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Tektronix RSA500A Real-Time Spectrum Analyzers

Tektronix RSA500A Real-Time Spectrum Analyzers Instruction Manual

Contents

Tektronix®

Tektronix RSA500A Real-Time Spectrum Analyzers

Documentation

- Review the following user documents before installing and using your instrument.
- These documents provide important operating information.

Product Documentation

- The following table lists the primary product-specific documentation available for your product.
- These and other user documents are available for download from **tek.com**.
- Other information, such as demonstration guides, technical briefs, and application notes, can also be found at **tek.com**.

Document	Content
Installation and Safety Instructions (multi-language)	Safety, compliance, and basic introductory information for hardware products. (Printed and available for download)
SignalVu-PC Help	In-depth operating information for the product. Available from the Help button in the product UI and as a downloadable PDF on *www.tek.com/downloads*.
User Manual	Introduction to product hardware and software, installation instructions, turn-on, and basic operating information.
Specifications and Performance Verification Technical Reference	Instrument specifications and performance verification instructions for testing instrument performance.
SignalVu-PC Programmer Manual	Commands for remotely controlling the instrument.
Declassification and Security Instructions	Information about the location of memory in the instrument. Instructions for declassifying and sanitizing the instrument.

How to find your product documentation

1. Go to **tek.com**.
2. Click Download in the green sidebar on the right side of the screen.
3. Select Manuals as the Download Type, enter your product model, and click Search.
4. View and download your product manuals. You can also click the Product Support Center and Learning Center links on the page for more documentation.

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 by local and national codes.
- For the correct and safe operation of the product, you must 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.
- This product is not intended for detection of hazardous voltages.
- 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 a 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.
- **Connect and disconnect properly**
  - Do not connect or disconnect probes or test leads while they are connected to a voltage source.
- **Observe all terminal ratings.**
  - To avoid fire or shock hazards, observe all ratings 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.
  - The measuring 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 the safety of the product,

    turn it off and disconnect the power cord. Mark the product to prevent its further operation.

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

    Use only specified replacement parts.

    Replace batteries properly

    Replace batteries only with the specified type and rating.

    Recharge batteries for the recommended charge cycle only.

    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.
- **Provide a safe working environment**
  - 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 only the Tektronix rackmount hardware specified for this product.
- **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.

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

- The following symbols(s) may appear on the product.

CAUTION
Refer to Manual

Compliance information

This section lists the 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.

Compliance questions may be directed to the following address:

- Tektronix, Inc.
- PO Box 500, MS 19-045
- Beaverton, OR 97077, USA
- **tek.com**.

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 specifications 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

Equipment type

- Test and measuring equipment.

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 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). Rated for indoor, dry location use only.

IP rating

- IP52 (as defined in IEC 60529-2004). Rated as dust-protected and protected from the ingress of dripping water when less than 15° from vertical.

Environmental compliance

- 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.
    - To avoid the 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**).
  - **Battery recycling**
    - This lithium-ion rechargeable battery pack must be recycled or disposed of properly at its end of life.
    - Lithium-ion batteries are subject to disposal and recycling regulations that vary by country and region. Always check and follow your applicable regulations before disposing of any battery. Contact
    - Rechargeable Battery Recycling Corporation (**www.rbrc.org**) for the U.S.A. and Canada, or your local battery recycling organization.
    - Many countries prohibit the disposal of waste batteries in standard waste receptacles.
    - Place only discharged batteries in a battery collection container. Use electrical tape or other approved covering over the battery connection points to prevent short circuits.
  - **Transporting batteries**

- The small lithium-ion rechargeable battery that may also be packed with this equipment does not exceed a capacity of 100 Wh per battery or 20 Wh per component cell.
- Each battery type has been shown by the manufacturer to comply with the applicable requirements of the UN Manual of Tests and Criteria Part III, Subsection 38.3.
- Consult your carrier to determine which lithium battery transportation requirements apply to your configuration, including its re-packaging and re-labelling, before the reshipment of the product by any mode of transport.

Operating Requirements

This section provides the specifications that you need to know to operate your instrument safely and correctly. See the RSA500A Series Specifications and Performance Verification Technical Reference for additional information on specifications.

Cooling requirements

- When placed on a surface: Observe the following clearance requirements for all unsupported faces.
  - **Top and bottom:** 25.4 mm (1.0 in)
  - **Left and right side:** 25.4 mm (1.0 in)
  - **Rear:** 25.4 mm (1.0 in)

With battery installed

- When inside the Tektronix-approved carry case: Place the instrument with the Tektronix logo facing the mesh side of the carry case to provide adequate airflow for cooling.
- **CAUTION:** To reduce the risk of overheating and damage to the instrument, do not place the instrument into an enclosed case other than the Tektronix-approved carry case when the instrument is on. When using the approved carry case, ensure the logo faces the mesh side of the case to ensure proper airflow.

Environmental requirements

For instrument accuracy, ensure that the instrument has warmed up for 20 minutes and meets these requirements.

Requirement	Description
Temperature (without battery installed)	
Operating	−10 °C to 55 °C (+14 °F to +131 °F)
Non-operating	−51 °C to 71°C (−59.8 °F to +123.8 °F)
Temperature (with battery installed)	
Operating (discharge)	−10 °C to 45 °C (+14 °F to +113 °F) Operation at -10 °C may require turning on the unit at room temperature first.
Storage (not charging)	−20 °C to 60°C (−4 °F to +140 °F)
Charging	0 °C to 45°C (32 °F to +113 °F)
Humidity (without battery)	5% to 95% (±5%) relative humidity at 10 °C to 30 °C (50 °F to 86 °F)
	5% to 75% (±5%) relative humidity above 30 °C to 40 °C (86 °F to 104 °F)
	5% to 45% (±5%) relative humidity above 40 °C to 55 °C (104 °F to 131 °F)
Humidity (with battery)	5% to 95% (±5%) relative humidity at 10 °C to 30 °C (50 °F to 86 °F)
	5% to 45% (±5%) relative humidity above 30 °C to 50 °C (86 °F to 122 °F)
Altitude (operating)	Up to 5000 m (16404 feet)

Electrical ratings

- **Power requirements**
    - This instrument is intended to be powered by the supplied Lithium-Ion rechargeable battery pack or the 18 V DC AC adapter.
- **AC power**
    - When the instrument operates from the external AC adapter, the following power requirements apply.
    - A single-phase power source with one current-carrying conductor at or near earth-ground (the neutral conductor).
    - The power source frequency must be 50 or 60 Hz, and the operating voltage range must be from 100 to 240 VAC, continuous. The typical power draw is less than 15 W.
    - **WARNING:** To reduce the risk of fire and shock, make sure the mains supply voltage fluctuations do not exceed 10% of the operating voltage range.
    - Systems with both current-carrying conductors live concerning ground (such as phase-to-phase in multiphase systems) are not recommended as power sources.
    - **Note:** 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 unit to an authorized service centre for repair.
    - Use the proper power cord with the AC adapter. (See page viii, International power cords.)

- **Note:** See the instrument Specifications and Performance Verification Technical Reference for additional information on power and environmental requirements.

Battery power

- This instrument can be powered by a Lithium-Ion rechargeable battery pack. One Lithium-Ion rechargeable battery pack is provided with the instrument. If needed, you can purchase additional battery packs.
- **Note:** For optimum performance, charge the battery pack completely before using it for the first time or after prolonged storage.
- When installed, the battery pack will charge whenever the supplied AC adapter is connected, whether the instrument is On, Off, or in Standby mode. The charging rate is unaffected by instrument operation.
- When using the supplied battery pack to power the instrument, read the following battery safety notices. See the Rechargeable Battery
- Pack Instructions for information about how to properly operate and maintain the battery pack.
- **CAUTION:** To avoid damage to the battery pack, use only the instrument or the optional battery charger to charge the battery pack. Do not connect any other voltage source to the battery pack.
- To avoid overheating of the battery pack during charging, do not exceed the maximum ambient temperature of 40 °C. The battery pack will stop charging if it gets too hot.
- The temperature at which the battery pack stops charging varies depending on the charging current and the battery heat dissipation characteristics. This is particularly true when the instrument is being operated while the battery pack is charging.
- The actual battery-charging temperature limit may be lower than 40 °C.

Installation

- This section provides instructions on how to install the software and hardware, and how to perform a functional check to verify system operation. Refer to the SignalVu-PC application Help for more detailed operation and application information.
- Unpack the instrument and check that you have received all of the standard accessories for your instrument configuration. (See Shipped accessories) If you ordered optional accessories, check that those you ordered are in your shipment.

Prepare the PC

- All of the software required to operate the RSA500 Series from a PC is included on the flash drive that ships with the instrument.
- The instrument can be controlled with Tektronix SignalVu-PC software, or you can control the instrument through your own custom signal processing application and API.
- Both SignalVu-PC and API control require a USB 3.0 connection to the instrument for communication.

Load the SignalVu-PC and TekVISA software
This software must be installed to control the instrument through the SignalVu-PC software.

1. Insert the flash drive included with the analyzer into the host PC. Windows File Explorer should open

automatically. If it does not, open it manually and browse to the flash drive folder.

2. Select SignalVu-PC from the list of folders.

3. Select the Win64 folder.

4. Double-click Setup.exe and follow the on-screen instructions to install SignalVu-PC. The USB driver is installed automatically as part of this process.

5. When the SignalVu-PC setup is complete, a TekVISA dialog box appears. Verify that the Install TekVISA box is checked. TekVISA is optimized for SignalVu-PC, especially for instrument searching, and is the recommended VISA application.

For additional information about installation, option activation and operation, refer to the SignalVu-PC Quick Start User Manual document, located in SignalVu-PC under Help/Quick Start Manual (PDF) and at **www.tek.com**.

Load the API driver software
If you want to use the API to create your custom signal-processing application, load the software using the procedure below.

1. Insert the flash drive included with the analyzer into the host PC. Windows File Explorer should open automatically. If it does not, open it manually and browse to the flash drive folder.

2. Select RSA API and USB from the list of folders. The USB driver is installed automatically as part of the SignalVu-PC application installation, but if you need to install it manually, it is located in this folder.

3. Double-click the appropriate setup.exe file and follow the on-screen instructions to install the software.

Battery pack

- When the supplied battery pack is not installed in the instrument, you can check the charge level by pressing the Check button on the back of the battery pack. LEDs illuminate to indicate the amount of charge remaining in increments of approximately 20%.
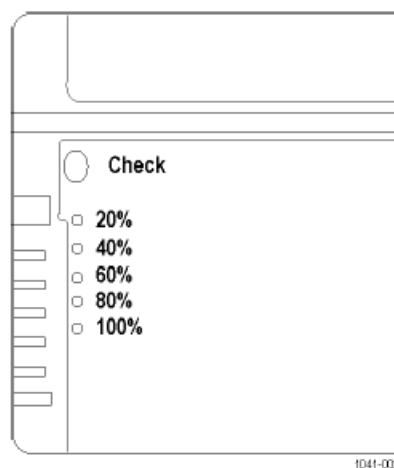

- When the battery pack is installed in the instrument, it charges whenever the AC adapter is attached.

- The front-panel battery LED indicates if the battery is charging or not. If connected to the SignalVu-PC application, the application monitors the battery and provides a detailed battery status. Refer to the SignalVu-PC help for more information.

- You can charge the battery pack outside of the instrument using the optional external charger.
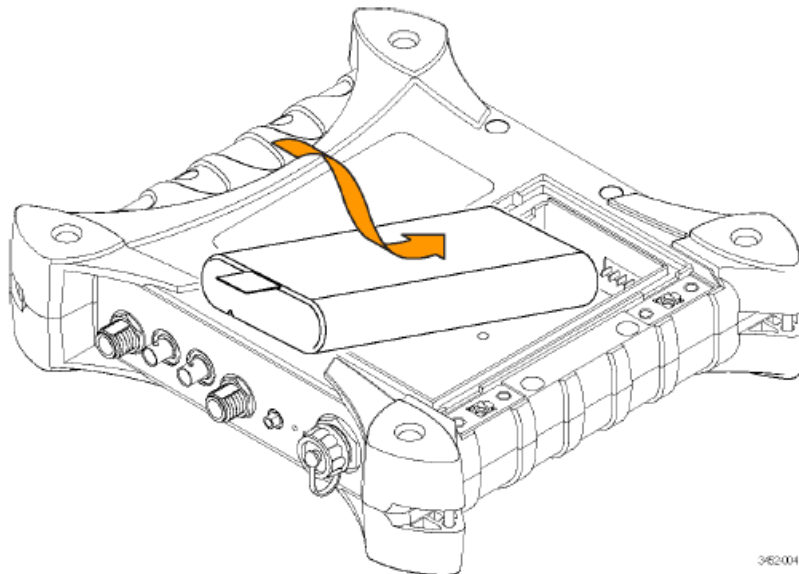
Battery pack installation
The instrument is shipped with a Lithium-Ion rechargeable battery pack. Perform the following steps to install the battery pack.

Note: For optimum performance, charge the battery pack completely before using it for the first time or after prolonged storage. The battery pack can be installed or removed while the instrument is turned on and operating with the AC adapter. See the Rechargeable Battery Pack Instructions for more information about the battery pack.
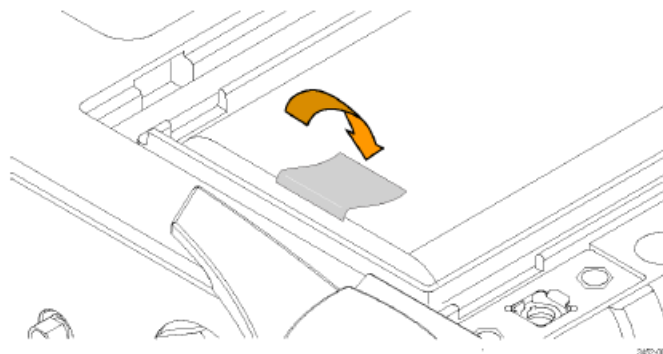
1. On the bottom of the instrument, remove the cover for the battery compartment:
   - **a.** Lift up the two battery-cover rings and rotate ¼ turn counterclockwise.
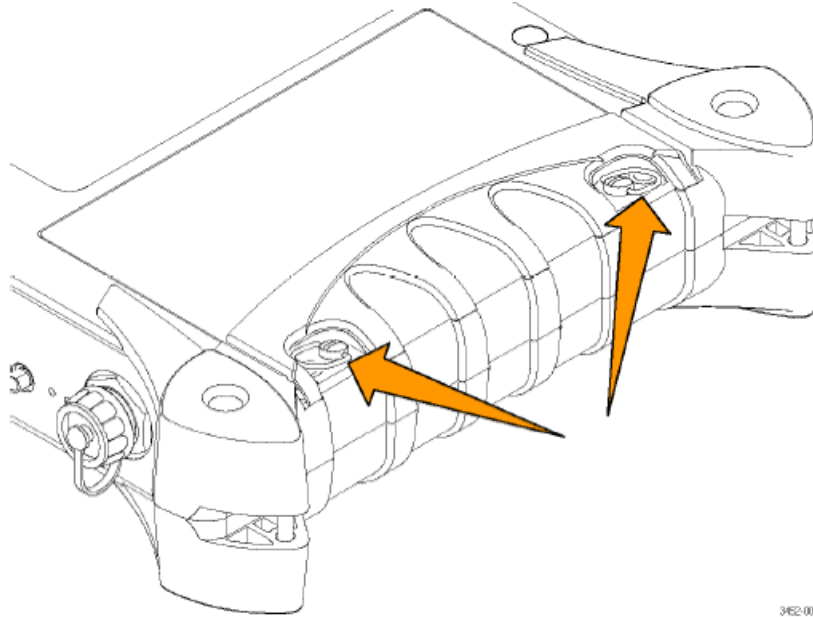
   - **b.** Lift away the battery cover.
2. Insert the supplied battery pack into the battery compartment.

3. Lay the battery pack tab flat on top of the battery. Do not let the tab interfere with the battery cover seal.

4. Reinstall the battery compartment cover:

- **a.** Insert the tabs on the battery cover into the chassis slots.
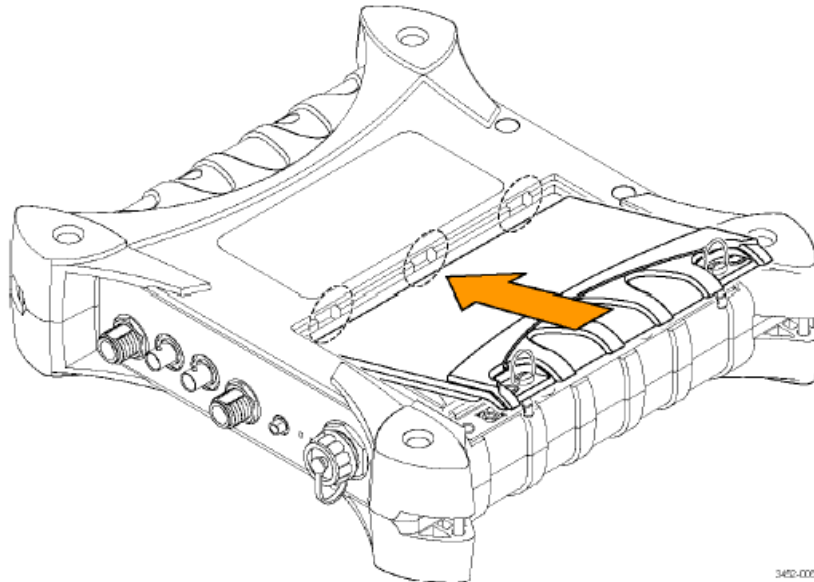
- **b.** Close the battery cover and rotate the battery cover rings ¼ turn clockwise to secure the cover.
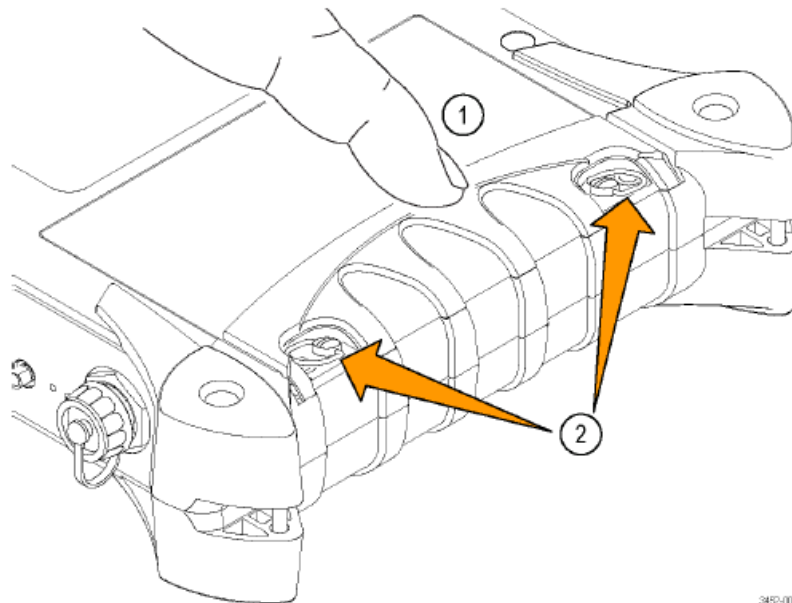
- **c.** Lay the battery cover rings down flat.

AC adapter

- Connect the AC adapter to the power connector on the rear of the instrument shown below.
- **Note:** If a battery pack is installed in the instrument, it is automatically charged whenever the supplied AC adapter is connected, whether the instrument is On or Off.
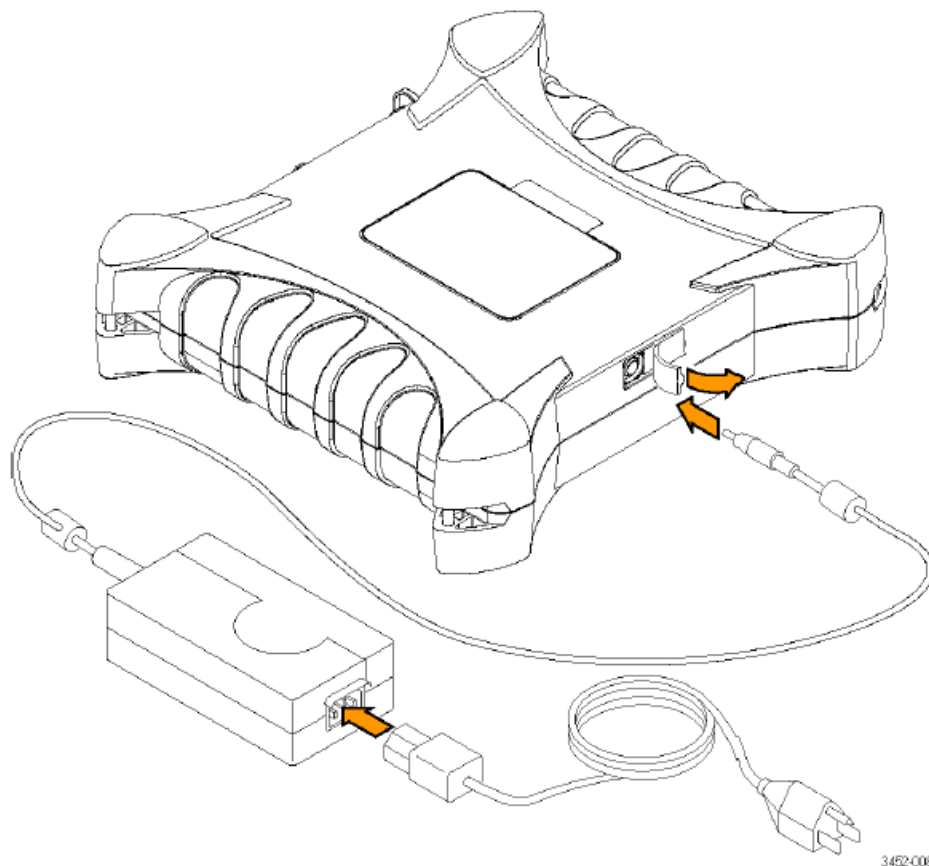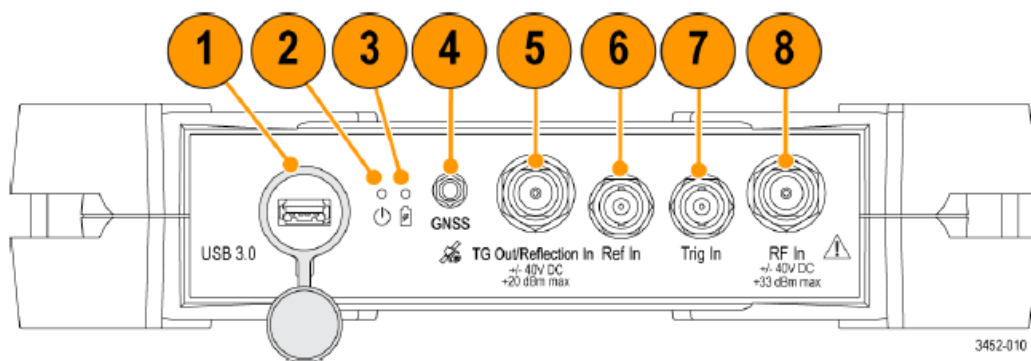
Introduction to the instrument

Connectors and controls are identified and described in the following images and text.

Front panel

- The following figure shows the connections and indicators on the instrument. Use the reference numbers to locate the descriptions.

Figure 1: Front panel

1. **USB 3.0 Type-A connector**
   - The USB 3.0 connector has a water-tight cap attached. When not in use, finger tighten the cap to the connector to prevent ingress of water and dust.
   - To connect the analyzer to the host PC via the USB 3.0 connector, use the USB 3.0 Type A to USB 3.0 Type A cable provided with the instrument. This cable has a water-tight cap on the instrument end to ensure a reliable connection and to protect it from water ingress. Finger-tighten the USB cable cap to the

instrument.

- The instrument automatically powers on when connected to a powered USB port.
- **CAUTION:** It is important to secure the USB cable to the instrument using the USB cable cap to maintain a reliable connection and protect it from water ingress.

2. **USB status LED**
   - Indicates when the instrument is powered on and USB data transfer.
     - **Steady Red:** USB power applied, or resetting
     - **Steady Green:** Initialized, ready for use
     - **Blinking Green:** Transferring data to the host PC

3. **Battery LED**
   - Indicates external power source and battery charging state.
     - **Blinking Green:** External power connected, battery charging
     - **Off:** No external DC power source connected, battery is fully charged

4. **Antenna input connector**
   - Use this SMA female connector to connect an optional GNSS antenna.

5. **Tracking Generator source output connector**
   - Use this N-type female connector to provide RF signal output to use the optional tracking generator feature in the SignalVu-PC application.
   - This connector is available only on instruments with Option 04 Tracking Generator.

6. **Ref In (external reference) connector**
   - Use this BNC female connector to connect an external reference signal to the analyzer. Refer to the instrument specifications for a list of supported reference frequencies.

7. **Trigger/Sync connector**
   - Use this BNC female connector to connect an external trigger source to the analyzer. The input accepts TTL-level signals (0 – 5.0 V), and can be rising- or falling-edge triggered.

8. **RF input connector**
   - This N-type female connector receives the RF signal input, via cable or antenna. The input signal frequency range for each instrument model is listed below. Keep the protective cover on the connector when not in use.
   - The input signal frequency range varies between models.
     - RSA503A: 9 kHz to 3 GHz
     - RSA507A: 9 kHz to 7.5 GHz
     - RSA513A: 9 kHz to 13.6 GHz
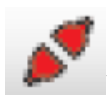   - RSA518A: 9 kHz to 18 GHz

Functional check

Refer to the front panel illustration for connector locations.

1. Ensure that either a battery is installed or AC power is supplied from the external supply.
2. Connect the USB cable included with the analyzer between the analyzer and the host PC.
   - **Note:** The instrument automatically powers on and the front-panel power LED lights when a USB connection is detected.
3. Connect an RF cable between the instrument's input and a signal source. This could be a signal generator,

device under test, or an antenna.
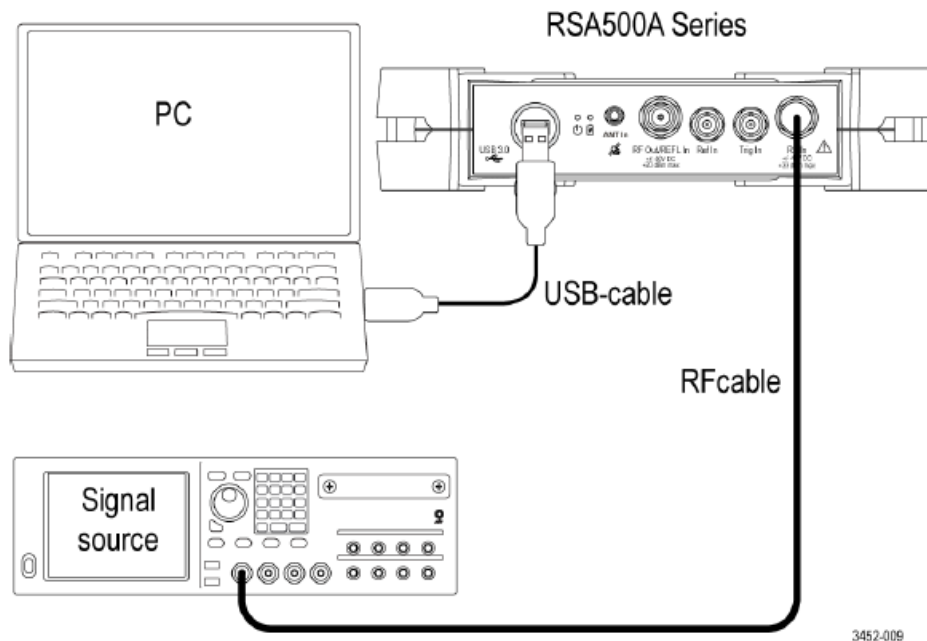
4. Start the SignalVu-PC application on the host PC.

5. SignalVu-PC automatically establishes a connection to the instrument via the USB cable.

6. A Connect Status dialogue appears in the SignalVu-PC status bar to confirm that the instrument is connected.

- **Note:** You can quickly verify connection status by looking at the Connection indicator in the SignalVu-PC status bar. It is green ( ) when an instrument is connected, and red ( ) when not connected. You can also view the name of the instrument that is connected by hovering the mouse pointer over the indicator.

Automatic connection fails: In some instances, the automatic connection may fail. Typically, the cause is that SignalVu-PC is already connected to an instrument (either USB or network). In this situation, use the following steps to make a connection using the SignalVu-PC application.

1. Click Connect on the menu bar to view the drop-down menu.

2. Select Disconnect From Instrument to end the existing connection.

3. Select Connect to Instrument. The USB-connected instruments appear in the Connect to Instrument list.

4. If you do not see the expected instrument, click Search for Instrument. TekVISA searches for the instrument, and a notification appears when the instrument is found. Check that the newly found instrument now appears in the Connect to Instrument list.

5. Select the instrument. First-time connection to the analyzer may take up to 10 seconds while the instrument runs Power On Self Test (POST) diagnostics.

Confirm operation

After you have installed the software and connected the system components, do the following to confirm system operation.

1. Click the Preset button in SignalVu-PC. This can launch the Spectrum display, set preset parameters, and set the analyzer to run state.

2. Check that the spectrum appears.

3. Check that the centre frequency is 1 GHz.
   - When you are ready to disconnect from the instrument, select Disconnect from Instrument to end the current connection.

Cleaning the instrument

- Cleaning is not required for the safe operation of the instrument.
- However, if you want to perform routine cleaning on the exterior of the instrument, clean the with a dry lint-free cloth or a soft-bristle brush.
- If any dirt remains, use a cloth or swab dipped in a 75% isopropyl alcohol solution. Do not use abrasive compounds on any part of the chassis that may damage the chassis.
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- *P071345204*
- 071-3452-04 March 2024

Documents / Resources

RSA500A Real-Time Spectrum Analyzers Installation and Safety Instructions [document thumbnail]	**Tektronix RSA500A Real-Time Spectrum Analyzers** [pdf] Instruction Manual RSA500A Real-Time Spectrum Analyzers, RSA500A, Real-Time Spectrum Analyzers, Time Spectrum Analyzers, Spectrum Analyzers, Analyzers

References

- **User Manual**