

# SPECTANO 100

## Quick Start Guide



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# 1 About this Quick Start Guide

This SPECTANO 100 Quick Start Guide provides short information on how to install and use *SPECTANO 100*. It is intended as an aid for the user to install *SPECTANO 100* and take it into operation quickly and easily. The SPECTANO 100 Quick Start Guide thus provides only a small subset of information available for *SPECTANO 100*. It cannot substitute the SPECTANO 100 User Manual.

Therefore, also read the SPECTANO 100 User Manual in addition to this Quick Start Guide. The SPECTANO 100 User Manual provides extensive and more detailed information about *SPECTANO 100*, its installation and intended use, and how to configure and operate it. The SPECTANO 100 User Manual is available in PDF format on the DVD delivered with *SPECTANO 100* or can be accessed directly on the OMICRON Lab website [www.omicron-lab.com](http://www.omicron-lab.com).

## Safety symbols used

In this Quick Start Guide, the following symbols indicate safety instructions for avoiding hazards.



### 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

## 2 Safety instructions

Before operating *SPECTANO 100* and its accessories, read the following safety instructions carefully. If you do not understand some safety instructions, contact OMICRON Lab before proceeding. When working with *SPECTANO 100*, observe the five safety rules (see 2.2 "Five safety rules" later in this chapter) and all other safety instructions in this Quick Start Guide.

You are responsible for every application that makes use of an OMICRON or OMICRON Lab product. *SPECTANO 100* may only be operated by trained personnel. Any miss-operation can result in damage to property or persons.

Maintenance and repair of *SPECTANO 100* and its accessories is only permitted by qualified experts either at OMICRON Lab or at certified repair centers.

### 2.1 Operator qualifications and safety standards

Testing and measuring with *SPECTANO 100* and its accessories like the *DTS1* dielectric test sample box must be carried out only by qualified, skilled and authorized personnel working with voltages up to  $200 V_{\text{peak}}$  AC and DC.

Before starting to work, clearly establish the responsibilities. Personnel receiving training, instructions, directions, or education on *SPECTANO 100* must be under constant supervision of an experienced operator. Measuring with *SPECTANO 100* must comply with the internal safety instructions as well as additional relevant documents like national and international safety standards:

- EN 50191 (VDE 0104) "Erection and Operation of Electrical Test Equipment"
- EN 50110-1 (VDE 0105 Part 100) "Operation of Electrical Installations"

Moreover, observe all applicable regulations for accident prevention in the country and at the site of operation.

The manufacturer or the distributors are not liable for damage resulting from unintended usage. The user alone assumes all responsibility and risks.

#### 2.1.1 Additional operator qualifications for testing with high and low voltage systems

The operator must be:

- Familiar with recognized operating practices and procedures for working on high and low voltage systems.
- Familiar with the five safety rules.
- Authorized to perform the required work on the equipment of the power distribution network.
- Trained in the proper use of all necessary personal safety equipment.

## 2.2 Five safety rules

Before connecting any test leads to a test object, always observe the five safety rules for working with high power:

- ▶ Disconnect completely.
- ▶ Secure against re-connection.
- ▶ Verify that the installation is dead.
- ▶ Carry out grounding and short-circuiting.
- ▶ Provide protection against adjacent live parts.

## 2.3 Instructions

- ▶ Read the safety instructions and setup information described in the SPECTANO 100 Quick Start Guide before operating *SPECTANO 100* or its accessories. In addition, read the manuals of all devices included in the test setup. Any maloperation can result in damage to property or persons.
- ▶ Use *SPECTANO 100* and its accessories only in a technically sound condition and when its use is in accordance with the local safety regulations. In particular, avoid disruptions that could in turn affect safety.
- ▶ Before using *SPECTANO 100*, always ensure that neither the device nor its accessories are damaged.
- ▶ Connect the equipotential ground of *SPECTANO 100* with a solid connection of at least 6 mm<sup>2</sup> cross-section and not longer than 20 meters to a ground connection in the laboratory. Never handle *SPECTANO 100* without grounding it.
- ▶ Ensure that all ground connections are in good condition, clean, and free of oxidation.
- ▶ Connect any parts of the test cell which have to be connected to ground according to the related manual.
- ▶ Only use the delivered grounded AC power supply DRA SUPPLY to power *SPECTANO 100*. Never use power outlets without protective ground (PE).
- ▶ Always turn off *SPECTANO 100* (with the power switch on the back) before connecting or disconnecting any cables or changing the test cell. Be especially careful when using unsafe adapter cables (for example, BNC adapter).
- ▶ Ensure that no dangerous voltages are present at touchable parts of the test setup. If this is not possible due to, for example, unsafe adapter cables or connectors or unsafe test cells always secure the danger zone with clearly visible barriers before performing tests.

## 2.4 Orderly measures

The SPECTANO 100 Quick Start Guide, SPECTANO 100 User Manual, or the e-book version of one of these documents have always to be available on the site where *SPECTANO 100* is being used. All users of *SPECTANO 100* must read and observe the safety instructions described in the documents and all relevant installation and operation instructions.

*SPECTANO 100* and its accessories like the *DTS1* dielectric test sample box may be used only as described in the SPECTANO 100 Quick Start Guide or the User Manual. Any other use is not in accordance with the local safety regulations. The manufacturer and the distributor are not liable for damage resulting from improper usage. The user alone assumes all responsibility and risk.

Full compliance with the local safety regulations also includes following the instructions provided in the SPECTANO 100 Quick Start Guide or the User Manual.

## 2.5 Designated use

*SPECTANO 100* and its accessories are especially designed for testing dielectric solid and liquid materials together with a suitable dielectric material test cell and test system.

Examples of dielectric material analysis use cases and applications:

<i>SPECTANO 100</i> characterizes, analyzes and determines the insulation, polarization or dielectric losses of solid and liquid materials such as:	<i>SPECTANO 100</i> achieves information on:
<ul style="list-style-type: none"> <li>• Electrical insulation paper/cellulose</li> <li>• Nanomaterials (nano-composites)</li> <li>• Dielectric components</li> <li>• Epoxy resin</li> <li>• Polymers</li> <li>• Insulation oils</li> <li>• Display technologies like glasses or polymers</li> <li>• Solar cells</li> <li>• etc.</li> </ul>	<ul style="list-style-type: none"> <li>• Dielectric properties</li> <li>• Material aging</li> <li>• Material structure</li> <li>• Space charges in multilayer insulation</li> <li>• Surface or film thickness of coatings</li> <li>• Curing processes</li> </ul>

## 2.6 Disclaimer

The advisory procedures and information contained within this document have been compiled as a guide to the safe and effective operation of *SPECTANO 100*. It has been prepared in conjunction with application engineers and the collective experience of the manufacturer.

The in-service conditions for the use of *SPECTANO 100* 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.

If *SPECTANO 100* or its accessories are used in a manner not specified by the manufacturer or used with third party test devices and cables, the protection provided by *SPECTANO 100* or its accessories may be impaired, and this may result in damage to property or persons.



## 3 Compliance statements and recycling

### 3.1 Compliance statements

#### 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 electromagnetic compatibility (EMC) directive, the low voltage directive (LVD) and the RoHS directive.

#### FCC compliance (USA)

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

#### Declaration of compliance (Canada)

This Class A digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

### 3.2 Recycling



**This test set (including all accessories) is not intended for household use. At the end of its service life, do not dispose of the test set with household waste!**

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

OMICRON test sets are subject to the EU Waste Electrical and Electronic Equipment Directive 2012/19/EU (WEEE directive). As part of our legal obligations under this legislation, OMICRON offers to take back the test set and ensure that it is disposed of by authorized recycling agents.

#### For customers outside the European Economic Area

Please contact the authorities in charge for the relevant environmental regulations in your country and dispose the OMICRON test set only in accordance with your local legal requirements.

## 4 PC requirements

The following table shows the minimum requirements your computer needs to run *SPECTANO Analyzer Suite*.

Table 4-1 *SPECTANO Analyzer Suite* PC requirements

Characteristic	Requirement
Processor	Current Intel or Intel compatible CPU
Memory (RAM)	2 GB, 4 GB recommended
Graphics resolution	Super VGA (1024×768), higher resolution recommended
Graphics card	UDirectX 11 with Direct2D support
USB interface	USB 2.0 or higher
Operating system	Windows 10

## 5 Introduction

### 5.1 SPECTANO 100

*SPECTANO 100*, in conjunction with its accessories or as stand-alone unit, is a test system for dielectric analysis of solid and liquid materials. It combines the time-domain and frequency-domain analysis within a wide frequency range from 20  $\mu\text{Hz}$  up to 5 kHz in one device and provides an output voltage range from 100 mV to 200 V<sub>peak</sub>. The designated use of *SPECTANO 100* is the analysis of dielectric characteristics of liquid and solid materials such as:

- Impedance, capacitance and resistance
- Complex permittivity  $\epsilon$
- Loss factor  $\tan\delta$

*SPECTANO 100* can be used for a wide range of different applications:

- Dielectric analysis of solid and liquid dielectric materials, for example, polymers, cellulose-based materials, oil, and other insulation materials
- Monitoring of polymerization and hardening processes
- Analysis of nanocomposites
- Research on dielectrics
- Analysis of ceramics
- Analysis of thin films

### 5.2 Methods

The following list gives a short overview of methods and test cell types which can be used together with *SPECTANO 100* to analyze dielectric materials. However, also measurements of dielectric materials or components without electrode arrangements are possible like capacitors or coils.

#### **Solid dielectric materials:**

- Parallel plate method
  - Contacting electrode method used with rigid metal electrodes
  - Contacting electrode method used with rigid metal electrodes and coated solid test material
  - Contacting electrode method used with thin film electrodes
  - Non-contacting electrode method (gap occupied by air or liquid, on one or both sides of the solid test material)
- Tube or cylindrical electrode method

#### **Liquid dielectric materials:**

- Coaxial probe method
- Parallel plate method
- Tube or cylindrical electrode method

### 5.3 **DTS1 dielectric test sample box**

The *DTS1* dielectric test sample box is an accessory to *SPECTANO 100* for demonstrating and testing the functionality of *SPECTANO 100* without a sample test cell. The *DTS1* is a demo box containing two samples: a high-precision, low-loss 1 nF capacitor and a RC circuit simulating a dielectric sample with losses. The main application areas of the *DTS1* are in training and demonstration purposes but it can also be used for detecting errors in a cable setup.

### 5.4 **DSH 100 Dielectric Sample Box**

OMICRON Lab's DSH 100 Dielectric Sample Holder is designed for the analysis of solid dielectric materials like nano-composites, polymers, epoxy, insulation paper, glasses, thin films and other materials for temperatures up to +200°C and voltages up to 200V(AC or DC).

Together with the Dielectric Material Analyzer SPECTANO 100, the DSH 100 is suitable to determine all important dielectric parameters such as the relative permittivity ( $\epsilon_r'$ ,  $\epsilon_r''$ ), losses ( $\tan\delta$ ), capacitance, specific conductivity or impedance and meets the requirements of international standards for dielectric material analysis (ASTM D150, IEC 62631-2-1 and 62631-3-1:2017).

The DSH 100 can be used in conjunction with other impedance analyzers or LCR meters such as the Bode 100.

The sample holder features a parallel plate electrode configuration with guard ring. The exchangeable electrode design allows to analyze curing processes of materials such as epoxy.

### 5.5 **Frequency domain spectroscopy (FDS)**

By using the frequency domain spectroscopy (FDS), the dielectric properties of the solid or liquid material under test are measured by frequency sweep (5  $\mu$ Hz to 5 kHz). The FDS allows fast measurements at high frequencies but requires long measurement times at lower frequencies.

### 5.6 **Polarization current method (PDC)**

In the polarization current (PDC) method, a DC voltage is applied to the device under test for a specific time and the polarization current is measured. From the polarization current, the dielectric response is evaluated and the dielectric frequency characteristic is calculated using Fourier transformation. The PDC method is faster than the FDS at very low frequencies, but the upper frequency is limited due to the finite rise time of the DC pulse. The test frequency range for the PDC method is 20  $\mu$ Hz to 100 mHz.

## 5.7 Combined mode (FDS and PDC)

*SPECTANO 100* combines the PDC with the FDS principle and thus significantly reduces the testing time to exclusive frequency domain measurements. PDC measurements can be accomplished in a short time but are limited to low frequencies while FDS measurements are feasible for high frequencies but take very long at low frequencies. It combines the advantages of both principles. It measures data in the time domain for frequencies below 100 mHz. This reduces the measurement time up to 75% compared to exclusive FDS measurements. For example, a FDS measurement from 1 kHz to 100  $\mu$ Hz will take 11 hours, *SPECTANO 100* will acquire this data in less than 3 hours using the combined FDS and PDC measurement. The maximum test frequency range for the combined mode is 20  $\mu$ Hz to 5 kHz.

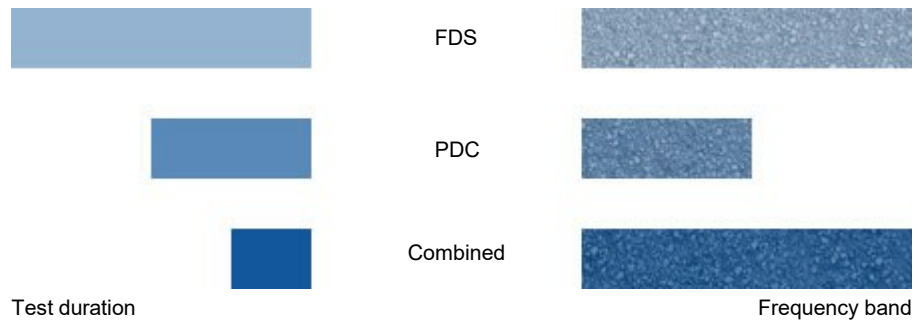
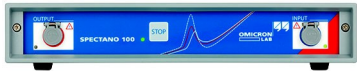








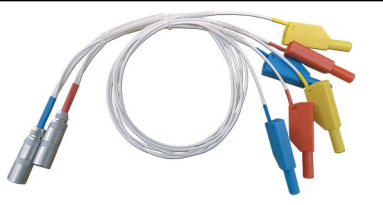
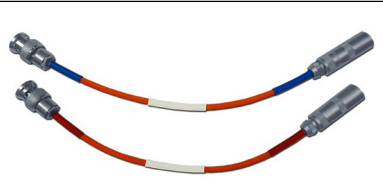
Figure 5-1 Comparison of measurement methods

## 5.8 Scope of delivery and ordering information

### 5.7.1 Main package

Description	Part No.	Picture
<i>SPECTANO 100</i> main device	OL000400	
<i>DTS1</i> dielectric sample test box		
2 × Triaxial standard cable (1.5 m)		
Specific grounded <i>SPECTANO 100</i> power supply		
CD ROM incl. <i>SPECTANO Analyzer Suite</i> and User Manual (English)		
Quick Start Guide (printed) (English)		
USB cable (1.5 m)		

## 5.7.2 Optional accessories

Description	Part No.	Picture
2 × Triaxial-to-4 mm plug adapter cable set	OL000451	
2 × Triaxial-to-BNC connector adapter cable set	OL000452	

## 6 Device description

### 6.1 SPECTANO 100

#### 6.1.1 Connectors and operating controls



#### DANGER

##### Death or severe injury caused by high voltage or current

- ▶ Do not touch the **OUTPUT** connector when the red LED is on or blinks.
- ▶ Always ensure that no dangerous voltages are present at any touchable part of the device.
- ▶ Before handling *SPECTANO 100* in any way, connect its equipotential ground terminal with a solid connection of at least 6 mm<sup>2</sup> cross-section and not longer than 20 meters to the ground terminal in the laboratory.

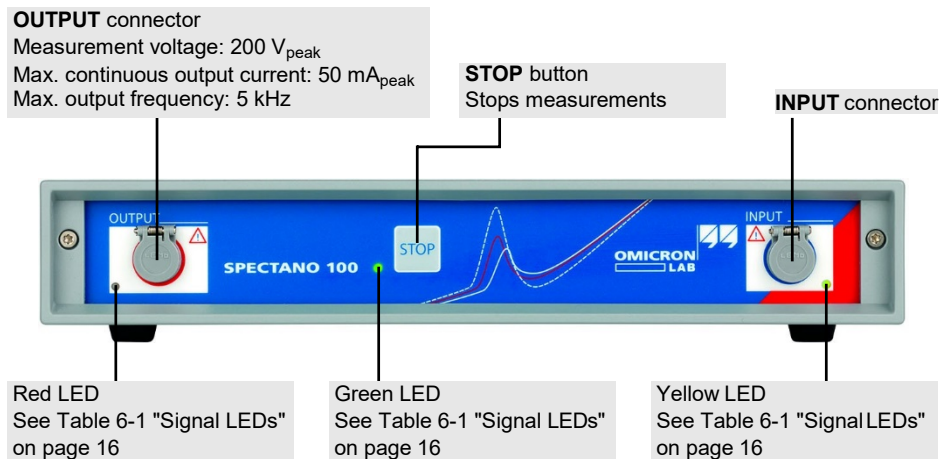


Figure 6-1 SPECTANO 100 front view



Table 6-1 Signal LEDs

LED	State	Description
Green	On	Signals that the power switch is on.
Yellow	Blinking	Signals the input activity: <ul style="list-style-type: none"> <li>• Measurement results are available in <i>SPECTANO 100</i> which are not saved. (This can happen when the computer is disconnected from <i>SPECTANO 100</i> after the measurement was started.)</li> <li>• An error has occurred during measurement (Measurement is stopped.). After a computer has been connected to <i>SPECTANO 100</i>, the error information is sent to the computer and the LED is on.</li> </ul>
Red	On or blinking	Signals dangerous voltage on the <b>OUTPUT</b> connector.
	Blinking	A measurement is running.
	On for approx. 10 s	The test object is being depolarized after a measurement has been stopped by <i>SPECTANO Analyzer Suite</i> , manually or due to an error.

**DANGER****Death or severe injury caused by high voltage or current**

- ▶ Do not handle *SPECTANO 100* without grounding it.
- ▶ Before handling *SPECTANO 100* in any way, connect its equipotential ground with a solid connection of at least 6 mm<sup>2</sup> cross-section and not longer than 20 meters to a ground connection in the laboratory.

**DANGER****Death or severe injury caused by high voltage or current**

- ▶ Do not use power outlets without protective ground (PE).
- ▶ Only use the delivered grounded AC power supply *DRA SUPPLY* to power *SPECTANO 100*.
- ▶ Connect the *SPECTANO 100* power supply only to a power outlet that is equipped with protective ground (PE).
- ▶ For safe operation always make sure that protective ground and equipotential ground are connected properly.

**DC power input**

Connect only the especially designed and optimized delivered power supply *DRA SUPPLY* for testing with *SPECTANO 100*.

**5 V DC output**

Optional: for connecting a USB isolator

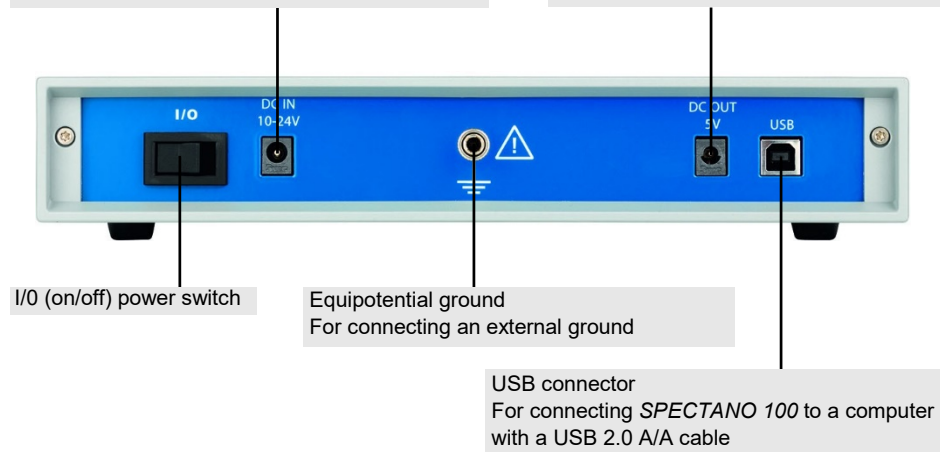


Figure 6-2 *SPECTANO 100* rear view

## 6.1.2 Cleaning



### DANGER

#### Death or severe injury caused by high voltage or current

- ▶ Do not clean *SPECTANO 100* when the device is powered.
- ▶ Do not clean *SPECTANO 100* when connected to the test object.
- ▶ Before cleaning *SPECTANO 100* and its accessories, always switch the device off and disconnect the test object, accessories and connection cables.

To clean *SPECTANO 100* and its accessories, use a cloth dampened with isopropanol alcohol.

## 6.2 *DTS1* dielectric test sample box



### DANGER

#### Death or severe injury caused by high voltage or current

- ▶ Use the *DTS1* box only together with the *SPECTANO 100* test device and the delivered accessories and cables.
- ▶ Read the safety instructions in 2 "Safety instructions" in this Quick Start Guide before using the *DTS1* box together with the *SPECTANO 100* test device.

### NOTICE

#### Equipment damage possible

- ▶ Do not supply a continuous input current  $> 50 \text{ mA}_{\text{peak}}$ . An overload at the *SPECTANO 100* input can cause damages at the device.
- ▶ Always configure the max. test output voltage and the input test frequency for the connected test object so that the maximum input current will not be reached.
- ▶ For information on how to configure the output signals for testing with the *DTS1* dielectric test sample box, see "Technical data" in the *SPECTANO 100* User Manual.

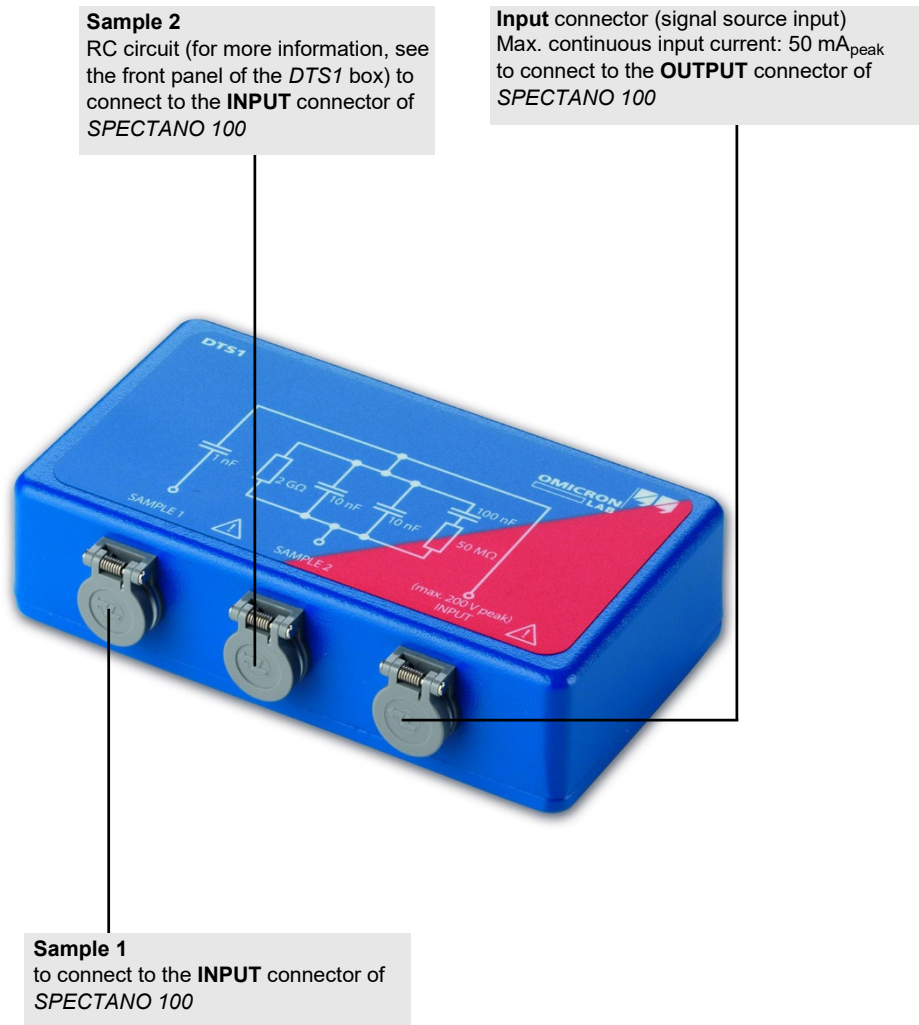


Figure 6-3 DTS1 dielectric test sample box

## 7 Installation

Before operating *SPECTANO 100* for the first time, use the delivered packing list to verify that all components of the test system are available.



### DANGER

**Avoid serious injury or death caused by worn-out, chafed, or otherwise damaged parts of *SPECTANO 100* or its accessories.**

- ▶ Before operating *SPECTANO 100*, always make sure that neither the device nor its accessories are damaged.
- ▶ Immediately replace any damaged device or accessory.



### DANGER

**Avoid serious injury or death caused by unsuitable accessories.**

- ▶ Only use the original components and accessories supplied by OMICRON.

### 7.1 Install *SPECTANO Analyzer Suite*

**Note:** Install *SPECTANO Analyzer Suite* before connecting *SPECTANO 100* to the computer.

For the minimum requirements your computer needs to run *SPECTANO Analyzer Suite*, see 4 "PC requirements" on page 9. To install *SPECTANO Analyzer Suite*, put the delivered *SPECTANO Analyzer Suite* DVD in the DVD drive of your computer and follow the instructions on the screen.

## 7.2 Power up *SPECTANO 100*



### DANGER

#### Death or severe injury caused by high voltage or current

- ▶ Use only the delivered accessories and cables to ensure the safety standard of *SPECTANO 100*.
- ▶ Read the safety instructions in 2 "Safety instructions" in this Quick Start Guide before powering up *SPECTANO 100*.
- ▶ Before powering up *SPECTANO 100*, ensure that
  - a solid connection of at least 6 mm<sup>2</sup> cross-section and not longer than 20 meters is connected between its equipotential ground and any ground connection in the laboratory.
  - the whole test system is grounded properly.
  - only the delivered grounded AC power supply *DRA Supply* is connected.
  - the test object is connected correctly.

To power up *SPECTANO 100* by using the delivered AC power supply:

1. Plug the DC output connector of the AC power supply into the DC power input on the *SPECTANO 100* rear panel (see Figure 6-2 "SPECTANO 100 rear view" on page 17).
2. Connect the AC power supply with the power cable.
3. Plug the mains plug of the power cable into the power outlet.
4. Press the I/O power switch on the *SPECTANO 100* rear panel.

## 7.3 Connect *SPECTANO 100* to the computer

*SPECTANO 100* communicates with the computer through USB interface (see 4 "PC requirements" on page 9). To connect *SPECTANO 100* to the computer:

1. Connect the USB 2.0 or higher cable to the USB connector on the *SPECTANO 100* rear panel.
2. Connect the USB cable to the USB connector of your computer by using the delivered USB 2.0 cable.

## 7.4 Connect *SPECTANO 100* to a test object

You can connect *SPECTANO 100* to a test cell for liquid or solid materials. This section describes how to connect *SPECTANO 100* to the most common test cell types.



### **DANGER**

#### **Avoid serious injury or death caused by**

- carrying out the testing procedure incorrectly.
- carrying out the connection incorrectly.
- not clearly established responsibilities of the personnel involved.
- either not or incorrectly applied safety rules and instructions.
- dangerous voltages at touchable parts of the device, test cell or sample.
- dangerous voltages at the **OUTPUT** connector of the device.
- using another power supply than the delivered one (*DRA SUPPLY*).
- electric shock from hazardous parts of the device, test cell or sample.
- ▶ Always observe the five safety rules (see 2 "Safety instructions" on page 4).
- ▶ Before performing a test with *SPECTANO 100*, all on-site procedures and methods for personal safety and all safety instructions in this Quick Start Guide must be discussed with all personnel involved so that they are familiar with and fully understand all safety rules and instructions.
- ▶ Before each test, the responsibility of all personnel involved must clearly be established, and the testing workflow must be determined.
- ▶ Make sure to exactly comply with the workflow described in this Quick Start Guide.
- ▶ Never perform tests without having secured the danger zone with clearly visible barriers and having placed all parts with hazardous voltage within the barriers.
- ▶ Always wear your personal safety equipment.

**DANGER****Death or severe injury caused by high voltage or current**

- ▶ Before handling *SPECTANO 100* in any way, connect its equipotential ground terminal with a solid connection of at least 6 mm<sup>2</sup> cross-section and not longer than 20 meters to the ground terminal in the laboratory.
- ▶ Do not connect or operate *SPECTANO 100* without proper grounding connection.
- ▶ Before handling *SPECTANO 100* in any way, connect the test object to ground properly.
- ▶ Do not connect or operate *SPECTANO 100* with a broken, dirty or oxidized ground terminal or connection cables.
- ▶ Do not use power outlets without protective ground (PE).
- ▶ Only use the delivered AC power supply to power *SPECTANO 100*.

Standard connection cable is the delivered high-temperature low-noise triaxial cable with a 1:1 connection of the inner conductor, the inner shield (guard) and the outer shield (ground). Connect the red-labeled cable to the **OUTPUT** connector of *SPECTANO 100* and the blue-labeled cable to the **INPUT** connector of *SPECTANO 100*.

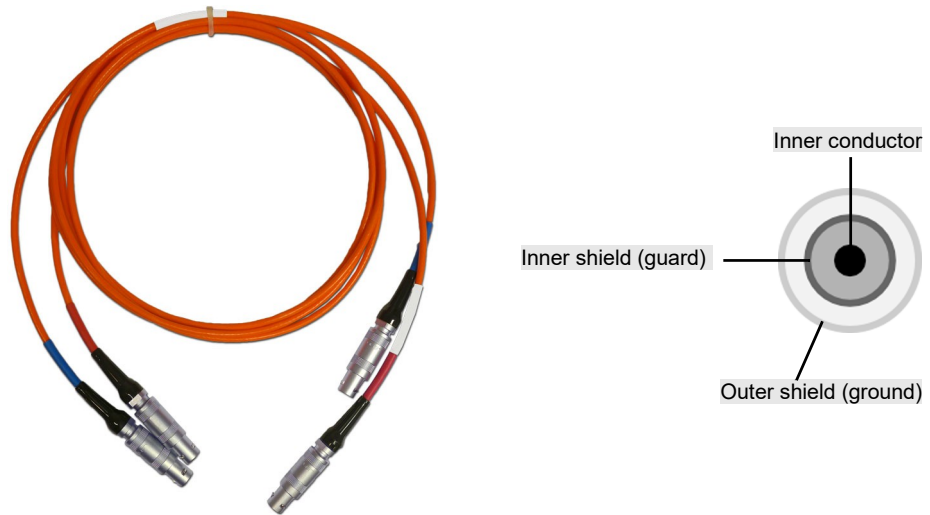


Figure 7-1 Standard high-temperature low-noise triaxial cable



Depending on the connection type of the test cell, OMICRON Lab offers the following adapters:

- High-temperature low-noise triaxial-to-BNC adapter with inner and outer shield connected to the BNC outer shield

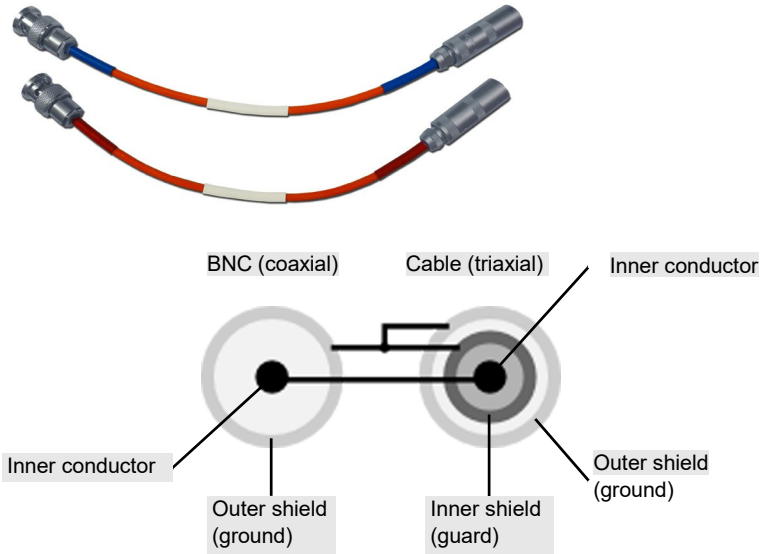


Figure 7-2 High-temperature low-noise triaxial-to-BNC adapter

- Triaxial-to-4 mm plug adapter  
The three contacts (inner conductor, inner shield and outer shield) of the triaxial connection are led through separately. They end in a 4 mm plug. Additionally, each cable has a shield which is connected to the inner shield (guard) of the triaxial connection.

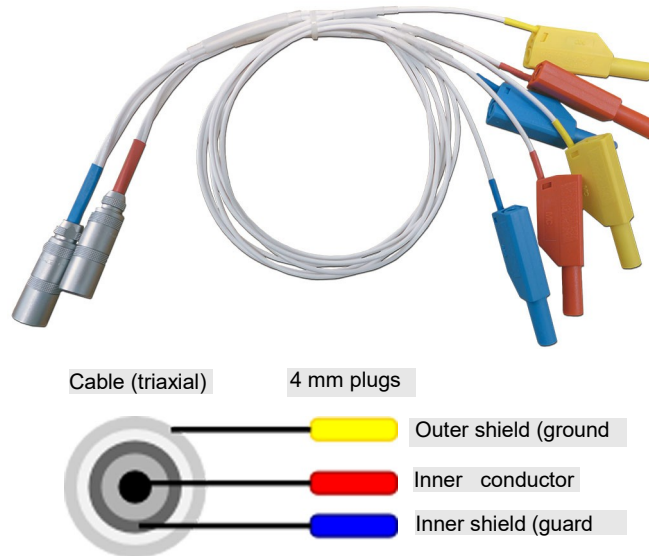


Figure 7-3 Triaxial-to-4 mm plug adapter

To connect the adapter cable to *SPECTANO 100*:

1. Connect the standard triaxial cable according to the color code to the *SPECTANO 100* **OUTPUT** and **INPUT** connectors.
2. Connect the adapter cables with the corresponding color code to the standard triaxial cable.

### 7.4.1 Typical setup for a test cell with guard ring



#### DANGER

**Death or severe injury caused by high voltage or current**

- ▶ Do not touch the **OUTPUT** connector when the red LED is on or blinks.
- ▶ Always ensure that no dangerous voltages are present at any touchable part of the device, test cell or sample.
- ▶ Do not touch the output if the guard (inner shield of the triaxial connection) is identical with the ground (outer shield of the triaxial connection).

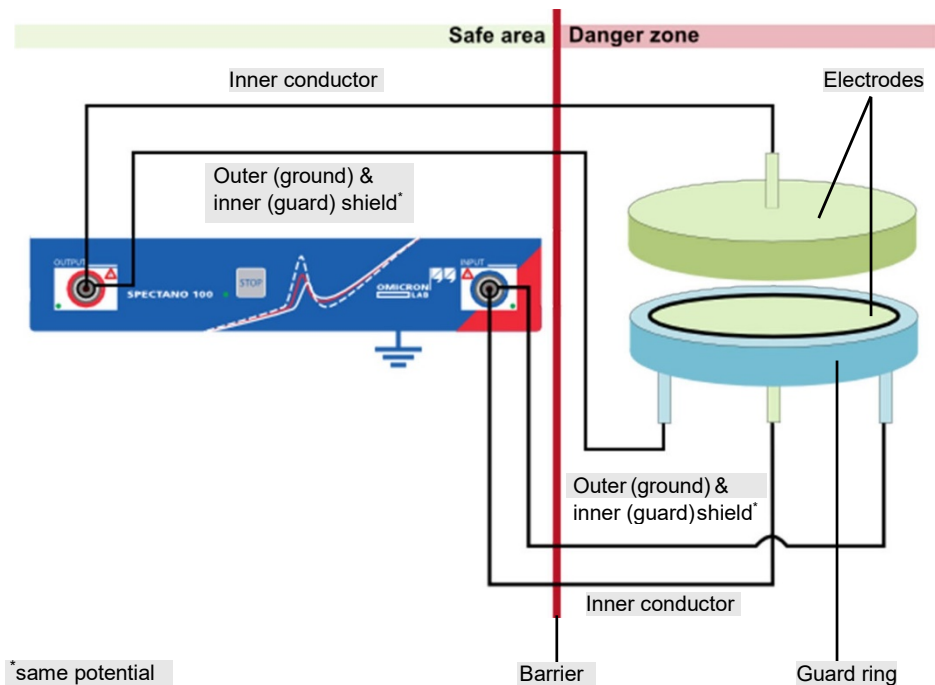


Figure 7-4 Connecting *SPECTANO 100* to a test cell with guard ring

#### NOTICE

The safe area is only safe if the delivered cables and adapters are used. Otherwise, this can also be a danger zone.

To connect *SPECTANO 100* to a test cell with guard ring:

1. Ground *SPECTANO 100* according to the safety rules (see 2.2 "Five safety rules" on page 5).
2. Connect the standard triaxial cable according to the color code to the *SPECTANO 100* **OUTPUT** and **INPUT** connectors:
  - Red-labeled cable to the **OUTPUT** connector
  - Blue-labeled cable to the **INPUT** connector
3. Depending on the test cell connection (BNC or 4 mm plug), connect one of the adapter cables described earlier in this chapter with the corresponding color code to the standard triaxial cable:
  - Red-labeled adapter cable to the red marked standard cable
  - Blue-labeled adapter cable to the blue marked standard cable
4. Connect the adapter cables to the test cell with guard ring according to the schematic diagram.

**Note:** If you are using the triaxial-to-4 mm plug adapter cable, be aware that the inner shield (guard) and the outer shield (ground) are not connected.

For more information and example connections to different types of test cells, see "Appendix" in the *SPECTANO 100* User Manual.

### 7.4.2 Typical setup for a test cell without guard ring



#### **DANGER**

##### **Death or severe injury caused by high voltage or current**

- ▶ Do not touch the **OUTPUT** connector when the red LED is on or blinks.
- ▶ Always ensure that no dangerous voltages are present at any touchable part of the device, test cell or sample.
- ▶ Do not touch the output if the guard (inner shield of the triaxial connection) is identical with the ground (outer shield of the triaxial connection).

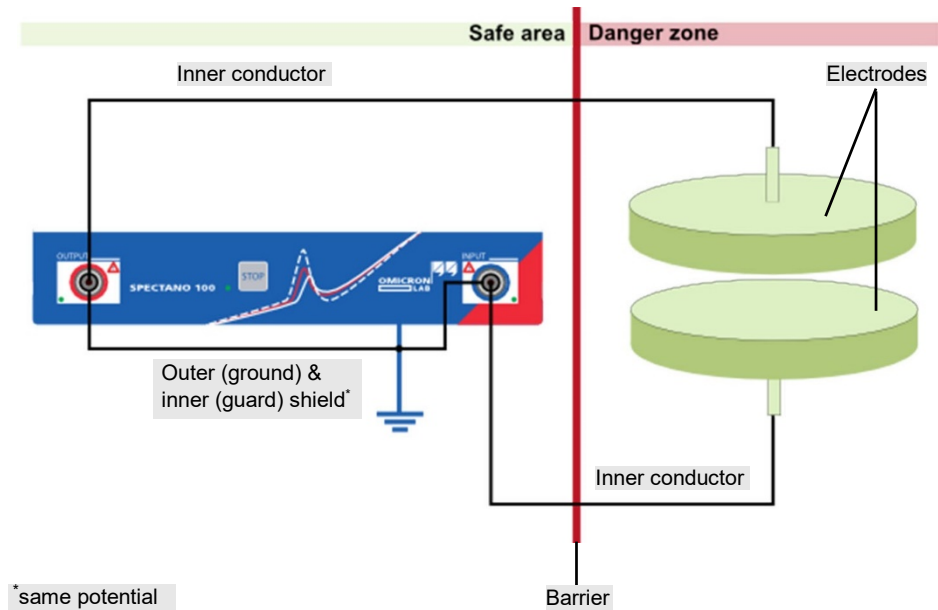


Figure 7-5 Connecting *SPECTANO 100* to a test cell without guard ring

#### NOTICE

The safe area is only safe if the delivered cables and adapters are used. Otherwise, this can also be a danger zone.

To connect *SPECTANO 100* to a test cell without guard ring:

1. Ground *SPECTANO 100* according to the safety rules (see 2.2 "Five safety rules" on page 5).
2. Connect the standard triaxial cable according to the color code to the *SPECTANO 100* **OUTPUT** and **INPUT** connectors:
  - Red-labeled cable to the **OUTPUT** connector
  - Blue-labeled cable to the **INPUT** connector
3. Depending on the test cell connection (BNC or 4 mm plug), connect one of the adapter cables described earlier in this chapter with the corresponding color code to the standard triaxial cable:
  - Red-labeled adapter cable to the red marked standard cable
  - Blue-labeled adapter cable to the blue marked standard cable
4. Connect the adapter cables to the test cell without guard ring according to the schematic diagram.

**Note:** If you are using the triaxial-to-4 mm plug adapter cable, be aware that the inner shield (guard) and the outer shield (ground) are not connected.

For more information and example connections to different types of test cells, see "Appendix" in the *SPECTANO 100* User Manual.

## 7.5 Connect *SPECTANO 100* to the *DTS1* dielectric test sample box



### DANGER

#### Death or severe injury caused by high voltage or current

- ▶ Before handling *SPECTANO 100* in any way, connect its equipotential ground terminal with a solid connection of at least 6 mm<sup>2</sup> cross-section and not longer than 20 meters to the ground terminal in the laboratory.
- ▶ Do not connect or operate *SPECTANO 100* without proper grounding connection.
- ▶ Before handling *SPECTANO 100* in any way, connect the test object to ground properly.
- ▶ Do not connect or operate *SPECTANO 100* with a broken, dirty or oxidized ground terminal or connection cables.
- ▶ Do not use power outlets without protective ground (PE).
- ▶ Only use the delivered AC power supply to power *SPECTANO 100*.



### DANGER

#### Death or severe injury caused by high voltage or current

- ▶ Do not touch the **OUTPUT** connector when the red LED is on or blinks.
- ▶ Do not touch the output if the guard (inner shield of the triaxial connection) is identical with the ground (outer shield of the triaxial connection).
- ▶ Always ensure that no dangerous voltages are present at any touchable part of the device or the *DTS1* box.

To test the functionality of *SPECTANO 100* without a sample cell, connect *SPECTANO 100* to the *DTS1* dielectric test sample box by using the delivered standard triaxial cables as shown in the following figure.



Figure 7-6 Connecting *SPECTANO 100* to the *DTS1* dielectric test sample box for measuring on the **Sample 1** connector<sup>1</sup>

## 7.6 Connect *SPECTANO 100* to the Dielectric Sample Holder *DSH 100*

Connect *SPECTANO 100* to OMICRON Lab's *DSH 100 Dielectric Sample Holder* by using the delivered triaxial cables as shown in the following figure

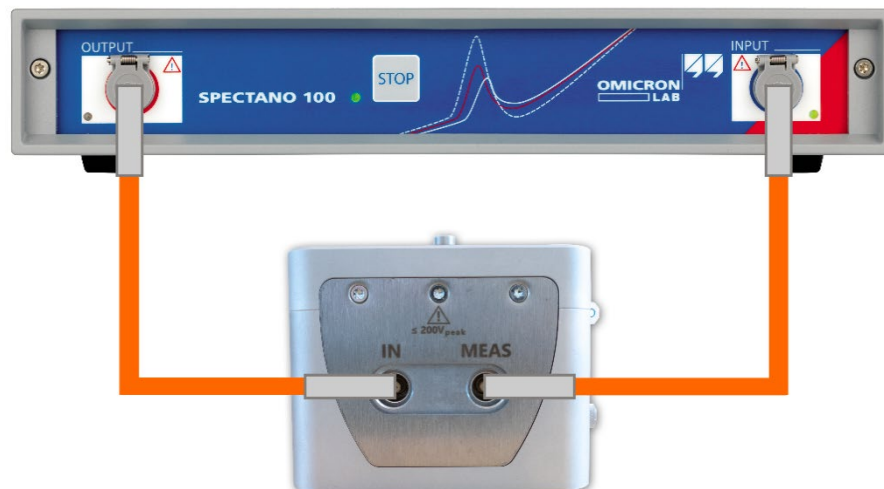


Figure 7-7 Connecting *SPECTANO 100* to the *DSH 100*

1. For measuring on the **Sample 2** connector, connect the blue-labeled cable to the **Sample 2** connector.



**CAUTION**

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

- ▶ Read the safety instructions in this user manual as well as the safety instructions and corresponding chapters in the *DSH 100* user manual first.
- ▶ Always connect the SPECTANO 100 earth terminal to safety ground using a proper ground connection when voltage levels  $>30 V_{AC}$  or  $>60 V_{DC}$  are present in the setup.

# Support

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