## HT-Instruments COMBI 420

# HT-Instruments COMBI 420 Multifunction VDE 0100 Tester User Manual

**Model: COMBI 420**

## 1. Introduction

This user manual provides comprehensive instructions for the safe and effective operation of the HT-Instruments COMBI 420 Multifunction VDE 0100 Tester. The COMBI 420 is an advanced and versatile instrument designed for quick and easy verification of electrical installations. It performs tests in accordance with VDE (EN61557) parts 2, 3, 4, 6, and 7, and includes single-phase network analysis capabilities. Please read this manual thoroughly before using the device to ensure proper functionality and user safety.

## 2. Safety Information

**Warning:** Electrical testing can be hazardous. Always follow local safety regulations and procedures. Failure to do so may result in injury or damage to the equipment.

- Ensure the device is in good working condition before each use.
- Do not use the device if it appears damaged or if any part of the insulation is compromised.
- Always wear appropriate personal protective equipment (PPE) when performing electrical tests.
- Verify that the test leads and accessories are rated for the voltage and current levels being measured.
- The COMBI 420 is designed for safety according to **IEC-1010-1, CAT III 415 V**. Adhere to these ratings.
- Never attempt to open or repair the device yourself. Refer servicing to qualified personnel.
- Avoid making measurements in wet or damp conditions.

## 3. Product Overview

The HT-Instruments COMBI 420 is a robust and user-friendly multifunction tester. It features a large, clear LCD screen with backlight and a graphical help menu for intuitive operation.


*Figure 3.1: HT-Instruments COMBI 420 Multifunction Tester. The device features a large LCD display, navigation buttons, and input terminals for various measurements.*

## 3.1 Key Features

- Large, backlit LCD screen with graphical help menu.
- Connectivity for external test probe with remote control (start/stop function).
- Input for external current clamp (e.g., HT96U) from 1 mA to 3000 A.
- Ports for external probes for humidity, temperature, light (lux), and sound level measurements.
- Low-ohm measurement with >200 mA DC (VDE 0413 part 4, EN 61557-4).
- Insulation test with selectable voltages: 50, 100, 250, 500, or 1000 V DC (VDE 0413 part 2, EN 61557-2).
- Comprehensive FI (RCD) test and analysis function (VDE 0413 part 6, EN 61557-6).
- Loop and network impedance measurement (VDE 0413 part 3, EN 61557-3).
- Short-circuit current Ik display (VDE 0413 part 3, EN 61557-3).
- Loop resistance measurement without RCD tripping.

- Rotating field direction measurement (VDE 0413 part 7, EN 61557-7), possible with a single test probe.
- Power measurement: active, reactive, and apparent power, power factor.
- Harmonic analysis of voltage and current up to the 49th harmonic and THD in %.
- Integrated optical USB interface for data transfer.
- Internal memory for 600 measurement values.
- Automatic shutdown feature.
- Integrated rubber protective holster.
- Online connection assistance via display.

### 3.2 Package Contents

The COMBI 420 package includes:

- HT-Instruments COMBI 420 Multifunction Tester
- Topview software (incl. USB interface + cable)
- Storage bag
- Measurement cable with earthed plug
- 3 safety test leads with banana connectors
- 2 test probes
- 3 crocodile clips
- 6 AA batteries (pre-installed or separate)
- User manual
- ISO 9000 calibration protocol

## 4. Setup

### 4.1 Battery Installation

The COMBI 420 requires 6 AA alkaline batteries. These are typically included with the device. To install or replace batteries:

1. Ensure the device is powered off.
2. Locate the battery compartment on the rear of the device.
3. Open the compartment cover.
4. Insert 6 AA batteries, observing the correct polarity (+/-) as indicated inside the compartment.
5. Close the battery compartment cover securely.

### 4.2 Connecting Test Leads and Accessories

Connect the appropriate test leads and accessories to the input terminals on the COMBI 420 based on the measurement you intend to perform. Always ensure connections are secure.

- **Safety Test Leads:** Use the provided safety test leads with banana connectors for most standard measurements.
- **Earthed Plug Cable:** For measurements requiring a connection to an earthed socket.
- **External Test Probe:** Connect to the designated port for remote start/stop functionality.
- **External Current Clamp:** Connect to the appropriate input for current measurements (e.g., HT96U).

- **External Probes:** Connect humidity, temperature, light, or sound level probes to their respective ports.

## 5. Operating Instructions

### 5.1 Powering On/Off

Press the **POWER** button to turn the device on. The device will perform a self-test and display the main menu. To turn off, press and hold the **POWER** button, or allow the automatic shutdown feature to activate after a period of inactivity.

### 5.2 Navigation and Display

Use the directional buttons and the**ENTER** button to navigate through the menus and select functions. The large LCD screen displays measurement results, settings, and the graphical help menu. Press **ESC/MENU** to return to the previous menu or access the main menu. The **HELP** button provides on-screen assistance for current functions.

### 5.3 Measurement Functions

The COMBI 420 offers a wide range of measurement capabilities. Always refer to the on-screen help or specific sections of this manual for detailed connection diagrams and procedures for each test.

1. **Low-Ohm Measurement (Continuity):**

   Measures resistance with a test current of >200 mA DC, compliant with VDE 0413 part 4 (EN 61557-4). Used to verify the continuity of protective conductors and equipotential bonding.

2. **Insulation Test:**

   Performs insulation resistance measurements at 50, 100, 250, 500, or 1000 V DC, compliant with VDE 0413 part 2 (EN 61557-2). Essential for checking the integrity of insulation in electrical systems.

3. **FI (RCD) Test and Analysis:**

   Comprehensive testing of Residual Current Devices (RCDs) according to VDE 0413 part 6 (EN 61557-6). Includes trip time, trip current, and contact voltage measurements.

4. **Loop and Network Impedance Measurement:**

   Measures loop impedance and network impedance, compliant with VDE 0413 part 3 (EN 61557-3). This is crucial for determining prospective fault current and ensuring proper circuit breaker operation.

5. **Short-Circuit Current Ik Display:**

   Displays the calculated prospective short-circuit current (Ik) based on impedance measurements, as per VDE 0413 part 3 (EN 61557-3).

6. **Loop Resistance without RCD Tripping:**

   Allows loop resistance measurement in circuits protected by RCDs without causing the RCD to trip, using a low test current.

7. **Rotating Field Direction Measurement:**

   Determines the phase sequence (rotating field direction) in three-phase systems, compliant with VDE 0413 part 7 (EN 61557-7). This can be performed even with a single test probe.

8. **Power Measurement and Harmonic Analysis:**

   Measures active, reactive, and apparent power, as well as power factor. Performs harmonic analysis of voltage and current up to the 49th harmonic and calculates Total Harmonic Distortion (THD) in percentage.

9. **External Probe Measurements:**

   When connected, the device can display readings from external humidity, temperature, light (lux), and sound level probes.

### 5.4 Data Storage and Transfer

The COMBI 420 has an internal memory capable of storing up to 600 measurement values. Use the **SAVE** button to store current measurement results. Data can be transferred to a PC using the integrated optical USB interface and the provided Topview software.

## 6. Maintenance

### 6.1 Cleaning

Clean the device regularly with a soft, dry cloth. Do not use abrasive cleaners or solvents. Ensure no moisture enters the device.

### 6.2 Battery Replacement

Replace batteries when the low battery indicator appears on the display. Refer to Section 4.1 for battery installation instructions. Always use new, high-quality AA alkaline batteries.

### 6.3 Calibration

For continued accuracy and compliance, periodic calibration by an authorized service center is recommended. The device is supplied with an ISO 9000 calibration protocol, indicating its initial calibration status.

## 7. Troubleshooting

If you encounter issues with your COMBI 420, try the following basic troubleshooting steps:

- **Device does not power on:** Check battery installation and ensure batteries are not depleted. Replace if necessary.
- **Incorrect or erratic readings:** Verify that test leads are correctly and securely connected. Ensure the correct measurement function is selected. Check for damaged test leads or probes.
- **Display issues:** If the display is dim, check battery level. If the display is frozen, try restarting the device.
- **Data transfer problems:** Ensure the USB cable is properly connected and the Topview software is correctly installed and running on your PC.

For more complex issues, utilize the device's built-in graphical help menu or contact HT-Instruments technical support.

## 8. Specifications

| Feature | Specification |
|---|---|
| Model Number | COMBI 420 |
| Manufacturer | HT-Instruments |
| Product Dimensions (L x W x H) | 24 x 17 x 8 cm (approx. 9.45 x 6.69 x 3.15 inches) |
| Weight | 3 kg (approx. 6.6 lbs) |
| Power Source | Battery-Powered (6 AA batteries required, included) |
| Safety Compliance | IEC-1010-1, CAT III 415 V |

| Feature | Specification |
|---|---|
| Measurement Standards | VDE (EN61557) parts 2, 3, 4, 6, 7 |
| Internal Memory | 600 measurement values |
| Interface | Optical USB |
| Included Components | Topview software, USB cable, storage bag, measurement cable with earthed plug, 3 safety test leads, 2 test probes, 3 crocodile clips, batteries, user manual, ISO 9000 calibration protocol |

## 9. Warranty and Support

HT-Instruments products are manufactured to high quality standards. For specific warranty information, please refer to the documentation included with your purchase or visit the official HT-Instruments website. For technical support, service, or inquiries regarding calibration, please contact your local HT-Instruments distributor or customer service department.

### Related Documents - COMBI 420

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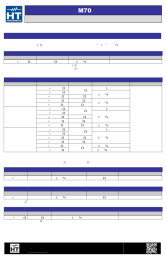
|   | COMBI521 Multifunction Tester: Electrical Safety, Power Quality & EVSE Testing<br>Comprehensive technical specifications for the HT Instruments COMBI521 multifunction tester, detailing its capabilities for electrical installation safety tests, power quality analysis, and EVSE safety tests. Includes measurement functions, detailed technical data, general specifications, and compliance information. |
|   | HT Instruments PV-ISOTEST User Manual<br>Comprehensive user manual for the HT Instruments PV-ISOTEST, detailing safety precautions, instrument functions, operating instructions, technical specifications, and troubleshooting for photovoltaic insulation testing. |
|   | HT Instruments M70 Handheld Insulation/Continuity Meter Specifications and Features<br>Detailed specifications, features, and reference standards for the HT Instruments M70 handheld insulation and continuity meter, capable of up to 1000VDC. Includes information on electrical tests, power, and operating conditions, along with services offered by EURO-INDEX. |

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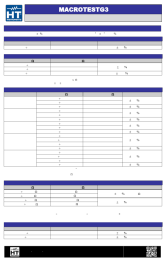
|  | [HT Instruments NEPTUNE Multifunction Professional Safety Multimeter Datasheet]<br>Comprehensive datasheet for the HT Instruments NEPTUNE, a professional safety multimeter. Details electrical specifications, features, power supply, environmental conditions, and compliance information. |
|  | [HT Instruments HT7 Digital Voltage Tester User Manual]<br>Comprehensive user manual for the HT Instruments HT7 digital voltage tester, covering safety instructions, operating procedures, technical specifications, and maintenance for safe and effective use. |
|  | [HT Instruments MACROTESTG3 Professional Installation Safety Tester - Specifications and Features]<br>Detailed technical specifications, electrical parameters, RCD testing capabilities, loop impedance, insulation resistance, voltage, current, power factor, and harmonics measurements of the HT Instruments MACROTESTG3 professional installation safety tester. |