not designed for use in households or by children.

Questions about the following compliance information may be directed to the following address:

Tektronix, Inc.

PO Box 500, MS 19-045

Beaverton, OR 97077, USA

www.tek.com

EMC compliance

EU EMC Directive

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

EN 61326-1, EN 61326-2-1. EMC requirements for electrical equipment for measurement, control, and laboratory use. ^{1 2 3 4}

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

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

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

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 Equipment may not meet the immunity requirements of applicable listed standards when test leads and/or test probes are connected due to coupling of electromagnetic interference onto those leads/probes. To minimize the influence of electromagnetic interference, minimize the loop area between the unshielded portions of signal and associated return leads, and keep leads as far away as possible from electromagnetic disturbance sources. Twisting unshielded test leads together is an effective way to reduce loop area. For probes, keep the ground return lead as short as possible and close to the probe body. Some probes have accessory probe tip adapters to accomplish this most effectively. In all cases, observe all safety instructions for the probes or leads used.

⁴ For compliance with the EMC standards listed here, high quality shielded interface cables that incorporate low impedance connection between the cable shield and the connector shell should be used.

⁵ Up to 3.0 ps of additional jitter is allowed when the instrument is subjected to fields and signals as defined in the IEC 61000-4-3 tests.

⁶ Up to 3.0 ps of additional jitter is allowed when the instrument is subjected to fields and signals as defined in the IEC 61000-4-6 tests.

EMC Compliance

Meets the intent of Directive 2014/30/EU for Electromagnetic Compatibility when it is used with the product(s) stated in the specifications table. Refer to the EMC specification published for the stated products. May not meet the intent of the directive if used with other products.

Australia / New Zealand Declaration of Conformity – EMC

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

- EN 61326-1 and EN 61326-2-1. Radiated and conducted emissions, Group 1, Class A.

Safety compliance

This section lists the safety standards with which the product complies and other safety compliance information.

EU declaration of conformity – low voltage

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

Low Voltage Directive 2014/35/EU.

- EN 61010-1. Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use – Part 1: General Requirements.
- EN 61010-2-030. Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use – Part 2-030: Particular requirements for testing and measuring circuits.

U.S. nationally recognized testing laboratory listing

- UL 61010-1. Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use – Part 1: General Requirements.
- UL 61010-2-030. Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use – Part 2-030: Particular requirements for testing and measuring circuits.

Canadian certification

- CAN/CSA-C22.2 No. 61010-1. Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use – Part 1: General Requirements.
- CAN/CSA-C22.2 No. 61010-2-030. Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use – Part 2-030: Particular requirements for testing and measuring circuits.

Additional compliances

- IEC 61010-1. Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use – Part 1: General Requirements.
- IEC 61010-2-030. Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use – Part 2-030: Particular requirements for testing and measuring circuits.

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 rating

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

IP rating

IP20 (as defined in IEC 60529).

Measurement and overvoltage category descriptions

Measurement terminals on this product may be rated for measuring mains voltages from one or more of the following categories (see specific ratings marked on the product and in the manual).

- Measurement Category II. For measurements performed on circuits directly connected to the low-voltage installation.
- Measurement Category III. For measurements performed in the building installation.
- Measurement Category IV. For measurements performed at the source of low-voltage installation.

NOTE. Only mains power supply circuits have an overvoltage category rating. Only measurement circuits have a measurement category rating. Other circuits within the product do not have either rating.

Mains overvoltage category rating

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

Environmental compliance

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

Restriction of hazardous substances

Complies with RoHS2 Directive 2011/65/EU.

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. 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 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).

Preface

TSO8 Series

The 8 Series is a disaggregated platform that provides you with a scalable, reconfigurable sampling oscilloscope. The 8 Series consists of:

- TSO820: Sampling oscilloscope mainframe that can house up to two modules.
- TSOVu: Software application you install on a PC. It provides the UI for the oscilloscope (connects to the mainframe through LAN).
- TSO8C17, TSO8C18: Optical modules (you can select one or more). The TSO8C17 is a one channel module, the TSO8C18 is a two channel module.

The TSO820 is an equivalent time sampling oscilloscope suitable for use in a variety of test and measurement applications and systems. The mainframe must be configured with at least one modular sampling module plug-in.

This document describes the installation, setup, and basic operating information of the Tektronix TSO8 Series Sampling Oscilloscope, TSOVu™ analysis software, and related modules. The TSO 8 Series supports optical device characterization at 56 GBd and 28 GBd on a disaggregated platform with LAN interface and analysis software that runs on a PC.

Key features include

Key performance specifications

- Low time base jitter
- Optical bandwidth above 30 GHz
- Single mode and multi-mode support for short and long wavelength optical testing
- Optical Reference Receiver (ORR) support for standard-mandated compliance testing

New system architecture

- Disaggregated architecture separates acquisition hardware and software analysis, allowing data to be streamed over Ethernet to any connected PC running TSOVu™. Scale your analysis platforms to fit your needs and connect from anywhere on the network.
- Swap modules for various configuration.

Optical modules

- Accurate testing and characterization of short or long wave optical signals using the high sensitivity and low noise performance of the TSO8C17 or TSO8C18 modules.
- Optical Reference Receivers (ORR) to support specified requirements for standards mandated compliance testing.
- Calibrated extinction ratio measurements and variable correction ER measurements to ensure accuracy and repeatability.

Analysis with TSOVu™

- The TSOVu™ software platform runs independent of the oscilloscope mainframe on your PC to support both live and post-processing of acquired data.
- Offers comprehensive analysis of PAM4 optical signals. Includes support for eye diagrams, optical measurements such as TDECQ, and other standard measurements. Measurements like PAM2 / NRZ are also available.

High test throughput

- High sample acquisition rate at 300 kS/s per channel standard
- Sophisticated Programmatic Interface (PI) for automation environments to enable the highest test throughput. Each command supports full data synchronization, eliminating the need to wait / sleep statements.

Available product documentation

The following documents for the TSO8 Series are available for download. For the most recent versions these documents, visit the Tektronix Web site at www.tek.com. You can find manuals by searching on the product name and selecting the Manuals filter.

To learn about	Use this document
How to install and turn on the instrument software and hardware; read safety and compliance information	TSO8 Series Installation and Safety Instructions Printed and shipped with the instrument. Also available online as a downloadable PDF. This document contains content in English, Japanese, and Simplified Chinese.
How to operate the instrument, take measurements, and navigate the UI.	TSO8 Series Help Available in the TSOVu application (Help menu) and as a downloadable PDF at www.tek.com .
How to remotely control the instrument using GPIB programmatic commands. Syntax provided.	TSO8 Series Programming Manual
Mainframe and module specifications. Includes procedures to verify that the mainframe and modules meet warranted specifications.	TSO8 Series Specifications and Performance Verification Technical Reference
Installing up to two mainframes, or one mainframe and one TCR801 clock recovery unit, into a standard instrument rack using the rackmount kit.	8 Series Rackmount Kit Instructions
How to declassify, sanitize, and clear memory devices in the instrument.	TSO8 Series Declassification and Security Instructions

Introduction to the instrument

What ships with your product

Standard accessories

Item	Tektronix part number or nomenclature
Sampling oscilloscope mainframe (if ordered)	TSO820
1 channel 28 GBd / 53 GBd optical module (if ordered)	TSO8C17
2 channel 28 GBd / 53 GBd optical module (if ordered)	TSO8C18
Power cord	Appropriate for your country
Ethernet CAT6 cable	174-7292-xx
ESD wrist strap	006-3415-xx
Front cover for instrument mainframe (if mainframe was ordered)	200-5473-xx
One empty module slot filler (filler module) (if mainframe was ordered)	407-6185-xx
Printed Safety and Installation manual (this manual)	071-3663-xx

Recommended accessories

Item	Tektronix part number or nomenclature
1 channel 28 GBd / 53 GBd optical module	TSO8C17
2 channel 28 GBd / 53 GBd optical module	TSO8C18
Rackmount kit	644-1095-xx
Hard transit case	016-2161-00
TSO820 D1 Calibration data report	N/A

Environmental requirements

Characteristic	Description
Operating temperature	5 °C to +45 °C (+41 °F to +113 °F)
Operating humidity	5% to 95% relative humidity (% RH) at up to +30 °C (+86 °F), noncondensing. 5% to 45% relative humidity (% RH) above +30 °C (+86 °F) up to +45 °C (113 °F), noncondensing.
Operating altitude	Up to 3000 meters (9842 feet)
Clearance requirements	Rear: 5.08 cm (2 in) Sides: 5.08 cm (2 in) Bottom: Cooling inlets on the bottom require that the instrument rests on a flat surface with the feet providing sufficient clearance.

Power requirements

Characteristic	Description
Input voltage	100 V - 240 V, 115 V
Frequency	50/60 Hz, 400 Hz
Power consumption	200 W (maximum)

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

Electrostatic discharge information

Read the electrostatic discharge (ESD) Read This First document that shipped with the mainframe and module for complete information about how to prevent damage to the modules and mainframe due to ESD. Following is some of that information.



CAUTION. To prevent damage to the instrument and electrical modules from electrostatic discharge (ESD), install 50 Ω terminations on the module connectors before removing them from the mainframe or when it is not in use.



CAUTION. Store modules in static-free containers. Whenever you move a module from one instrument to another, use a static-free container in which to transport it. This will help prevent damage due to ESD.



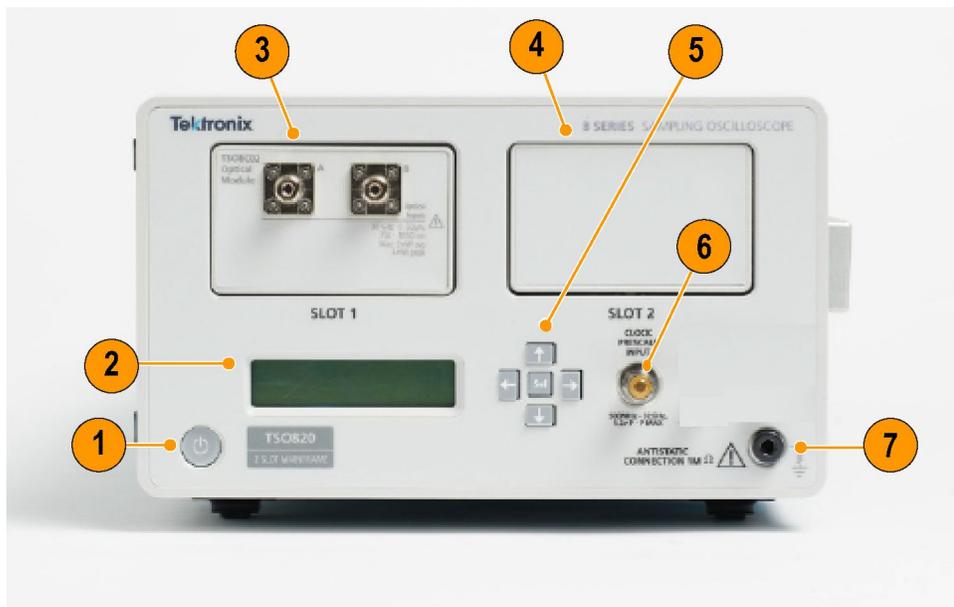
CAUTION. To prevent damage to the electrical module, discharge to ground any electrostatic charge that may be present on the center and outer conductors of cables before attaching a cable to a module.



CAUTION.
To prevent damage to the modules, always wear a grounded antistatic strap (provided with the instrument) when handling modules or making connections. Wear anti-static clothing and work at a static-free workstation when using the modules.

Front panel

The front panel of your instrument gives you access to the following.



Number	Item	Description
1	Power button	Turn on/off power to instrument and installed modules. Blue indicates power is on. Amber indicates standby power is on.
2	LCD display	Shows MAC and IP addresses. Navigate using scroll/select buttons. 61 mm (W) x 12 mm (H) x 2x20 liquid crystal display (LCD).
3	Slot 1	Slot for module.
4	Slot 2	Slot for module.
5	Keypad buttons	Scroll/select buttons to navigate LCD display.
6	Clock Prescale Input	2.92 mm. 50 Ω , AC-coupled, divide-by-one/two/four/eight external trigger input port, enabling direct or prescaled triggering for clocks in the frequency range of 500MHz - 32 GHz.
7	Antistatic connection 1M Ω	A banana-jack antistatic connection of 1 M Ω to ground.

Rear panel

The rear panel of your instrument gives you access to the following.



Number	Item	Description
1	Security cable slot	Security cable can be attached to secure instrument to a physical location.
2	Module vents	Provides airflow for installed modules. There is one fan in each module slot.
3	USB port	USB 3.0
4	Mfg port	Not for use.
5	LAN port	10/100/1000 Gb Ethernet
6	Side feet	The side feet (4) protect the product when placed on its side. Do not use this equipment while turned on if the instrument is sitting on its side feet.
7	Power	Input voltage: 100 - 240 V, 115 V Frequency: 50 - 60 Hz, 400 Hz Power: 200 W max
8	Rear feet	The rear feet (4) are for preventing damage of connected cables or power cord if those are connected and the instrument is placed on its rear. Do not use this equipment while turned on if the instrument is sitting on its rear feet.
9	Handle	Carrying handle.



WARNING. Do not use this equipment while turned on if the instrument is sitting on its rear feet. This can prevent proper air flow.

Initial setup and connection

Module installation and removal

Procedure for installing and removing modules.

The TSO820 sampling oscilloscope allows for installation of the following two modules. For detailed specifications information, see the *TSO820, TSO8C17, TSO8C18 Sampling Oscilloscope and Modules Specifications and Performance Verification* manual available for download on www.tek.com.

- TSO8C17, 1 channel 28 GBd / 53 GBd
- TSO8C18, 2 channel 28 GBd / 53 GBd



CAUTION. Only qualified personnel should perform the following procedures. Ensure power is off to the unit before installing or removing modules.



CAUTION. To prevent damage to the modules, wear a grounded antistatic strap when removing and installing modules and cables connected to modules.

Install a module



CAUTION. Do not hot swap modules. Installing or removing modules into/from the mainframe with the power on will damage the module. To avoid damage, turn off the power before installing or removing a module.



1. Power off the mainframe.
2. Use a flathead screw driver to loosen the two latch screws that secure the top cover to the mainframe and lift off the cover.



3. Notice that the mainframe ships with one filler module installed. This is a place holder that ensures proper air flow and temperature stability when only one module is installed.

Before installing a module, remove the filler module from the side into which you want to insert the regular module by loosening the securing screws (they are captive and stay attached to the filler module).

Never leave a module slot empty while the instrument is powered on and running. Always have a filler or regular modules installed to ensure proper air flow and temperature stability.

4. Insert the desired module into the mainframe at an angle, as shown.
5. Push down lightly on the rear of the module to seat it securely into the mainframe. You will hear a click when it seats fully.
6. Tighten the 4 attached screws to secure the module to the mainframe.
7. Replace the mainframe cover and use the driver again to turn the screw latches to secure it in place.



8. Before taking measurements, allow a minimum 30 minutes warmup and run a compensation.

Remove a module



CAUTION. Do not hot swap modules. Installing or removing modules into/from the mainframe with the power on will damage the module. To avoid damage, turn off the power before installing or removing a module.

1. Power off the mainframe.
2. Use a flathead screw driver to loosen the two latch screws that secure the top cover to the mainframe and lift off the cover.
3. Loosen the 4 screws that secure the module to the mainframe. These are captive screws and stay attached to the module.
4. Grasp the rear of the module (as noted on the module) and pull up at an angle to unseat the module.
5. Lift the module from the mainframe at an angle to remove it.
6. Before powering on the mainframe, ensure a filler module or module is installed in the side from which you removed the module.

The mainframe ships with one filler module installed. This is a place holder that ensures proper air flow and temperature stability when only one or module is installed.

Never leave a module slot empty while the instrument is powered on and running. Always have a filler or regular modules installed to ensure proper air flow and temperature stability.

7. Replace the mainframe cover and turn the screw latches to secure it in place.
8. Before taking measurements, allow a minimum 30 minutes warmup and run a compensation.

Software installation and requirements

The following software is available for the 8 Series. The TSOVu base software enables mainframe connectivity and operation, cursors, results tables, and other features. The base software package also includes the Pulse measurements plug-in. Other plug-ins are available for purchase and download separately.

PC system requirements

Install the software on a PC with the following specifications.

Item	Requirement
Operating system	Microsoft® Windows 10, 64 Bit
CPU	Recommended: AMD Ryzen 7 or Intel i7 class CPU with 4 core / 8 thread Minimum: AMD Ryzen 5 or Intel i5 with hyperthreading <i>Note that the time to calculate the TDECQ result is inversely proportionate to the clock speed.</i>
Memory	16 Gbytes (recommended)
Disk	256 GBytes SSD or more
Networking	1 Gigabit Ethernet wired

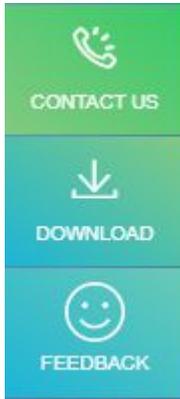
Other software requirements

You must install MATLAB® Compiler Runtime version 9.3 on to the host PC. Go to MathWorks (<https://www.mathworks.com/products/compiler/matlab-runtime.html>) to download and install it.

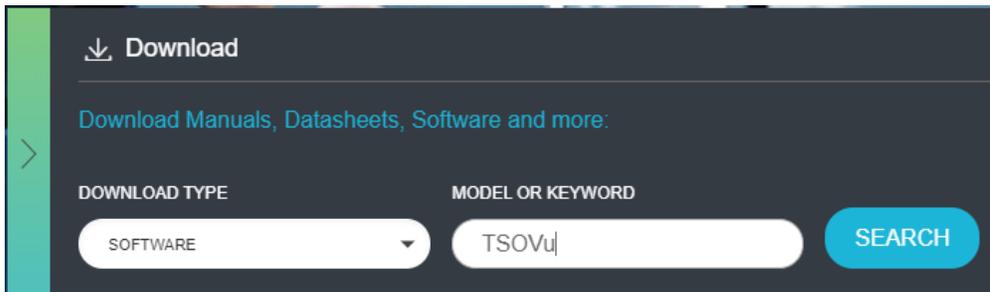
Install TSOVu software

You must install the base software before installing any plug-ins. The downloadable package will include the base software and the Pulse and PAM4 measurement plug-ins. The PAM4 plug-in is optional and requires a purchased license to enable it. Install the software as follows.

1. Go to www.tek.com and click the Download icon.



2. Select Software, enter TSOVu, and click Search.



3. Find the most recent version of the TSOVu base software and download the package to the PC you will use to connect with and control the mainframe.
4. Double click the .exe file to launch the install wizard. Follow the instructions to install the software. Your PC will automatically restart when the installation is complete.
5. A TSOVu icon will install on the Windows Desktop. Click to launch the application.

The following items are installed with the base software package:

- **TSOVu™**
The application that runs on your PC and is the analysis engine and UI of the mainframe and modules. It is required to connect to a mainframe.
- **Pulse measurement plug-in**
This plug-in comes standard with the base installation package and provides pulse measurement capabilities.
- **PAM4 measurement plug-in**
Use of this plug-in is optional. To enable it, you must purchase a license.

- **TSO8 firmware**
- **TekVISA™**

A library of industry-standard compliant software components, organized according to the standard VISA model established by the VXIplug&play Systems Alliance. Use TekVISA software to write interoperable instrument drivers to handle communicating between software applications and your instrument.

Install optional plug-ins

For a full list of optional plug-ins, see the *Software licenses and options* topic in the Help or view the TSO 8 Series product datasheet on www.tek.com. Due to the plug-in architecture of TSOVu, measurement plug-ins must be installed prior to TSOVu software launch. To purchase and download optional plug-ins, do the following.

1. Navigate to your TekAMS system account and purchase the desired plug-in(s).
2. Run the plug-in installer with administrative privileges and walk through the installation procedure for each measurement plug-in.
3. Re-launch TSOVu.
4. Install the new plug-in license(s) from **Help > About** in the TSOVu application.

(See the *Software licenses and options* topic next for more information.)

See these TSOVu Help topics for more information:

[Software licenses and options](#)

[Connect to network and TSOVu](#)

[Firmware installation and requirements](#)

[Run signal path compensation \(SPC\)](#)

Software licenses and options

The TSOVu application is made up of the base software, Pulse measurement plug-in, and any additionally purchased plug-in software (licensed optional software). The base package enables mainframe connectivity and operation, cursors, results tables, pulse measurements, and other baseline features. It is free and available for download at www.tek.com/downloads.

To install a license in TSOVu

1. Select **Help > About** from the TSOVu main menu bar to view installed options and system information.
2. Click the **Install License** button under the **Installed Options** table.
3. Select the appropriate install location:
 - a. TSOVu: The license will install on the PC. Anyone using that PC will have access to the license for any instruments to which it connects.
 - b. Instrument: The license will install on the selected instrument. Any PC connecting to that instrument will have access to license.
4. Click the **Browse** button to open a file explorer window and navigate to the location to which you saved the license file from the Tek AMS system.
5. Click **Open**.
6. Click the **Install** button.

To copy system information (TSOVu SW version, host ID, plug-in versions)

1. Select **Help > About** from the TSOVU main menu bar to view installed options and system information.
2. Click the **Copy System Information** button under the **System Information** table.
3. The information from the table has been copied to a clipboard. You can now paste it into a document of your choice.

Plug-in options

The following optional plug-ins are available to add to the TSOVU base software. These plug-ins enable new capabilities. For the most updated list of options, please view the TSO 8 Series datasheet at www.tek.com.

Plug-in description	Option	License
Measurements for PAM4 optical signals. Enables TDECQ equalization and analysis.	TSO8SW-NLP-PAM4-O	License; PAM4 Optical Measurements; Node-Locked Perpetual
	TSO8SW-FLP-PAM4-O	License; PAM4 Optical Measurements; Floating Perpetual
	TSO8SW-NL1-PAM4-O	License; PAM4 Optical Measurements; Node-Locked 1-Year subscription
	TSO8SW-NL3-PAM4-O	License; PAM4 Optical Measurements; Node-Locked 3-Year subscription
	TSO8SW-FL1-PAM4-O	License; PAM4 Optical Measurements; Floating 1-Year subscription
	TSO8SW-FL3-PAM4-O	License; PAM4 Optical Measurements; Floating 3-Year subscription

License options

License types

- **Perpetual:** This license does not expire, but updates and support are available for a set time period. Support can be renewed for an annual fee. When that annual subscription of the perpetual license expires, the software will be usable but frozen to the last released version before the expiration date.
- **Subscription:** This license provides use, updates, and support of the software throughout the term of the license. When the license expires, those software features will no longer work.

License terms

- **Node-locked:** License assigned to a specific instrument/PC. It cannot be transferred to any other instrument/PC.
- **Floating:** License can be transferred from one instrument/PC to another. It can only be used on one instrument/PC at a time.

See these topics for more information:

Software installation and requirements

Connect to network and TSOVU

Available product documentation

Firmware installation and requirements

Keep the mainframe firmware updated to ensure the latest features are available and the instrument is taking the most accurate measurements. You can do this by downloading the latest firmware from www.tek.com and installing it yourself. Module firmware can only be updated by the Tektronix service organization.

Determine the current version of firmware installed on the instrument using the front panel LCD screen menu.

1. Download the instrument firmware to a USB drive:
 - a. Navigate to `C:\Program Files\Tektronix\TSOVu_Firmware` to locate the firmware that was downloaded to your PC when you installed the TSOVu installation package.
 - b. If the available firmware version is newer than what is on your instrument, select that file.
 - c. Copy the .img file to a USB memory device.
2. Install firmware on instrument:
 - a. Power on the instrument and wait for the instrument to fully boot up.
 - b. Insert the USB flash drive into the USB port on the instrument rear panel.
 - c. Cycle the power on the mainframe to begin the update process. The process status will appear on the front panel LCD until finished.
 - d. The instrument will update the firmware and power on immediately following installation completion.
 - e. Remove the USB stick after the instrument has powered on successfully.

NOTE. Do not power off the instrument or remove the USB flash drive until the instrument finishes installing the firmware. Remove the USB drive before powering on the instrument.

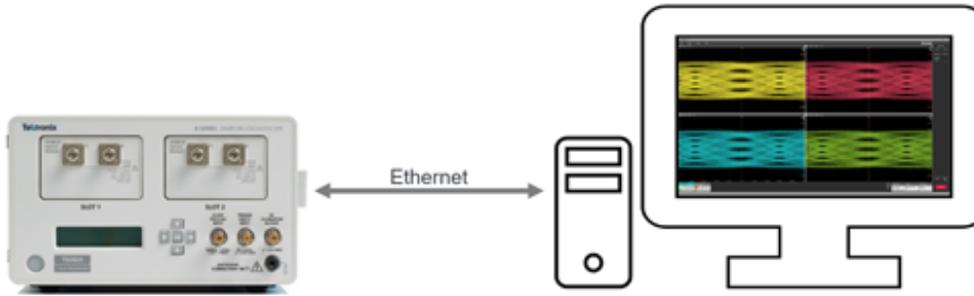
3. Confirm that the firmware was updated:
 - a. Check the Firmware version in the Firmware menu on the front panel LCD. It should now show the updated version.

If an error occurs, try to reformat your USB drive. Navigate to **Computer Management > Disk Management** on your PC to repartition the USB drive with the default allocation unit size.

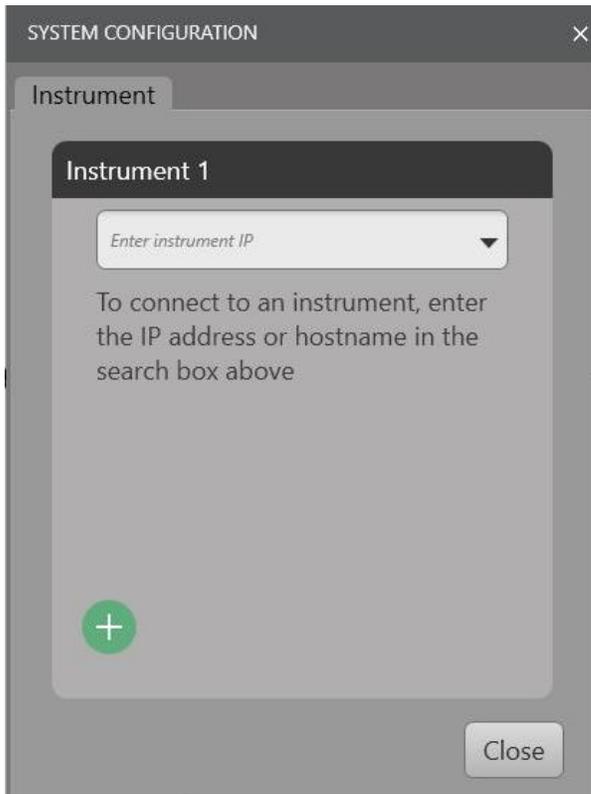
Connect the mainframe to the network and TSOVu

To control the instrument with the TSOVu application, the instrument must be made available to the same LAN as the PC hosting TSOVu. The oscilloscope has a standard Ethernet (RJ-45) interface for connecting to a network.

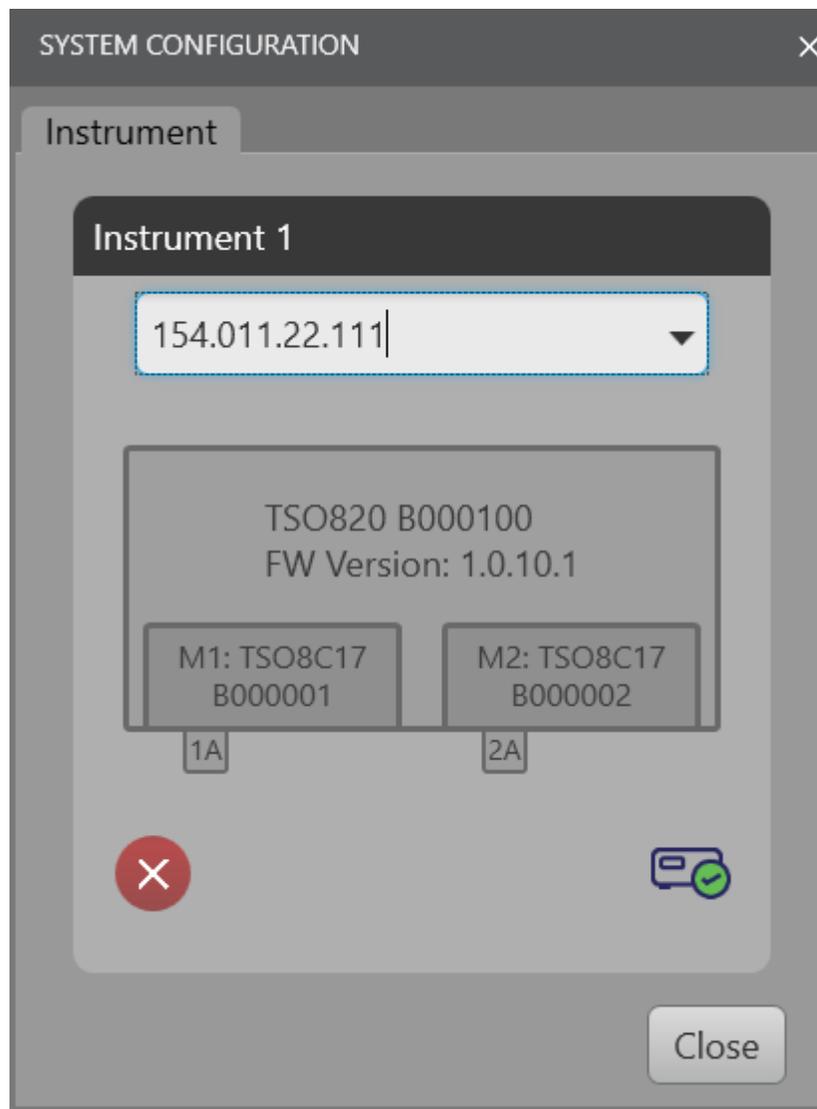
Use the included CAT6 Ethernet cable. If you use a different type of Ethernet cable, it must be a CAT6 or faster cable and it should be consistent with the network speed you require.



1. Connect the CAT6 Ethernet cable to the LAN connector on the rear panel of the instrument.
2. Plug in the instrument power cord to the instrument and then a power source. The instrument will power on automatically.
3. Press the right/left arrow keys on the mainframe front panel until you see IP address on the LCD display. Note the IP address. Only DHCP addresses are supported.
4. Launch TSOVu.
5. In TSOVu, select **Connect > System Configuration** and enter the previously noted IP address.



6. Press the green + button (or the Enter key on a keyboard) and the instrument will connect. Mainframe and modules names and firmware versions will appear.

**Next steps:**

See the [Run signal path compensation \(SPC\)](#) topic in the Help for instructions for running a SPC before connecting a signal to view.

Cleaning

Cleaning the instrument

Periodically you may need to clean the exterior of your instrument. To do so, follow the instructions in this section.



Warning. Before performing any procedure that follows, power down the instrument and disconnect it from line voltage.

Exterior cleaning



CAUTION.

To prevent getting moisture inside the instrument during external cleaning, use only enough liquid to dampen the cloth or applicator.

Clean the exterior surfaces of the chassis with a dry lint-free cloth or a soft-bristle brush. If any dirt remains, use a cloth or swab dipped in a 70% isopropyl alcohol solution. Use a swab to clean narrow spaces around controls and connectors. Do not use abrasive compounds on any part of the chassis, as they may damage it.



CAUTION.

Avoid the use of chemical cleaning agents, which might damage the plastics used in this instrument. Use a 70% isopropyl alcohol solution as a cleaner and wipe with a clean cloth dampened with deionized water. (Use only deionized water when cleaning the menu buttons or front-panel buttons.) Before using any other type of cleaner, consult your Tektronix Service Center or representative.

Optical connector cleaning

Keep the optical module connectors clean to maintain measurement accuracy. The optical module user manual contains the procedures for cleaning optical connectors.

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