OMICRON

COMPANO 100

Getting Started

Manual version: ENU 1122 03 04 — Year: 2020

1 Welcome

Welcome to OMICRON! We are happy that you have chosen a *COMPANO 100* test set.

COMPANO 100 is a lightweight, highly flexible fully electronic current or voltage source for various checks in an electrical energy system, such as generation, transmission, distribution, railways or industry. It is battery-operated; you do not need any additional power source for the test set. The battery is rechargeable. We are certain that you will enjoy using this product. The following guide will provide you with information related to the package and services that will enable you to use this product with confidence.

License

The license for working with *COMPANO 100* is already integrated into your test set. You do not need an additional activation key to use *COMPANO 100*.

Get started

For information on how to get started with the *COMPANO 100* test set, refer to the chapters "Safety instructions", "Battery", "Test set overview" and "Product startup". These chapters are identical in **Getting Started** manual and **User Manual**.

Care for your device

This document contains information on how to maintain your device and its battery (see "Battery" chapter).

► If you do not use the *COMPANO 100* for a longer period of time, charge the battery before storing it and recharge once every 6 months.

  Deep discharge irreversibly damages batteries.

Stay informed

Our **Customer Portal** is an international knowledge exchange platform full of useful information. Here you can inform yourself about the latest product and application features and software updates. You can also find up-to-date articles, conference papers, user manuals and much more.

Furthermore, you can share your own experiences in the OMICRON User Forum.

Register today: www.omicronenergy.com/customer.

Learn more

You can learn more about your new product in one of the customized training courses offered by the OMICRON Academy.

For more details have a look at: www.omicronenergy.com/academy.

Get support

Well-educated and competent technicians are available to answer all of your questions on our technical support hotline. All around the clock.

Make use of our 24/7 international technical support hotline: → Support on page 24.

Scope of documentation

The printed **Getting Started** manual guides you through the first steps and actions with the *COMPANO 100* test set.

The *COMPANO 100* **User Manual**, available as PDF and invocable in chapters by scanning the according QR code in the test set's lid with your smart phone, was written for professional specialists in electronics and electrical engineering. Its purpose is to familiarize you with the *COMPANO 100* test set and its various application fields. It contains helpful instructions on how to use *COMPANO 100* safely, properly, and efficiently. Read the User Manual manual thoroughly.

At **Google Play** and in the **Apple App Store (iOS)** you find an app called "COMPANO Knowledge Access Point" with a QR code reader for offline access to the manuals.

Check out the **OMICRON Video Channel** (visit https://www.omicronenergy.com/COMPANO100-Videos). There we provide you with the latest videos about proper test set usage and typical application examples.

2 About this manual

This manual was written for professional specialists in electronics and electrical engineering. Its purpose is to familiarize you with the *COMPANO 100* test set and its various application fields. It contains helpful instructions on how to use *COMPANO 100* safely, properly, and efficiently.

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 *COMPANO 100*.

Note: Use *COMPANO 100* in observance of all existing safety requirements from national standards for accident prevention and environmental protection.

Reading the *COMPANO 100* manual alone does not release you from the duty of complying with all national and international safety regulations relevant for working with *COMPANO 100*, for example, the regulation EN50191 "Erection and Operation of Electrical Test Equipment".

Safety symbols used in this manual

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

3 Safety instructions

WARNING

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

- ► The *COMPANO 100* test set can output life-hazardous voltages and currents.
- ► Before operating any such electrical equipment, carefully read the **Safety Instructions** section of this manual.
- ► Do not use (or even turn on) any electrical equipment without understanding the information in its manual.
- ► Existing national safety standards for accident prevention and environmental protection may supplement the equipment's manual.
- ► Only trained personnel should work with *COMPANO 100*.

For your own safety always follow the 5 basic safety rules:

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

3.1 Operator qualifications

- Working on high-voltage assets can be extremely dangerous. Testing with *COMPANO 100* must be carried out by qualified, skilled and authorized personnel, only. Before starting to work, clearly establish the responsibilities.
- Personnel receiving training, instructions, directions, or education on *COMPANO 100* must be under constant supervision of an experienced operator while working with the equipment. Testing with *COMPANO 100* must comply with the internal safety instructions as well as additional relevant documents.
- Personnel operating the *COMPANO 100* must be familiar with all necessary personal safety equipment.

3.2 Rules for use

- *COMPANO 100* is exclusively intended for the application area specified in this manual. 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 both the *COMPANO 100* test set and its accessories only when they are in a technically sound condition.
- The *COMPANO 100* test set does not contain any serviceable parts. Do not open the test set, or remove any of its housing components. The test set's lid with the attached QR code sticker is removable, though.
- Do not carry out any modifications, extensions or adaptations at the *COMPANO 100*.
- Use *COMPANO 100* in observance of all existing safety requirements from national and international standards for accident prevention and environmental protection.
- Always keep the manual either printed or as PDF file at the site where *COMPANO 100* is used. The manual must be read by all people working with *COMPANO 100*.
  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.
- Always be aware of the dangers of high voltages. Pay attention to the safety information provided in the documentation.
- When testing a current transformer by feeding a test current into its primary winding, make sure that all secondary windings are shorted.
- When measuring the ratio of voltage and power transformers, make sure that the test voltage is connected to the corresponding *primary winding*, and the voltage of the *secondary winding* is the one that is measured. Accidentally mixing up the windings can generate life-threatening voltages within the transformer.
  For example: feeding a voltage of 100 V to the secondary winding of a voltage transformer that has a ratio of 10,000:100 V, induces a voltage of 10,000 V in the transformer’s primary winding.
- The mains cable (cable to the OMICRON-supplied battery charger) must be rated for the nominal voltage and current specified in chapter Technical Data ► Battery Charger on page 23. We recommend to only use *COMPANO 100* in combination with the original cable supplied by OMICRON accessories together with the test set.
- Test leads wired to tall test objects must be sufficiently mechanically secured. Be aware of the hazard of falling adapters or cables.
- Do not block access to safety-relevant test set components, such as the emergency stop button. In a case of emergency, such components need free and quick access.
- Only operate the *COMPANO 100* test set under the environmental conditions specified in chapter Technical Data ► Environmental conditions on page 23.
- Do not operate the *COMPANO 100* test set when explosive gas or vapors are present.
- Do not use *COMPANO 100* during rain or in condensing environments.
- Do not use *COMPANO 100* above an altitude of 4000 m (13,000 feet).
- When setting up the *COMPANO 100* test set, make sure the ventilation holes remain unobstructed.
- Do not insert objects (for example, screwdrivers) into any input/output socket.

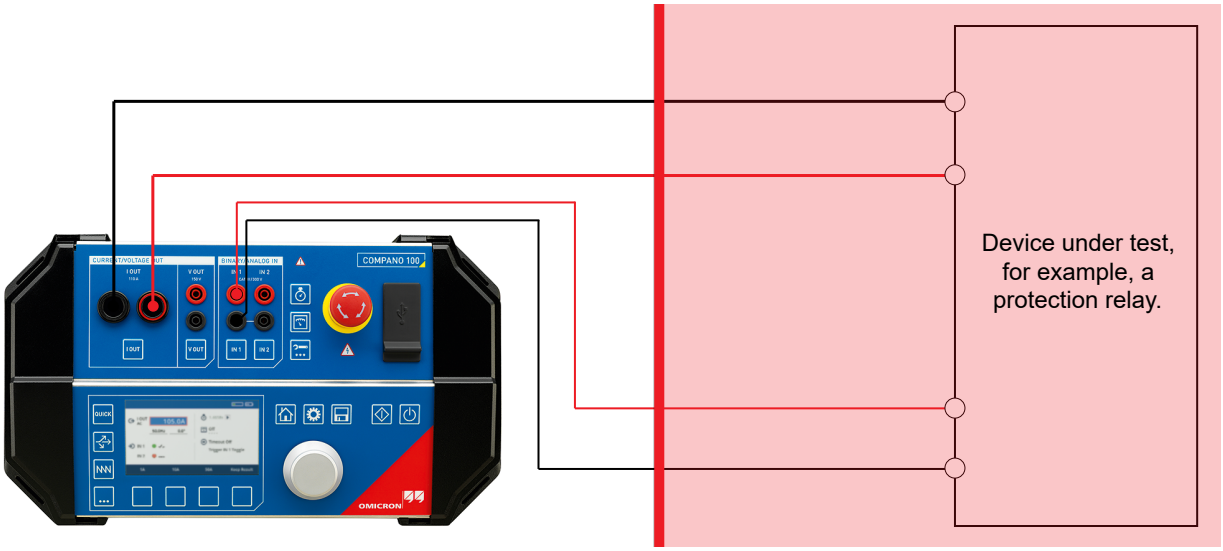
- If the *COMPANO 100* test set does not seem to function properly, contact OMICRON's Technical Support (→ Support).

3.3 Cleaning

To clean the *COMPANO 100* test set, use a cloth dampened with isopropanol alcohol. Prior to cleaning, always switch off the On/Off power switch and unplug the battery charger.

3.4 Safe operation procedures

3.4.1 Wiring and Safe Connection



Work area Dangerous area

To carry out tests with *COMPANO 100*, proceed as follows:

1. Always press the **Emergency stop** button first.
2. Secure the device under test by following the 5 basic safety rules (see The 5 basic safety rules on page 6):
3. Connect the cables to the device under test.
4. Connect the banana plug cables to *COMPANO 100* (see Safe use of test leads and adapters on page 10).
5. Release the **Emergency stop** button and power up *COMPANO 100*. Do not enter the dangerous area anymore now (see image above).
6. Start the test at *COMPANO 100*.

   While testing, do not enter the dangerous area. Stay clear from the cable ends at the device under test. Quite often these devices have connectors that can easily be touched. The same applies to some connection adapters of *COMPANO 100*. Always stay in the safe area (see image above).

When the test is finished and you want to leave the site, proceed as follows:

1. Power down *COMPANO 100*, and press the **Emergency stop** button.
2. To prevent the *COMPANO 100* from unauthorized usage or from being powered up again accidentally, pull off the dongle (the connector for external safety functions; see side view on page 20).
3. Disconnect the cables from *COMPANO 100*.
4. Disconnect the cables from the device under test.

3.4.2 Safe use of test leads and adapters

Test leads

WARNING

Death or severe injury caused by high voltage possible

The outputs of the *COMPANO 100* are controlled by the software running in the device. Note that just turning off the outputs in the controlling software is not sufficiently safe.

- ► Do not work on connected touchable test objects, connections or teminals while the *COMPANO 100* is active (Start/stop pressed) .
- ► Always make sure that the **Emergency stop** button is pressed, the test set is secured against reactivation, and all parts in the working area are powerless before you work on touchable test objects, connections or terminals (see Wiring and Safe Connection on page 9).

The *COMPANO 100* test set is supplied with flexible test lead adapters (2 x black, 2 x red) that have an angled connector at one end, and a retractable sleeve at the other end.

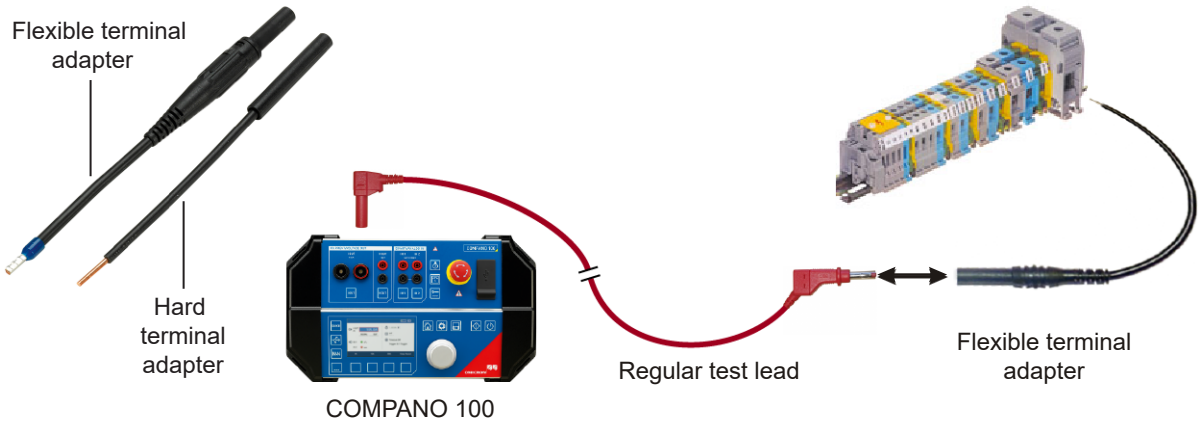
Never directly insert one of the retractable sleeves into a *COMPANO 100* socket at the front of the test set. This does not comply with the designated purpose of these leads and is contrary to the safety regulations.

To connect a test object to *COMPANO 100*, always use the angled connectors for the test set's sockets:

At the test object, use the test lead's retractable sleeve side:

Terminal adapters

Use flexible or hard terminal adapters to connect regular test leads to screw-clamp terminals.



WARNING

Death or severe injury caused by high voltage possible

The terminal adapters have blank ends.

- ► Before connecting the terminal adapters, press the **Emergency stop** button on the COMPANO's front panel and secure the test set against reactivation (see Wiring and Safe Connection on page 9).
- ► Always insert the terminal adapter with its blank end first into the terminal strip, and fasten it before connecting it to a test lead.

3.4.3 Grounding COMPANO 100

COMPANO 100 is of protection class II. Therefore, grounding is not as critical as with devices that are grounded via a power cord. Nevertheless, due to internal capacities you could still sense some coupled voltages at the housing. Grounding is therefore recommended.

Grounding is ***mandatory*** in the following scenarios:

- If *COMPANO 100* is connected to other devices via Ethernet or USB cables.
- If *COMPANO 100* is used outdoors and there is the risk of rain or condensation, e.g. due to changing weather conditions
- If *COMPANO 100* is used in a substation environment.

► Use a ground connection with a diameter of at least 2.5 mm^2 (see side view on page 20).

► Ground *COMPANO 100* as close to the operator as possible.

3.4.4 Setting COMPANO 100 into operation

- Follow the instructions in chapter Product Startup on page 21 that describe how to properly and safely set *COMPANO 100* into operation.
-  The warning symbol on the *COMPANO 100* front panel indicates that the device is activated, and that its outputs may carry dangerous voltages.
  Even if the test set does not indicate dangerous output voltage, it's safe to always consider the outputs live. The indicator could be defective. Also a software error or remote command could accidentally start the test set. You may assume the outputs to be free of dangerous voltage when the **emergency stop** button is pressed (see Wiring and Safe Connection on page 9).

3.4.5 Safety instructions for grounding system tests

The grounding system application modules of *COMPANO 100* allows for output voltages of up to 150 V used for grounding system tests in medium- and high-voltage systems according to EN 50522 and IEEE Std 80/81. *COMPANO 100* is only intended for current injection using an auxiliary current probe.

► Refer to the COMPANO 100 User Manual for more information.

WARNING

Death or severe injury caused by high voltage or current possible.

Employ the proper test set.

► Never use *COMPANO 100* to directly inject currents into power cables or overhead lines. If this should become inevitable, use the CPC 100 test set together with *CP CU1* and *CP GB1*.

The auxiliary current probe can carry life-threatening voltages during the test. In case of an error, unexpected high voltages can occur at output **I OUT** or **V OUT** at any time. Also the step voltage around the auxiliary current probe can be quite high.

► Always press the emergency stop button before working with these connectors.

► Use the provided warning flag*) to mark the auxiliary current probe.

► Mark an area of 5 m/15 ft around the electrode as dangerous zone, and position a guard outside this area to keep people from entering the dangerous zone.

In case of a high-current ground fault within the substation or at the transmission tower during the test, high voltages may occur in any wire connected to the grounding grid or leading away from it.

► Do not touch the current probe, the potential probe or any wire without insulating gloves.

► First insert the current probe, then connect it to the provided crocodile clamp. Before removing the current probe, disconnect the crocodile clamp.

*) Warning flag for auxiliary current probes provided by OMICRON.

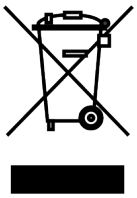
3.4.6 Required maintenance

COMPANO 100 contains safety-relevant mechanical components like the emergency stop button. To ensure the safe operation over long times, the device must be sent to OMICRON for inspection at least after every 10 years of use. This inspection is part of the calibration or repair process (→ Support).

3.4.7 Accessories

Only use *COMPANO 100* in combination with original OMICRON accessories as explained in the user manual. Only use *COMPANO 100* accessories with other OMICRON devices when this usage is described in the respective device's user manual.

3.4.8 Information for disposal and recycling



The test set and all of its accessories are 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 (WEE directive). As part of our legal obligations under this legislation, OMICRON offers to take back the test set and to ensure that it is disposed of by an authorized recycling facility.

However, if there are any signs of a defective lithium-ion battery, transportation is not allowed.

For customers outside the European Economic Area

Contact the authorities in charge for the relevant environmental regulations in your country, and dispose of the OMICRON test set in accordance with your legal local requirements.

see Handling defective lithium-ion batteries on page 17.

4 Battery

The internal battery of the *COMPANO 100* test set is a 152 Wh rechargeable lithium-ion battery. When working with rechargeable lithium-ion batteries, certain safety issues apply:

- There is a risk of fire and burns when handled inappropriately. Do not drop or crush the battery, and refrain from opening it. Do not short out the battery contacts, and never expose the battery to high temperatures. Dispose of properly. The battery may explode if damaged or disposed of in fire.
- Do not immerse in any liquid. Avoid the battery to come in contact with chemicals.
- Before charging the battery, read the relevant chapters of the manual. Use the OMICRON-supplied charger, only. Do not charge the battery in a flammable environment. Charge/discharge the battery in the permitted temperature range, only (see User Manual chapter **Technical Data ► Battery**). To avoid damaging the battery, charging is terminated automatically when the temperature exceeds that range. You can check the battery status and temperature at **Setup ► Battery Info**.
- In order to ensure a long lifetime, a battery should not be charged at extreme temperatures. Therefore, *COMPANO 100* controls the permissible temperature range for the battery to be charged. If the battery inside the test set is either too hot or too cold, *COMPANO 100* automatically prevents charging.

  For more information about the charging temperature of the battery see chapter **Technical data ► Battery** in the User Manual.
- If the battery is fully charged, the charger stops charging. If kept connected, the charger restarts charging automatically if the battery is down to approximately 90 %. If the charger is reconnected to the power supply, charging will start immediately (as long as the battery temperature is within the specified range).
- If you do not use the *COMPANO 100* test set for a longer period of time, recharge the battery once every 6 months.

4.1 Transportation of COMPANO 100 with built-in battery

The *COMPANO 100* battery is specified as **Dangerous Goods Class 9**.

- Battery stand-alone: **UN 3480**, Lithium-ion battery.
- *COMPANO 100* with built-in battery: **UN 3481**, Lithium-ion battery contained in equipment or packed with equipment.

Dangerous Good Class 9 label combined with the **UN 3480** number.

Dangerous Good Class 9 label combined with the **UN 3481** number.

Depending on the way of transportation, different rules apply.

1. **Transport of COMPANO 100 by a person on land.**
   Craftsman exemption: The craftsman exemption is a special regulation in the ADR that allows users of a device to ignore the requirements stated below at "4. Shipment of COMPANO 100 on land on page 16". This exemption becomes effective under the following preconditions:
   - Battery and/or test set are transported by a company and their employees.
   - The reason for the transportation is job-related; for example, the test set is used for tests or measurements, brought for repair or maintenance, etc.
   - As long as you do not transport more than 10 *COMPANO 100* test sets at a time, the maximum load of the dangerous good is not exceeded
   - Check whether local regulations supplement the craftsman exemption, or suspend it as a whole or in portions.
2. **Transport of COMPANO 100 by a person on a plane.**
   - In its original case and as initially labeled with information stickers, the *COMPANO 100* test set complies with the IATA (International Air Transport Association) and the ADR (European Agreement concerning the International Carriage of Dangerous Goods by Road) regulations. The built-in battery is **UN 38.3** and **UL** certified.
   - It is possible to either check in the test set, or to take it on board as carry-on luggage. However, since the battery has more than 100 Wh but less than 160 Wh, the approval of the airline is needed. No special labeling is required.
   - Note that these regulations change frequently. Double-check the current status whenever applicable, or, if in doubt, contact OMICRON's Technical Support (→ Support).
   - The signing the IATA Shipper's Declaration must be done by a person who is IATA DGR-certified for category 1. That is a person either of the company that ships out the equipment, or of the transportation company.
3. **Shipment of COMPANO 100 on land.**
   - Shipping lithium-ion batteries on land by a car/truck underlies special regulations. Select a qualified shipping company that is aware of those regulations and complies with it. The shipping company must be a qualified **Dangerous Good** carrier with an according permit. If in doubt, contact OMICRON's Technical Support for shipment regulations (→ Support).
   - Make sure to comply with all requirements listed at **General requirements when packing test sets with built-in batteries** below.
   - Properly label the *COMPANO 100* test set with a **Dangerous Good Class 9** sticker combined with the **UN 3481** number (see page 15).
4. **Shipment of COMPANO 100 by plane:**
   - Shipping lithium-ion batteries by plane underlies special regulations. Make sure to select a qualified shipping company that is aware of those regulations and complies with it. The shipping company must be a qualified **Dangerous Good** carrier with an according permit. If in doubt, contact OMICRON's Technical Support for shipment regulations (→ Support).
   - Properly label the *COMPANO 100* test set with a **Dangerous Good Class 9** sticker combined with the **UN 3481** number (see page 15).
   - Ship the test set in the yellow *COMPANO 100* case, or a likewise solid transportation box, only.

General requirements when packing test sets with built-in batteries

- Protect the test set against damage that may be caused by movement or placement within the packaging. The packaging must be strong enough to withstand the shocks and loadings normally encountered during carriage, including trans-shipment between different transport units and/or warehouses.
- Test set and battery must be packed in a way that under normal conditions of carriage the battery they cannot break, be punctured or be damaged in any other way.
- If you pack the *COMPANO 100* test set with the battery inside, prevent any accidental operation of the test set during transportation.
- Shipping spare batteries underlies stricter regulations. For details, please contact OMICRON's Technical Support (→ Support).

4.2 Storing lithium-ion batteries

The following regulations apply to short- and long-term storage:

- Store the *COMPANO 100* with an almost fully charged battery at a low temperature (we recommend below 25 °C/77 °F) and in a low humidity environment.
- To avoid deep discharge of the battery, recharge it about every 6 months. Note that higher temperatures result in a drastically higher self-discharge rate of the battery.
- Do not store the battery in places with direct sunlight, or near a stove.
- Do not expose the battery to condensation, water drop or not to store it under frozen condition.
- Do not store the battery in places where it is exposed to abnormal static electricity.

4.3 Handling defective lithium-ion batteries

- Consider a lithium-ion battery defective when you notice a mechanical damage, deformation, leaking fluid, an unusual smell or similar abnormal symptoms.
  Note: A battery not showing any of the above mentioned symptoms, however revealing a noticeable capacity loss, does not need to be handled like a defective battery.
- Do not try to continue using a defective lithium-ion battery.
- Do not store or ship a defective lithium-ion battery. Hand it over to an appropriate disposal facility. Regulations and laws pertaining to the recycling and disposal of lithium-ion batteries vary from country to country as well as by state and local governments. Check the laws and regulations of your home region.

4.4 State of health (SOH) of the battery

► For information on the state of health (SOH) of the battery go to **Setup** ► **Battery Info** (see User Manual, chapter **Setup**).

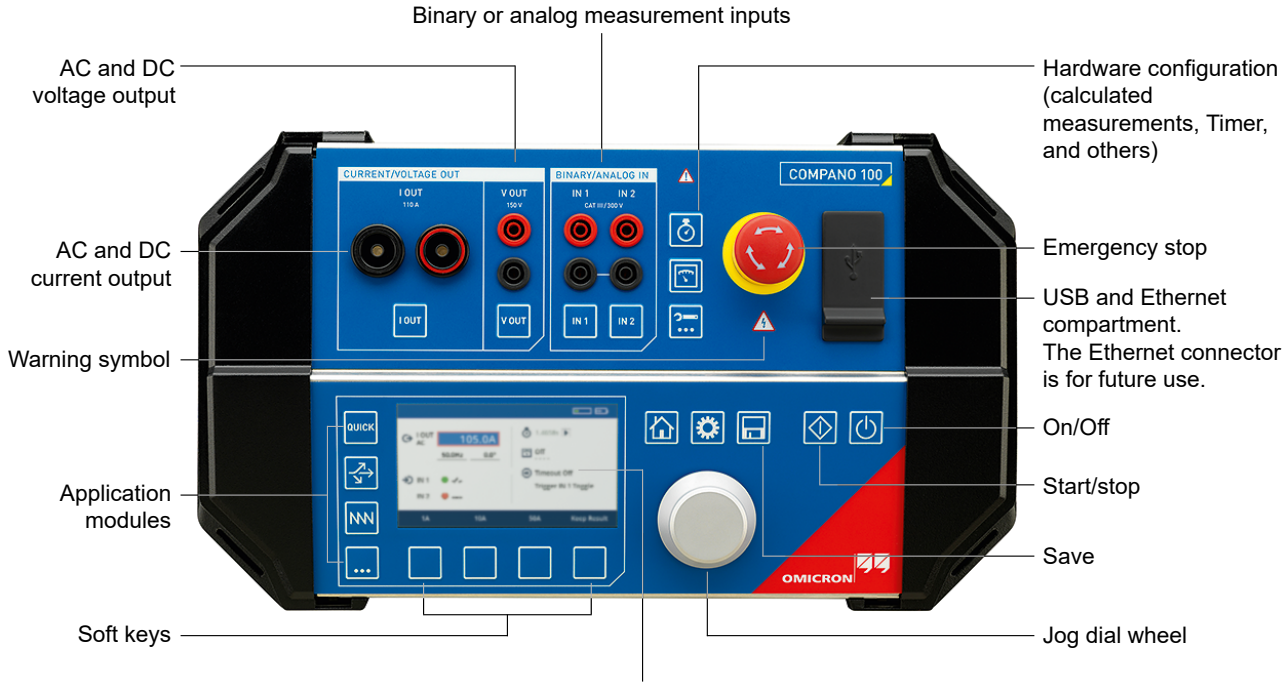
Note that the SOH is the "digital image" of a chemical process, and therefore not an accurate representation. It can change in both directions over time. The SOH is updated with every full discharge-charge cycle.

► Please contact OMICRON Support if the battery state has significantly deteriorated compared to when it was new.

5 Test set overview

COMPANO 100 is a lightweight, highly flexible fully electronic current or voltage source for various checks in an electrical energy system, such as generation, transmission, distribution, railways or industry. *COMPANO 100* is battery-operated; you do not need any additional power source for the test set. The battery is rechargeable.

Top view (For details see the User Manual chapter **Front panel operation**):



WARNING

Death or severe injury caused by high voltage possible

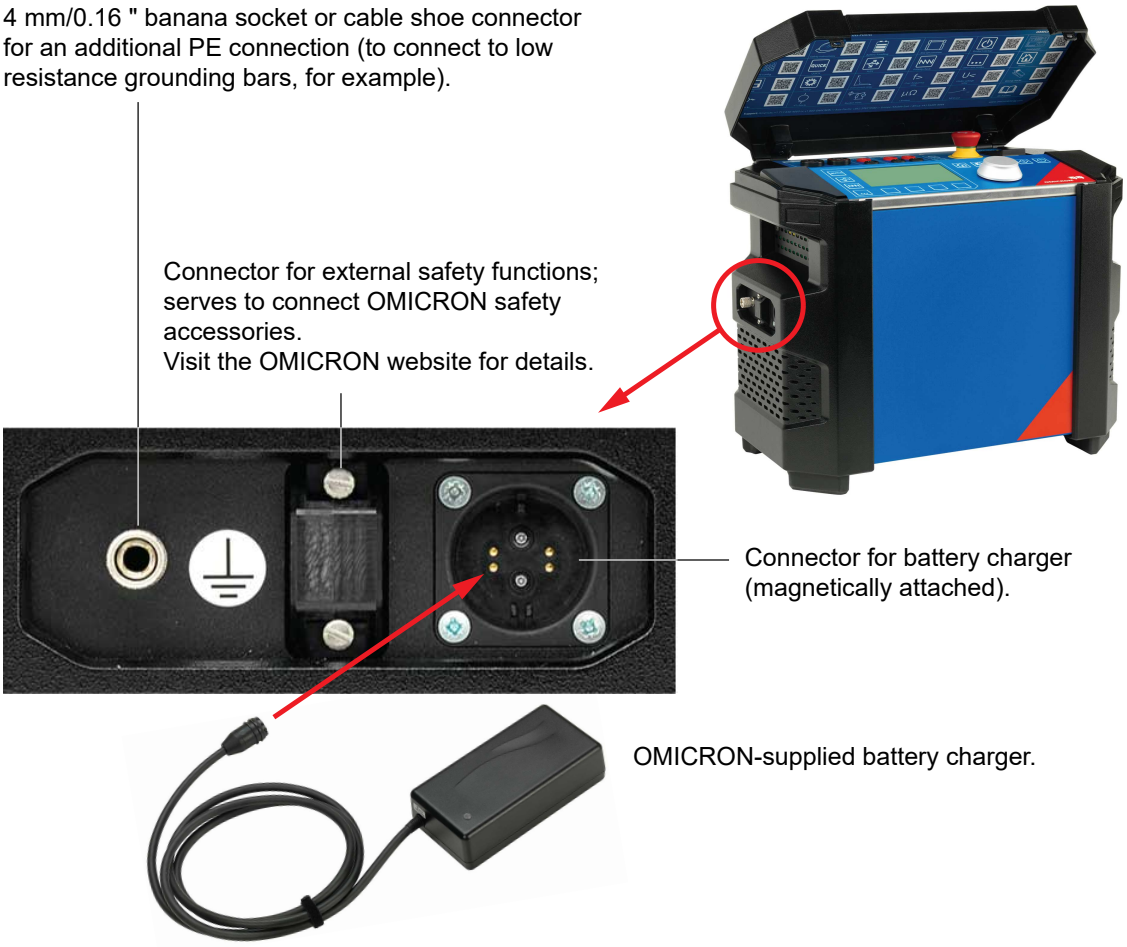
Inductive loads may contain a lethal amount of energy if charged with current. The amount of energy depends on the size of the inductive load, the strength of the applied current, and the frequency. To give an example, 350 mJ are assumed as safe according to the safety standard IEC 61010-1. Particularly critical devices are potential transformers or current transformers, but also the inductive part of other test objects can be critical.

► If you connect loads >0.3 mH to the *COMPANO 100* current output **I OUT**, do not touch the outputs or anything that is connected to them.

The binary and/or analog inputs **IN 1** and **IN 2** may conduct hazardous voltages. The insulation against other potential hazardous voltages is implemented as functional insulation, and they are not isolated against each other (common N).

► Never connect touchable test objects to the inputs without having secured the dangerous area.

Side view:



Note: You can remove the dongle shown in the picture above (the connector for external safety functions) to protect *COMPANO 100* from unauthorized usage.

WARNING

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

The OMICRON-supplied charger has a magnetically attached power connector. Magnets can impact the function of pace makers and implantable cardioverter-defibrillators (for example, actuation of reed switch).

► Keep a minimum distance of 20 cm/8 inch between the magnetic connector and the implanted devices to prevent malfunction and danger to health.

6 Product startup

First, charge the battery

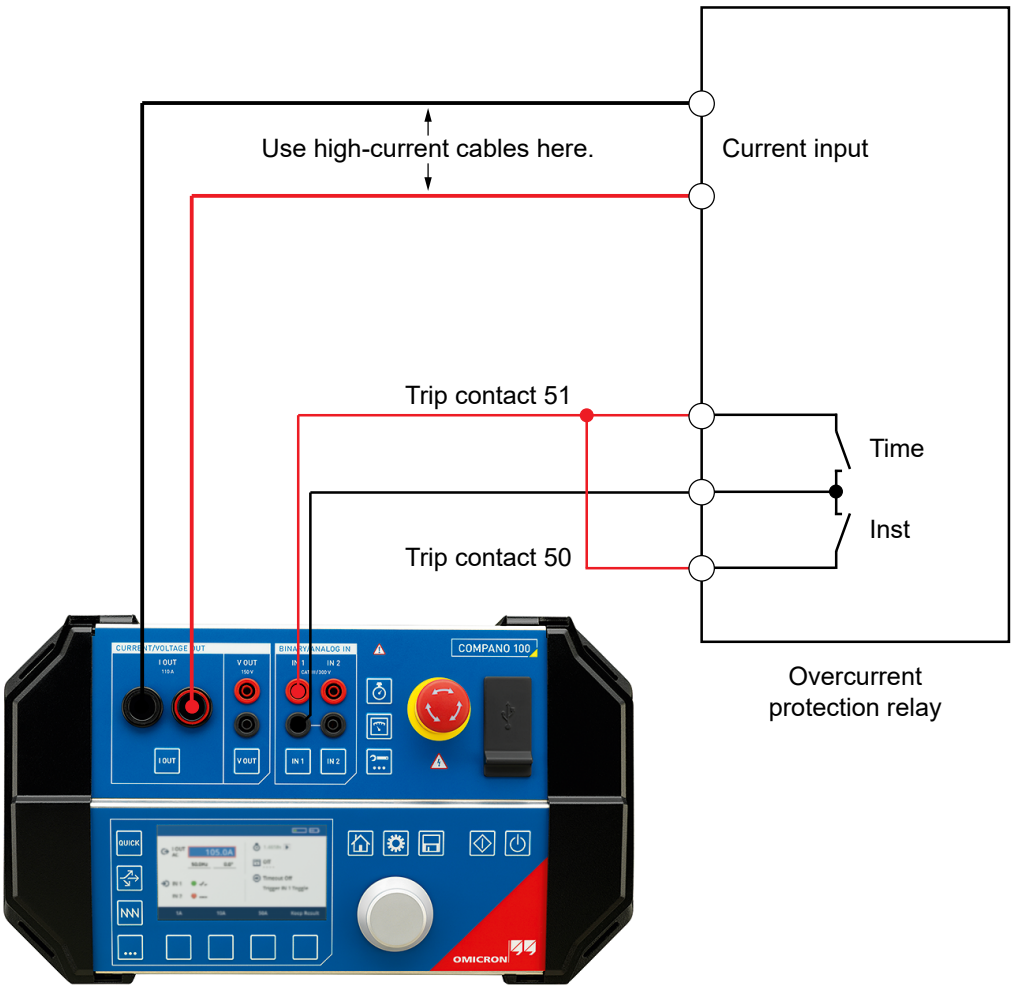
When shipped, the battery inside the *COMPANO 100* test set is partly charged, and the test set can be used immediately. To fully charge the battery, grant a charging time of about 90 minutes.

Use the OMICRON-supplied charger, only. That charger has a magnetically attached power connector. Such a connector has the advantage that, when it is tugged — for example, by someone tripping over the cord — it will pull out of the test set's socket without damaging the connector or the socket.

Then connect COMPANO 100 to the device you would like to test

For safety reasons, press the **emergency stop** button while connecting, and secure the test set against reactivation (see Wiring and Safe Connection on page 9).

The illustration below shows current output **I OUT** connected to an overcurrent protection relay. The relay's potential-free trip contact is connected to binary input **IN 1**.



Power up COMPANO 100

Press the **On/Off** key to power up *COMPANO 100*. Grant the test set about 30 s to boot up. The test set starts in QUICK (see chapter **QUICK** in User Manual).

Power down COMPANO 100

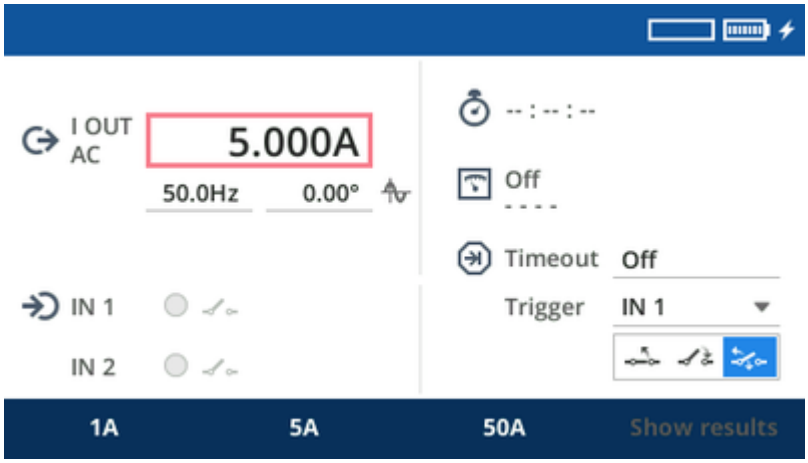
While *COMPANO 100* is running, press the **On/Off** key again to turn off the test set. *COMPANO 100* does not shut off instantly, but performs a controlled shutdown instead.

To abort the controlled shutdown, press any other key of your choice at the front panel control.

A battery running low also initiates a system shutdown, shortly before a looming power supply loss.

Check out the ***COMPANO 100* Product Startup** video on the **OMICRON Video Channel** (visit https://www.omicronenergy.com/COMPANO100-Startup).

6.1 Testing a relay in QUICK



1. Turn the jog dial wheel until the focus is on the output current field.
2. Press the jog dial wheel, set the current to a value of your choice (that is, a value that will make the relay trip for sure), then press the jog dial wheel again.
3. By default, the timer is configured to start when you press the **Start/Stop** key, and to end when there is a change at the dry contact connected to **IN 1**. Therefore, for many applications it may not be necessary to change the timer from its default.
4. Press the **Start/Stop** key. The current is issued at the current output.
5. The current output is turned off by default as soon as the binary contact of the relay switches.
6. The timer records the duration of the relay trip time, that is, the time it took the relay to trip starting from the moment of the current injection.

7 Technical Data

The technical data listed below are an extract of the **Technical Data** chapter of the ***COMPANO 100*** **User Manual**.

Environmental conditions

- Operating temperature: -10 °C ... +50 °C (14 °F ... 122 °F).
- Maximum altitude for operation: 4000 m (13.123 feet).
- Maximum altitude for storage: 15000 m (49.212 feet).
- Humidity: 5 % ... 95 % relative humidity, no condensation.
- Protection class: IP20 according IEC 60529.

Shock and vibration (test set not in operation)

- Shock: 30 g, 11 ms, half sine, 3 shocks in each axis.
- Vibration: 5 g RMS, frequency range 10 … 2 kHz; 30min in each axis.

Size, weight

- Weight: 9.9 kg (22 lb); case without protection cover.
- Dimensions (w × h × d): 360 × 312 × 210 mm (14.2 × 12.3 × 8.3 in).

Power input at connector for battery charger

- 58.8 V DC, maximum charging current 1.7 A.

Battery charger

- Connection: C14 connector according to IEC 60320-1.
- Nominal voltage: 115 V AC/230 V AC.
- Nominal frequency: 50/60 Hz.
- Maximum input current: 2.1 A.
- Maximum output power: 100 W.

Analog Inputs

- Measurement Category: CAT III/300 V.

Analog Outputs

- Current output **I OUT**: 1 x 110 A AC or 100 A DC.
- Voltage output **V OUT**: 1 x 150 V AC or 220 V DC.

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!

24/7 Technical Support - Get Support

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At our technical support hotline, you can reach well-educated technicians for all of your questions. Around the clock – competent and free of charge.

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