Bode 500

Quick Start Guide

(Multilingual Safety Instructions)

Smart Measurement Solutions®

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Contents

1 Introduction

1.1 About this document

This Quick Start Guide was written for professional specialists in electronics and electrical engineering. Its purpose is to familiarize you with the *Bode 500* vector network analyzer and its various application fields. It contains helpful instructions on how to use *Bode 500* safely, properly, and efficiently.
This Quick Start Guide provides you with information on how to download and install the *Bode Analyzer Suite* and how to connect the *Bode 500* to your computer. It is intended as an aid for you to take the *Bode 500* into operation quickly and easily.

Thus, this Quick Start Guide only provides a small subset of information available for the *Bode 500*. When using accessories in combination with the *Bode 500*, read the corresponding documentation. Therefore, we recommend to read the Bode 100, Bode 500 User Manual, which can be viewed by clicking the icon at the top right corner of the *Bode Analyzer Suite* screen.

The latest version of the Bode 100, Bode 500 User Manual and Quick Start Guides can be downloaded from www.omicron-lab.com.

1.2 Safety symbols used

DANGER

Death or severe injury will occur if the appropriate safety instructions are not observed.

WARNING

Death or severe injury can occur if the appropriate safety instructions are not observed.

CAUTION

Minor or moderate injury may occur if the appropriate safety instructions are not observed.

NOTICE

Equipment damage or loss of data possible

1.3 Bode 500 compliance statements

In the following statement, the *Bode 500* device is designated as "product", "equipment", or "apparatus". The OMICRON contact address can be found on the last page (back page) of this document.

Declaration of conformity (EU)

The equipment adheres to the guidelines of the council of the European Community for meeting the requirements of the member states regarding the following directives:

- Electromagnetic compatibility (EMC) directive
- RoHS directive

Declaration of conformity (UK)

The equipment adheres to the regulations of the UK government for meeting the requirements regarding the following regulations:

- Electromagnetic Compatibility (EMC) Regulation
- Regulation for Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment

FCC compliance (USA)

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

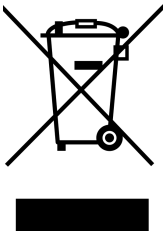
Declaration of compliance (Canada)

This Class B digital apparatus complies with Canadian ICES-003. Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

The use of the delivered mains adapter is required to comply with FCC and ICES rules as well as the EMC directive.

If an antenna is connected to the Bode 500, the emission limits for class B will be violated. If this application is required, ensure that the other environment is electromagnetically protected.

1.4 Information for disposal and recycling



Bode 500, and its accessories, are not intended for household use. At the end of its service life, do not dispose of the device with household waste!

For customers in EU countries (incl. European Economic Area)

OMICRON devices are subject to the EU Waste Electrical and Electronic Equipment Directive (WEEE directive). As part of our legal obligations under this legislation, OMICRON offers to take back the device and to ensure that it is disposed of by authorized recycling agents.

For customers outside the European Economic Area

Contact the authorities in charge of the relevant environmental regulations in your country and dispose of the OMICRON device only in accordance with your local legal requirements.

1.5 Cleaning

Use a cloth dampened with isopropanol alcohol to clean *Bode 500* and its accessories.

2 Safety instructions

Before operating *Bode 500*, and their accessories, read the safety instructions in this document carefully. A summary and translation of the safety instructions can be found at the end of this document. If you do not fully understand any safety instruction or any part thereof, contact OMICRON Lab before proceeding. When working with *Bode 500*, observe all safety instructions in this document. You are responsible for every application that makes use of an OMICRON or OMICRON Lab product. Any miss-operation can result in damage to property or persons. Maintenance and repair of *Bode 500* and its accessories is only permitted by qualified experts either at OMICRON Lab or at certified repair centers.

Following these instructions will help you to prevent danger, repair costs and possible down time due to incorrect operation. Furthermore, it ensures the reliability and life-cycle of *Bode 500*.

Use *Bode 500* in observance of all existing safety requirements from national standards for accident prevention and environmental protection.

Reading the *Bode 500* manual alone does not release you from the duty of complying with all national and international safety regulations relevant for working with *Bode 500*.

2.1 Operator qualifications

- Testing with *Bode 500* must only be carried out by qualified, skilled and authorized personnel.
- Personnel receiving training, instructions, directions, or education on *Bode 500* must be under constant supervision of an experienced operator while working with the equipment.
- Testing with *Bode 500* must comply with the on-site safety instructions as well as additional relevant documents.

2.2 Rules for use

- *Bode 500* is exclusively intended for the application area specified in this document. The manufacturer/distributors are not liable for damage resulting from a use other than the specified operation. The user alone assumes all responsibility and risk.
- Use *Bode 500* only when it is in a technically sound condition.
- Do not operate *Bode 500* in the presence of explosive gas or vapours.
- Do not operate *Bode 500* under ambient conditions that exceed the temperature and humidity limits listed in the user documentation.
- Do not open *Bode 500* or remove any of its housing components.
- The *Bode 500* does not contain any serviceable parts. Do not open the *Bode 500* or carry out any modifications, extensions, or adaptations.
- Use *Bode 500* in observance of all existing safety requirements from national and international standards for accident prevention and environmental protection.
- Always keep the manual as PDF file or printed at the site where *Bode 500* is used. The manual must be read by all people working with *Bode 500*. In addition to the manual and the applicable regulations for accident prevention in the country and at the site of operation, heed the accepted technical procedures for safe and competent work.

2.3 Designated use

Bode 500 and their accessories are especially designed for Gain/Phase, S-Parameter and Impedance measurements of electronic circuits in laboratory and manufacturing environments.
Typical applications are:

- Measurement of the complex transfer function of amplifiers, filters and attenuators
- S-Parameter measurement in the 50 Ω domain
- Stability assessment of control loops
- Determination of resonance frequencies of piezo elements and quartz crystals
- Impedance measurement of inductors, capacitors and resistors

Disclaimer

The advisory procedures and information contained within this document have been compiled as a guide for a safe and effective operation of *Bode 500*. It has been prepared in conjunction with application engineers and the collective experience of the manufacturer. The in-service conditions for the use of *Bode 500* may vary between customers and end-users.
Consequently, this document is offered as a guide only. It shall be used in conjunction with the customers own safety procedures, maintenance program, engineering judgment, and training qualifications.
Using *Bode 500* or its accessories in a manner not specified by the manufacturer may result in damage to property or persons.

3 Description

Bode 500 is a USB controlled vector network analyzer. The system consists of the *Bode 500* hardware and the *Bode Analyzer Suite* software. In the following the *Bode 500* hardware is described in detail. To learn more about the *Bode Analyzer Suite*, please check out 4.4 Performing your first measurement on page 16 ff.

3.1 Connectors & Indicators

Bode 500 provides the following connectors and indicators at the front panel:

- OUTPUT: signal source output (Type-N socket)
- Source ON LED (yellow): indicates when a signal generated at the output port
- Power/Status LED (RGB): yellow during power-up phase; adjustable color after device has booted
- CH 1: channel 1 signal input (Type-N socket)
- CH1 Termination LED (yellow): indicates channel input impedance (50Ω or high-impedance)
- CH 2: channel 2 signal input (Type-N socket)
- CH2 Termination LED (yellow): indicates channel input impedance (50Ω or high-impedance)

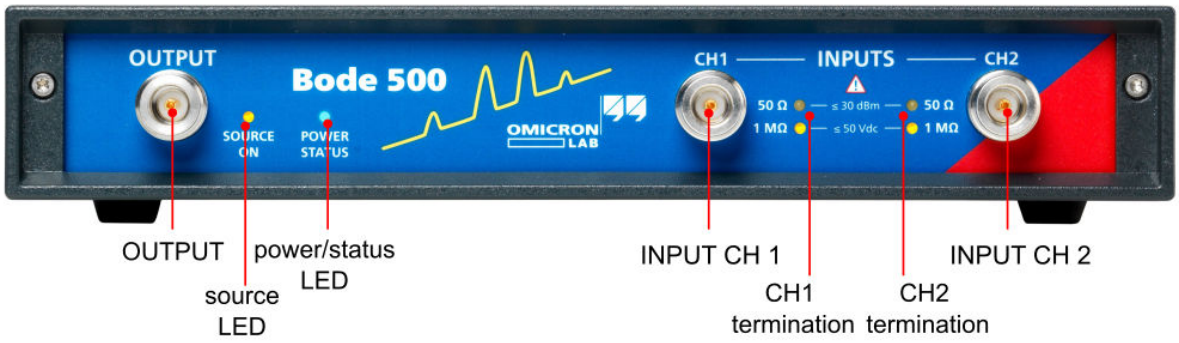


Figure 3-1: *Bode 500* front view

WARNING

Death or severe injury can occur if hazardous voltages are connected to the Bode 500.

Bode 500 is a SELV device (SELV = Safety Extra Low Voltage according to IEC 60950-1), also known as protection class III or ES1 equipment according to IEC 62368-1).

- ► Do not apply voltage levels > 50 V DC or > 25 V AC to the inputs of *Bode 500*.
- ► When working with external voltage or current sources in the test setup, ensure that they can not exceed the SELV levels and provide appropriate isolation to other hazardous circuits, such as the AC line voltage supply.

Bode 500 provides the following connectors at the rear panel:

- CONTROL USB: USB-C device port to connect *Bode 500* to a computer
- CONTROL ETH: RJ45 network interface
- Supply power input for DC voltages from 9 Vdc to 24 Vdc (5.5 mm coaxial plug with 2.5 mm pin)
- ⏚: Ground connector for external ground connection (4 mm banana-socket)
- Kensington security lock slot
- EXT TRIG OUT: External trigger output*
- EXT TRIG IN: External trigger input*
- REF FREQ IN: External frequency reference input*
- USB-A: USB host port*

*...reserved for future use, no function in current software version.

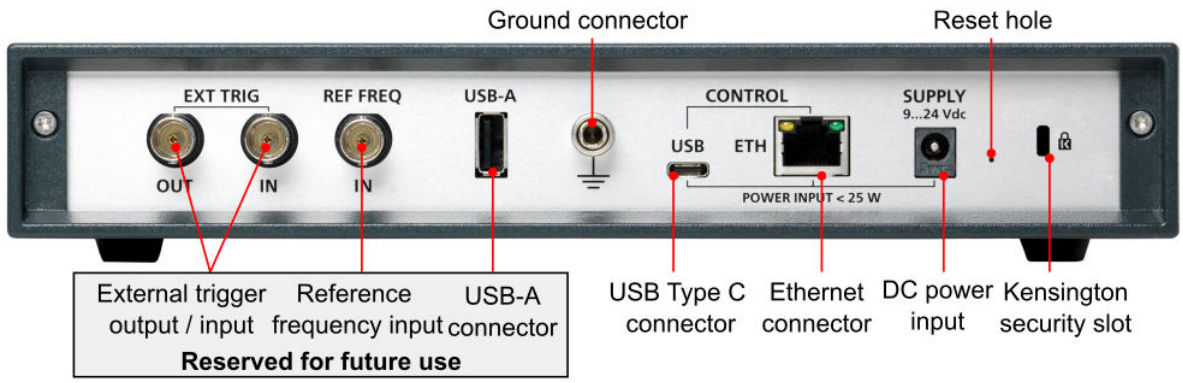


Figure 3-2: *Bode 500* rear view

NOTICE

Risk of permanent damage of the device.

Exceeding the absolute maximum ratings will result in equipment damage.

► The AC-coupled inputs represent a high impedance for DC signal. Before using passive probes, check out 4.5 Using external probes & injection transformers on page 20.

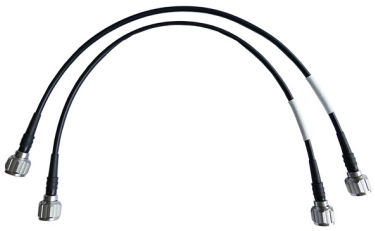
NOTICE

Risk of permanent damage of the device.

Connecting a charged DUT to the *Bode 500* can damage the input and output ports.

► Always discharge the DUT (e.g. piezo or capacitor) before connecting it to the *Bode 500*.

3.2 Delivered items

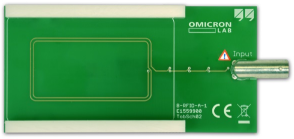
 *Bode 500* multi-functional measurement device	 18 V, 24 W wide-range AC power supply including mains input plugs for different national standards	 USB-A to USB-C cable
 2x N-N (M-M) Cable 50cm	 3x N-BNC (M-M) Cable 50cm	 Adapters: N-Thru (F-F), N-Short (M), N-50Ω Load (M), 2x N-BNC (M-F) and BNC-T (F-F-F)
 Test objects (Quartz filter and IF filter) on PCB with BNC connectors	 *Bode 500* Quick Start Guide including multilingual safety instructions	 *Bode Analyzer Suite* on DVD

The delivered items may vary a bit from the look shown above.

We strongly recommend to use the original wide-range AC power supply delivered with *Bode 500*. If you choose to use a different power supply, make sure that it can provide at least 24 W of power.

3.3 Optional accessories

	**B-WIT 100 Wideband Injection Transformer** **B-LFT 100 Low-Frequency Injection Transformer** **B-WIT 100** and **B-LFT 100** are used to inject signals into control loops. Its main application are the stability analysis of switched mode power supplies and linear voltage regulators. B-WIT 100 order number: P0005758 B-LFT 100 order number: P0005773
	**Passive Probes PML 1110 & PHV 1000-0** **PML 111O** is a passive 10:1 probe designed for precise low-noise transfer function measurements. **PHV 1000-O** is a passive 100:1 high-voltage probe designed for a maximum working voltage of 2000 V. PML 111O order number: B1666600 PHV 1000-O order number: P0008137
	**B-WIC & B-SMC Impedance test fixtures** **B-WIC** and **B-SMC** are designed to extend the impedance measurement range of *Bode 100*. They enable you to easily measure THT or SMD components such as inductors and capacitors. **B-WIC** and **B-SMC** can be also used in conjunction with the *Bode 500* using N-BNC cables. The maximum frequency for B-WIC and B-SMC is 50 MHz. B-WIC order number: P0005760 B-SMC order numer: P0005759
	**B-TCA Wide Frequency Test Fixture** **B-TCA** is designed to perform impedance measurements in a wide frequency range up to 450 MHz using the *Bode 500*. **B-TCA** can be also used in conjunction with the *Bode 100* using two BNC-N cables. B-TCA order number: P0009653
	**B-AMP 12 Amplifier** B-AMP 12 boosts the output signal of *Bode 500* up to 25 dBm in a frequency range from dc to 50 MHz. Order number: P0005772

	**B-LCM Common Mode Choke** A low-frequency common mode choke to reduce ground-loop errors in e.g. Shunt-Thru measurements. Order number: P0005778
	**B-RFID Measurement Adapters** The B-RFID adapters allow the contact-less measurement of the resonance frequency and Q-factor of 13.56 MHz RFID transponders / chip-cards.

For more information on the above mentioned accessories and other recommended accessories for your *Bode 500* please check out www.omicron-lab.com.

4 Getting started

This section explains how to connect *Bode 500*, put it into operation and how to perform the first measurement with it.

4.1 Installing the *Bode Analyzer Suite*

To install the *Bode Analyzer Suite* download version 3.50 or newer from www.omicron-lab.com. After downloading, run the installation file and follow the instructions on the screen.

It is recommended to disconnect the USB connection between the *Bode 500* and your PC during the installation of the *Bode Analyzer Suite*.

4.2 Powering the *Bode 500*

The *Bode 500* is powered with an external wide-range AC power adapter. Before powering *Bode 500*, select the adapter's mains input plug fitting your power outlet. Plug the adapter's DC output connector into the *Bode 500* DC power input on the rear panel and the mains input plug into the power outlet. The power status LED at the front panel of *Bode 500* will light up and will change color and indicate the start-up process.

NOTICE

Equipment damage possible.

Make sure the voltage and polarity of the power supply match the ratings of the device.

► Use the power adapter delivered with the *Bode 500*.

4.3 Connecting *Bode 500* to a computer

The *Bode 500* communicates with the computer via USB or ETH control. This example shows the control using USB connection. Connect the *Bode 500*'s USB connector on the rear panel to the USB connector of your computer using the USB cable delivered with your *Bode 500*. See the Bode 100, Bode 500 User Manual for more information on configuring the *Bode 500* for network usage.

In case you are experiencing problems with the USB connection, try to connect your *Bode 500* directly to a USB port of your computer without using any USB hub or USB isolator between the device and computer. Use the USB cable included in the *Bode 500* delivery.

4.4 Performing your first measurement

For the following example a "IF Filter" test object is used. Follow the steps described below to perform your first measurement:
Connect the test object "IF Filter" to the *Bode 500* using two of the N-BNC cables as shown in the figure below.

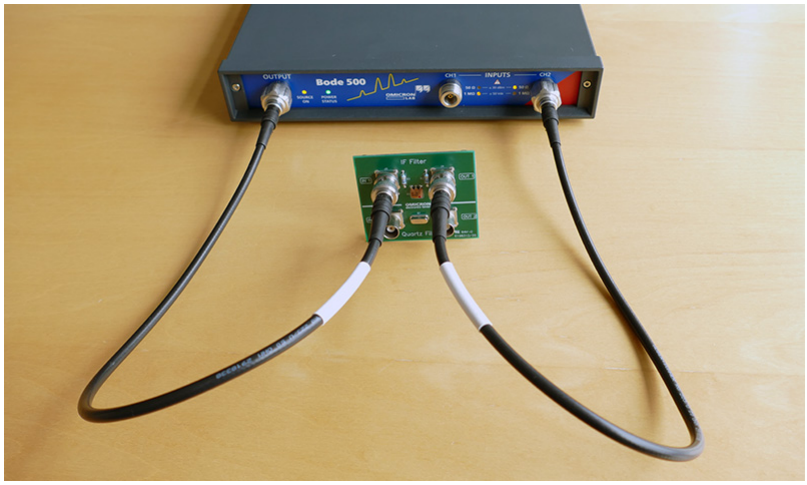
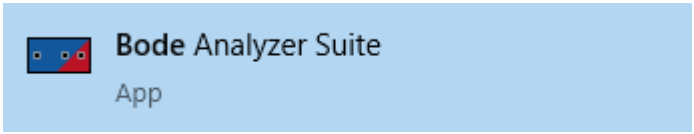


Figure 4-1: Connecting the test object IF Filter to the *Bode 500*

Now start the *Bode Analyzer Suite*:

- either by clicking its desktop icon:

- or by using the Microsoft Windows start menu:



After the *Bode Analyzer Suite* has started, you will see a start screen as shown below:

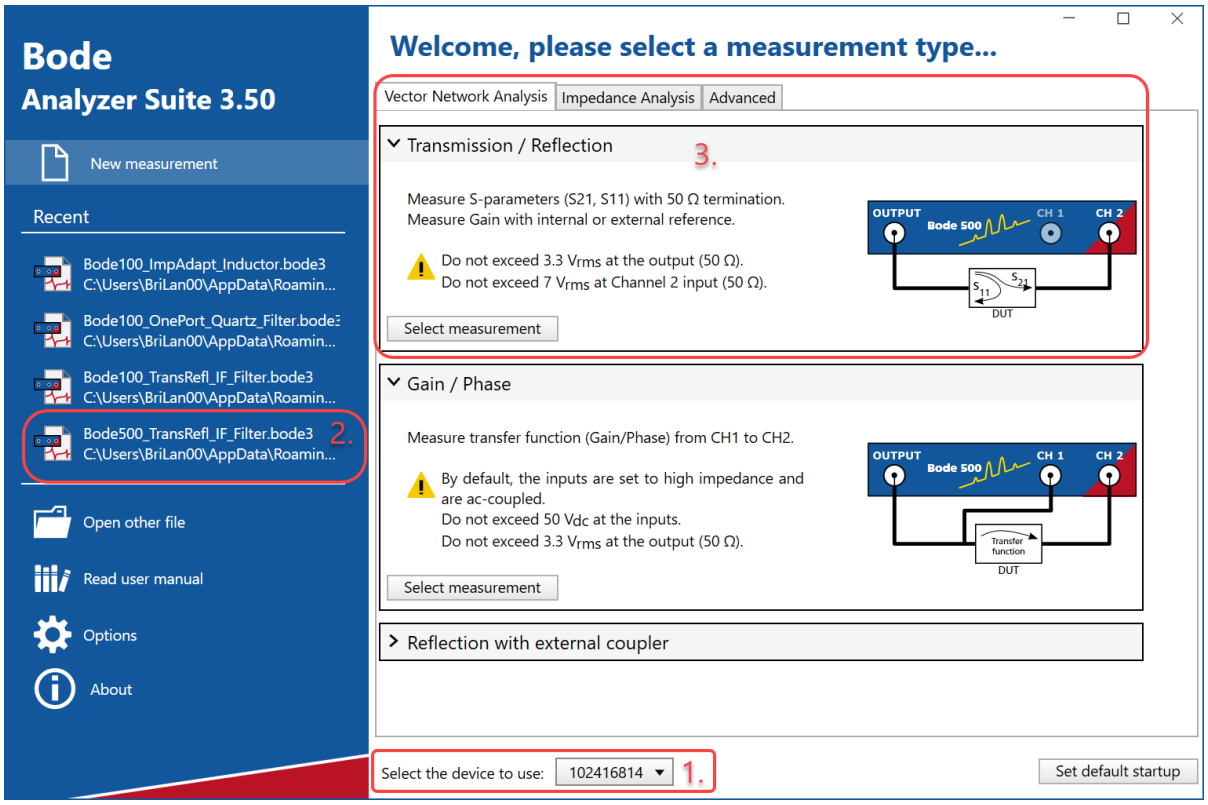
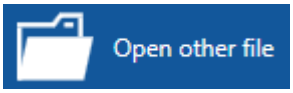


Figure 4-2: *Bode Analyzer Suite* start screen

- Select the device to use (**1.**). This field is only visible if you have a *Bode 500* device connected to your PC. To find out if your*Bode 500* is recognized by the *Bode Analyzer Suite*, check if the serial number of your *Bode 500* is displayed like shown in the figure above (see **1.**). If no serial number is displayed, refer to the section Troubleshooting for further information.
- To start your first measurement open for example the *Bode 500* demo file **Bode500_TransRefl_IF-filter.bode3** from the Recent list (see **2.**)
- Or alternatively select a **Transmission / Reflection** measurement from the **Vector Network Analysis** measurement mode list (**3.**) to start a measurement.

If you cannot see the file **Bode500_TransRefl_IF-filter.bode3** in the Recent list, use the



function and enter "%appdata%\OMICRON_Lab\BodeAnalyzerSuite\DemoFiles" to navigate to the demo files.

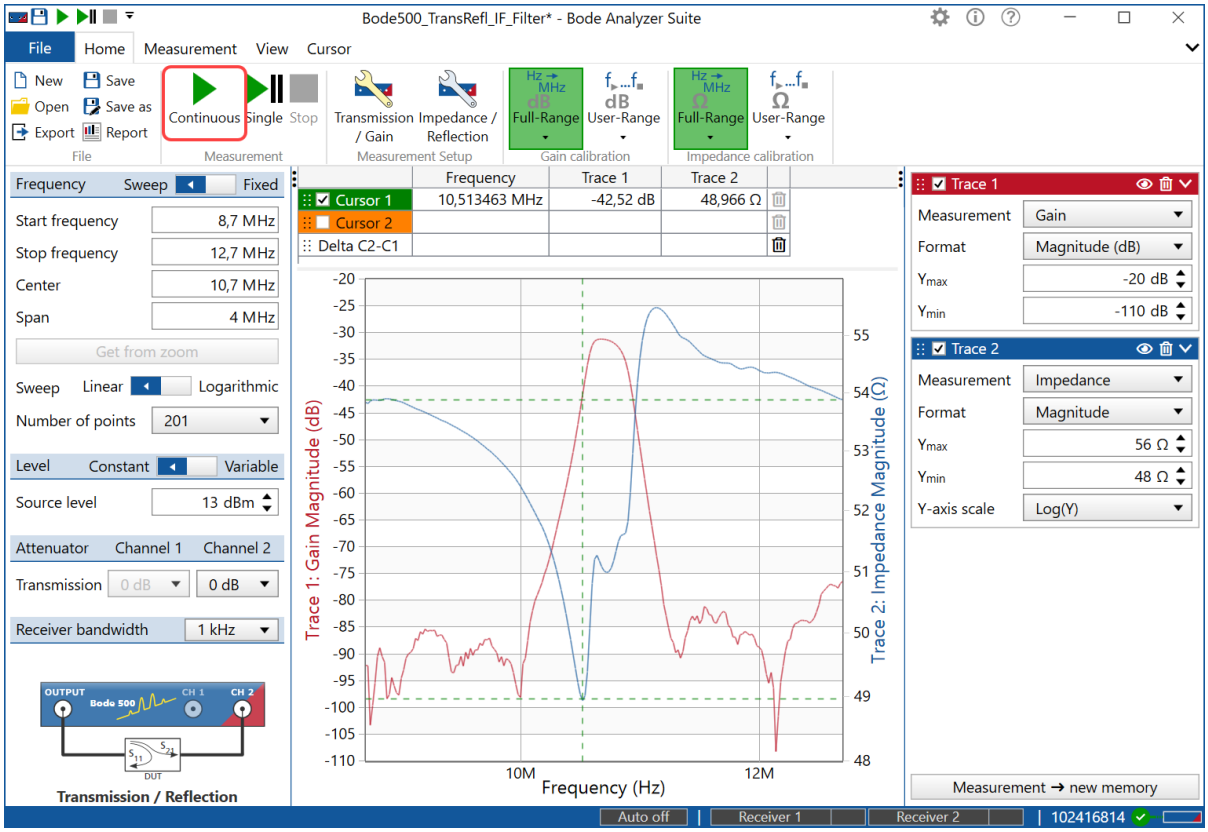


Figure 4-3: Your First Measurement

To start your first measurement, simply press the button marked with a red frame in the figure above.

Congratulations! You have just performed your first measurement using the *Bode 500*.

The red curve shows the transmission characteristic (S21) of the IF filter, while the blue curve shows the reflection (S11) of the IF filter.

Please refer to the *Bode 500* User Manual for more information on the *Bode 500* and its measurement capabilities. You can view the user manual by clicking **Read user manual** in the start screen or by clicking the help icon that is available at the top right corner of the *Bode Analyzer Suite* window.

4.5 Using external probes & injection transformers

External probes

You can use external probes with *Bode 500* that do not require a proprietary interface but offer a standard coaxial connector. The use of external probes can have the following advantages:

- Reduction of the capacitive loading added by connecting the input channels of *Bode 500* to your circuit.
- Easier in-circuit probing possibilities when no coaxial connectors are available on the DUT.
- Being able to measure currents by using an active current probe or a wideband current monitor.
- Protection of *Bode 500* from hazardous voltages if **isolating probes** are used.

When using a passive 10:1 voltage probe, the use of a 1 MΩ 10:1 probe is recommended. A 1 MΩ probe features the divider in the probe-tip which lowers the DC voltage as well when used with *Bode 500*. A standard 10 MΩ oscilloscope probe will not divide the DC voltage when used with the AC-coupled inputs of *Bode 500*. Furthermore, a 1 MΩ probe provides a lower impedance path that reduces channel to channel crosstalk and noise. OMICRON Lab recommends using the PML-111O passive probe from PMK for the use with *Bode 500*.

WARNING

Death or severe injury due to hazardous voltage levels possible.

Connecting the ground of a probe or cable to a hazardous live potential will cause this potential to be present at touchable parts of the *Bode 500* because all grounding is internally connected.

► Ensure that voltage and current probes used with the *Bode 500* are properly grounded in accordance with their manufacturer's guidelines.

► When working with voltage or current probes, always connect the ground terminal of the *Bode 500* to the ground terminal in the laboratory, using a solid connection of at least 3.6 mm² cross-section and not longer than 10 m.

NOTICE

Risk of permanent damage of the device.

The inputs of the *Bode 500* are AC coupled with a maximum allowed DC voltage of 50 V DC. A standard 10:1 passive probe will not divide the DC voltage when connected to the *Bode 500*.

► Use suitable probes when measuring at DC levels above 50 V.

► Do not use standard 10:1 oscilloscope probes with the *Bode 500*.

Injection transformers

You can use injection transformers or isolators with *Bode 500* for measurements in active circuits like control loops of power electronic systems. Make sure the isolation of the injector is safe to use for your application.

WARNING

Death or severe injury due to hazardous voltage levels possible.

If the isolation of the injection transformer fails, the DC potential of the equipment under test will be present at touchable parts of the *Bode 500*.

- ► Only use injection transformers, isolated for the application's maximum working voltage and overvoltage.
- ► Always connect the ground terminal of the *Bode 500* to the ground terminal in the laboaratory, using a solid connection of at least 3.6 mm² cross-section and not longer than 10 m.

For more information on how to configure probes correctly, how to perform a calibration / correction and how to set up the *Bode Analyzer Suite*, please refer to the Bode 100, Bode 500 User Manual.

5 Troubleshooting

This chapter describes solutions for different troubleshooting scenarios.

Software problems

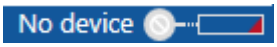
In case you run into software issues such as **crashes** or unexpected behavior, please contact the OMICRON Lab Support.
To help the support team, please include the **log file** of the *Bode Analyzer Suite* in your support request. By default, the log file is located at: *C:\ProgramData\OMICRON_Lab\BodeAnalyzer\Logs\BodeAnalyzerSuite.log*. Note that C:\ProgramData is typically a hidden folder on your computer. For the *Bode 500* the log files can be accessed via the web-interface (see web-interface description).

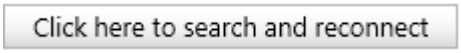
Sometimes graphics card driver issues cause problems in rendering the charts correctly. If you experience chart rendering issues, please update the drivers of your graphics hardware. If this does not resolve your issues, try switching to **software rendering** in the options of *Bode Analyzer Suite*.

Connection issues

In case you are not able to connect to your *Bode 500*, please perform the following steps:

1. Check if the Power LED at the front panel is on. In case that the LED is not lit, execute the following steps:
   a. Check if the wide-range AC power supply is plugged correctly into the mains socket.
   b. Check if the coaxial DC power connector of the wide-range AC power supply is properly plugged into the *Bode 500*.
   c. Check the output voltage of the DC connector using a volt-meter. The power supply included in the delivery should provide a voltage of 18 VDC.
2. Check if the communication between the *Bode Analyzer Suite* and the *Bode 500* has been successfully established. To do so, check if the serial number of your *Bode 500* is displayed in the start screen (see 4-2 on page 18, or in the right bottom corner of the measurement screen 

(see 4-3 on page 19). If you cannot see the serial number, please check the following:
   a. Check if the communication cable (USB or Ethernet) is properly plugged into your computer and the *Bode 500*.
   b. Try disconnecting and re-connecting the communication cable and make sure you use the USB cable included in the delivery if you use a USB connection.
   c. Move the mouse over the icon 

in the bottom right corner of the status bar and then click 

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3. Try re-starting your computer and the *Bode 500*.

If the above mentioned general hints don't help you resolve your issues using your *Bode 500*, please check out the hints below.

General issues

If you experience general issues using your *Bode 500*, please check that you use a power supply capable of delivering 24 W. If you use a power supply with less power capability, your *Bode 500* might not start correctly or might occasionally reset if power demand exceeds supply.

The power supply delivered with *Bode 100* is not sufficient to supply a *Bode 500* ! Use only the power supply delivered with your *Bode 500* or a similar device capable of delivering 24 W.

Bode 500 specific connection issues

In case you are still having issues to connect *Bode Analyzer Suite* to your *Bode 500*, we recommend to check if you can reach the web-interface of *Bode 500* by entering the URL **http://*Hostname*** in the address bar of your Internet Explorer.
Each *Bode 500* device came with the same default ***hostname***: **Bode500-*SerialNumber***.
SerialNumber is the 9-digit serial number of your *Bode 500*.
This should lead you to the web-interface of the device.
In the web-interface you can check / change / reset the IP settings of *Bode 500* and configure your *Bode 500* accordingly.
If you cannot reach the web-interface, please check:

1. Try using a different connection interface. If you have used USB, try using Ethernet or vice versa.
2. If none of the interfaces work, check the IP settings of your computer. Note that the following hints are valid for a *Bode 500* in factory-default configuration. If *Bode 500* has been reconfigured, a **factory-reset** might help.
    a. If you connect *Bode 500* to a network via Ethernet, there must be a DHCP server in the network which assigns a valid IP configuration to *Bode 500* and your computer.
    b. If you are connected via USB cable, a virtual network connection (RNDIS) will be established. This interface must be configured to use DHCP. *Bode 500* runs a DHCP server and will assign the IP address to your computer.
    c. If you try to connect *Bode 500* directly to your computer via Ethernet (point-to-point), your computer must act as a DHCP server to enable a connection.

In case you are still having issues to connect *Bode Analyzer Suite* to your *Bode 500*, please remove power from your *Bode 500* and wait for 30 s before you re-power *Bode 500*. During booting of *Bode 500*, please check the following:

1. Check if the green Power / Status LED at the front panel is on and starts to blink after a couple of seconds. The first blinking indicates that the operating system of *Bode 500* has started.
2. As soon as the *Bode 500* is completely initialized, the Power / Status LED switches color and stays on continuously.
3. If the above sequence does not work as described or the re-start did not resolve your connection issues, we recommend that you perform a **factory reset** of your *Bode 500*.

The factory reset will **revert all settings** to it's factory defaults and **delete all user data** stored on the device.

To perform a factory reset of *Bode 500*, follow the steps outlined below:

- Locate the reset button, hidden behind the reset hole at the rear of the device.
- Put a straightened paperclip into the reset hole. Press and hold the switch for a duration of 5 s.
- Release the button and wait until the *Bode 500* restarts.

If all these hints did not help to resolve your issues please contact us. Check out OMICRON Lab Support for further information on how to reach us.

6 Technical data

In this section you can find the most important technical data valid for the *Bode 500* device. You can download a detailed technical data sheet from the OMICRON Lab website www.omicron-lab.com → Bode 500 → Technical Data.

NOTICE

Risk of permanent damage of the device.

Exceeding the absolute maximum ratings might result in equipment damage.

► Do not exceed the absolute maximum ratings listed below.

6.1 Absolute maximum ratings

Table 6-1: Absolute maximum ratings

Characteristic	Absolute Maximum Rating
dc Power Input	
Max. dc supply voltage	+26 V
Max. dc supply reverse voltage	-26 V
INPUT CH 1, INPUT CH 2 connectors (1 MΩ input impedance selected)	
Maximum dc input signal	- 50 V...+ 50 V
Maximum peak value for ac + dc signal	- 60 V...+ 60 V
Maximum ac input signal	10 mHz...1 MHz: 40 Vrms 2 MHz...5 MHz: 15 Vrms 5 MHz...10 MHz: 10 Vrms 10 MHz ... 450 MHz: 7 Vrms
INPUT CH 1, INPUT CH 2 connectors (50 Ω input impedance selected)	
Maximum input power	1 W
Maximum input voltage	7 Vrms
OUTPUT connector	
Maximum reverse power	0.5 W
Maximum reverse voltage	5 Vrms (≤ 3.3 Vdc recommended)

6.2 Bode 500 specifications

Table 6-2: *Bode 500* specifications:

Characteristic	Rating
Frequency range	1 Hz to 450 MHz
OUTPUT	
Waveform	Sinusoidal
Signal level range	-50 dBm...16 dBm* 4 mVpp to 8 Vpp (no load) 2 mVpp to 4 Vpp (50 Ω load)
*...linear derating from 16 dBm to 13 dBm (100 MHz to 300 MHz), and to 7 dBm at 450 MHz.	
Source level accuracy	±0.2 dB (dc to 100 MHz) ±0.6 dB (100 MHz to 450 MHz)
Source signal dc offset	Up to 35 kHz: < 5 mV or < 0.2% of Vpp Above 35 kHz: < 2 mV
Frequency accuracy after adjustment	± 0.5 ppm ± 0.5 step size
Frequency resolution (step size)	3.52 µHz
Source impedance	50 Ω
Return loss (1 Hz to 50 MHz)	>30 dB, >35 dB typical (dc to 100 MHz) >26 dB, >30 dB typical (100 MHz to 200 MHz) >23 dB, >28 dB typical (200 MHz to 450 MHz)
Spurious signals & harmonics	<-25 dBc at full output power (typical)
Maximum reverse signal / power	0.5 W = 5 Vrms (≤ 3.3 Vdc recommended)
INPUT CH 1, INPUT CH 2	
Input impedance (software switchable)	**High**: 1 MΩ (ac-coupled) **Low**: 50 Ω (dc-coupled)
1 MΩ input impedance Input capacitance	1 MΩ ± 0.5 % (ac-coupled) 25 pF @ 1 MHz (typical)
50 Ω input impedance return loss	> 28 dB, >35 dB typical (dc to 100 MHz) > 23 dB, >28 dB typical (100 MHz to 450 MHz)
Receiver bandwidth (RBW) software selectable	1 Hz, 3 Hz, 10 Hz, 30 Hz, 100 Hz, 300 Hz, 1 kHz, 3 kHz , 5 kHz, 10 kHz, 15 kHz
Input attenuation (software selectable)	0 dB, 20 dB
Full-scale AC input signal	1 Vrms @ 0 dB input attenuator 10 Vrms @ 20 dB input attenuator
Input channel sensitivity (typical)	< 1 µVrms (@ 0 dB attenuator, 10 Hz RBW, 3 kHz to 100 MHz)
Maximum dc voltage	1 MΩ input impedance: 50 V 50 Ω input impedance: 7 V
Input channel dynamic range (typical)	> 120 dB (@ 10 Hz RBW, 3 kHz to 100 MHz)
Noise floor (S21 measurement) RBW = 10 Hz, PSOURCE = 16 dBm, Attenuator CH2: 0 dB	1 Hz to 10 kHz: -120 dB (typical) 3 kHz to 100 MHz: -130 dB (typical) at 300 MHz: -115 dB (typical) at 450 MHz: -105 dB (typical)

Characteristic	Rating
Warn-up time (3τ)	84 min*
OUTPUT, CH1, CH2 connector type	N
Control (and supply) USB connector	USB-C
Control (and supply) Ethernet connector	RJ45
USB-Host interface connector	USB-A**
External reference input connector	BNC**
External trigger input/output connector	BNC**
*...specifications are valid after device has warmed up and reached a stable temperature. **...reserved for future use.	
Bode 500 power requirements	
Maximum power requirement	24 W
Coaxial Power socket	+9 Vdc to +24 Vdc Type: 2.5 mm / 5.5mm Inner conductor is positive
Power over Ethernet	PoE+, class 4
USB-PD (Powered over USB) demand	20 V / 1.25 A or 15 V / 1.75 A

6.3 System requirements

Table 6-3: System requirements

Characteristic	Minimum PC Configuration
Processor	Intel Core-i Dual-Core (or similar)
Memory (RAM)	2 GB, 4 GB recommended
Graphics resolution	Super VGA (1024x768) higher resolution recommended
Graphics card	DirectX 11 with Direct2D support
USB interface	USB 2.0 or higher
Operating System	Microsoft Windows 10 / 11
Bode Analyzer Suite Software	Bode 500 requires Bode Analyzer Suite 3.50 or newer.

6.4 Power adapter requirements

Table 6-4: Wide-range mains power adapter

Characteristic	Rating
Line input voltage / frequency / current	100…240 V / 47…63 Hz / < 0.5 A
Output voltage / current / power	18 Vdc / 1.33 A / 24 W

6.5 Environmental requirements

Table 6-5: Environmental requirements

Characteristic	Condition	Rating
Temperature	Storage	-35 ... +60 °C / -31...+140 °F
	Operating	+5 ... +40 °C / -41...+104 °F
	For specification	23 °C ±5 °C / 73 °F ±18 °F
Relative humidity	Storage	20 ... 90 %, non-condensing
	Operating	20 ... 80 %, non-condensing

6.6 Mechanical data

Table 6-6: Mechanical data

Characteristic	Rating
Dimensions (w x h x d) without connectors	26 cm x 5 cm x 27.5 cm / 10.25 " x 2 " x 10.85 "
Weight	2.2 kg / 4.9 lb

7 Multilingual Safety Instructions

Български – Указания за безопасност, предназначение и квалификации на оператора

Указания за безопасност:

- Bode 100 и Bode 500 представляват БСНН устройства (БСНН = безопасно свръхниско напрежение в съответствие с IEC 60950-1), известни също така като съоръжения с клас на защита III или съоръжения ES1 в съответствие с IEC 62368-1.
- Не прилагайте нива на напрежение > 50 V DC или > 25 V AC към входовете на Bode 100 или Bode 500.
- Имайте предвид, че Bode 100 няма индикатор, който да показва, че изходът е активен. Това е от особено значение, ако към Bode 100 са свързани усилватели.
- Когато работите с външно напрежение или източници на ток в тестова среда, се уверете, че те не могат да надвишават нивата на БСНН и осигурете подходяща изолация на другите опасни вериги, като мрежовото захранване с променливо напрежение.
- Уверете се, че измервателните клещи за напрежение и ток, които използвате с Bode 100 или Bode 500, са правилно заземени, в съответствие с инструкциите на производителя.
- Когато работите с измервателни клещи за напрежение или ток или инжекционни трансформатори винаги свързвайте заземяващата клема на Bode 100 или Bode 500 със заземяващата клема в лабораторията, като използвате стабилна връзка от поне 3,6 mm² напречно сечение и не по-дълга от 10 m.
- Използвайте само инжекционни трансформатори, изолирани за максималното работно напрежение и пренапрежение на приложението.
- Не работете с Bode 100 или Bode 500 при наличие на експлозиви газове или изпарения.
- Не работете с Bode 100 или Bode 500 в околна среда извън границите на температурата и влажността, посочени в документацията за потребителя.

Предназначение:

- Bode 100, Bode 500 и техните аксесоари са специално създадени за измерване на амплитуда/фаза, S параметър и импеданс на електрически вериги в лабораторни и производствени условия.

Квалификация на оператора:

- Изпитванията с Bode 100 или Bode 500 може да се извършват само от упълномощен и квалифициран персонал.
- Служителите, които се обучават или инструктират за работата с Bode 100 или Bode 500, трябва да бъдат под постоянния надзор на опитен оператор, докато работят с апаратурата. При извършване на изпитвания с Bode 100 или Bode 500 трябва да се спазват вътрешните указания за безопасност и допълнителни приложими документи.

中文-安全说明、指定用途和操作人员资格

安全说明：

- Bode 100 和 Bode 500 均为 SELV 设备（根据 IEC 60950-1，SELV = 安全特低电压）,又称防触电安全等级 III 或 ES1 设备（根据 IEC 62368-1）。
- 请勿向 Bode 100 或 Bode 500 的输入端施加超过 50 V DC 或 25 V AC 的电压。
- 请注意，Bode 100 没有用于显示输出是否处于激活状态的指示灯。如果 Bode 100 连接有放大器，则这一点尤其重要。
- 在测试设置中使用外部电源或电流来源时，请确保其不会超出 SELV 水平，并且提供与其他危险电路（例如 AC 线路电压电源）的适当隔离。
- 确保 Bode 100 或 Bode 500 使用的电压和电流探头根据设备制造商指南正确接地。
- 在使用电压探头、电流探头或注入变压器的情况下，请始终使用横截面积至少 3.6 mm² 且长度不超过 10 m 的牢固连接线将 Bode 100 或 Bode 500 的接地端连接到实验室的接地端。
- 仅使用针对应用的最大工作电压和过电压进行隔离的注入变压器。
- 请勿在有易爆气体或蒸汽的环境下操作 Bode 100 或 Bode 500。
- 请勿在超过用户文档中所列温度和湿度限值的环境条件下操作 Bode 100 或 Bode 500。

设计用途：

- Bode 100、Bode 500 及其附件专门用于在实验室和制造环境下测量电子电路的增益/相位、S-参数和阻抗。

操作人员资质：

- 采用 Bode 100 或 Bode 500 的测试必须由符合资质且获得授权的技术人员完成。
- 接受 Bode 100 或 Bode 500 训练、指示、指导、培训的人员在使用该设备时，必须在有经验的操作人员的监督下进行。采用 Bode 100 或 Bode 500 的测试必须满足内部安全规定以及其他相关文件的要求。

Čeština – Bezpečnostní pokyny, určené použití a kvalifikace operátora

Bezpečnostní pokyny:

- Bode 100 a Bode 500 jsou zařízení SELV (SELV = Safety Extra Low Voltage [bezpečné velmi malé napětí] podle IEC 60950-1), známá také jako zařízení třídy ochrany III nebo ES1 podle IEC 62368-1.
- Na vstupy zařízení Bode 100 nebo Bode 500 neaplikujte úrovně napětí >50 V DC či >25 V AC.
- Upozorňujeme, že zařízení Bode 100 nedisponuje žádným indikátorem aktivního výstupu. To by mohlo být obzvláště kritické, pokud jsou k zařízení Bode 100 připojeny zesilovače.
- Při práci s externími zdroji napětí nebo proudu ve zkušební sestavě se ujistěte, že nemohou překročit úrovně SELV, a zajistěte odpovídající izolaci od jiných nebezpečných obvodů, například od síťového zdroje střídavého napětí.
- Ujistěte se, že napěťové a proudové sondy používané se zařízením Bode 100 nebo Bode 500 jsou řádně uzemněny v souladu s pokyny výrobců.
- Při práci s napěťovými a proudovými sondami nebo injekčními transformátory vždy připojte zemnicí svorku zařízení Bode 100 nebo Bode 500 k zemnicí svorce v laboratoři pomocí pevného spoje o průřezu alespoň 3,6 mm² a ne delšího než 10 m.
- Používejte pouze injekční transformátory izolované pro maximální pracovní napětí a přepětí dané aplikace.
- Nepoužívejte zařízení Bode 100 nebo Bode 500 v přítomnosti výbušných plynů nebo výparů.
- Nepoužívejte zařízení Bode 100 nebo Bode 500 v okolních podmínkách, které překračují teplotní a vlhkostní limity uvedené v uživatelské dokumentaci.

Určené použití:

- Zařízení Bode 100, Bode 500 a jejich příslušenství jsou navržena zejména pro měření předstihu/fáze, S parametru a impedance elektronických obvodů v laboratorním a výrobním prostředí.

Kvalifikace operátora:

- Testování se zařízením Bode 100 nebo Bode 500 smí provádět pouze kvalifikovaný, odborně zkušený a oprávněný personál.
- Personál, který podstupuje školení, instruktáž, poučení nebo vzdělávání ohledně zařízení Bode 100 nebo Bode 500, musí být při práci se zařízením pod neustálým dohledem zkušeného operátora. Testování se zařízením Bode 100 nebo Bode 500 musí vyhovovat interním bezpečnostním předpisům a dalším relevantním dokumentům.

Dansk – Sikkerhedsanvisninger, tilsigtet brug og operatørkvalifikationer

Sikkerhedsanvisninger:

- Bode 100 og Bode 500 er SELV-apparater (SELV = Safety Extra Low Voltage iht. IEC 60950-1), der også kaldes udstyr i beskyttelsesklasse III eller ES1-udstyr iht. IEC 62368-1.
- Tilslut ikke spændingsniveauer > 50 V DC eller > 25 V AC til indgangene på Bode 100 eller Bode 500.
- Vær opmærksom på, at Bode 100 ikke har en indikator, der viser om udgangen er aktiv. Det kan især være afgørende, hvis der er forstærkere forbundet til Bode 100.
- Ved arbejde på eksterne spændings- eller strømkilder i testopsætningen skal det sikres, at de ikke overskrider SELV-niveauerne, og at de yder den nødvendige isolation i forhold til andre farlige kredsløb såsom AC-linjespændingsforsyningen.
- Det skal sikres, at de spændings- og strømsensorer, der anvendes sammen med Bode 100 eller Bode 500, har en passende jordforbindelse i henhold til producentens retningslinjer.
- Ved arbejde med spændingssensorer, strømsensorer eller indsprøjtningstransformatorer, skal jordforbindelsen for Bode 100 eller Bode 500 altid forbindes med jordforbindelsen i laboratoriet ved hjælp af en solid forbindelse med et tværsnit på mindst 3,6 mm² og en længde på ikke over 10 m.
- Brug kun indsprøjtningstransformatorer, der er isoleret i overensstemmelse med apparatets maksimale driftsspænding og overspænding.
- Anvend ikke Bode 100 eller Bode 500, hvis der er eksplosive gasser eller dampe til stede.
- Anvend ikke Bode 100 eller Bode 500, der overskrider de temperatur- og fugtighedsgrænser, der er angivet i brugermanualen.

Tilsigtet brug:

- Bode 100, Bode 500 samt tilbehør er specialdesignet til Gain/Phase, S-parameter og impedansmålinger af elektroniske kredsløb i laboratorie- og produktionsmiljøer.

Operatørkvalifikation:

- Tests med Bode 100 eller Bode 500 skal altid udføres af autoriseret og kvalificeret personale.
- Personale, der modtager oplæring, anvisninger, instruktioner eller er under uddannelse til at arbejde med Bode 100 eller Bode 500, skal være under konstant opsyn af en erfaren operatør, mens de arbejder med udstyret. Test med Bode 100 eller Bode 500 skal være i overensstemmelse med de interne sikkerhedsforskrifter samt supplerende relevante dokumenter.

Deutsch – Sicherheitshinweise, bestimmungsgemäße Verwendung und Qualifikation des Bedienpersonals

Sicherheitshinweise:

- Bode 100 und Bode 500 sind Sicherheitskleinspannungsgeräte gemäß IEC 60950-1 (sogenannte „SELV-Geräte“, von SELV = Safety Extra Low Voltage), auch als Geräte der Schutzklasse III oder ES1-Geräte gemäß IEC 62368-1 bekannt.
- An die Eingänge des Bode 100 oder Bode 500 dürfen keine Spannungen > 50 V DC oder > 25 V AC angelegt werden.
- Beachten Sie, dass das Bode 100 keine Anzeige hat, aus der hervorgeht, ob der Ausgang aktiv ist. Dies kann besonders beim Anschluss von Verstärkern an das Bode 100 kritisch sein.
- Wenn Sie im Prüfaufbau mit externen Spannungs- oder Stromquellen arbeiten, stellen Sie sicher, dass diese die SELV-Pegel nicht überschreiten können, und sorgen Sie für eine angemessene Trennung von anderen gefährlichen Stromkreisen, wie z. B. der AC-Spannungsversorgung.
- Stellen Sie bei Verwendung von Spannungstastköpfen und Stromzangen mit dem Bode 100 oder Bode 500 sicher, dass sie gemäß den Richtlinien des jeweiligen Herstellers korrekt geerdet sind.
- Sorgen Sie beim Arbeiten mit Spannungstastköpfen, Stromzangen oder Einspeise-Übertragern dafür, dass der Erdungsanschluss des Bode 100 oder Bode 500 immer mit dem Erdungsanschluss im Labor verbunden ist. Für diese Verbindung ist eine solide Erdungsleitung mit einem Querschnitt von mindestens 3,6 mm² zu verwenden, die nicht länger als 10 m ist.
- Verwenden Sie ausschließlich Einspeise-Übertrager, die für die maximale Betriebsspannung und Überspannung der jeweiligen Anwendung isoliert sind.
- Betreiben Sie das Bode 100 oder Bode 500 niemals in der Nähe von explosionsfähigen Gasen oder Dämpfen.
- Betreiben Sie das Bode 100 oder Bode 500 niemals unter Umgebungsbedingungen, die die in den Nutzungsinformationen aufgelisteten zulässigen Bereiche für Temperatur und Feuchtigkeit über- bzw. unterschreiten.

Bestimmungsgemäße Verwendung:

- Das Bode 100 und das Bode 500 sowie deren Zubehör sind speziell für die Messung der Verstärkung und des Phasenverhaltens von elektronischen Schaltungen sowie von deren Streuparametern und Impedanzen konzipiert. Sie sind ausschließlich für die Verwendung in Labor- und Fertigungsumgebungen vorgesehen.

Qualifikation des Bedienpersonals:

- Prüfungen mit dem Bode 100 oder Bode 500 dürfen nur durch autorisierte, qualifizierte und dafür ausgebildete Personen durchgeführt werden.
- Personen, die das Bode 100 oder das Bode 500 im Rahmen einer Schulung, Einweisung oder anderweitigen Ausbildung bedienen, müssen dabei durchgängig von einer erfahrenen Person beaufsichtigt werden. Prüfungen mit dem Bode 100 oder Bode 500 müssen immer unter Beachtung der internen Sicherheitsvorschriften und aller sonstigen relevanten Dokumente erfolgen.

English – Safety Instructions, Designated Use and Operator Qualification

Safety Instructions:

- Bode 100 and Bode 500 are SELV devices (SELV = Safety Extra Low Voltage according to IEC 60950-1), also known as protection class III or ES1 equipment according to IEC 62368-1.
- Do not apply voltage levels > 50 V DC or > 25 V AC to the inputs of the Bode 100 or Bode 500.
- Be aware that the Bode 100 has no indicator to show if the output is active. This could be especially critical if amplifiers are connected to Bode 100.
- When working with external voltage or current sources in the test setup, ensure that they can not exceed the SELV levels and provide appropriate isolation to other hazardous circuits, such as the AC line voltage supply.
- Ensure that voltage and current probes used with the Bode 100 or Bode 500 are properly grounded in accordance with their manufacturer's guidelines.
- When working with voltage probes, current probes or injection transformers always connect the ground terminal of the Bode 100 or Bode 500 to the ground terminal in the laboratory, using a solid connection of at least 3.6 mm² cross-section and not longer than 10 m.
- Only use injection transformers, isolated for the application's maximum working voltage and overvoltage.
- Do not operate Bode 100 or Bode 500 in the presence of explosive gas or vapours.
- Do not operate Bode 100 or Bode 500 under ambient conditions that exceed the temperature and humidity limits listed in the user documentation.

Designated Use:

- Bode 100, Bode 500, and their accessories are especially designed for Gain/Phase, S-Parameter and Impedance measurements of electronic circuits in laboratory and manufacturing environments.

Operator Qualification:

- Testing with the Bode 100 or Bode 500 may only be carried out by qualified, skilled and authorized personnel.
- Personnel receiving training, instructions, directions, or education on a Bode 100 or Bode 500 must be under constant supervision of an experienced operator while working with the equipment. Testing with the Bode 100 or Bode 500 must comply with the internal safety regulations as well as additional relevant documents.

Ελληνικά – Οδηγίες ασφαλείας, προβλεπόμενη χρήση και προσόντα χειριστών

Οδηγίες ασφαλείας:

- Οι Bode 100 και Bode 500 είναι συσκευές SELV (SELV = Εξαιρετικά χαμηλή τάση ασφαλείας σύμφωνα με το πρότυπο IEC 60950-1), γνωστές επίσης ως εξοπλισμός κατηγορίας III ή ES1 σύμφωνα με το πρότυπο IEC 62368-1.
- Μην εφαρμόζετε τάσεις επιπέδου >50 V DC ή >25 V AC στις εισόδους των Bode 100 ή Bode 500.
- Λάβετε υπόψη ότι η Bode 100 δεν διαθέτει ένδειξη ενεργής εξόδου. Αυτό μπορεί να έχει ιδιαίτερα κρίσιμη σημασία αν συνδέονται ενισχυτές στην Bode 100.
- Όταν εργάζεστε με εξωτερικές πηγές τάσης ή έντασης ρεύματος στο σύστημα δοκιμής, πρέπει να βεβαιώνεστε ότι δεν μπορούν να υπερβούν τα επίπεδα SELV και να παρέχετε κατάλληλη απομόνωση για τα άλλα επικίνδυνα κυκλώματα, όπως η γραμμή παροχής τάσης AC.
- Πρέπει να βεβαιώνεστε ότι οι ανιχνευτές τάσης και έντασης ρεύματος που χρησιμοποιούνται με τις Bode 100 ή Bode 500 είναι σωστά γειωμένοι σύμφωνα με τις οδηγίες του κατασκευαστή τους.
- Όταν εργάζεστε με ανιχνευτές τάσης, ανιχνευτές έντασης ρεύματος ή μετασχηματιστές διοχέτευσης, πρέπει πάντα να συνδέετε τον ακροδέκτη γείωσης της Bode 100 ή της Bode 500 στον ακροδέκτη γείωσης του εργαστηρίου με συμπαγές καλώδιο σύνδεσης διατομής τουλάχιστον 3,6 mm² και μήκος που δεν υπερβαίνει τα 10 m.
- Πρέπει να χρησιμοποιείτε μόνο μετασχηματιστές διοχέτευσης με μόνωση κατάλληλη για τη μέγιστη τάση λειτουργίας της εφαρμογής και τη μέγιστη υπέρβαση τάσης.
- Μην χρησιμοποιείτε την Bode 100 ή την Bode 500 παρουσία εκρηκτικών αερίων ή αναθυμιάσεων.
- Μην χρησιμοποιείτε την Bode 100 ή την Bode 500 σε συνθήκες περιβάλλοντος που υπερβαίνουν τα όρια θερμοκρασίας και υγρασίας που αναφέρονται στα έγγραφα τεκμηρίωσης για τον χρήστη.

Προβλεπόμενη χρήση:

- Η Bode 100, η Bode 500 και τα παρελκόμενά τους έχουν σχεδιαστεί ειδικά για μετρήσεις της απολαβής/φάσης, της παραμέτρου S (σκέδασης) και της σύνθετης αντίστασης ηλεκτρονικών κυκλωμάτων σε εργαστηριακά και βιομηχανικά περιβάλλοντα παραγωγής.

Προσόντα χειριστών:

- Οι δοκιμές με την Bode 100 ή την Bode 500 πρέπει να εκτελούνται μόνο από πιστοποιημένο, ειδικευμένο και εξουσιοδοτημένο προσωπικό.
- Το προσωπικό που εκτελεί πρακτική εξάσκηση ή λαμβάνει εντολές, οδηγίες ή εκπαίδευση σχετικά με την Bode 100 ή την Bode 500 πρέπει να βρίσκεται υπό τη συνεχή επίβλεψη ενός έμπειρου χειριστή όταν εργάζεται με τον εξοπλισμό. Η εκτέλεση δοκιμών με την Bode 100 ή την Bode 500 πρέπει να συμμορφώνεται με τους εσωτερικούς κανονισμούς ασφαλείας και με οποιαδήποτε επιπρόσθετα σχετικά έγγραφα.

Español – Instrucciones de seguridad, aplicación prevista y cualificación del operador

Instrucciones de seguridad:

- El Bode 100 y el Bode 500 son dispositivos SELV (SELV = tensión extrabaja de seguridad según la norma IEC 60950-1), también conocidos como equipos ES1 o con clase de protección III según la norma IEC 62368-1.
- No aplique niveles de tensión > 50 V CC o > 25 V CA a las entradas del Bode 100 o del Bode 500.
- Tenga en cuenta que el Bode 100 no tiene ningún indicador que muestre si la salida está activa. Esto podría ser especialmente crítico si los amplificadores están conectados al Bode 100.
- Cuando trabaje con fuentes externas de tensión o corriente en la configuración de prueba, asegúrese de que no puedan superar los niveles SELV y proporcione el aislamiento adecuado a otros circuitos peligrosos, como la alimentación de tensión de la línea de CA.
- Asegúrese de que las sondas de tensión y corriente utilizadas con el Bode 100 o el Bode 500 están correctamente conectadas a tierra de acuerdo con las directrices de su fabricante.
- Cuando trabaje con sondas de tensión, sondas de corriente o transformadores de inyección, conecte siempre el terminal de tierra del Bode 100 o del Bode 500 al terminal de tierra del laboratorio, utilizando una conexión sólida de al menos 3,6 mm² de sección y no más de 10 m de longitud.
- Utilice únicamente transformadores de inyección, aislados para la sobretensión y la tensión máxima de trabajo de la aplicación.
- No utilice el Bode 100 o el Bode 500 junto a gases explosivos o vapores.
- No utilice el Bode 100 o el Bode 500 en condiciones ambientales que sobrepasen los límites de temperatura y humedad que se indican en la documentación del usuario.

Uso previsto:

- El Bode 100, el Bode 500 y sus accesorios están diseñados especialmente para mediciones de ganancia/fase, parámetro S e impedancia de circuitos electrónicos en entornos de laboratorio y de fábrica.

Cualificación del operador:

- Solo el personal cualificado, experimentado y autorizado puede realizar pruebas con el Bode 100 o el Bode 500.
- El personal no experimentado en el manejo del Bode 100 o del Bode 500 y que esté en plena formación debe encontrarse en todo momento bajo la supervisión de un operador experimentado mientras trabaja con el equipo. Al realizar pruebas con el Bode 100 o el Bode 500 se deben cumplir todas las normativas de seguridad internas, así como las instrucciones proporcionadas en cualquier otro documento que resulte pertinente.

Eesti keel – Ohutusjuhised, kasutusotstarve ja kasutaja kvalifikatsioon

Ohutusjuhised:

- Bode 100 ja Bode 500 on maandamata kaitseväikepingega (Safety Extra Low Voltage, SELV) seadmed (kooskõlas standardi IEC 60950-1 nõuetega), mida teatakse ka kui III kaitseklassi seadmeid või ES1 seadmeid kooskõlas standardiga IEC 62368-1.
- Ärge kasutage seadme Bode 100 või Bode 500 sisendis > 50 V alalisvoolu või > 25 V vahelduvvoolu pinget.
- Pange tähele, et seadmes Bode 100 ei ole näidikut, mis näitaks, kas väljund on aktiivne. Seda on äärmiselt oluline jälgida, kui seade Bode 100 on ühendatud võimenditega.
- Töötades väliste elektripinge- või vooluallikatega katsetingimustes, veenduge, et need ei ületaks SELV-i tasemeid, ja tagage sobiv isolatsioon teistele ohtlikele vooluringidele, nagu vahelduvvoolu liinidele.
- Veenduge, et seadmega Bode 100 või Bode 500 kasutatavad elektripinge ja -voolu andurid oleks õigesti maandatud kooskõlas andurite maaletootja juhistega.
- Töötades elektripingeandurite või sisendtrafodega, ühendage alati seadme Bode 100 või Bode 500 maandusklemm labori maandusklemmiga, kasutades pidevühendust, mis on ristlõikes vähemalt 3,6 mm² ja mitte pikem kui 10 m.
- Kasutage ainult sisendtrafosid, mis on isoleeritud rakenduse maksimaalse tööpinge ja ülepinge jaoks.
- Ärge kasutage seadet Bode 100 või Bode 500 kohas, kus leidub plahvatusohtlikke aineid, gaase või aure.
- Ärge kasutage seadet Bode 100 või Bode 500 keskkonnatingimustes, mis ületavad vastavas kasutusjuhendis esitatud temperatuuri- ja niiskuspiiranguid.

Ettenähtud kasutus:

- Bode 100, Bode 500 ja nende lisatarvikud on mõeldud selleks, et mõõta võimendust/faasi, S-parameetrit ja takistust elektriahelates labori- ja tööstuskeskkonnas.

Kasutaja kvalifikatsioon:

- seadmega Bode 100 või Bode 500 testimist võivad läbi viia üksnes kvalifitseeritud, kogenud ja volitatud töötajad.
- Töötajad, kes läbivad seadme Bode 100 või Bode 500 kasutamise väljaõpet või koolitust või keda juhendatakse selles valdkonnas, peavad seadmega töötamise ajal olema kogenud kasutaja pideva järelevalve all. Seadmega Bode 100 või Bode 500 testimine peab toimuma ettevõttesiseste ohutusnõuete ja asjaomaste lisadokumentide kohaselt.

Suomalainen – Turvallisuusohjeet, käyttötarkoitus ja käyttäjän pätevyys

Turvallisuusohjeet:

- Bode 100 ja Bode 500 ovat SELV-laitteita (SELV = ”pienoisjännitteinen perus- ja vikasuojausehdon täyttävä järjestelmä” IEC 60950-1 -standardin mukaisesti). Luokan muita nimityksiä ovat suojausluokka III ja ES1-laiteluokka IEC 62368-1 -standardin mukaisesti.
- Älä käytä Bode 100- tai Bode 500 -laitteen syöttöliitännöissä vaarallisia jännitetasoja > 50 V DC tai > 25 V AC.
- Huomaa, ettei Bode 100 -laite ilmoita aktiivisesta lähdöstä millään tavalla. Tämä voi olla kriittistä erityisesti silloin, kun Bode 100 -laitteeseen on kiinnitetty vahvistimia.
- Kun käsittelet testilaitteiston ulkoisia jännite- tai virtalähtöjä, varmista, etteivät ne voi ylittää SELV-tasoja ja että ne tarjoavat riittävän eristyksen muihin vaarallisiin piireihin, kuten vaihtovirtalinjan jännitelähteeseen.
- Varmista, että Bode 100- tai Bode 500 -laitteen jännite- ja virta-anturit on maadoitettu valmistajan ohjeiden mukaan.
- Kun käytät jänniteantureita, virta-antureita tai syöttömuuntajia, kytke Bode 100 tai Bode 500 aina laboratorion maadoitusliitäntään kaapelilla, jonka poikkipinta-ala on vähintään 3,6 mm² ja jonka enimmäispituus on 10 m.
- Käytä vain syöttömuuntajia, jotka on eristetty käyttökohteen enimmäiskäyttöjännitteestä ja ylijännitteestä.
- Älä käytä Bode 100- tai Bode 500 -laitetta ympäristössä, jossa on räjähtäviä kaasuja tai höyryjä.
- Älä käytä Bode 100- tai Bode 500 -laitetta ympäristössä, jonka lämpötila ja kosteus poikkeavat käyttöoppaassa mainituista rajoista.

Käyttötarkoitus:

- Bode 100, Bode 500 ja niiden lisävarusteet on suunniteltu nimenomaisesti elektroniikkapiirien vahvistus/vaihe-, S-parametri- ja impedanssimittaukseen laboratorioissa ja tuotantoympäristöissä.

Käyttäjän pätevyys:

- Bode 100- tai Bode 500 -laitteen testaukseen osallistuvilla henkilöillä tulee olla asianmukainen pätevyys, ammattitaito ja valtuutus.
- Henkilöiden, joille annetaan Bode 100- tai Bode 500 -laitetta koskevaa koulutusta, ohjeistusta, opastusta tai valmennusta, tulee olla kokeneen käyttäjän jatkuvan valvonnan alaisina käsitellessään laitteistoa. Bode 100- tai Bode 500 -laitteella suoritettavan testauksen täytyy noudattaa sisäisiä turvallisuusohjeita sekä muita asianmukaisia asiakirjoja.

Français – Consignes de sécurité, utilisation prévue et qualifications des opérateurs

Consignes de sécurité :

- Le Bode 100 et le Bode 500 sont des appareils de type TBTS (Très Basse Tension de Sécurité, en accord avec la norme CEI 60950-1), également connus sous le nom d'équipements de protection de classe III ou d'équipements ES1, en accord avec la norme CEI 62368-1.
- Ne pas appliquer de tensions supérieures à 50 V CC ou 25 V CA aux entrées du Bode 100 ou du Bode 500.
- Noter que le Bode 100 ne possède pas de voyant indiquant si la sortie est active. Être particulièrement vigilant dans le cas où des amplificateurs sont connectés au Bode 100.
- Lors de l'utilisation de sources de tension ou de courant externes dans un montage de test, s'assurer qu'elles ne dépassent pas les niveaux TBTS et isoler de manière appropriée les autres circuits dangereux, tel que l'alimentation électrique en alternatif.
- Veiller à ce que les sondes de tension et de courant utilisées avec le Bode 100 ou le Bode 500 soient convenablement mises à la terre conformément aux consignes de leur fabricant.
- Lors de l'utilisation de sondes de tension, de sondes de courant ou de transformateurs d'injection, toujours connecter la borne de terre du Bode 100 ou du Bode 500 à la borne de terre du laboratoire, à l'aide d'une liaison d'une section minimale de 3,6 mm² et d'une longueur maximale de 10 m.
- Utiliser uniquement des transformateurs d'injection isolés par rapport à la tension de service et la surtension maximales de l'application.
- Ne pas utiliser le Bode 100 ou le Bode 500 en présence de vapeurs ou de gaz explosifs.
- Ne pas utiliser le Bode 100 ou le Bode 500 dans des conditions ambiantes de température et d'humidité supérieures à celles indiquées dans la documentation d'utilisation.

Utilisation prévue :

- Le Bode 100, le Bode 500 et leurs accessoires sont spécialement conçus pour mesurer le gain/phase, le paramètre S et l'impédance des circuits électroniques dans les laboratoires et les usines.

Qualifications des opérateurs :

- Les essais effectués à l'aide du Bode 100 ou du Bode 500 doivent exclusivement être réalisés par du personnel qualifié, compétent et agréé.
- Le personnel recevant une formation, des instructions ou des directives quant à l'utilisation d'un Bode 100 ou d'un Bode 500 doit rester sous la supervision permanente d'un opérateur expérimenté pendant l'utilisation de l'équipement. Les tests effectués à l'aide du Bode 100 ou du Bode 500 doivent être conformes aux réglementations de sécurité internes et à tout autre document relatif.

Hrvatski – Sigurnosne upute, predviđena namjena i kvalifikacije rukovatelja

Sigurnosne upute:

- Bode 100 i Bode 500 su SELV uređaji (engl. SELV = Safety Extra Low Voltage, tj. sigurnosni izrazito niski napon u skladu s normom IEC 60950-1), poznati i kao zaštitna oprema III. klase ili ES1 oprema u skladu s normom IEC 62368-1.
- Nemojte dovoditi napon > 50 V DC ili > 25 V AC na ulaze uređaja Bode 100 ili Bode 500.
- Imajte na umu da na uređaju Bode 100 ne postoji indikator koji pokazuje da je izlaz aktivan. Ovo može biti osobito kritično ako su na Bode 100 priključeni pojačivači.
- Pri radu s vanjskim izvorima napona ili struje u kompletu za ispitivanje, osigurajte da vanjski izvori ne mogu prijeći granice SELV-a i osigurajte odgovarajuću izolaciju na drugim opasnim strujnim krugovima, npr. na vodu za napajanje izmjeničnom strujom.
- Uvjerite se da su naponske i strujne sonde koje se upotrebljavaju uz Bode 100 ili Bode 500 pravilno uzemljene u skladu sa smjernicama njihovih proizvođača.
- Pri radu s naponskim sondama, strujnim sondama ili transformatorima za ubrizgavanje, uvijek povežite terminal za uzemljenje uređaja Bode 100 ili Bode 500 s terminalom za uzemljenje u laboratoriju vodičem minimalnog poprečnog presjeka od 3,6 mm² i ne duljim od 10 m.
- Upotrebljavajte samo transformatore za ubrizgavanje izolirane za maksimalni radni napon primjene i prenapon.
- Nemojte upotrebljavati uređaj Bode 100 ili Bode 500 blizini eksplozivnih plinova ili isparavanja.
- Nemojte upotrebljavati uređaj Bode 100 ili Bode 500 u okolišnim uvjetima koji prekoračuju ograničenja temperature i vlažnosti navedena u korisničkim priručnicima.

Predviđena namjena:

- Uređaji Bode 100 i Bode 500 te njihova dodatna oprema osmišljeni su izričito za mjerenja parametara pojačanje/faza, parametra S i električne impedancije elektroničkih krugova u laboratorijima i proizvodnim okolinama.

Kvalifikacije rukovatelja:

- Uređaj Bode 100 ili Bode 500 smiju koristiti samo kvalificirani, stručni i ovlašteni zaposlenici.
- Zaposlenici koji prolaze izobrazbu, instrukcije, poduku ili tečaj o uređaju Bode 100 ili Bode 500 moraju biti pod stalnim nadzorom iskusnog rukovatelja prilikom rada s opremom. Ispitivanje uređajem Bode 100 ili Bode 500 mora biti u skladu s unutarnjim sigurnosnim propisima i dodatnim relevantnim dokumentima.

Magyar – Biztonsági utasítások, rendeltetésszerű használat és kezelői szakképesítési követelmények

Biztonsági utasítások:

- A Bode 100 és Bode 500 ún. SELV (SELV = biztonsági törpefeszültség az IEC 60950-1 szabvány szerint), más jelölés szerint III. érintésvédelmi osztályú, avagy IEC 62368-1 szabvány szerinti ES1 készülékek.
- A Bode 100 és Bode 500 bemeneteire tilos 50 V (egyenáramú, DC) vagy 25 V (váltakozó áramú, AC) feszültségnél nagyobb jelszintet kapcsolni.
- Vegye figyelembe, hogy a Bode 100 nem rendelkezik állapotjelzővel az aktív kimenet jelzésére. Ez különösen akkor lehet kritikus fontosságú, ha a Bode 100 kimenetére erősítők csatlakoznak.
- Ha a vizsgálati rendszerben külső feszültség- vagy áramforrásokkal végeznek munkát, gondoskodni kell róla, hogy azok értéke ne léphesse túl a SELV szintjeit, az egyéb veszélyes áramköröket pedig, mint például a vonali AC tápfeszültség, megfelelő szigeteléssel kell ellátni.
- Gondoskodjon arról, hogy a Bode 100 vagy Bode 500 készülékhez feszültség- és árammérés céljából csatlakoztatott mérőfejek a gyártói útmutatások szerint megfelelően földelve legyenek.
- A feszültség- és árammérőfejekkel vagy betápláló transzformátorokkal végzett munka során minden esetben legalább 3,6 mm² keresztmetszetű és legfeljebb 10 méter hosszú kábel segítségével alakítson ki szilárd csatlakozást a Bode 100 és Bode 500 földelőcsatlakozója és a laboratórium földelőcsatlakozója között.
- Csak az alkalmazás maximális üzemi feszültségének és túlfeszültségének megfelelően szigetelt betápláló transzformátort használjon.
- Tilos a Bode 100 és Bode 500 készüléket robbanásveszélyes gáz vagy gőzök jelenlétében használni.
- Ne üzemeltesse a Bode 100 és Bode 500 készüléket olyan környezeti feltételek esetén, amikor a hőmérséklet és a páratartalom értékei túllépik a felhasználói dokumentációban felsorolt határértékeket.

Rendeltetésszerű használat:

- A Bode 100 és Bode 500, valamint tartozékaik különösen elektronikai áramkörök erősítésének, fázisának, szórásparaméterének és impedanciájának laboratóriumban és gyártási környezetekben végzett mérésére szolgálnak.

Kezelői képesítések:

- A Bode 100 és Bode 500 segítségével végzendő méréseket csak szakképzett, gyakorlattal rendelkező és ezzel megbízott személyek végezhetik.
- A Bode 100 és Bode 500 kezelésére vonatkozó betanításban, utasításokban, útmutatásban vagy oktatásban részesülő személyeket a készülék használata során folyamatosan felügyelnie kell egy tapasztalt kezelőnek. A Bode 100 és Bode 500 segítségével végzendő vizsgálatok során be kell tartani a belső biztonsági szabályokat és a további vonatkozó dokumentumokban foglaltakat.

Italiano – Istruzioni di sicurezza, utilizzo previsto e qualifiche degli operator

Istruzioni di sicurezza:

- Bode 100 e Bode 500 sono dispositivi SELV (SELV = Safety Extra Low Voltage, vale a dire a bassissima tensione di sicurezza, secondo IEC 60950-1), denominati anche apparecchi con classe di protezione III o apparecchi ES1 secondo IEC 62368-1.
- Non applicare livelli di tensione >50 V CC o >25 V CA agli ingressi di Bode 100 o Bode 500.
- Considerare che Bode 100 non è dotato di un indicatore in grado di mostrare se l'uscita è attiva. Questo può comportare problemi soprattutto in caso di collegamento di amplificatori a Bode 100.
- Quando si lavora con sorgenti di tensione o di corrente esterne nell'impianto di prova, assicurarsi che non superino i livelli SELV e che forniscano un isolamento appropriato da altri circuiti pericolosi, come l'alimentazione di tensione della linea CA.
- Le sonde di tensione e di corrente impiegate con Bode 100 o Bode 500 vanno collegate a terra in modo corretto, secondo le istruzioni del rispettivo produttore.
- Quando si lavora con sonde di tensione, sonde di corrente o trasformatori di iniezione, collegare sempre il terminale di terra di Bode 100 o Bode 500 al terminale di terra del laboratorio, utilizzando un collegamento solido con sezione trasversale minima di 3,6 mm² e di lunghezza non superiore a 10 m.
- Utilizzare esclusivamente trasformatori di iniezione isolati per la tensione massima di esercizio e la sovratensione dell'applicazione.
- Evitare di utilizzare Bode 100 o Bode 500 in presenza di gas o vapori esplosivi.
- Non utilizzare Bode 100 o Bode 500 in condizioni ambientali con temperatura e umidità superiori ai limiti indicati nella documentazione utente.

Utilizzo previsto:

- Bode 100, Bode 500 e i loro accessori sono appositamente progettati per le misurazioni di guadagno/fase, parametro-S e impedenza nei circuiti elettronici del laboratorio e degli ambienti di produzione.

Qualifiche degli operatori:

- Le prove con Bode 100 o Bode 500 devono essere condotte solo da personale esperto autorizzato e qualificato.
- Quando utilizza l'apparecchiatura, il personale che riceve addestramento, istruzioni o formazione su Bode 100 o Bode 500 deve trovarsi sotto la costante supervisione di un operatore esperto. Le prove eseguite con Bode 100 o Bode 500 devono rispettare le regole di sicurezza interne e i relativi documenti aggiuntivi.

日本語 - 安全上のご注意、用途および使用者資格

安全のために：

- Bode 100 および Bode 500 は SELV 機器（SELV = Safety Extra Low Voltage（安全超低電圧回路）、IEC 60950-1 準拠）であり、IEC 62368-1 準拠の保護クラス III または ES1 機器としても知られています。
- Bode 100 または Bode 500 の入力には、50 V DC または 25 V AC を超える電圧レベルを印加しないでください。
- Bode 100 には、出力がアクティブかどうかを示すインジケーターがないことに注意してください。これは、アンプが Bode 100 に接続されている場合、特に重要です。
- 試験装置で外部の電圧源や電流源を使用する場合、それらが SELV レベルを超えないようにし、AC ライン電圧供給源など、他の危険な回路に対して適切な絶縁を行ってください。
- Bode 100 または Bode 500 で使用する電圧プローブおよび電流プローブが、製造元のガイドラインに従って適切に接地されていることを確認してください。
- 電圧プローブ、電流プローブ、またはインジェクショントランスを使用する場合は、必ず、断面積 3.6 mm²以上、10 m 以下の距離で、Bode 100 または Bode 500 のアース端子と実験室のアース端子を確実に接続してください。
- アプリケーションの最大使用電圧と過電圧に対して絶縁されたインジェクショントランスのみを使用してください。
- 爆発性ガスや蒸気がある場所では、Bode 100 または Bode 500 を使用しないでください。
- ユーザーマニュアルに記載されている温度と湿度の制限を超える周囲条件下で Bode 100 または Bode 500 を使用しないでください。

使用目的：

- Bode 100、Bode 500 とそのアクセサリは、特に実験室や製造環境における電子回路のゲイン/位相、S パラメータ、インピーダンス測定用に設計されています。

作業者の資格：

- Bode 100 または Bode 500 を使用した試験は、資格があり、熟練し、認可を受けた担当者のみが実施できます。
- Bode 100 または Bode 500 に関するトレーニング、指示、指令、または教育を受けている者は、装置を使用して作業している間は常に経験豊富なオペレーターの監督下にいなければなりません。Bode100 または Bode500 を使用した試験は、社内安全規定および追加の関連文書に準拠する必要があります。

Lietuvių – Saugos nurodymai, numatomasis naudojimas ir operatoriaus kvalifikacija

Saugos nurodymai

- „Bode 100“ ir „Bode 500“ yra SELV įrenginiai (SELV – saugi žemiausioji įtampa pagal standartą IEC 60950-1), taip pat žinomi kaip III apsaugos klasės arba ES1 įranga pagal standartą IEC 62368-1.
- Prie „Bode 100“ arba „Bode 500“ įėjimų nejunkite pavojingos įtampos (>50 V (nuol. Sr.) arba >25 V (kint. sr.)).
- Atminkite, kad „Bode 100“ neturi indikatoriaus, rodančio, ar išėjimas yra aktyvus. Šis reikalavimas ypač svarbus, jei prie „Bode 100“ jungiami stiprintuvai.
- Dirbdami su išoriniais įtampos ar srovės šaltiniais konfigūruodami bandymą įsitikinkite, kad jie neviršija SELV lygių, ir užtikrinkite tinkamą izoliaciją nuo kitų pavojingų grandinių, pavyzdžiui, kintamosios srovės linijos įtampos šaltinio.
- Pasirūpinkite, kad su „Bode 100“ arba „Bode 500“ naudojami įtampos ir srovės bandikliai būtų tinkamai įžeminti, kaip nurodyta jų gamintojo parengtose taisyklėse.
- Prieš dirbdami su įtampos, srovės bandikliais arba injekcijos transformatoriais, būtinai prijunkite „Bode 100“ arba „Bode 500“ įžeminimo gnybtą prie laboratorijos įžeminimo gnybto, naudodami tvirtą ne mažesnio kaip 3,6 mm² skerspjūvio ir ne ilgesnę kaip 10 m ilgio jungtį.
- Naudokite tik injekcijos transformatorius, izoliuotus atsižvelgiant į didžiausią programos darbinę įtampą ir viršįtampį.
- Nenaudokite „Bode 100“ arba „Bode 500“, jei aplinkoje yra sprogių dujų arba garų.
- Nenaudokite „Bode 100“ arba „Bode 500“ tokiomis aplinkos sąlygomis, kai viršijamos naudotojo dokumentacijoje nurodytos ribinės temperatūros ir drėgnio vertės.

Numatytasis naudojimas

- Bode 100, Bode 500 ir jų priedai specialiai skirti laboratorijose ir gamyklose matuoti elektroninių grandinių stiprinimo koeficientui, fazei, S parametrui ir pilnutinei varžai.

Operatoriaus kvalifikacija

- Bandymus su „Bode 100“ ir „Bode 500“ leidžiama atlikti tik kvalifikuotiems, įgudusiems ir įgaliotiems darbuotojams.
- Darbuotojai, kurie mokomi, instruktuojami, kuriems nurodoma arba pasakojama, kaip dirbti su „Bode 100“ arba „Bode 500“, turi būti nuolat, kol dirbama su įranga, prižiūrimi patyrusio operatoriaus. Bandymai su „Bode 100“ arba „Bode 500“ turi būti atliekami laikantis vidaus saugos instrukcijų ir papildomų aktualių dokumentų.

Latvijas – Drošības instrukcijas, paredzētā izmantošana un operatora kvalifikācija

Drošības norādījumi

- Bode 100 un Bode 500 ir SELV ierīces (SELV = sevišķi zema sprieguma (drošības) ierīce saskaņā ar IEC 60950-1), kas atbilst arī III aizsardzības klases vai ES1 aprīkojumam saskaņā ar IEC 62368-1.
- Nepievadiet Bode 100 vai Bode 500 ieejām spriegumu, kas pārsniedz 50 V līdzstrāvu vai 25 V maiņstrāvu.
- Ņemiet vērā, ka Bode 100 nav indikatora, kas parāda, vai izeja ir aktīva. Tas ir īpaši svarīgi, ja Bode 100 ir pievienoti pastiprinātāji.
- Strādājot ar ārējiem sprieguma vai strāvas avotiem testa režīmā, pārliecinieties, ka tie nevar pārsniegt SELV līmeni, un nodrošiniet atbilstošu izolāciju citām bīstamām shēmām, piemēram, maiņstrāvas līnijas sprieguma padevei.
- Pārliecinieties, ka ar Bode 100 vai Bode 500 izmantotie sprieguma un strāvas devēji ir pareizi iezemēti atbilstoši to ražotāju norādēm.
- Strādājot ar sprieguma devējiem, strāvas devējiem vai inžekcijas transformatoriem, vienmēr savienojiet Bode 100 vai Bode 500 zemējuma spaili ar zemējuma spaili laboratorijā, izmantojot stabilu savienojumu, kura šķērsgriezums ir vismaz 3,6 mm² un garums nepārsniedz 10 m.
- Izmantojiet tikai tādus inžekcijas transformatorus, kas izolēti pret maksimālo darba spriegumu un pārspriegumu attiecīgajos lietošanas apstākļos.
- Neekspluatējiet Bode 100 vai Bode 500 sprādzienbīstamas gāzes vai tvaiku tuvumā.
- Neekspluatējiet Bode 100 vai Bode 500, ja vides apstākļi pārsniedz lietotāja dokumentācijā norādīto temperatūras un mitruma robežvērtību.

Paredzētā izmantošana

- Bode 100, Bode 500 un to piederumi ir īpaši paredzēti pastiprinājuma/fāžu, S parametra un pilnās pretestības mērījumiem laboratorijas un ražošanas vides elektroniskajās shēmās.

Operatora kvalifikācija

- Testēšanu ar Bode 100 vai Bode 500 atļauts veikt tikai atbilstoši pilnvarotiem un kvalificētiem darbiniekiem ar nepieciešamajām prasmēm.
- Strādājot ar aprīkojumu, darbiniekiem, kas piedalās apmācībās, saņem instrukcijas, norādījumus vai izglītojošu informāciju par Bode 100 vai Bode 500, jābūt pastāvīgā pieredzējuša operatora uzraudzībā. Testēšanai ar Bode 100 vai Bode 500 jāatbilst iekšējiem drošības noteikumiem un attiecīgajiem papildu dokumentiem.

Nederlands – Veiligheidsinstructies, beoogd gebruik en kwalificaties van de bediener

Veiligheidsinstructies:

- Bode 100 en Bode 500 zijn SELV-apparaten (SELV = Safety Extra Low Voltage volgens IEC 60950-1), ook wel bekend als een apparaat van beschermingsklasse III of ES1-apparatuur volgens IEC 62368-1.
- Plaats geen spanningsniveaus > 50 V DC of > 25 AC op de invoeraansluitingen van de Bode 100 of Bode 500.
- Houd er rekening mee dat de Bode 100 niet aangeeft wanneer de uitvoer actief is. Dit kan vooral van belang zijn indien er versterkers op de Bode 100 zijn aangesloten.
- Als in de testopstelling met externe spannings- of stroombronnen wordt gewerkt, moet ervoor worden gezorgd dat deze de SELV-niveaus niet overschrijden en moeten deze bronnen juist zijn geïsoleerd van andere gevaarlijke circuits, zoals de AC-netspanning.
- Zorg ervoor dat de spannings- en stroomtestkabels die met de Bode 100 of Bode 500 worden gebruikt, correct zijn geaard, in overeenstemming met de richtlijnen van de fabrikant.
- Sluit bij het werken met spannings- en stroomtestkabels of injectietransformatoren altijd de aardklem van de Bode 100 of Bode 500 op de aardklem in het laboratorium aan. Maak hiervoor gebruik van een stevige kabel die een diameter van minstens 3,6 mm² heeft en niet langer is dan 10 m.
- Gebruik alleen injectietransformatoren met isolatie die bestand is tegen de maximale werkspanning en overspanning van de toepassing.
- Gebruik de Bode 100 of Bode 500 niet in de buurt van explosief materiaal, gevaarlijke gassen of dampen.
- Gebruik de Bode 100 of Bode 500 niet bij omgevingsomstandigheden die de temperatuur- en vochtigheidslimieten overschrijden welke zijn gespecificeerd in de gebruikersdocumentatie.

Beoogd gebruik:

- De Bode 100, Bode 500 en de bijbehorende accessoires zijn speciaal ontwikkeld voor het uitvoeren van metingen van amplitudeversterking/faseverschuiving, S-parameters en impedantie van elektronische circuits in laboratorium- en productieomgevingen.

Kwalificaties van de bediener:

- Tests met de Bode 100 of Bode 500 mogen alleen worden uitgevoerd door ervaren, gekwalificeerd en hiertoe bevoegd personeel.
- Personen die via een training, een cursus, instructies of aanwijzingen bekend worden gemaakt met het gebruik van de Bode 100 of Bode 500, moeten continu onder toezicht van een ervaren bediener staan wanneer ze met de apparatuur werken. Het testen met de Bode 100 of Bode 500 moet aan de interne veiligheidsregels en aanvullende veiligheidsrelevante documenten voldoen.

Polski – Instrukcje bezpieczeństwa, przeznaczenie i kwalifikacje operatora

Instrukcje bezpieczeństwa:

- Bode 100 i Bode 500 to urządzenia niskonapięciowe SELV (ang. Safety Extra Low Voltage – bardzo niskie napięcie bezpieczne, zgodnie z normą IEC 60950-1), określane również jako wyposażenie o klasie ochronności III lub ES1 zgodnie z normą IEC 62368-1.
- Do wejść urządzeń Bode 100 i Bode 500 nie wolno przykładać napięć powyżej 50 V DC lub 25 V AC.
- Pamiętaj, że urządzenie Bode 100 nie ma wskaźnika, który sygnalizowałby, że wyjście urządzenia jest aktywne. Może to być szczególnie istotne, gdy do urządzenia Bode 100 podłączone są wzmacniacze.
- Podczas pracy z zewnętrznymi źródłami napięcia lub prądu wchodzącymi w skład konfiguracji testowej upewnij się, że nie przekraczają one poziomów napięcia SELV i zapewnij odpowiednią izolację od innych niebezpiecznych obwodów, takich jak obwód zasilania napięciem linii AC.
- Upewnij się, że sondy napięciowe i prądowe używane z urządzeniami Bode 100 i Bode 500 są prawidłowo uziemione zgodnie z wytycznymi ich producenta.
- Podczas pracy z sondami napięciowymi, sondami prądowymi i transformatorami „wstrzykującymi” zawsze podłączaj zacisk uziemiający urządzenia Bode 100 lub Bode 500 do zacisku uziemiającego w laboratorium, używając do tego celu przewodu drutowego o przekroju co najmniej 3,6 mm² i długości nie większej niż 10 m.
- Używaj wyłącznie transformatorów iniekcyjnych z izolacją dostosowaną do maksymalnego napięcia roboczego i przepięć, które mogą występować przy danym zastosowaniu.
- Nie używaj urządzeń Bode 100 i Bode 500 w obecności wybuchowych gazów lub oparów.
- Nie używaj urządzeń Bode 100 i Bode 500 w warunkach środowiskowych przekraczających dopuszczalne zakresy temperatury i wilgotności podane w dokumentacji użytkownika.

Przeznaczenie:

- Urządzenia Bode 100, Bode 500 oraz ich osprzęt służą do pomiarów wzmocnienia/fazy, parametru S i impedancji obwodów elektronicznych w warunkach laboratoryjnych i produkcyjnych.

Kwalifikacje operatora:

- Testy za pomocą urządzeń Bode 100 i Bode 500 może wykonywać wyłącznie wykwalifikowany i autoryzowany personel mający odpowiednie umiejętności.
- Pracownicy odbywający szkolenie, zapoznający się z instrukcjami, wytycznymi i obsługą urządzenia Bode 100 lub Bode 500 muszą się znajdować pod stałym nadzorem doświadczonego operatora podczas pracy ze sprzętem. Testy przeprowadzane przy użyciu urządzeń Bode 100 i Bode 500 muszą być zgodne z wewnętrznymi przepisami bezpieczeństwa oraz dodatkowymi obowiązującymi dokumentami.

Portugues do Brasil – Instruções de segurança, uso designado e qualificações do operador

Instruções de segurança:

- O Bode 100 e o Bode 500 são dispositivos SELV (SELV = tensão de segurança extrabaixa de acordo com a IEC 60950-1), também conhecidos como equipamento de proteção classe III ou ES1 de acordo com a IEC 62368-1.
- Não aplique níveis de tensão >50 VCC ou >25 VCA às entradas do Bode 100 ou do Bode 500.
- Lembre-se de que o Bode 100 não tem indicador para mostrar se a saída está ativa. Isso pode ser especialmente crítico se os amplificadores estiverem conectados ao Bode 100.
- Ao trabalhar com fontes de corrente ou tensão externas na configuração de teste, garanta que elas não possam exceder os níveis SELV e forneça isolamento adequado para outros circuitos perigosos, como a fonte de alimentação da linha CA.
- Certifique-se de que as alicates de tensão e alicates de corrente utilizadas com o Bode 100 ou o Bode 500 estejam devidamente aterradas de acordo com as diretrizes do fabricante.
- Ao trabalhar com alicates de tensão, os alicates de corrente ou os transformadores de injeção sempre se conectam ao terminal de aterramento do Bode 100 ou do Bode 500 ao terminal de aterramento no laboratório usando uma conexão sólida de uma seção transversal de pelo menos 3,6 mm² e não mais de 10 m.
- Use apenas transformadores de injeção isolados para a tensão de operação e sobretensão máxima da aplicação.
- Não opere o Bode 100 ou o Bode 500 na presença de gases ou vapores explosivos.
- Não opere o Bode 100 ou o Bode 500 em condições ambientais que excedam os limites de temperatura e umidade listados na documentação do usuário.

Uso designado:

- O Bode 100, o Bode 500 e seus acessórios são especialmente projetados para medições de ganho/fase, parâmetro de dispersão e de impedância de circuitos eletrônicos em ambientes laboratoriais e de fabricação.

Qualificação do operador:

- Testes com o Bode 100 ou o Bode 500 devem ser realizados apenas por pessoal autorizado, capacitado e qualificado.
- Pessoal em fase de treinamento, instrução, orientação ou aprendizado sobre o Bode 100 ou o Bode 500 deve permanecer sob a constante supervisão de um operador experiente ao trabalhar com o equipamento. O teste com o Bode 100 ou o Bode 500 deve estar em conformidade com os regulamentos de segurança internas, além de com os documentos relevantes adicionais.

Română – Instrucțiuni de siguranță, destinația de utilizare și calificările operatorului

Instrucțiuni de siguranță:

- Bode 100 și Bode 500 sunt dispozitive SELV (SELV = Safety Extra Low Voltage conform IEC 60950-1), cunoscute și ca echipamente din clasa de protecție III sau echipament ES1 conform IEC 62368-1.
- A nu se aplica niveluri de tensiune > 50 V CC sau > 25 V CA pe intrările Bode 100 sau Bode 500.
- Vă rugăm să rețineți că Bode 100 nu are niciun indicator care să arate dacă ieșirea este activă. Acest aspect poate avea importanță critică dacă sunt conectate amplificatoare la Bode 100.
- În condiții de lucru cu tensiune externă sau surse de curent în configurația de test, asigurați-vă că acestea nu depășesc nivelurile SELV și realizați izolația adecvată față de alte circuite periculoase, precum sursa de tensiune a liniei CA.
- Asigurați-vă că sondele de tensiune și curent utilizate cu Bode 100 sau Bode 500 sunt împământate corect conform instrucțiunilor producătorului.
- În cazul utilizării sondelor de tensiune, a sondelor de curent sau a transformatoarelor de injecție conectați întotdeauna terminalul de împământare al Bode 100 sau Bode 500 la terminalul de împământare din laborator, folosind o conexiune solidă cu o secțiune de cel puțin 3,6 mm² și o lungime de maximum 10 m.
- Folosiți doar transformatoare de tensiune izolate pentru tensiunea și supratensiunea maximă de utilizare a aplicației.
- Nu operați Bode 100 sau Bode 500 în prezența gazelor sau vaporilor cu risc de explozie.
- Nu operați Bode 100 sau Bode 500 în condiții ambientale care depășesc limitele de temperatură și umiditate listate în documentația utilizatorului.

Destinația de utilizare:

- Bode 100, Bode 500 și accesoriile acestora sunt proiectate special pentru măsurători de amplificare/fază, parametri de dispersie și impedanță ale circuitelor electronice în medii de laborator sau de producție.

Calificările operatorului:

- Testarea cu Bode 100 sau Bode 500 trebuie efectuată doar de către personal calificat, instruit și autorizat.
- Personalul în curs de instruire, dirijare și educare privind Bode 100 sau Bode 500 trebuie să se afle sub supravegherea permanentă a unui operator experimentat în timpul utilizării echipamentului. Testarea cu Bode 100 sau Bode 500 trebuie să respecte reglementările de siguranță internă, precum și documentația suplimentară relevantă.

Slovenský – Bezpečnostné pokyny, určené použitie a kvalifikácia obsluhy

Bezpečnostné pokyny:

- Bode 100 a Bode 500 sú zariadenia SELV (SELV = bezpečnostné mimoriadne nízke napätie podľa IEC 60950-1), známe aj ako zariadenia triedy ochrany III alebo ES1 podľa IEC 62368-1.
- Na vstupy zariadenia Bode 100 alebo Bode 500 neprivádzajte napätie > 50 V DC alebo > 25 V AC.
- Majte na pamäti, že Bode 100 nemá žiadny indikátor, ktorý by ukazoval, či je výstup aktívny. Táto skutočnosť by mohla byť zvlášť kritická pri pripojení zosilňovačov k zariadeniu Bode 100.
- Pri práci s externými zdrojmi napätia alebo prúdu v testovacej zostave zabezpečte, aby nemohli prekročiť úrovne SELV, a zabezpečte vhodnú izoláciu od iných nebezpečných obvodov, ako je napríklad sieťový zdroj striedavého napätia.
- Uistite sa, že napäťové a prúdové snímače používané so zariadením Bode 100 alebo Bode 500 sú riadne uzemnené podľa pokynov výrobcu.
- Pri práci s napäťovými sondami, prúdovými sondami alebo injektážnymi transformátormi vždy pripojte uzemňovaciu svorku Bode 100 alebo Bode 500 k uzemňovacej svorke v laboratóriu pomocou pevného spojenia s prierezom najmenej 3,6 mm² a nie dlhšieho ako 10 m.
- Používajte len injektážne transformátory izolované na maximálne pracovné napätie a prepätie aplikácie.
- So zariadením Bode 100 alebo Bode 500 nepracujte za prítomnosti výbušných plynov alebo výparov.
- Nepoužívajte zariadenie Bode 100 alebo Bode 500 pri podmienkach prostredia, ktoré prekračujú teplotné a vlhkostné limity uvedené v používateľskej dokumentácii.

Určené použitie:

- Zariadenia Bode 100, Bode 500 a ich príslušenstvo sú špeciálne navrhnuté na merania zosilnenia/fázu, S-parametra a impedancie elektronických obvodov v laboratóriách a výrobných prostrediach.

Kvalifikácia obsluhy:

- Testovanie pomocou zariadenia Bode 100 alebo Bode 500 môže vykonávať len vyškolený, skúsený a oprávnený personál.
- Na pracovníkov, ktorí momentálne absolvujú školenie, zaúčajú sa alebo sa vzdelávajú v súvislosti so zariadením Bode 100 alebo Bode 500, musí pri práci so zariadením vždy dohliadať skúsený operátor. Testovanie pomocou zariadenia Bode 100 alebo Bode 500 sa musí vykonávať v zhode s internými bezpečnostnými predpismi, ako aj ďalšou príslušnou dokumentáciou.

Slovenščina – Varnostna navodila, predvidena uporaba in kvalifikacije upravljavca

Varnostna navodila:

- Bode 100 in Bode 500 sta napravi z napetostjo SELV (SELV = varna zelo nizka napetost v skladu s standardom IEC 60950-1), znani tudi kot oprema z zaščitnim razredom III ali ES1 v skladu s standardom IEC 62368-1.
- Na vhodih naprave Bode 100 ali Bode 500 ne uporabljajte napetosti > 50 V DC ali > 25 V AC.
- Zavedajte se, da naprava Bode 100 nima indikatorja, ki bi pokazal, ali je izhod aktiven. To je še posebej pomembno, če so na napravo Bode 100 priključeni ojačevalniki.
- Pri delu z zunanjimi viri napetosti ali toka v nastavitvi preizkusa poskrbite, da ne presegajo ravni SELV, in zagotovite ustrezno izolacijo drugih nevarnih tokokrogov, kot je omrežno napajanje z izmeničnim tokom.
- Zagotovite, da so sonde za napetost in tok, ki se uporabljajo z napravo Bode 100 ali Bode 500, pravilno ozemljene v skladu z navodili proizvajalca.
- Pri delu s sondami za napetost in tok ali dovodnimi transformatorji ozemljitveni priključek naprave Bode 100 ali Bode 500 vedno povežite z ozemljitvenim priključkom v laboratoriju, pri čemer uporabite priključitev s prerezom vsaj 3,6 mm² in ne daljšo od 10 m.
- Uporabljajte samo dovodne transformatorje, izolirane za največjo delovno napetost in prenapetost aplikacije.
- Naprave Bode 100 ali Bode 500 ne uporabljajte v bližini eksplozivnih plinov ali hlapov.
- Naprave Bode 100 ali Bode 500 ne uporabljajte v okoljskih pogojih, v katerih so presežene omejitve temperature in vlage, navedene v uporabniški dokumentaciji.

Predvidena uporaba:

- Napravi Bode 100 in Bode 500 ter njuna dodatna oprema so izdelane posebej za merjenje ojačevalnega/faznega razločka, parametra razpršenosti in impedance elektronskih vezij v laboratoriju in proizvodnih okoljih.

Kvalifikacija upravljavca:

- Preizkušanje z napravo Bode 100 ali Bode 500 lahko izvaja samo kvalificirano, usposobljeno in pooblaščeno osebje.
- Osebje, ki se usposablja, prejema navodila ali se izobražuje o napravi Bode 100 ali Bode 500, mora biti med delom z opremo pod stalnim nadzorom izkušenega upravljavca. Preizkušanje z napravo Bode 100 ali Bode 500 mora biti v skladu z notranjimi varnostnimi predpisi in dodatnimi ustreznimi dokumenti.

Svenska – Säkerhetsinstruktioner, avsedd användning och användarkvalifikationer

Säkerhetsinstruktioner:

- Bode 100 och Bode 500 är SELV-enheter (SELV = Safety Extra Low Voltage (säkerhet extra låg spänning) enligt IEC 60950-1), även känd som skyddsklass III- eller ES1-utrustning enligt IEC 62368-1.
- Anslut inte spänningsnivåer > 50 V DC eller > 25 V AC till ingångarna på Bode 100 eller Bode 500.
- Var medveten om att Bode 100 inte har någon indikator som visar om utgången är aktiv. Detta kan vara särskilt kritiskt om förstärkare är anslutna till Bode 100.
- När du arbetar med externa spännings- eller strömkällor i testutrustningen, ska du se till att de inte kan överskrida SELV-nivåerna och ge lämplig isolering till andra farliga kretsar, såsom nätspänningsförsörjningen.
- Kontrollera att spännings- och strömsonder som används med Bode 100 eller Bode 500 har jordats ordentligt i enlighet med deras tillverkares anvisningar.
- Vid arbete med spänningssonder, strömsonder eller matningstransformatorer, ska jordterminalen på Bode 100 eller Bode 500 alltid anslutas till jordterminalen i laboratoriet, med en fast anslutning med minst 3,6 mm² i tvärsnitt och som inte är längre än 10 m.
- Använd endast matningstransformatorer som är isolerade för tillämpningens maximala arbetsspänning och överspänning.
- Använd inte Bode 100 eller Bode 500 i närvaro av explosiva gaser eller ångor.
- Använd inte Bode 100 eller Bode 500 i förhållanden som ligger utanför de temperatur- och fuktighetsgränser som anges i användarmanualerna.

Avsedd användning:

- Bode 100, Bode 500 och enheternas tillbehör har tagits fram specifikt för förstärkning/fas-, S-parameter- och impedansmätningar på elektroniska kretsar i laboratorie- och tillverkningsmiljöer.

Användarkvalifikation:

- Test med Bode 100 eller Bode 500 ska endast utföras av kvalificerad, kunnig och auktoriserad personal.
- Personal som får utbildning, instruktioner, anvisningar eller undervisning om Bode 100 eller Bode 500 måste vara under ständig övervakning av en erfaren operatör medan de arbetar med utrustningen. Test med Bode 100 eller Bode 500 måste följa interna säkerhetsföreskrifter, samt ytterligare relaterade dokument.

8 Support

When you are working with our products we want to provide you with the greatest possible benefits. If you need any support, we are here to assist you!

Technical Support - Get Support

www.omicron-lab.com/support

support@omicron-lab.com

At our technical support hotline, you can reach well-educated technicians for all of your questions. Competent and free of charge.

Make use of our technical support hotlines:

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Additionally, you can find the OMICRON Lab Service Center or Sales Partner closest to you at www.omicron-lab.com → Contact.

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