GOSSEN METRAWATT

# METRACELL BT PRO

## Portable Battery Tester

3-447-058-03
6/5.26



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# 1 Safety Regulations



Read and follow these instructions carefully and completely in order to ensure safe and proper use.

The instructions must be made available to all persons who use the device.

Keep for future reference.

**General Information**

- The device may only be used by electrically trained persons (ETP) and qualified electricians in commercial applications. It is not a consumer product.
- Observe and comply with the following safety rules: 1. Shut down entirely. 2. Secure against restart. 3. Assure absence of voltage at all poles. 4. Ground and short circuit. 5. Cover neighboring live components, or make them inaccessible. (See, e.g., “DIN VDE 0105-100, Operation of electrical installations – Part 100: General requirements“ for Germany.)
- Observe and comply with all safety regulations that apply to your work environment.
- Wear suitable and appropriate personal protective equipment (PPE) whenever working with the device.
- The functioning of active medical devices (e.g., pacemakers, defibrillators) and passive medical devices may be affected by voltages, currents and electromagnetic fields generated by the device and the health of their users may be impaired. Implement corresponding protective measures in consultation with the manufacturer of the medical device and your physician. If any potential risk cannot be ruled out, do not use the device.

**Accessories**

- Use only the specified accessories (included in the scope of delivery or listed as options) with the device.
- Carefully and completely read and follow the product documentation for optional accessories. Retain the documentation for future reference.

**Handling**

- Use the device only if it is in perfect condition.
  Inspect the device before use. Pay particular attention to damage, interrupted insulation, or kinked cables.
  Damaged components must be replaced immediately.
- Use only accessories and cables that are in perfect condition.
  Inspect accessories and all cables before use. Pay particular attention to damage, interrupted insulation, or kinked cables.
- If the device or its accessories do not function flawlessly, permanently remove the device/accessories from operation and secure them against being restarted inadvertently.
- If the device or accessories are damaged during use (e.g., if they are dropped), permanently remove the device/accessories from operation and secure them against being restarted inadvertently.
- If there are any signs of interior damage to the device or accessories (e.g., loose parts in the housing), permanently remove the device/accessories from operation and secure them being restarted inadvertently.
- The device and accessories may only be used for the tests/measurements described in the documentation for the device.
- The devices and accessories of Gossen Metrawatt GmbH are designed to ensure optimum compatibility with the Gossen Metrawatt GmbH products that are expressly provided for them. Unless otherwise expressly confirmed by Gossen Metrawatt GmbH, they are neither intended nor suited for use with other products.
- Route cables in an orderly fashion, e.g., the mains power cable and accessory cables. Loose, disorderly cables result in unnecessary danger of tripping and falling.

**Measurements/Tests**

- Please note that the voltage measurement function is subject to regional requirements, e.g.:
  - European Union:
    The voltage measuring function and/or mains check integrated into the test instrument may not be used to test systems or system components for the absence of voltage.
    Testing for the absence of voltage is only permissible with a suitable (2-pole) voltage tester or voltage measuring system which fulfills the requirements specified in EN 61243.
  - United Kingdom:
    If the device is used to determine the presence or absence of dangerous voltages, the function of the voltage measurement unit must always be checked with a known voltage source or test unit before and after use.

- Be aware that unexpected voltages may occur on the devices under test (e.g., defective devices). For example, capacitors may be dangerously charged.
- Be aware that dangerous pulsating voltages may occur in HF circuits.
- Do not perform any measurements in electrical circuits with corona discharge (high-voltage).

**Operating Conditions**

- Do not use the device and accessories after long periods of storage under unfavorable conditions (e.g., humidity, dust or extreme temperature).
- Do not use the device and accessories after extraordinary stressing due to transport.
- Do not expose the device to direct sunlight for long periods of time. Overheating may cause damage to the device.
- Only use the device and accessories within the limits of the specified technical data and conditions (ambient conditions, IP protection code, measurement category, etc.).
- Do not use the device in potentially explosive atmospheres. Risk of explosion!
- Do not use the device in areas subject to the risk of fire. Risk of fire!
- Implement adequate measures for protection against electrostatic discharge (ESD):

**(Rechargeable) Batteries**

- Use (rechargeable) batteries that are in perfect condition. Risk of explosion and fire in the case of damaged (rechargeable) batteries!
  Inspect the (rechargeable) batteries before use. Pay particular attention to leaky and damaged (rechargeable) batteries.
- When using (rechargeable) batteries, the respective test/measuring instrument must only be used with the (rechargeable) battery compartment lid inserted and secured. Otherwise, dangerous voltages may occur at the (rechargeable) battery terminals under certain circumstances.
- Do not use the associated test/measuring instrument while the internal rechargeable batteries are being charged.
- Only charge intact rechargeable batteries. Risk of explosion and fire in the case of damaged rechargeable batteries!
  Inspect the rechargeable batteries before charging. Pay particular attention to leaky and damaged rechargeable batteries.

**Fuses**

- The device may only be used as long as the fuses are in flawless condition. Defective fuses must be replaced.
  This may only be performed by our repair service department.
- Never bridge the fuses. Never disable the fuses.

**Measurement Cables and Establishing Contact**

- Plugging in the measurement cables must not necessitate any undue force.
- Never touch conductive ends (e.g., of test probes).
- Fully unroll all measurement cables before starting a test/measurement. Never perform a test/measurement with the measurement cable rolled up.
- Avoid short circuits due to incorrectly connected measurement cables.
- Ensure appropriate contacting (e.g., on the test probes, alligator clips, Kelvin probes, etc.).
- Move or remove contactors (e.g., the test probes, alligator clips, Kelvin probes, etc.) only after the test or measurement procedure has been completed.
  Unwanted sparking may otherwise occur due to test current.
- Only use measurement cables and external cabling with a maximum length of 1 m.

**Adjustment/Calibration**

- Comply with national adjustment regulations and laws.
- Comply with national calibration regulations and laws.
- Calibration may only be carried out by authorized service centers.

**Emissions**

- The device is equipped with a Bluetooth® module. Determine whether or not use of the implemented frequency band of 2400 MHz to 2483.5 MHz is permissible in your country.
- The device is equipped with a transponder module. Determine whether or not use of the 125 kHz frequency is permissible in your country.
- Switch off nearby cell phones while performing tests/measurements with the device. Cell phone signals may impair correct functioning of the device due to interference.

**Data Security**

- Always create a backup copy of your measurement/test data.
- The device is equipped with a data memory to which personal and/or sensitive data can be stored. Observe and comply with the applicable national data protection regulations. Use the corresponding functions provided by the device (such as access protection), as well as other appropriate measures to prevent unauthorized access to the data.
- Protect the device against unauthorized tampering. Use the functions provided by the device (e.g., key lock / sealing / lock) as well as other appropriate measures (e.g., restricting physical access to the device).

**Documentation**

- Test reports must be checked for correctness and signed by the inspector.

# 2 Important Information

Please read this important information!

## 2.1 Intended Use / Use for Intended Purpose

Periodic testing and well-organized maintenance are necessary in order to assure the availability of stationary battery systems.

The METRACELL BT PRO is a multifunctional device for testing batteries and battery blocks (referred to below as “devices under test” or “DUTs”). It can be used to determine the current status of a DUT and pinpoint concealed defects. The battery tester is used primarily for testing DUTs in stationary battery systems.

The battery tester stores measured values internally. All recorded measured values can be viewed on site. If necessary, individual measurements can be easily repeated. Management of devices under test, as well as evaluation and backup of the measured values, is handled by the included “BT PRO Manager” software. The measured values can also be transferred to an external computer as a CSV file.

The battery tester is a portable device which can be held in the hand while performing measurements.

The safety of the operator and the device is only assured when it is used in accordance with its intended use.

## 2.2 Use for Other Than Intended Purpose

Using the device for any purposes other than that described in the quick start guide or these device operating instructions is considered misuse. Use for other than the intended purpose may lead to unpredictable damage!

## 2.3 Liability and Guarantee

The liability and warranty provided by Gossen Metrawatt GmbH are governed by the applicable contractual and mandatory statutory provisions.

## 2.4 Opening the Device / Repairs

The device may only be opened by authorized, trained personnel in order to ensure flawless, safe operation and to assure that the guarantee is not rendered null and void. Original replacement parts may also only be installed by authorized, trained personnel.

Unauthorized modification of the device is prohibited.

If it can be ascertained that the battery tester has been opened by unauthorized personnel, no guarantee claims can be honored by the manufacturer with regard to personal safety, measuring accuracy, compliance with applicable safety measures or any consequential damages.

# 3 Documentation

## 3.1 Information Concerning This Manual

Read this manual carefully and thoroughly. It contains all the information necessary for the safe use of the device. Follow these instructions to protect yourself and others from injury and to prevent damage to the device.

The latest version of this manual is available on our website:

https://www.gossenmetrawatt.de/en/service-support/download-center/

### Errors and Suggestions for Improvement

This manual has been prepared with the utmost care to ensure the accuracy and completeness of all information. Unfortunately, however, errors can never be avoided completely. As part of our quality management, we strive to continuously improve our products – your relevant comments and suggestions help us in this regard.

### Gender-neutral Language

For the sake of readability, we have chosen not to use the masculine, feminine, and diverse (m/f/d) forms simultaneously. Instead, we use only the masculine form.

### Intellectual Property Rights

The product names used in this document may be subject to trademark and patent law. They are the property of their respective owners.

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## 3.2 WARNINGS AND HAZARD NOTICES

Throughout this document, notes and instructions for ensuring user and equipment safety, as well as for protecting the equipment, are highlighted in appropriate places.

The manner of presentation depends on the severity of the hazard and the potential risk. The accompanying description takes into account possible causes, consequences of non-compliance with the relevant instructions, and necessary measures to avoid a hazard.

**DANGER**

Death or serious injury is very likely.

**WARNING**

Death or serious injury is possible.

**ATTENTION**

Minor or moderate injuries are possible.

**ATTENTION**

Damage to the product or the environment is possible.

**Note**

Important information

**Tip**

Useful additional information or application notes

## 3.3 IDENTIFIERS

The following identifiers are used in this documentation:

| Label | Meaning |
|---|---|
| **Control element** | Control buttons, keys, menus and other controls |
| ✓ Prerequisite | A condition, etc., that must be fulfilled before a given action can be taken. |
| ▶ **Procedure** | Start of procedural instructions |
| 1. Action step | Action steps that must be completed in the specified order. |
| ↳ Result | Result of an action step. |
| ■ List<br>■ List | Bullet lists |
| *Figure 1: Caption* | Description of the content of a figure |
| *Table 1: Table 1* | Description of the content of a table |
| Footnote | Comment |

*Table 1: Labels used in this document*

## 3.4 SYMBOLS USED

The following symbols are used in this documentation:

| Symbol | Meaning |
|---|---|
|  | Read and follow the product documentation. |
|  | General warning symbol |
|  | Warning of dangerous electrical voltage |

*Table 2: Symbols used*

## 3.5 Definition of Terms

A battery is an electrochemical energy storage device and the smallest unit that can be used in technical applications. One or more cells in a housing form a block. In turn, a battery consists of a single block or a group of blocks which are connected in parallel and/or in series. Sufficiently high voltages are generated by connecting units into a string. Together, one or more batteries and/or blocks, along with additional components (e.g., control systems, cooling, fuses etc.) form a system as the largest unit.

A UPS system (uninterruptible power supply) usually consists of several rechargeable batteries, which in turn are made up of several blocks and electrical circuits (e.g., the charging equipment, control electronics for monitoring mains voltage and the inverter for converting outgoing direct voltage into alternating voltage).

In the case of a battery tester, a device under test is always a battery by definition. Information such as the location (the system) and the number of blocks is assigned to this battery.

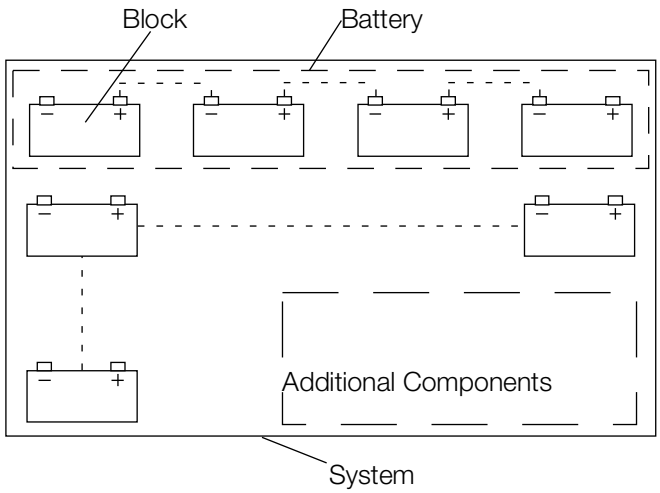



*Image 1: Example – Blocks and battery within a system*

# 4 Getting Started

1. Read and follow the product documentation. In particular, observe all safety information in the documentation, on the device and on the packaging.
   ⇨ “Safety Regulations” 🗎4
   ⇨ “Important Information” 🗎7
   ⇨ “Documentation” 🗎8
2. Familiarize yourself with the battery tester.
   ⇨ “Device” 🗎11
   ⇨ “Operation” 🗎18
   ⇨ “Menu and Functions” 🗎23
3. Install BT PRO Manager software and familiarize yourself with the program ⇨🗎34.
4. Create a battery database ⇨🗎45.
5. Complete all required preparations to be able to perform measurements ⇨🗎37.
6. Perform measurements ⇨🗎65.
7. Evaluate your measurements ⇨ “Viewing, Editing, Transferring and Evaluating Measured Values” 🗎89.

# 5 Device

## 5.1 Scope of Delivery

Please check the scope of delivery for completeness.

1 METRACELL BT PRO
1 Rubber case
4 1.2 V AA batteries
1 Power pack
1 Set of multimeter test probes (KS29)
2 Alligator clips (KY95-3)
1 Set of Kelvin probes for 4-wire measurement (Z227D)
1 Carrying strap
1 Carrying case
1 BT PTO Manager (battery tester management software)
1 Test report / factory calibration certificate
1 Quick start guide

## 5.2 Optional Accessories

Some measurements require optional accessories:

- AC/DC current clamp sensor
  - CP1800 (Z204A) for measurements up to 1250 $A_{DC}$ or
  - CP330 (Z202B) for measurements up to 300 $A_{DC}$
- METRATHERM IR BASE temperature sensor (Z680A)
- Angled Kelvin probes for 4-wire measurement (Z227W)
- Spring-loaded contact pins as replacement parts for Kelvin probes (Z227F) and angled Kelvin probes (Z227W)
- IrDA USB adapter (Z227I)

For further information on accessories, please contact our product support team ➪🗎95.

Values recorded and stored with the DMA 35 portable density meter from Anton Paar GmbH can be transferred to the battery tester. A description of how to use the density meter with the METRACELL BT PRO is included in these operating instructions (➪🗎65). Please contact Anton Paar GmbH for any further information concerning the DMA 35 density meter.

## 5.3 Device Overview

### 5.3.1 Front




*Image 2: Front panel*

### 5.3.2 Back

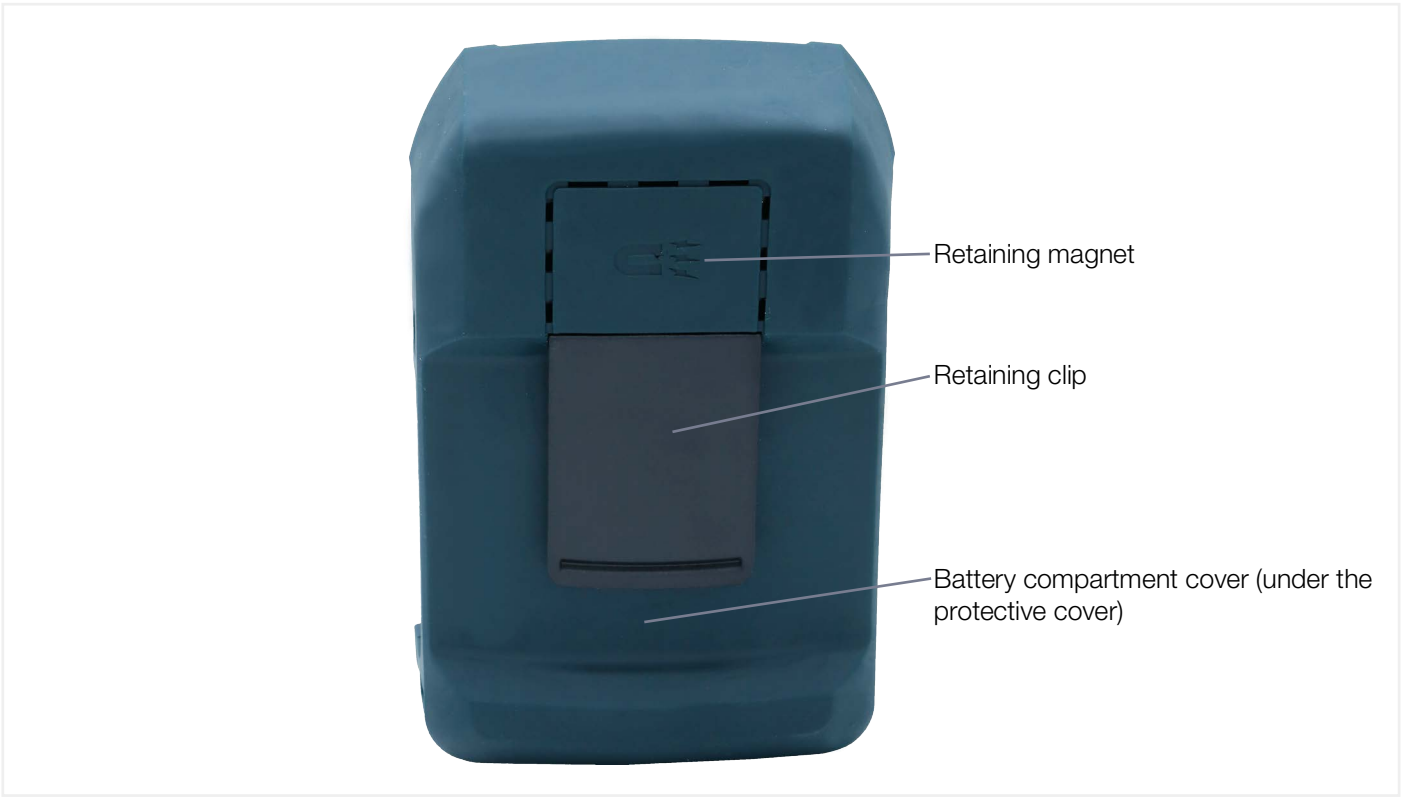



*Image 3: Back of device*

### 5.3.3 Symbols on the Device and the Included Accessories:



Warning concerning a point of danger
(Attention, follow documentation!)



Double insulation (protection class II)




Charging socket location (⇨ “Device Overview” 🗎12).

**ATTENTION**

**Damage to the device due to unsuitable batteries!**

Damage to the device.

Only rechargeable NiMH batteries may be inserted when the charger is connected.



Fuse

IR ▸ Infrared interface location



Static magnetic field

CE conformity marking



The device may not be disposed of with household trash
⇨ “https://www.gossenmetrawatt.de/services/mygmc/” 🗎96.

## 5.4 Relevant Standards

The battery tester has been manufactured and tested in accordance with the following safety regulations:

| | |
|---|---|
| IEC 61010-1<br>EN 61010-1<br>VDE 0411-1 | Safety requirements for electrical equipment for measurement, control and laboratory use –<br>General requirements |
| EN 60529<br>VDE 0470-1 | Test devices and test procedures<br>Protection classes provided by housing (IP code) |
| DIN EN 61326-1<br>VDE 0843-20-1 | Electrical equipment for measurement, control and laboratory use – EMC requirements –<br>Part 1: General requirements |

## 5.5 Measurement Inputs

All measurement inputs are referenced to ground and the reference potential, P–/COM input. The measurement inputs are not electrically isolated from each other.

The measuring ranges depend on the respective measurement inputs.

| Measurement Input | Meaning |
|---|---|
| S– | Input for measuring DC voltage.<br>Measuring range: ± 2450.00 $mV_{DC}$<br>Resolution: 0.01 mV<br>Input impedance: > 10 MΩ<br>Sense lead to minus pole for resistance measurement. |
| P–/COM | Reference potential (ground potential) of all measurement inputs.<br>Current-carrying conductor to minus pole for resistance measurement. |
| S+ | Measurement input for DC and AC voltage measurements.<br>Measuring range: ± 5000 $V_{DC}$, Resolution: 0.1 mV<br>Measuring range: ±600.000 $V_{DC}$, Resolution: 1 mV<br>Measuring range: 0…300.00 $V_{AC}$, Resolution: 10 mV<br>Input impedance: 1.6 MΩ<br>Sense lead to plus pole for resistance measurement. |

| | |
|---|---|
| P+ | Current-carrying conductor to plus pole for resistance measurement.<br><br>**ATTENTION**<br>**Exceeding the maximum test voltage of 24 $V_{DC}$!**<br>Damage to the device.<br>Do not exceed the test maximum voltage of 24$V_{DC}$.at the p+ input. |

**Note**

600 V CAT III refers to measurement inputs S+, S– and P–/COM.

## 5.6 LCD Display

All measured values, functions and settings can be viewed on the device display. As a rule, the display at the LCD panel appears in two lines. Certain displays, such as measured values, are also shown on three or four lines.

After the battery tester is switched on, the start screen appears with the device designation, the version, and the date and time.

| | |
|---|---|
| BTpro | <date> |
| <version> | <time> |

*Image 4: Image: Start screen*

After pressing any key while the start screen is shown, the battery tester switches to the main menu.

All other displays and information which appear at the device depend on the previously selected function. The currently selected function is always indicated by a preceding arrow **->**.

## 5.7 Function Keys / Navigation

| Key | Meaning |
|---|---|
|  | "**Function**" key<br>– Switch on and off (⇨🗎19)<br>– Press briefly: Return to next higher menu level or abort measurement<br>– Press and hold: End (⇨🗎66) or reactivate (⇨🗎66) measurement |
|  | Down arrow key "▼"<br>Select menu items or digits in the downward direction. |
|  | Up arrow key "▲"<br>Select menu items or digits in the upward direction. |
|  | "**OK**" key<br>– Open menus<br>– Execute functions<br>– Confirm entries<br>– Select digits<br>– Properly end measurements<br>– Press and hold: Repeat measurement (⇨🗎66) |

## 5.8 RFID Reader

The display is surrounded by an RFID reader. If individual batteries are equipped with an RFID tag (transponder), you can scan the tag before a measurement so that the measurement data is automatically assigned to the unit afterward ⇨🗎67.

### 5.8.1 125 kHz Technology

The RFID reader can only read RFID tags which use a frequency of 125 kHz. This technology offers several advantages:

- As one of the first RFID technologies, it is widely used and easy to obtain.
- It uses robust tags which are relatively insensitive to interference from metals and liquids, which is crucial in battery environments.
- Universal use (license-free ISM band)
- Minimal energy consumption (low-frequency long-wave range – LF passive tags)
- Reading range: approx. 10 cm
- Small data transfer volumes with fast reading process (e.g., only object ID as battery identification)

### 5.8.2 Reading RFID Tags

To read an RFID tag, hold the battery tester display 1 to 2 cm above the RFID tag. The display will show the identifier **RF**.

## 5.9 Attachment Options

The battery tester provides acoustic feedback for all important steps, e.g., readiness to record measured values. Therefore, you do not need to continuously observe the display.

To ensure freedom of movement, convenience, and quick work for the operator, the battery tester can be secured using various retaining devices for the entire duration of measurement:

- Carrying strap:
  You can use the carrying strap to hang the battery tester around your neck. The quick start guide includes ⇨🕮 a description of how to attach the carrying strap.
- Retaining clip:
  You can use the retaining clip to attach the battery tester to your belt.
- Retaining magnet:
  The retaining magnet allows you to attach the battery tester to magnetic surfaces such as battery cabinet doors.

## 5.10 Technical Data

| | | |
|---|---|---|
| **Power Supply** | Rechargeable NiMH battery, 4 x 1.2 V type AA (recommended: Ansmann maxE 2500 mAh) | |
| **Input Impedance** | Measurement input S+: | 1.6 MΩ |
| | Measurement input S–: | > 10 MΩ |
| **Ambient Conditions** | Operating temperatures: | +5 ... +40 °C |
| | Storage temperatures: | –20 ... +60 °C |
| | Relative humidity: | Max. 75%, no condensation allowed |
| | Elevation: | Max. 2000 m |
| **Electrical Safety** | Measurement category: | 600 V CAT III |
| | Pollution degree: | 2 |
| | Protection class: | II |
| | Fuse: | 1 × SIBA 2 A/1000 $V_{DC}$/30 kA |
| | Test voltage: | The maximum test voltage at measuring connection P+ must not exceed 24 $V_{DC}$. |
| **Electromagnetic Compatibility (EMC)** | Interference emission: | EN 61326-1, class A |
| | Interference immunity: | EN 61 326-1<br>EN 61326-2-1 |
| **Mechanical Design** | Protection: | Housing: IP40<br>per DIN VDE 0470-1/EN 60529<br>(protection against ingress of solid foreign objects:<br>≥ 1.0 mm ∅; protection against ingress of water: not protected) |
| | Housing (W × H × D): | Approx. 9.6 × 15.4 × 3.3 cm |
| | Weight: | Approx. 0.45 kg (without rubber case) |
| | Display: | LCD, monochrome, luminous |
| **Data Interfaces** | IrDA: | Connection for DMA 35 BASIC density meter (Version 3)<br>Connection to laptop/PC with optional IrDA USB adapter (Z227I) |
| | RFID: | Connection for RFID tag<br>Frequency range: 125 kHz<br>Transmission intensity: 34.3 dbµV/m or -17.2 dbµA/m |
| | Wireless interface: | Connection to PC,<br>headset, and DMA 35 density meter (Version 4)<br>Frequency range: 2.4–2.4835 GHz<br>Transmission intensity: max. + 3 dBm |
| **Internal Memory** | Up to 300,000 data records | |

**Note**

The technical data for the AC/DC current clamp sensors, the temperature sensor, and the DMA 35 density meter can be found in the respective product documentation.

## 5.11 Characteristic Values

| Measuring Function | | Multimeter/ Connector | Multimeter/ Float/ Discharge/ Charge | Multimeter/ Interval U/ Interval U+I | Multimeter | resistance | Temperature |
|---|---|---|---|---|---|---|---|
| Measured Quantity | | $V_{DC}$ | $V_{DC}$ | $V_{DC}$ | $V_{AC}$ [1] | $R_{el} + R_{ct}$ | °C |
| Display Range | | –2450.00 … +2450.00 mV | –24.5000 … +24.5000 V | –600.000 … +600.000 V | 0.00 … 300.00 V | 00.00 … 1000.00 mΩ | –230.0 … +230.0 °C [2] |
| Measuring Range | | –2450.00 … +2450.00 mV | –24.5000 … +24.5000 V | –600.000 … +600.000 V | 0.00 … 300.00 V | 00.10 … 1000.00 mΩ | |
| Frequency Display | | – | – | – | 40.00 – 99.99 Hz<br>100.0 – 999.9 Hz<br>1000 – 1400 Hz [3] | – | – |
| Resolution | | 0.01 mV | 0.1 mV | 1 mV | 10 mV | 0.01 mΩ | 0.1 °C |
| Input Impedance / Test Current | | > 10 MΩ | 1.6 MΩ | 1.6 MΩ | 1.6 MΩ | $I_p$ approx. 2A | > 10 MΩ |
| Intrinsic Uncertainty | | ±(0.05% rdg. + 10D) | ±(0.05% rdg. + 10D) | ±(0.05% rdg. + 50D) | ±(2.0% rdg. + 10D) [4] | ±(3.0% rdg. + 8D) | |
| S+ | Measuring Connections | | • | • | • | • | |
| S– | | • | | ⋏ | | • | • |
| P+ | | | | | | • | |
| P–/ COM | | • | • | • ⋏ | • | • | • |

[1] Frequency measurement only works at an input voltage of 20 $V_{AC}$ or higher.

[2] Applies only if the temperature sensor is connected to the battery tester.

[3] The 1000 – 1400 Hz frequency range is not calibrated. This is indicated on the METRACELL BT PRO display by “NC” (not calibrated).

[4] In the frequency range of 45 – 500 Hz.

**Note**

The characteristic values of the AC/DC current clamp sensors and the DMA 35 density meter, as well as additional characteristic values for the temperature sensor and the IrDA USB adapter, can be found in the respective product documentation.

# 6 Operation

## 6.1 Power Supply (rechargeable batteries)

### 6.1.1 Battery Operation

The battery tester is powered by rechargeable NiMH batteries. You have already inserted the batteries during initial startup (⇨🕮 quick start guide).

The operating time is approximately 10 hours when the batteries are fully charged. A warning is issued when the battery voltage drops below 4.8 V. After this message appears, the battery tester can be operated for approximately 1 more hour.

**ATTENTION**

**Leaking batteries!**

Damage to the device.

Check the batteries at regular, short intervals and after long periods of storage.

### 6.1.2 Charging Process

It takes about 3½ hours to charge the batteries.

Damage to the batteries or the device.
When charging, use only:
- The rechargeable batteries specified in the technical data.
- The included charger.

Always connect the charger to the battery tester first, i.e., before you connect the charger to the electrical outlet.

**Note**

Do not switch the battery tester on during charging. The battery tester must not be operated during charging and will automatically switch off after 3 seconds.

✓ The battery tester has been switched off.
✓ 4 rechargeable NiMH batteries are inserted.
(For information on inserting batteries, see Section “Replacing the Batteries” ⇨🗎18.)
✓ All measurement cables and accessories have been removed from the battery tester.

1. Insert the connector plug of the charger into the charging socket on the battery tester ⇨ “Device Overview” 🗎12.
2. Connect the charger to the 230 V power supply.
The batteries in the battery tester are charging.
3. Wait until the charging process has been completed.
It takes about 3½ hours to fully charge the batteries.
4. Unplug the charger from the electrical outlet.
5. Remove the connector plug from the charging socket on the battery tester.

↳ The batteries are charged. The battery tester can now be used.

### 6.1.3 Replacing the Batteries

You can replace the batteries as needed.

**CAUTION**

**Dangerous voltage!**

Electric shock.

Only use the device when the battery compartment cover is inserted and firmly screwed into place.

Required tools: Philips screwdriver

✓ The battery tester has been switched off.
✓ All measurement cables and accessories have been removed from the battery tester.

1. Remove the protective cover from the battery tester: Press against the bottom of the protective cover at the front and push it back and off the battery tester. As soon as the lower part of the battery tester is exposed, pull the device completely out of the protective cover.
2. Place the battery tester face down on a stable surface.
3. Loosen and remove the screw from the battery compartment cover.
4. Unlock and remove the battery compartment cover.

5. Remove any batteries from the battery compartment.
6. Insert 4 approved rechargeable batteries into the battery compartment, making sure that the plus and minus poles match up with the provided polarity symbols.

**Note**

Use only the batteries specified in the technical data (⇨🗎16).

7. Place the battery compartment cover onto the battery compartment and press it until it audibly clicks into place.
8. Secure the battery compartment cover with the screw.
9. Pull the protective cover over the battery tester again: Make sure to align it with the cutouts for the front panel and connections. Push the battery tester into the protective cover at the top first as far as it will go. Then press on the front at the bottom until the battery tester is fully reinserted into the protective cover.

↳ The batteries have been inserted. The battery tester can now be used.

## 6.2 Switching the Device On/Off

### 6.2.1 Switching the Device On

1. Press and hold the **Function** key for approx. 2 seconds.
   The start screen appears with the device designation, version, and date and time (⇨ “LCD Display” 🗎14).
2. Press any key.

↳ The start screen changes to the **main menu**. The battery tester can now be used.

### 6.2.2 Switching the Device Off

Normally, you switch the battery tester off manually. If the battery tester has not been used for more than 10 minutes, it also switches off automatically.

1. In the **main menu**, press the ▼ key to select → **POWER OFF**.
2. Press the **OK** key.

↳ The display goes blank. The battery tester has been switched off.

**Note**

The battery tester can also be switched off by pressing the **Function** key. To do this, press and hold the key for approximately 10 seconds.
However, it is recommended that you turn off the device using the **POWER OFF** function.

## 6.3 System Settings

You can configure basic settings for the battery tester.

### 6.3.1 Setting Date and Time

**Note**

Set standard time and daylight savings time manually. The battery tester is not equipped with an automatic time change function.

1. Switch the battery tester on ⇨🗎19.
2. Press the **OK** key.
   The **main menu** is displayed.
3. From the **main menu**, use the ▼ ▲ keys to select
   → **SETTINGS**.
4. Press the **OK** key.
   The **SETTINGS** menu is displayed.
5. Use the ▼ ▲ keys to select → **SYSTEM**.
6. Press the **OK** key.
   The **SYSTEM** menu is displayed.
7. Use the ▼ ▲ keys to select → **TIME & DATE**.
8. Press the **OK** key.
   The **TIME & DATE** menu is displayed. The cursor is positioned at the first digit of the date display (dd.mm.yy: dd = day, mm = month and yy = year).
9. Use the ▼ ▲ keys to enter the first digit.
10. Press the **OK** key.
    The cursor jumps to the next position.
11. Repeat steps 9. and 10. until you have entered the entire date.
    After entering and confirming the last digit for the year, the cursor jumps to the first digit of the time display (ss:mm:hh: ss = second, mm = minute and hh = hour).
12. Set the digits for time using the same procedure as described for setting the date.
    After entering the last digit for current time, your settings are saved. The **SYSTEM** menu is displayed.

↳ The date and time have been specified.

### 6.3.2 Setting the Language

You can choose between English and German for the device language.

1. Switch the battery tester on ⇨🗎19.
2. Press the **OK** key.
   The **main menu** is displayed.
3. From the **main menu**, use the ▼ ▲ keys to select
   → **SETTINGS**.
4. Press the **OK** key.
   The **SETTINGS** menu is displayed.
5. Use the ▼ ▲ keys to select → **SYSTEM**.
6. Press the **OK** key.
   The **SYSTEM** menu is displayed.
7. Use the ▼ ▲ keys to select → **LANGUAGES**.
8. Press the **OK** key.
   The **LANGUAGES** menu is displayed.
9. Use the ▼ ▲ keys to select the desired language.
10. Press the **OK** key.

↳ The device changes the language.

## 6.4 Establishing and Disconnecting Wireless Connections

The battery tester can be wirelessly connected to various devices:

- With the DMA 35 density meter from Anton Paar GmbH
  - DMA 35 BASIC (version 3) via infrared ⇨ “DMA35 Measurement (IrDA)” 🗎84
  - DMA 35 (version 4) via wireless interface ⇨ “DMA35 (BT) Measurement” 🗎86
- With a PC via an IrDA USB adapter (Z227I) as an optional accessory to view, evaluate, and save the measurement data.
- With a wireless interface with a PC to view, analyze, and save the measurement data ⇨🗎43.
- With a headset to hear the acoustic signals of the device better ⇨🗎21.

**Note**

Although the battery tester can be paired with several devices via the wireless interface, simultaneous operation with several devices via wireless interface is not possible.

Wireless interface connections can be disconnected when they are no longer needed.

**Note**

In case of connection problems, it may help to disconnect the wireless connections (⇨🗎22) and re-establish them (see references to specific sections above).

### 6.4.1 Establishing and Testing a Wireless Interface Connection with a Headset

Acoustic signals are used to confirm various actions before, during, and after a measuring procedure, as well as certain device reactions.

The device can be paired with a headset, making it possible to hear these signals better in noisy work environments. The connection can be checked in advance with a test signal.

**Note**

Read and follow the documentation included with your headset.

✓ The headset supports the wireless interface profile “HSP”.

1. Switch the battery tester on ⇨🗎19.
2. Press the **OK** key.
   The **main menu** is displayed.
3. From the **main menu**, use the ▼▲ keys to select
   ➔ **SETTINGS**.
4. Press the **OK** key.
   The **SETTINGS** menu is displayed.
5. Use the ▼▲ keys to select ➔ **BT SETTINGS**.
   The **BT SETTINGS** menu is displayed.
6. Use the ▼▲ keys to select ➔ **LINK HEADSET**.
7. Press the **OK** key.
8. The message **HEADSET READY?** appears.
9. Set the headset to pairing mode. Read the documentation included with your headset to find out how.
10. Position the headset close to the battery tester.
11. Confirm the **IS HEADSET READY?** prompt by pressing the **OK** key.
    The message **BT PAIRING: SEARCH HEADSET!** is displayed.
12. The headset and the battery tester connect to each other. The pairing progress is displayed as a percentage. As soon as the devices are successfully connected, **SUCCESSFUL!** appears on the display.
13. Put on the headset.
14. Press the **OK** key.
    The **BT SETTINGS** menu is displayed.
15. Press the **Function** key.
    The **main menu** is displayed.
16. From the **main menu**, use the ▼▲ keys to select ➔ **SETTINGS**.
17. Press the **OK** key.
    The **SETTINGS** menu is displayed.
18. Use the ▼▲ keys to select ➔**SYSTEM**.

19. Press the **OK** key.
    The **SYSTEM** menu is displayed.
20. Use the ▼▲ keys to select → **TEST HEADSET**.
21. Press the **OK** key.

↳ The headset emits a test signal.

### 6.4.2 Disconnecting the Wireless Interface Connection

All paired devices are disconnected when the wireless interface connection is disconnected. It is not possible to disconnect individual devices.

1. Switch the battery tester on ⇨19.
2. Press the **OK** key.
   The **main menu** is displayed.
3. From the **main menu**, use the ▼▲ keys to select
   → **SETTINGS**.
4. Press the **OK** key.
   The **SETTINGS** menu is displayed.
5. Use the ▼▲ keys to select → **BT SETTINGS**.
   The **BT SETTINGS** menu is displayed.
6. Use the ▼▲ keys to select →**DELETE BT CONN.** .
7. Press the **OK** key.
   The message **DELETE NOW?** appears.
8. Press the **OK** key.
   The message **DELETE DATA! PLEASE WAIT** appears briefly. The message **DELETE BT CONN.** is then displayed.

↳ The wireless interface connection to all paired devices has been disconnected.

## 6.5 Testing the RFID Reader

You can test the RFID reader (⇨15).

✓ A compatible RFID tag (125 kHz) is available.

1. Switch the battery tester on ⇨19.
2. Press the **OK** key.
   The **main menu** is displayed.
3. From the **main menu**, use the ▼▲ keys to select
   → **SETTINGS**.
4. Press the **OK** key.
   The **SETTINGS** menu is displayed.
5. Use the ▼▲ keys to select → **SYSTEM**.
6. Press the **OK** key.
   The **SYSTEM** menu is displayed.
7. Use the ▼ key to select → **TEST TRANSP.**.
8. Press the **OK** key.
   The message **WAITING FOR RFID** **–––––> ( ) <–––––** appears. Furthermore, a repeating beep indicates readiness to read.
9. Hold the battery tester's RFID reader approx. 1–2 cm above the RFID tag.

↳ The RFID tag is read. The number of the RFID tag appears on the display.

To see how to assign RFID tags to DUTs and read them out during measurement, see Section "Performing Measurements" ⇨65.

# 7 Menu and Functions

## 7.1 Overview

| On | Main Menu Level | | 1. Submenu Level | | 2. Submenu Level | | 3. Submenu Level | | 4. Submenu Level | |
|---|---|---|---|---|---|---|---|---|---|---|
| Start | Display | Keys | Display A | Keys | Display | Keys | Display | Keys | Display | Keys |
| ON 2 sec Start | MEA-SURE-MENT | | MULTIMETER | | 2.45 VDC (S-)<br>24.5 VDC (S+)<br>600 VDC (S+)<br>300 VAC (S+) | | Start measurement (short tone)<br>End measurement (short tone), display measured value | | End measured value recording, return to **MULTIMETER**. | |
| | | | | | BACK | OK | | | | |
| | | | CHARGE RETENTION | | START | OK | Start measurement (short tone),<br>End measurement (short tone),<br>Display of measured value | OK<br>ON | **END NOW? (AND SAVE)**<br>**END NOW (DO NOT SAVE)** | OK |
| | | | | | | | WAITING FOR DMA35 | → | | |
| | | | DISCHARGE | | BATT DATABASE | | Battery database display<br>Short beep indicates that the RFID reader is ready | | For manual selection, return to display<br>For RFID, display read result | For RFID OK |
| | | | CHARGE | | LOCATION: XXXX | | LOCATION: 0000 | A | | |
| | | | RESISTANCE | | | | | | | |
| | | | TEMPERATURE | | BATTERY: XXXX | | BATTERY: 0000 | | | |
| | | | CONNECTOR | | BLOCKS: XXXX* | | BLOCKS: 0000 | | | |
| | | | INTERVAL U | | MIN: XX.XXX [unit] | | MIN: 0000 [Unit] | | | |
| | | | INTERVAL U+I | | MAX: XX:XXX [unit] | | MAX: 0000 [Unit] | | | |
| | | | DMA35 (IrDA) | | INT [s]: XXXX** | | INT [s]: 0000 | | | |
| | | | DMA35 (BT) | | CLAMP A: XXXX *** | | CLAMP A: 0000 | | | |
| | | | | | CLAMP mV: XXXX *** | | CLAMP mV: 0000 | | | |
| | | | BACK | OK | BACK | OK | | | | |
| | DATA | | MEASURED VALUES | | **Display of measurement with indication of measurement type, date, time, etc.** | | Display measured values (see legend) | OK | Repeat measurement | |
| | | | | | | | Display of measured value evaluation | | View evaluation via all keys, then automatic return | |
| | | | EXPORT (CSV) | | BT CSV EXPORT (CONNECT) | – – | **DEVICE PAIRED? EXPORT TARGET OK?** | OK | | |
| | | | BATTERY DEF. | | Battery database display<br>Short beep indicates that the RFID reader is ready | | For manual selection, return to display<br>For RFID, display read result | For RFID OK | | |
| | | | CLEAR DATA | | DELETE NOW? | OK | **DELETING DATA! PLEASE WAIT!** | – – | Short beep indicates deletion, return to **DELETE VALUE/BATT.** display | |
| | | | CLEAR BAT-DEF. | | DELETE NOW? | | **DELETING DATA! PLEASE WAIT!** | | | |
| | | | BACK | OK | | | | | | |

| On | Main Menu Level | | 1. Submenu Level | | 2. Submenu Level | | 3. Submenu Level | | 4. Submenu Level | |
|---|---|---|---|---|---|---|---|---|---|---|
| Start | Display | Keys | Display A | Keys | Display | Keys | Display | Keys | Display | Keys |
| → OK | SETTINGS | | SYSTEM | | TIME & DATE | | DATE: XX.XX.X TIME: XX:XX:XX | A | | |
| | | | | | SEL. LAN-GUAGE | | ENGLISH DEUTSCH | | Menu is displayed in selected lan-guage, return to **LAN-GUAGES** display | |
| | | | | | TEST HEADSET | | Read out test signal | – – | | |
| | | | | | TEST TRANSP. | | WAITING FOR RFID -----> ( ) <---- - | B | WAITING FOR RFID <RFID Number> | →→ |
| | | | | | IR DATA ON | OK ← | | | | |
| | | | | | BT DATA ON | OK ← | | | | |
| | | | | | BACK | OK ← | | | | |
| | | | MEASURE-MENTS | | POLARITY ON | | POLARITY ON | —— | Short beep indi-cates selection, display remains in menu | |
| | | | | | POLARITY OFF | | POLARITY OFF | —— | | |
| | | | | | BACK | OK ← | | | | |
| | | | BT SETTINGS | | LINK COMPUTER | | BT CONNECTION: WAITING FOR PC | – – | List with all detected BT devices is dis-played. | →→ |
| | | | | | LINK HEADSET | | HEADSET READY? | ← ON OK → | BT PAIRING: SEARCH HEADSET ! | →→ |
| | | | | | LINK DMA35 V4 | | PLEASE FIND RTS WITH DMA. | →→ | | |
| | | | | | DELETE BT CONN. | | DELETE NOW? | ← ON OK → | DELETING DATA! PLEASE WAIT! | ← |
| | | | | | BACK | OK ← | | | | |
| | | | CSV EXPORT | | EXPORT TAR-GET | | LOOKING FOR BT DEVICES. | – – | NO BT DEVICES FOUND | OK ← |
| | | | | | | | | | Detected BT devices are listed | →→ |
| | | | | | FILENA. FIXED | | FILENA. FIXED | —— | | |
| | | | | | FILENA. AUTO | | FILENA. AUTO | —— | | |
| | | | | | BACK | OK ← | | | | |
| | | | BLOCKED RANGE | | BLOCKED RANGE PASSWORD: XXXXX | | | | | |
| | | | BACK | OK ← | | | | | | |
| | INFO | | VERSION: VX.XX JOBS: XXX% DATA: XXX% BATTERY: XXX% | OK ← | | | | | | |
| | POWER OFF | OK | | | | | | | | |

| General Legend | |
|---|---|
| ->MEASUREMENT DATA | Display menu/function<br>The arrow indicates the selected function. |
| **DELETING DATA**<br>**PLEASE WAIT** | Feedback or information after action |
| BLOCK12.2500 V<br>0004/4<br>SN:0001BN:0010 | Display of measured value (example)<br>Display of measured value evaluation |
| Descriptive text | Explanation of measured value, parameter and other displays |
| △ ▽ = ▲ ▼ | Scroll within menu levels and functions. |
| ○ = OK | Start function,<br>submenu selection |
| ON = ON | Switch on,<br>cancel an action currently being executed |
| ↑ | Move up one view in the menu. |
| ↓ | Move down one view in the menu. |
| → | Jump to submenu level (press briefly). |
| → | Jump to submenu level (press and hold). |
| ← | Return to higher menu level (initial position). |
| — | Remains at current position. |
| – – | No action required. |
| →→ | Further action and displays depend on systems to be linked or downstream systems. |
| 0 | Currently selected digit (display with black background). |
| **X** | Placeholder for one digit. |
| * | Parameter not for **INTERVAL U** and **INTERVAL U+I** measuring functions. |
| ** | Parameter only for **INTERVAL U** and **INTERVAL U+I** measuring functions. |
| *** | Parameter only for **INTERVAL U+I** measuring function. |

| | |
|---|---|
| A | **Set/select special key assignments for parameters.** |
| ○ = OK | Cursor for selecting the digit to be changed (inverted cursor), storage takes place after selection of the last digit, then return to next higher menu level |
| △ = ▲ | Increase digit |
| ▽ = ▼ | Decrease digit |
| ON = ON | Cancel entry/selection of digits without saving, return to next higher menu level |

| | |
|---|---|
| B | RFID tags must be held approx. 1 to 2 cm above the display |

## 7.2 Main Menu

The start screen appears after the battery tester is switched on (➪🗎19). After you press any key, the **main menu** is displayed.

If you are already in a submenu, press the **FUNCTION** key repeatedly until you return to the **main menu**.

The **main menu** is the central menu from which you can access all other hierarchically subordinate menus and functions. The ▼▲ keys allow you to select all functions of the **main menu**.

Table 10: List of available functions in the **main menu**

| Function | Description |
|---|---|
| **MEASUREMENT** | Available measuring functions ➪🗎26. |
| **DATA** | Data management functions ➪🗎30. |
| **SETTINGS** | Parameter settings for system, measurements and data transfer ➪🗎32. |
| **INFO** | Information on the firmware version, battery charge level and memory usage ➪🗎33. |
| **POWER OFF** | Switch off the battery tester ➪🗎19. |

## 7.3 Measurement Menu

To open the menu, select **main menu** → **MEASUREMENT**. Then press the **OK** key.

Table 11: List of available functions in the **MEASUREMENT** menu

| Measurement | Description |
|---|---|
| **MULTIMETER** | DC and AC voltage measurements without storing the measured values. |
| **FLOAT** | Periodic measurement of block voltages.<br>This measurement is used for quarterly recording of float voltage, for example, in UPS systems. |
| **DISCHARGE** | Multiple measurement of block voltages at short intervals during discharging (capacity test). |
| **CHARGE** | Multiple measurement of block voltages at short intervals during charging (capacity test). |
| **RESISTANCE** | Periodic measurement of the internal resistance of the blocks. |
| **TEMPERATURE** | Measurement of block temperature with an IR temperature sensor. |
| **CONNECTOR** | Measurement of voltage drop to determine connector loss between blocks. |
| **INTERVAL U** | Measurement of the voltage of a battery at any desired time interval (voltage curve). |
| **INTERVAL U + I** | Measurement of the voltage and current of a battery at any desired time interval (voltage and current curves).<br>Example: Recording of discharge current during discharging. |
| **DMA 35 (IrDA)** | Measurement of acid density and electrolyte temperature within a block.<br>Measurements are performed with the DMA 35 Basic density meter (Version 3) from Anton Paar GmbH. Data are transferred from the sensor to the battery tester via infrared (Infrared Data Association – IrDA). |
| **DMA 35 (BT)** | Measurement of acid density and electrolyte temperature within a block.<br>Measurements are performed with the DMA 35 density meter (Version 4) from Anton Paar GmbH. Measured values are transferred from the sensor to the battery tester via wireless interface. |
| **BACK** | Exit the **MEASUREMENT** menu and return to the **main menu**. |

**Note**

The required parameters for the device under test must be specified before you start a measurement. To do this, use the battery database (➪ “Performing Measurements” 🗎65 and ➪ “Transferring the Battery Database to the Battery Tester” 🗎53).

Manual entries should only be made in exceptional cases.

### 7.3.1 Multimeter

To open the menu, select the function sequence → **MEASUREMENT** → **MULTIMETER** in the **main menu**. Then press the **OK** key.

Table 12: Possible measuring ranges for **MULTIMETER** measurements

| Measuring Ranges | Description |
|---|---|
| **2.45 $V_{DC}$ (S–)** | Measuring range selection for DC voltage measurement via measuring socket S–. |
| **24.5 $V_{DC}$ (S+)** | Measuring range selection for DC voltage measurement via measuring socket S+. |
| **600 $V_{DC}$ (S+)** | Measuring range selection for DC voltage measurement via measuring socket S+. |
| **300 $V_{AC}$ (S+)** | Measuring range selection for AC voltage measurement via measuring socket S+. |
| **BACK** | Return to the **MEASUREMENT** menu. |

### 7.3.2 Float, Discharge, Charge, and Resistance

To open the menu, select one of the following function sequences from the **main menu**:
→ **MEASUREMENT** → **FLOAT** or → **MEASUREMENT**
→ **DISCHARGE** or → **MEASUREMENT**→ **CHARGE** or → **MEASUREMENT**→ and then press the **OK** key.

Table 13: Parameters and functions for **FLOAT, DISCHARGE, CHARGE** and **RESISTANCE** measurements

| Function/ Settings | Description |
|---|---|
| **START** | Measurement is started after selecting or entering the battery parameters. |
| **BATT DATENB.** | The menu for selecting and loading a stored battery database is accessed via this function. If a database exists, the stored data records appear. |
| **LOCATION: XXXX** | Manual assignment of a unique four-digit number for the location of the battery system. |
| **BATTERY: XXXX** | Manual assignment of a unique four-digit number as a designation of the battery in the battery system. |
| **BLOCKS:XXXX** | Manual assignment of a unique four-digit number identifying the number of blocks within the battery. |
| **MIN: XX.XXX V** | Lower voltage limit, editable via the OK key |
| **MAX: XX.XXX V** | Upper voltage limit, editable via the OK key (max. +24.50 V) |
| **BACK** | Return to the **MEASUREMENT** menu. |

### 7.3.3 Temperature

To open the menu, select the function sequence → **MEASUREMENT** → **TEMPERATURE** in the **main menu**, Then press the **OK** key.

Table 14: Parameters and functions for **TEMPERATURE** measurement

| Function/ Settings | Description |
|---|---|
| **START** | Measurement is started after selecting or entering the battery parameters. |
| **BATT DATENB.** | The menu for selecting and loading a stored battery database is accessed via this function. If a database exists, the stored data records appear. |
| **LOCATION: XXXX** | Manual assignment of a unique four-digit number for the location of the battery system. |
| **BATTERY: XXXX** | Manual assignment of a unique four-digit number as a designation of the battery in the battery system. |
| **BLOCKS:XXXX** | Manual assignment of a unique four-digit number identifying the number of blocks within the battery. |
| **MIN: XXXX.X C** | Lower temperature limit, editable via the OK key (max. –230 °C) |
| **MAX: XXXX.X C** | Upper temperature limit, editable via the OK key (max. +230 °C) |
| **BACK** | Return to the **MEASUREMENT** menu. |

### 7.3.4 Start / Battery Parameters Menu for Connector Measurement

To open the menu, select the function sequence → **MEASUREMENT** → **CONNECTOR** in the **main menu**. Then press the **OK** key.

Table 15: Parameters and Functions for **CONNECTOR** measurement

| Function/ Settings | Description |
|---|---|
| **START** | Measurement is started after selecting or entering the battery parameters. |
| **BATT DATENB.** | The menu for selecting and loading a stored battery database is accessed via this function. If a database exists, the stored data records appear. |
| **LOCATION: XXXX** | Manual assignment of a unique four-digit number for the location of the battery system. |
| **BATTERY: XXXX** | Manual assignment of a unique four-digit number as a designation of the battery in the battery system. |
| **BLOCKS:XXXX** | Manual assignment of a unique four-digit number identifying the number of blocks within the battery. |
| **MIN: XXXX.X mV** | Lower voltage limit, editable via the OK key |
| **MAX: XXXX.X mV** | Upper voltage limit, editable via the OK key (max. +2400.0 mV) |
| **BACK** | Return to the **MEASUREMENT** menu. |

### 7.3.5 Start / Battery Parameters Menu for Interval U Measurement

To open the menu, select the function sequence → **MEASUREMENT** → **INTERVAL U** in the **main menu**. Then press the **OK** key.

Table 16: Parameters and Functions for **INTERVAL U** measurement

| Function/ Settings | Description |
|---|---|
| **START** | Measurement is started after selecting or entering the battery parameters. |
| **BATT DATENB.** | The menu for selecting and loading a stored battery database is accessed via this function. If a database exists, the stored data records appear. |
| **LOCATION: XXXX** | Manual assignment of a unique four-digit number for the location of the battery system. |
| **BATTERY: XXXX** | Manual assignment of a unique four-digit number as a designation of the battery in the battery system. |
| **INT [s]: XXXX** | Manually adjustable time interval (in seconds) for recording the measured value.<br>(min. 1 second) |
| **MIN: XXX.XX V** | Manual measuring range setting: Lower voltage limit.<br>**Note**<br>Same as discharge cut-off voltage. If the limit value is fallen short of, the device emits a beep at regular intervals. This indicates that the discharging process has been completed and you should stop the measurement. |
| **MAX: XXX.XX V** | Measuring range setting: Upper voltage limit.<br>**Note**<br>Same as charge cut-off voltage. If the limit value is exceeded, the device emits a beep at regular intervals. This indicates that the charging process has been completed and you should stop the measurement.<br>(Max. +600 V) |
| **BACK** | Return to the **MEASUREMENT** menu. |

### 7.3.6 Interval U + I

To open the menu, select the function sequence → **MEASUREMENT** → **INTERVAL U+I** in the **main menu**. Then press the **OK** key.

Table 17: Parameters and functions for **INTERVAL U + I** measurements

| Function/ Settings | Description |
|---|---|
| **START** | Measurement is started after selecting or entering the battery parameters. |
| **BATT DATENB.** | The menu for selecting and loading a stored battery database is accessed via this function. If a database exists, the stored data records appear. |
| **LOCATION: XXXX** | Manual assignment of a unique four-digit number for the location of the battery system. |
| **BATTERY: XXXX** | Manual assignment of a unique four-digit number as a designation of the battery in the battery system. |
| **INT [s]: XXXX** | Manually adjustable time interval (in seconds) for recording the measured value.<br>(min. 1 second) |
| **MIN: XXX.XX V** | Lower voltage limit, editable via the OK key<br>**Note**<br>Same as discharge cut-off voltage. If the limit value is fallen short of, the device emits a beep at regular intervals. This indicates that the discharging process has been completed and you should stop the measurement. |
| **MAX: XXX.XX V** | Upper voltage limit, editable via the OK key<br>**Note**<br>Same as charge cut-off voltage. If the limit value is exceeded, the device emits a beep at regular intervals. This indicates that the charging process has been completed and you should stop the measurement.<br>(Max. +600 V) |
| **CLAMP A: XXXX** | Manual measuring range setting: Current value of the transformation ratio of the current clamp. |
| **CLAMP mV: XXXX** | Manual measuring range setting: Voltage value of the transformation ratio of the current clamp. |
| **BACK** | Return to the **MEASUREMENT** menu. |

### 7.3.7 DMA35 (IrDA and Wireless Interface)

To open the menu, select the function sequence → **MEASUREMENT** → **DMA35 (IrDA)** or → **DMA35 (BT)** in the **main menu**. Then press the **OK** key.

Table 18: Parameters and functions for **DMA35 (IrDA)** and **DMA35 (BT)** measurements

| Function/ Settings | Description |
|---|---|
| **START** | Measurement is started after selecting or entering the battery parameters. |
| **BATT DATENB.** | The menu for selecting and loading a stored battery database is accessed via this function. If a database exists, the stored data records appear. |
| **LOCATION: XXXX** | Manual assignment of a unique four-digit number for the location of the battery system. |
| **BATTERY: XXXX** | Manual assignment of a unique four-digit number as a designation of the battery in the battery system. |
| **BLOCKS:XXXX** | Manual assignment of a unique four-digit number identifying the number of blocks within the battery. |
| **MIN: X.XXXX** | Lower limit for acid density, editable via the OK key |
| **MAX: X.XXXX** | Upper limit for acid density, editable via the OK key |
| **BACK** | Return to the **MEASUREMENT** menu. |

## 7.4 Data Menu

To open the menu, select **main menu** → **DATA**. Then press the **OK** key.

Table 19: Functions in the **DATA** menu

| Function | Description |
|---|---|
| **MEASURED VALUES** | Display of stored measured values |
| **EXPORT (CSV)** | Transfer of stored measured values to the PC as a CSV file |
| **BATTERY DEF.** | Display of the battery database |
| **CLEAR DATA** | Complete, irretrievable deletion of all stored measured values |
| **CLEAR BAT-DEF.** | Complete, irretrievable deletion of a battery database |
| **BACK** | Return to the **main menu** |

### 7.4.1 Measured Values

To open the **MEASUREMENTS** menu, select the function sequence → **DATA** → **MEASURE VALUES** in the **main menu**. Then press the **OK** key.

Table 20: Information on stored **MEASUREMENTS**

| Designation | Description |
|---|---|
| **Measuring Function** | Designation of the measuring function |
| **[XXXXX]** | Meaning varies depending on measurement:<br>– Number of blocks over which measurements have been performed<br>– Number of measurements (e.g., for **INTERVAL U**) |
| **DD.MM.YY** | Date of measurement |
| **HH:MM:SS** | Time of measurement |
| **AN:XXXX** | Location number assigned to the battery system |
| **BN:XXXX** | Battery number assigned to the battery |

In the **MEASURED VALUES** menu, use the ▼ ▲ keys to navigate through all measurements. If you press the **OK** key during a measurement, the measured values or measurement details are displayed.

Table 21: Measured **FLOAT** values

| Designation | Description |
|---|---|
| **BLOCK** | Measurement over one block |
| **XXXX/X** | Block number / number of measured value |
| **X.XXXX V** | Measured voltage value |
| **AN:XXXX** | Location number assigned to the battery system |
| **BN:XXXX** | Battery number assigned to the battery |

Table 22: Measured **DISCHARGE** and **CHARGE** values

| Designation | Description |
|---|---|
| **BLOCK** | Measurement over one block |
| **XXXX/X** | Block number / number of measured value |
| **X.XXXX V** | Measured voltage value |
| **AN:XXXX** | Location number assigned to the battery system |
| **BN:XXXX** | Battery number assigned to the battery |

Table 23: Measured **RESISTANCE** values

| Designation | Description |
|---|---|
| **BLOCK** | Measurement over one block |
| **XXXX/X** | Block number / number of measured value |
| **XX.XXXX V** | Measured voltage value |
| **R(el) =** | Measured value of the internal electrical resistance of a block |
| **R(ct) =** | Measured value of the internal electrochemical resistance of a block |

Table 24: Measured **TEMPERATURE** values

| Designation | Description |
|---|---|
| **BLOCK** | Measurement over one block |
| **XXXX/X** | Block number / number of measured value |
| **XXXX.X C** | Measured temperature value |
| **AN:XXXX** | Location number assigned to the battery system |
| **BN:XXXX** | Battery number assigned to the battery |

Table 25: Measured **CONNECTOR** values

| Designation | Description |
|---|---|
| **BLOCK** | Measurement over one block |
| **XXXX/X** | Block number / number of measured value |
| **XXXX.XX mV** | Measured voltage value |
| **AN:XXXX** | Location number assigned to the battery system |
| **BN:XXXX** | Battery number assigned to the battery |

Table 26: Measured **INTERVAL U** values

| Designation | Description |
|---|---|
| **COUNT** | Number of measurements performed over a freely defined time interval |
| **X.XXX V** | Display of overall battery voltage which was measured during a freely defined time interval |
| **Time** | Time interval during which the total battery voltage was measured |

Table 27: Measured **INTERVAL U + I** values

| Designation | Description |
|---|---|
| **COUNT** | Number of measurements performed |
| **X.XXX V** | Overall battery voltage measured during the specified time interval |
| **X.XXXX A** | Battery current measured during the specified time interval |
| **Time** | Time interval during which the overall battery voltage and battery current were measured |

Table 28: Measured **DMA (IrDA)** and **DMA35 (BT)** values

| Designation | Description |
|---|---|
| **BLOCK** | Measurement over one block |
| **XXXX/X** | Block number / number of measured value |
| **X.XXX kg/l** | Acid density |
| **X.XXX C** | Temperature |
| **AN:XXXX** | Location number assigned to the battery system |
| **BN:XXXX** | Battery number assigned to the battery |

### 7.4.2 Menu for the Display of Measured Value Evaluations

In addition to individual measurements, measured value evaluations can also be displayed. In the **MEASURED VALUES** menu, use the ▼ ▲ keys to select a measurement. Then press and hold the **OK** key until the menu with the measured value evaluations is displayed.

For detailed information, see Section "Viewing, Editing, Transferring and Evaluating Measured Values" ⇨🗎89.

Table 29: Measured Value Evaluations

| Designation | Description |
|---|---|
| **SUM: [XXXX]** | Sum of all measured values measured over the blocks of a battery. The number of blocks over which measurement has been performed is shown in square brackets (e.g., for **FLOAT** or **RESISTANCE**). |
| **NUMBER [XXXX]** | Number of all measured values that were measured during a multiple measurement over a block. The number of measurements is shown in square brackets (e.g., for **TEMPERATURE**). |
| **AVER.:** | Mean value of the measured values measured either over all blocks of a battery or over one block in the case of a multiple measurement |
| **MIN: XXXX** | Smallest measured value of the measurement with indication of the number of the block at which the value was measured |
| **MAX: XXXX** | Largest measured value of the measurement with indication of the number of the block at which the value was measured |

## 7.5 SETTINGS Menu

To open the menu, select **main menu** → **SETTINGS**: Then press the **OK** key.

Table 30: Functions in the **SETTINGS** menu

| Function | Description |
|---|---|
| **SYSTEM** | System settings |
| **MEASUREMENTS** | Settings for measured value recording |
| **BT SETTINGS** | Settings for establishing a wireless interface connection |
| **CSV EXPORT** | Settings for the transmission of data and measured values as a CSV file |
| **SERVICE MENU** | This function is for service only (⇨ "Service and Support" 🗎95). Access is restricted by a password. |
| **BACK** | Exit the **SETTINGS** menu and return to the **main menu**. |

### 7.5.1 SYSTEM

To open the **SYSTEM** menu, select the → **SETTINGS** → **SYSTEM** function sequence in the **main menu** and press the **OK** key.

Table 31: Functions in the **SYSTEM** menu

| Function | Description |
|---|---|
| **TIME & DATE** | Settings for device date and time |
| **SEL. LANGUAGE** | User language selection |
| **TEST HEADSET** | Playback of a test signal on a headset in order to check the wireless interface function. |
| TEST TRANSP. | Display of data from the stored RFID tag |
| IR DATA ON | Select data transfer via IrDA USB adapter |
| BT DATA ON | Select data transfer via wireless interface |
| **BACK** | Return to the **SETTINGS** menu |

### 7.5.2 MEASUREMENTS

To open the **MEASUREMENTS** menu, select the function sequence → **SETTINGS** → **MEASUREMENTS** in the **main menu**. Then press the **OK** key.

Table 32: List of available functions in the **MEASUREMENTS** menu

| Function | Description |
|---|---|
| **POLARITY ON** | Switch polarity on: The negative or positive measured value is displayed. |
| **POLARITY OFF** | Switch polarity off: The absolute value of the measured value is displayed. |
| **BACK** | Return to the **SETTINGS** menu |

### 7.5.3 BT SETTINGS

To open the **BT SETTINGS** menu, select the function sequence → **SETTINGS** → **BT SETTINGS** in the **main menu**. The press the **OK** key.

Table 33: Functions in the **BT SETTINGS** menu

| Function | Description |
|---|---|
| **LINK COMPUTER** | Function for establishing a wireless interface connection between the battery tester and a PC. |
| **LINK HEADSET** | Function for establishing a wireless interface connection between the battery tester and a headset. |
| **LINK DMA35 V4** | Function for establishing a wireless interface connection between the battery tester and a DMA 35 density meter (Version 4) from Anton Paar GmbH. |
| **DELETE BT CONN.** | Disconnection of the wireless interface connection to all paired devices.<br>(device connections cannot be disconnected individually) |
| **BACK** | Return to the **SETTINGS** menu |

### 7.5.4 CSV EXPORT

To open the **CSV-EXPORT** menu, select the function sequence → **SETTINGS** → **CSV EXPORT** in the **main menu**. Then press the **OK** key.

Table 34: Functions in the **CSV EXPORT** menu

| Function | Description |
|---|---|
| **EXPORT TARGET** | Selection of the destination (e.g., PC) for the transmission of measured values as a CSV file.<br>(A wireless interface connection must first be established between the battery tester and the PC.) |
| **FILENA. FIXED** | Function for defining a uniform file name when transferring measured values to a PC as a CSV file<br>The file is named “BTPRO_Export.csv”. |
| **FILENA. FILENA.** | Function for generating different file names each time measured values are transferred to a PC as a CSV file. The file is named “BTPRO_Export_<system-ID>_<date>_<time>.csv”. |
| **BACK** | Return to the **SETTINGS** menu. |

## 7.6 INFO Menu

To open the menu, select **main menu** → **INFO**. Then press the **OK** key.

Table 35: Information in the **INFO** menu

| Function | Description |
|---|---|
| **VERSION:** | The current firmware version of the battery tester |
| **JOBS:** | Display of memory usage for measuring procedures as a percentage<br>100%=full storage capacity available<br>0%=no storage capacity available |
| **DATA:** | Display of memory usage for measured values as a percentage<br>100%=full storage capacity available<br>0%=no storage capacity available |
| **BATTERY** | Battery charge status (in volts) |

# 8 PC Software “BT PRO Manager”

“BT PRO Manager” PC software is an important tool for using the battery tester. The program can be used to:

- Create, maintain, and manage the battery database (DUT management)
- Transfer and save measurement data
- View measurement results and create measurement evaluations (reports)

**Note**

We strongly recommend using BT PRO Manager software!
You can use the battery tester without the program, but you will not have access to the important and convenient features mentioned above.

This chapter provides all the information you need to work with the BT PRO Manager.

If this is your first time using the battery tester and the BT PRO Manager, start by following the chapters up to and including “Creating the Battery Database” in the order presented.

If you have already performed measurements and would like to import the measurement data into BT PRO Manager, as well as view and create reports, go directly to ⇨ “Importing Measurement Data” 🗎54.

## 8.1 Installation, Launching the Program, and Updates

### 8.1.1 Download

The current version of the software can be downloaded free of charge as a ZIP file from the “myGMC” service portal on the Gossen Metrawatt GmbH website:

https://www.gossenmetrawatt.de/service-support/mygmc/

You first have to register yourself and your test device. You are then provided with access to the download.

### 8.1.2 System Requirements

- PC with Microsoft Windows 10® or higher
- Screen resolution of at least 1024 × 768
- At least 2 GB available hard disk memory
- At least 8 GB RAM

### 8.1.3 Installation

✓ You have downloaded the installation file ⇨🗎34.
✓ Your system fulfills the specified requirements ⇨🗎34.

1. Run the installation file.
   The installation wizard appears.
2. Follow the instructions in the installation wizard.

↳ The software is installed on your PC.

### 8.1.4 Launching the Program

✓ BT PRO Manager is installed on your PC ⇨🗎34.

The program can be launched using the standard methods is Windows®, such as the desktop shortcut.

### 8.1.5 Update

**Note**

If you are using a server database older than BT PRO Manager v2.02, please contact the product support team first ⇨🗎95.

Software updates provide new features and bug fixes.

All settings, measurement data, and the battery database are retained when the software is updated.

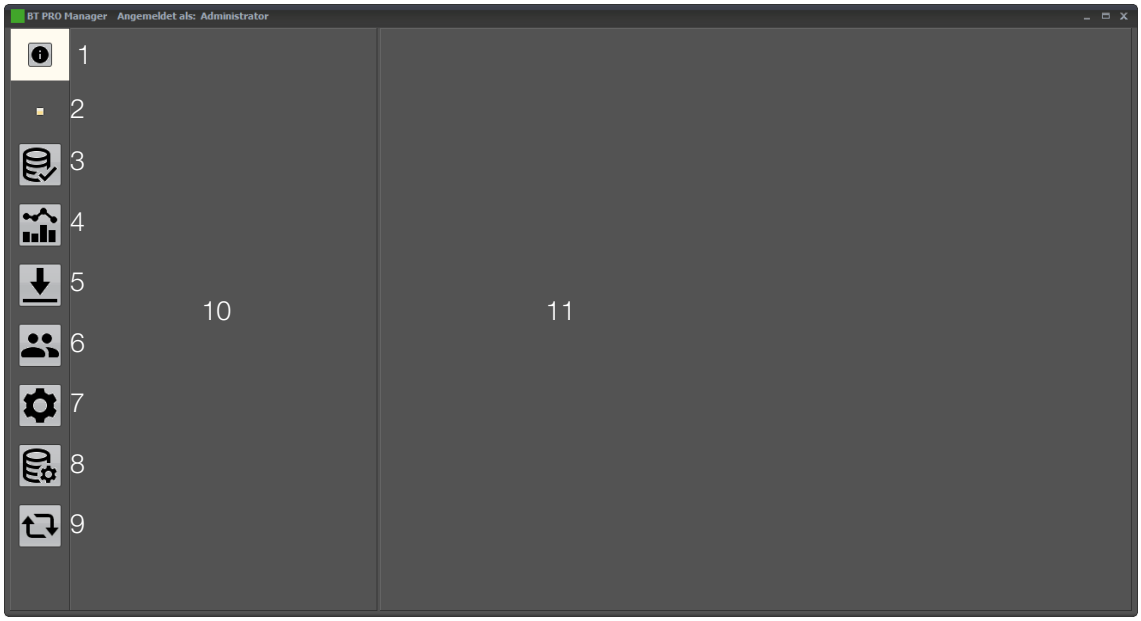
1. Check to see which software version is currently available ⇨ “Download” 🗎34.
2. Start BT PRO Manager.
   The **Login** dialog appears.
3. Click the ✕ button.
   The Login dialog closes.
4. Click the **Information** button.
   The **Information** dialog appears and displays the currently installed software version.
5. Compare the software versions.
   – If the versions differ: Continue.
   – If the versions are identical: no action is required.
6. Download the latest version of the software.
7. Back up your database ⇨🗎38.
8. Uninstall the old version of the software.
9. Run the installation file.
   The installation wizard appears.
10. Follow the instructions in the installation wizard.

↳ The software is updated.

**Note**

After logging in for the first time after the software update, it may be necessary to update the database. A dialog box appears and you are prompted to confirm the update. A backup copy of the database is created and the storage path is displayed.

## 8.2 Overview




| No. | Meaning |
|---|---|
| 1 | **Information**<br>Displays information about the program. |
| 2 | **Database status** |
| 3 | **Definitions**<br>Specifies batteries including all associated information such as blocks and location. |
| 4 | **Display measurement series**<br>Displays data associated with already performed measurements. |
| 5 | **Read in measurement series**<br>Reads in measurement data from the battery tester or from a stored CSV file. |
| 6 | **User administration**<br>Specifies user accounts for login. |
| 7 | **General Settings**<br>Specifies general settings. |
| 8 | **Database settings**<br>Specifies settings for the database. |
| 9 | **Various actions**<br>– Stored measurement series<br>– Update all groups<br>– Update all tours<br>– Databases<br>– Creation of a backup copy<br>– Restore from a backup copy |
| 10 | **Display selection**<br>Elements can be selected here for which further information is displayed in the Detail display area (11). |
| 11 | **Detail display area**<br>Displays detailed information about the element selected in the display selection (10). Some of this information can be edited or deleted. |

## 8.3 Specifying the Data(base) Storage Location

All data (measurement data, battery databases etc.) available in BT PRO Manager are stored in a database.

Access is protected with the help of user accounts ➪🗎40.

This database can be stored locally at a PC or remotely on a server. The main difference between local and server-based databases is the number of user accounts: You can specify up to 10 user accounts for a local database. Only one administrator can be specified for a server database.

**Note**

If you want to create more users for a server database, please contact the product support team ➪🗎95.

If necessary, you can create several databases and switch between them. As a service provider, for example, you can create separate databases for each customer.

A local database is created when BT PRO Manager is installed. This is selected by default and can be used immediately.

### 8.3.1 Using the Local Database

During program installation, an empty local database is created which is included in BT PRO Manager by default. Alternatively, you can select a different local database.

- ✓ The database is located on the PC where BT PRO Manager is installed.
- ✓ The database uses the ".fdb" format.
- ✓ You know a username and the corresponding password for the database to be integrated.
- ✓ You have rights for database settings.

1. Start BT PRO Manager.
   The **Login** dialog appears.
2. Log in with your username and password.
3. Click the **Database Settings** button.
   The **Database** dialog appears.
4. Activate the **Local** checkbox.
5. In the **Database** field, enter the path to the database.
6. Click the **Save** button.
   The setting is saved. The program closes.
7. Start BT PRO Manager.
   The **Login** dialog appears.
8. Log in.

↳ The other database is integrated and can now be used.

### 8.3.2 Using a Server Database

**Note**

If you want to use a server database, please contact the product support team first ➪🗎95.

- ✓ The database is located on a server.
- ✓ The database uses the ".fdb" format.
- ✓ You know a username and the corresponding password for the database to be integrated.
- ✓ You have rights for database settings.
- ✓ There is a network connection between the PC with BT PRO Manager and the server.

1. Start BT PRO Manager.
   The **Login** dialog appears.
2. Log in with your username and password.
3. Click the **Database Settings** button.
   The **Database** dialog appears.
4. Activate the **Server** checkbox.
5. In the **Alias** field, enter the name of the database.
6. In the **Server** field, enter the IP address of the server.
7. In the **Port** field, enter the port number of the port through which the connection is established.

**Note**

The port must not be blocked by a firewall or other security measures.

8. In the **User** field, enter the username for accessing the database.
9. In the **Password** field, enter the password for accessing the database.
10. Click the **Save** button.
    The setting is saved. The program closes.

↳ The other database is integrated and can be used the next time the program is started.

### 8.3.3 Querying Database Status

If the connection to the database is interrupted, a message appears automatically. However, the status of the database can be queried manually as well.

✓ BT PRO Manager is installed on your PC ⇨🗎34.

1. Start BT PRO Manager.
2. Click the database status checkbox.
   The **Information** dialog appears.

↳ The database status is displayed.
If necessary, follow the instructions in the dialog to restore an interrupted connection.

## 8.4 Backing Up the Database

Back up your databases at regular intervals.

**Note**

Use only the function described below to back up your database.

### 8.4.1 Backing Up the Local Database

✓ BT PRO Manager is installed on your PC ⇨🗎34.

1. Start BT PRO Manager.
   The **Login** dialog appears.
2. Log in as administrator.
3. Click the **Various Actions** button.
   The **Various Actions** dialog appears.
4. Click the **Create a Backup** button.

↳ The database is saved to the following directory: “C:\ProgramData\Cellizer\CS-Manager\Database\Backup”. The file name of the backup copy is displayed. The backup copy is saved in a special file format (*.nbk).

5. Test your database ⇨🗎39.

### 8.4.2 Backing Up a Database from the Server

**Note**

If you want to back up a server database, please contact the product support team first ⇨🗎95.

## 8.5 Restoring the Local Database

✓ BT PRO Manager is installed on your PC ⇨🗎34.
✓ A backup copy has been created ⇨🗎38.

1. Start BT PRO Manager.
   The **Login** dialog appears.
2. Log in as administrator.
3. Click the **Various Actions** button.
   The **Various Actions** dialog appears.
4. Click the **Restore from Backup** button.
5. The **Open** dialog appears.
6. Open the database to be restored.
   The database is restored. The file name of the restored database is displayed.
7. Click the **Database Settings** button.
   The **Database** dialog appears.
8. In the **Database** field, enter the path to the database.
9. Click the **Save** button.
   The setting is saved. The program closes.
10. Start BT PRO Manager.
    The **Login** dialog appears.
11. Log in.

↳ The program can be used with the restored database.

## 8.6 Testing the Database Backup Copy

✓ BT PRO Manager is installed on your PC ⇨🗎34.
✓ A backup copy has been created ⇨🗎38.

**Note**

Testing of the database is performed on a renamed copy of the backup.

1. Copy the backup and rename it.
2. Click the **Various Actions** button.
   The **Various Actions** dialog appears.
3. Click the **Restore from Backup** button.
   The **Open** dialog appears.
4. Open the database to be tested.
5. Click the **Database Settings** button.
   The **Database** dialog appears.
6. In the **Database** field, enter the path to the database to be tested.
7. Click the **Save** button.
   The setting is saved. The program closes.
8. Start BT PRO Manager.
   The **Login** dialog appears.
9. Log in.
10. Test the database for correct functioning.
11. After testing, reload the original database ⇨🗎37.

## 8.7 Managing User Accounts

BT PRO is equipped with a user administration feature. All important functions can only be used after logging in.

User accounts are database-specific. This means that validity depends on the integrated database (⇨🗎37). However, user accounts are managed via the program and BT PRO Manager sets up the user accounts for the respective database.

When the program is started for the first time, an administrator account is automatically created for the empty local database that is installed along with the program. Set a password for this account. Afterward, you can create and manage additional user accounts with different rights.

### 8.7.1 Specifying the Administrator Password (first program launch)

The administrator account is created automatically the first time the program is started. You can specify the password.

✓ BT PRO Manager is installed on your PC ⇨🗎34.

1. Start BT PRO Manager.
   The **Information** dialog appears. An “admin” user account was created.
2. Click **OK**.
   The **Login** dialog appears.
3. In the **Username** field, enter the name **admin**.
4. Click the ✓ button.
   The **Information** dialog appears.
5. Click **OK**.
   The **Login** dialog appears.
6. In the **Password** field, enter a password of your choice with at least 8 characters.
7. In the **Repeat password** field, enter the password again.
8. Click the ✓ button.
   Your password is saved and is displayed again for confirmation.
9. Click **OK**.
   The **Login** dialog appears.

↳ The password for the administrator account has been specified. You can log in and use the program. Create additional user accounts as needed.

**Note**

Create an additional user account with administrator rights.
This provides you with an additional option for full access to the database, even if the password for the first administrator account has been lost.
Passwords cannot be recovered.

### 8.7.2 Creating User Accounts

In addition to the administrator account, you can create 9 further user accounts (total: 10) with different rights for local databases. Functions for which no rights are available are not displayed in the account window.

**Note**

If you want to create more user accounts for server databases, please contact the product support team ⇨🗎95.

First create a user account. The password is specified the first time you log in via the user account.

✓ BT PRO Manager is installed on your PC ⇨🗎34.
✓ The administrator account has been created ⇨🗎40.

1. Start BT PRO Manager.
   The **Login** dialog appears.
2. Log in as administrator.
3. Click the **User Administration** button.
   The **User Administration** dialog appears.
4. Click the + button.
5. In the **Username** field, enter a designation.
   (Enter a full username as it should appear in the report ⇨ “Viewing a Measurement Series and Creating Measurement Evaluations (Reports)” 🗎55. The login name is specified in the next step.)

6. In the **Login name** field, enter the login name.
   (The login name is used to log in to the program. For example, initials can be used to save time when logging in.)
7. Select a role profile with predefined rights from the **Presets** list.
   Alternatively, you can select any desired rights from the **Function**, **Administrator**, **Action**, **Definitions** and **Reports** areas by entering checkmarks.
8. In the **E-mail** field, enter the e-mail address of the user.
   The e-mail address appears in reports ⇨ “Viewing a Measurement Series and Creating Measurement Evaluations (Reports)” 🗎55.
9. Click the ✓ button.
   The administrator account has been created.
10. Exit user administration.
11. Close the BT PRO Manager.
    The user specifies the password when logging in to the newly created user account for the first time.
12. Start BT PRO Manager.
    The **Login** dialog appears.
13. In the **Username** field, enter the previously specified login name.
14. Click the ✓ button.
    The **Information** dialog appears.
15. Click **OK**.
    The **Login** dialog appears.
16. In the **Password** field, enter a password of your choice with at least 8 characters.
17. In the **Repeat password** field, enter the password again.
18. Click the ✓ button.
    Your password is saved and is displayed again for confirmation.
19. Click **OK**.
    The **Login** dialog appears.

↳ The password for the user account has been specified. You can log in and use the program.

### 8.7.3 Editing User Accounts

You can edit user accounts, for example, by assigning different rights. The password cannot be changed.

To edit user accounts, a user account with user administration rights is required. For example, use the administrator account.

✓ BT PRO Manager is installed on your PC ⇨🗎34.

✓ The user account has user administration rights.

1. Start BT PRO Manager.
   The **Login** dialog appears.
2. Log in via a user account with user administration rights, e.g., the administrator account.
3. Click the **User Administration** button.
   The **User Administration** dialog appears.
4. Select the desired user account from the **Username** list.
5. Click the ✎ button.
   The editing mode is activated.
6. Make the desired changes.
7. Click the ✓ button.

↳ The user account has been modified.

### 8.7.4 Deleting a User Account

You can delete a previously created user account. The administrator account cannot be deleted.

To delete a user account, a user account with user administration rights is required. For example, use the administrator account.

1. Start BT PRO Manager.
   The **Login** dialog appears.
2. Log in via a user account with user administration rights, e.g., the administrator account.
3. Click the **User Administration** button.
   The **User Administration** dialog appears.
4. Select the desired user account from the **Username** list.
5. Click the **–** button.
   A security prompt appears.
6. Confirm the security prompt by clicking **Yes**.

↳ The user account is deleted.

### 8.7.5 Forgotten Password

If you forget the password for a user account, delete the user account (⇨🗎42) and create a new one (⇨🗎40).

If you forget the password for the administrator account and you do not have another user account with administrator rights, please contact ⇨ “Service and Support” 🗎95.

## 8.8 Basic Settings

### 8.8.1 Language

The BT PRO Manager program is available in the following languages: German and English.

The program language is selected automatically to match the language of your operating system. If the language of your operating system is not supported by the program, the program is displayed in English.

### 8.8.2 Specifying the Temperature Unit of Measure

Temperature values can be displayed in degrees Celsius (°C) or Fahrenheit (°F). The default setting is degrees Celsius (°C).

1. Start BT PRO Manager.
2. Click the **General Settings** button.
   The **General Settings** dialog appears.
3. Deactivate or activate the **Fahrenheit** checkbox.
4. Click the **Apply** button.

↳ The setting is saved.

### 8.8.3 Specifying the Number of Measurement Series to be Read In

You can specify a maximum number of measurement series to be transferred in order to avoid always reading in all measurement series and to reduce the transfer time of measurement series from the METRACELL BT PRO to BT PRO MANAGER.

1. Start BT PRO Manager.
2. Click the **General Settings** button.
   The **General Settings** dialog appears.
3. In the **Read in Measurement Series** field, enter the number of measurement series to be transferred.
4. Click the **Apply** button.

↳ The number of measurement series is saved.

### 8.8.4 Wireless Interface Connection

To enable communication between BT PRO Manager and the battery tester, you must establish a wireless interface connection between the PC and the battery tester. Make sure that the COM port in the operating system and in BT PRO Manager match up with each other.

The following instructions are provided as an example for a PC running the Microsoft® Windows® 10 operating system. The procedure is similar for all other Microsoft® Windows® operating systems.

✓ The battery database has been specified ⇨🗎37.

1. Open the Windows® start menu.
2. Click “Settings”.
   The **Windows Settings** dialog opens.
3. Click the **Devices** button.
   The **Device**dialog opens with the **BT and Other Devices** window.
4. On the battery tester, in the **main menu**, use the ▼▲ keys to select → **SETTINGS**.
5. Press the **OK** key.
   The **SETTINGS** menu is displayed.
6. Use the ▼▲ keys to select →**BT SETTINGS**.
7. Press the **OK** key.
   The **BT SETTINGS** menu is displayed.
8. Use the ▼▲ keys to select → **LINK COMPUTER**.
9. Press the **OK** key.
   The message **BT PAIRING: WAITING FOR PC** is displayed.
10. In Windows®, in the **Add BT and Other Devices** dialog, click the **Add BT or Other Device** button.
    The **Add Device** dialog opens.
11. Click the **BT** button.
    Wireless interface devices are searched for. After some time, the battery tester appears.
12. Click the battery tester.
    The connection is established. The message **CODE CORRECT ?** and a six-digit number appear on the battery tester. Information concerning the connection and a six-digit number are displayed on the PC.
13. Compare the six-digit numbers.
14. If the six-digit numbers are identical, press the **OK** key on the battery tester.
15. In Windows®, click the **Connect** button in the **Add device** dialog.
    The connection is established. The **DEVICE PAIRED?** message appears on the battery tester. **CONTINUE WITH KEY!**. The connection process is displayed on the PC, then a message indicating successful connection appears.
16. Click **Done** in the **Add a Device** dialog in Windows®.
    The devices are connected.
17. Open the Windows® start menu.
18. Click **Settings**.
    The Windows Settings dialog opens.
19. Click the **Devices** button.
    The Devices dialog opens with the **BT and Other Devices** window.
20. Click **More BT Options** in the list on the right.
    The **BT Settings** dialog is displayed.
21. Click the **COM Ports** tab.
    The **COM PORTS** tab is displayed.
22. Search the list for the port named **BTPRO** with the **Outgoing** direction.
    Make a note of the port number.
23. Start BT PRO Manager.
24. Click the **General Settings** button.
    The **General Settings** dialog appears.
25. Check whether the number in the **COM Port** field matches the COM port number you noted earlier.
    – If they match: Go to step 27.
    – If they do not match: In the **COM Port** field, enter the COM port number and click the **Apply** button.
      The setting is saved.
26. Close the **General Settings** dialog by clicking the ✕ button.

### 8.8.5 Establishing an IrDA Interface Connection with a Computer

The following instructions are provided as an example for a PC running the Microsoft® Windows® 11 operating system.

The procedure is similar for all Microsoft® Windows® operating systems.

✓ A COM port (outgoing direction) on the PC is used for connection under Microsoft® Windows®. Read the documentation included with your operating system for detailed information.

1. Connect the IrDA USB adapter to your PC.
2. Open the Windows® Device Manager.
   The **Device Manager** dialog opens.
3. Open the **Ports (COM & LPT)** tab.
   The dialog of connected devices opens.
4. Under **USB Serial Port** you can see the COM input of the IrDA USB adapter.
   Make a note of this COM input.
5. Open BT PRO Manager.
6. Log in with your credentials.
7. Click **General Settings**.
   The **General Settings** dialog opens.
8. Under **Com Port** you can see COM input of the IrDA USB adapter.
9. Click **Apply**.
   The dialog closes.
10. Click **Read in Measurement Series**.
    The **Read in Measurement Series** dialog box opens.
11. Click **BT PRO (Read-Out)**.
    The **COM** dialog opens.
12. Under COM Port, enter the COM input of the IrDA USB adapter.
13. Click **OK**.
    The **Save as** dialog opens.
14. Specify the save location and enter a file name.
15. Click **Save**.
    The dialog closes.
16. Place the IrDA USB adapter directly in front of the infrared interface of the device (max. 5 cm away). Hold this position for the duration of the data transfer.
17. The data read-out starts automatically.

## 8.9 Creating and Managing the Battery Database

Many battery systems are complex and their objects require inventory management. Inspecting the system involves all sorts of maintenance and service work that require measurements. These measurements must be correctly assigned to the respective object. This is the case regardless of whether you are manage your own system or customer systems as a service provider.

For measurements (⇨🗎34) using the battery tester (excluding **MULTIMETER**), you must specify the location of the battery system, the battery itself, the number of cells in the battery, and the limit values. This makes it possible to evaluate the measurement in an object-specific manner (type-dependent limit values, etc.), and assign it correctly to the object.

Manually entering the measurement parameters and manual transfer of the obtained measured values to your documents is of course inconvenient, error-prone and very time-consuming.

To avoid this, a battery database can be created in the BT PRO Manager software. This makes it possible to visualize all of your DUTs within a single digital structure. The battery database must be kept up to date continuously, for example, when replacing units. The battery database is transferred to the battery tester after it is created, and each time it is changed.

When taking a measurement on site, select the entry associated with the device under test from the battery database. This assigns the measured value to the respective object. After all measurements have been completed, transfer the results to BT PRO Manager for review and evaluation (⇨ “Viewing a Measurement Series and Creating Measurement Evaluations (Reports)” 🗎55).

If you or your customers use an RFID system for asset management whose tags (transponders) operate at a frequency of 125 kHz, you can use this system. Instead of manually selecting the entry for the DUT from the database, just scan the RFID tag and the entry is selected automatically. To do this, after you create the database, you must link the RFID tags to the respective DUTs in the database once or enter the RFID tags manually ⇨🗎53.

To be able to digitally map a system as an accurate replication of the original, various entries are created and linked to each other at different levels:

- The battery is the central unit (device under test).
- The battery is assigned a block type (⇨🗎48) and location (⇨🗎49).
- A block type, in turn, is assigned a block technology (⇨🗎47) and manufacturer (⇨🗎48).

You must give each of these 4 entries all the relevant information, such as the limit values required for measurement.

Due to this link, we recommend that you start at the lowest level and work your way up.

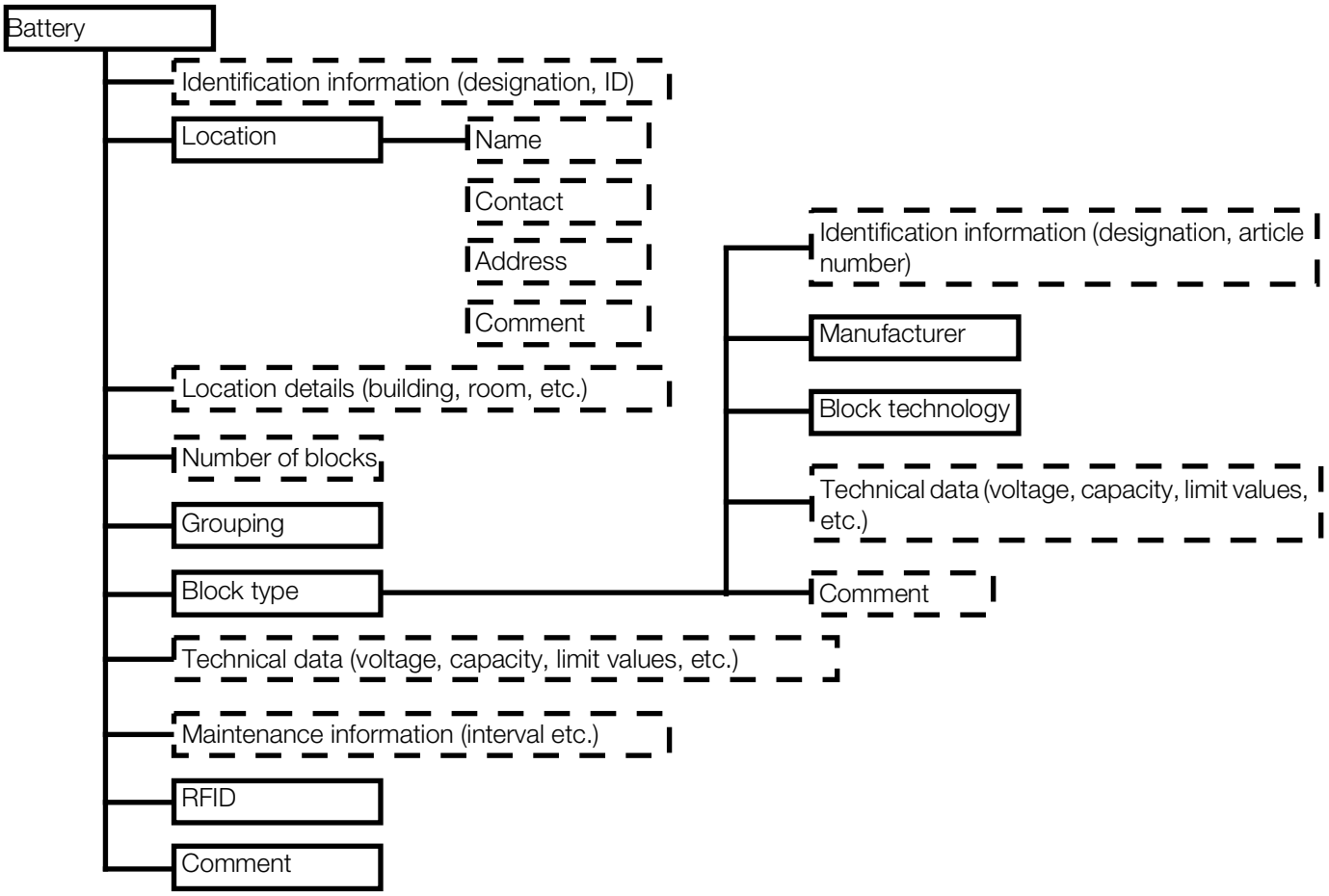
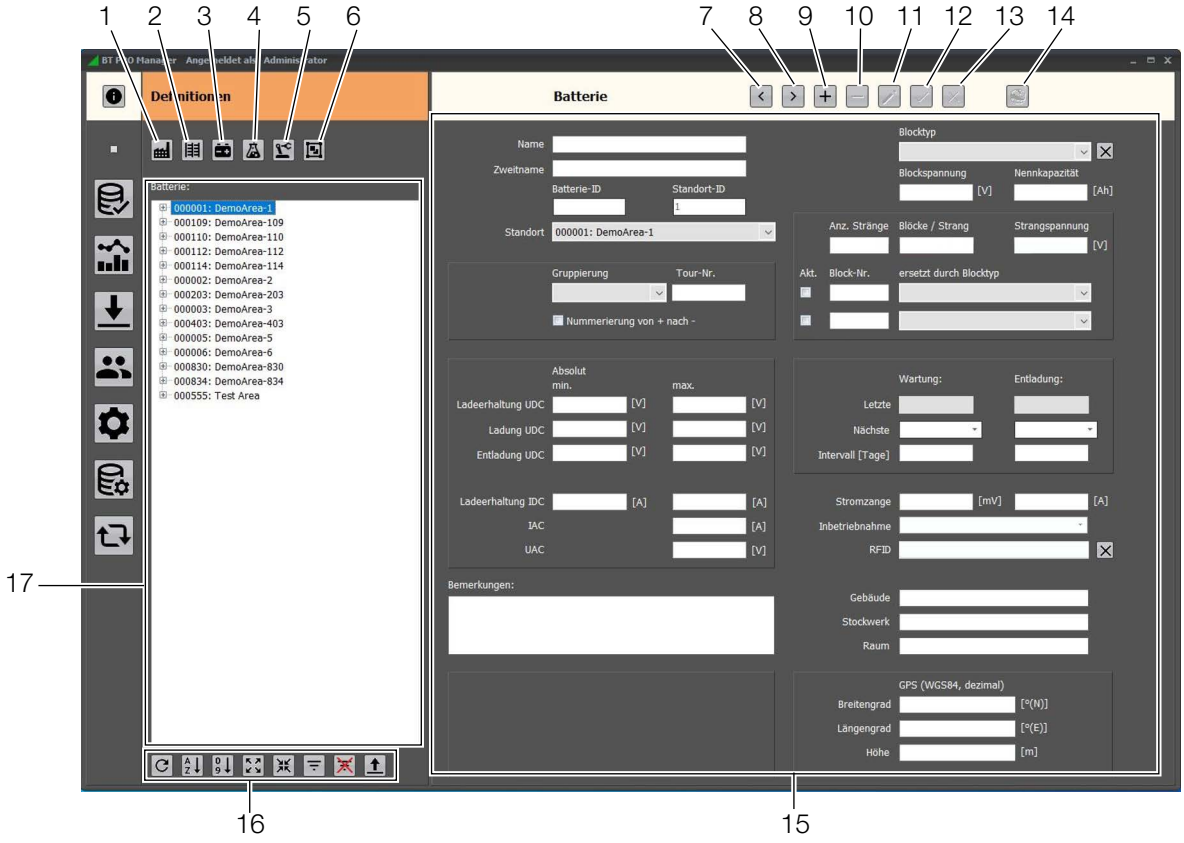



*Image 5: Database structure: Entries (▬) and storable information (-----)*

## Definitions




| No. | Meaning | No. | Meaning |
|---|---|---|---|
| 1 | **Location**<br>Specifies a location which is assigned to batteries. | 10 | Delete data record |
| 2 | **Battery**<br>Specifies a battery (device under test). | 11 | Edit data record |
| 3 | **Block type**<br>Specifies a block type which is assigned to batteries. | 12 | Confirm |
| 4 | **Block technology**<br>Specifies a block technology which is assigned to a block type. | 13 | Abort |
| 5 | **Manufacturer**<br>Specifies a manufacturer which is assigned to a block type. | 14 | Google Maps (only under Definition > Battery)<br>Entered GPS coordinates are displayed in Google Maps. |
| 6 | **Grouping**<br>Specifies groups for further structuring of battery definitions and measurement series.<br>Groups can also be assigned to existing measurement series via the menu item **Various Actions** (⇨🗎36) | 15 | Input fields (depending on the selected definition) |
| 7 | Last data record | 16 | Buttons for editing the displayed lists |
| 8 | Next data record | 17 | **Window with list of created definitions**<br>If the list window has a colored background, a filter is active.<br>Blue background: Measurement filter active<br>Yellow background: Battery filter active |
| 9 | Add data record | | |

### 8.9.1 Creating Block Technologies

Specifies a block technology which is assigned to a block type.

1. Start BT PRO Manager.
2. Click the **Definitions** button.
   The **Definitions** buttons are displayed in the **Display selection**.
3. Click the **Block Technology** button.
   The fields for defining the block technology are displayed in the **Detail display area**.
4. Click the + button.
   The fields are ready for input.
5. Specify the block technology parameters.
   Example: Lithium.
   (Yellow fields must be filled in. Permissible entries: A–Z, a–z, 0–9.)
6. Click the ✓ button.

↳ The block technology is stored.

### 8.9.2 Editing a Block Technology

✓ A block technology has been created.

1. Start BT PRO Manager.
2. Click the **Definitions** button.
   The **Definitions** buttons are displayed in the **Display selection**.
3. Click the **Block Technology** button.
   The created **block technologies** are displayed in the **Display selection**.
4. Click the block technology you want to edit.
   The fields for defining the block technology are displayed in the **Detail display area**.
5. Click the ✎ button.
   The fields are ready for input.
6. Change the desired block technology parameters.
   (permissible entries: A–Z, a–z, 0–9.)
7. Click the ✓ button.

↳ The block technology is edited.

### 8.9.3 Deleting a Block Technology

✓ A block technology has been created.
✓ The block technology is not assigned to any block type.

1. Start BT PRO Manager.
2. Click the **Definitions** button.
   The **Definitions** buttons are displayed in the **Display selection**.
3. Click the **Block Technology** button.
   The created block technologies are displayed in the **Display selection**.
4. Click the block technology you want to delete.
   The fields for defining the block technology are displayed in the **Detail display area**.
5. Click the – button.
   A security prompt is displayed.
6. Confirm the security prompt.

↳ The block technology is deleted.

### 8.9.4 Creating a Manufacturer

Specifies a manufacturer which is assigned to a block type.

1. Start BT PRO Manager.
2. Click the **Definitions** button.
   The **Definitions** buttons are displayed in the **Display selection**.
3. Click the **Manufacturer** button.
   The fields for specifying the manufacturer are displayed in the **Detail display area**.
4. Click the + button.
   The fields are ready for input.
5. Specify the manufacturer parameters.
   (Yellow fields must be filled in. Permissible entries: A–Z, a–z, 0–9.)
6. Click the ✓ button.

↳ The manufacturer is stored.

### 8.9.5 Editing a Manufacturer

✓ A manufacturer has been created.

1. Start BT PRO Manager.
2. Click the **Definitions** button.
   The **Definitions** buttons are displayed in the **Display selection**.
3. Click the **Manufacturer** button.
   The created **manufacturers** are displayed in the **Display selection**.
4. Click the manufacturer you want to edit.
   The fields for specifying the manufacturer are displayed in the **Detail display area**.
5. Click the ✎ button.
   The fields are ready for input.
6. Change the desired manufacturer parameters.
   (permissible entries: A–Z, a–z, 0–9.)
7. Click the ✓ button.

↳ The manufacturer is edited.

### 8.9.6 Deleting a Manufacturer

✓ A manufacturer has been created.
✓ The manufacturer is not assigned to any block type.

1. Start BT PRO Manager.
2. Click the **Definitions** button.
   The **Definitions** buttons are displayed in the **Display selection**.
3. Click the **Manufacturer** button.
   The created manufacturers are displayed in the **Display selection**.
4. Click the manufacturer you want to delete.
   The fields for specifying the manufacturer are displayed in the **Detail display area**.
5. Click the – button.
   A security prompt is displayed.
6. Confirm the security prompt.

↳ The manufacturer is deleted.

### 8.9.7 Creating a Block Type

Specifies a block type which is assigned to batteries.

✓ A block technology has been created ➪🗎47.
✓ A manufacturer has been created ➪🗎48.

1. Start BT PRO Manager.
2. Click the **Definitions** button.
   The **Definitions** buttons are displayed in the **Display selection**.
3. Click the **Block Type** button.
   The fields for specifying the block type are displayed in the **Detail display area**.
4. Click the + button.
   The fields are ready for input.
5. Specify the block type parameters. Enter the previously specified block technology and the manufacturer.

**Note**

The values entered here are mandatory because they are used for measurements. They are block-specific.
Enter all values, i.e., limit values, nominal values etc.

**Note**

Some block-specific values are used for batteries (⇨🗎51) and linked to other values.

(Yellow fields must be filled in. Permissible entries: A–Z, a–z, 0–9.)

6. Click the ✓ button.

↳ The block type is stored.

### 8.9.8 Editing a Block Type

✓ A block type has been created.
✓ A block technology has been created.
✓ A manufacturer has been created.

1. Start BT PRO Manager.
2. Click the **Definitions** button.
   The **Definitions** buttons are displayed in the **Display selection**.
3. Click the **Block Type** button.
   The created block types are displayed in the **Display selection**.
4. Click the block type you want to edit.
   The fields for specifying the block type are displayed in the **Detail display area**.
5. Click the ✎ button.
   The fields are ready for input.
6. Change the desired block type parameters.
   (permissible entries: A–Z, a–z, 0–9.)
7. Click the ✓ button.

↳ The block type is edited.

### 8.9.9 Deleting a Block Type

✓ A block type has been created.
✓ The block type is not assigned to any batteries.

1. Start BT PRO Manager.
2. Click the **Definitions** button.
   The **Definitions** buttons are displayed in the **Display selection**.
3. Click the **Block Type** button.
   The created block types are displayed in the **Display selection**.
4. Click the block type you want to delete.
   The fields for specifying the block type are displayed in the **Detail display area**.
5. Click the **–** button.
   A security prompt is displayed.
6. Confirm the security prompt.

↳ The block type is deleted.

### 8.9.10 Creating a Location

Specifies a location which is assigned to batteries.

1. Start BT PRO Manager.
2. Click the **Definitions** button.
   The **Definitions** buttons are displayed in the **Display selection**.
3. Click the **Location** button.
   The fields for specifying the location are displayed in the **Detail display area**.
4. Click the **+** button.
   The fields are ready for input.
5. Specify the location parameters.
   (Yellow fields must be filled in. Permissible entries: A–Z, a–z, 0–9.)

6. Click the ✓ button.

↳ The location is stored.

### 8.9.11 Editing a Location

✓ A location has been created.

1. Start BT PRO Manager.
2. Click the **Definitions** button.
   The **Definitions** buttons are displayed in the **Display selection**.
3. Click the **Location** button.
   The created locations are displayed in the **Display selection**.
4. Click the location you want to edit.
   The fields for specifying the location are displayed in the **Detail display area**.
5. Click the ✎ button.
   The fields are ready for input.
6. Change the desired location parameters.
   (permissible entries: A–Z, a–z, 0–9.)
7. Click the ✓ button.

↳ The location is edited.

### 8.9.12 Deleting a Location

✓ A location has been created.

✓ The location is not assigned to any batteries.

1. Start BT PRO Manager.
2. Click the **Definitions** button.
   The **Definitions** buttons are displayed in the **Display selection**.
3. Click the **Location** button.
   The created locations are displayed in the **Display selection**.
4. Click the location you want to delete.
   The fields for specifying the location are displayed in the **Detail display area**.
5. Click the **–** button.
   A security prompt is displayed.
6. Confirm the security prompt.

↳ The location is deleted.

### 8.9.13 Creating a Grouping

Specifies groups for structuring battery definitions and measurement series, e.g., for states, conditions, or regions.

1. Start BT PRO Manager.
2. Click the **Definitions** button.
   The **Definitions** buttons are displayed in the **Display selection**.
3. Click the **Grouping** button.
   The field for defining groups is displayed in the **Detail display area**.
4. Click the **+** button.
   The field is ready for input.
5. Specify the group name.
   (Yellow fields must be filled in. Permissible entries: A–Z, a–z, 0–9.)
6. Click the ✓ button.

↳ The grouping is saved and can be used in the battery definition.

**Note**

Group entries are only valid for filtering in the subsequently recorded measurement series after they have been added to the battery definitions. If all available measurement series need to be synchronized with all subsequent entries, this is done via the **Various Actions** menu ⇨🗎36.

### 8.9.14 Editing a Grouping

✓ A grouping has been created.

1. Start BT PRO Manager.
2. Click the **Definitions** button.
   The **Definitions** buttons are displayed in the **Display selection**.
3. Click the **Grouping** button.
   The created groupings are displayed in the **Display selection**.
4. Click the grouping you want to edit.
   The field for defining groups is displayed in the **Detail display area**.
5. Click the ✎ button.
   The field is ready for input.
6. Change the desired group parameters.
   (permissible entries: A–Z, a–z, 0–9.)
7. Click the ✓ button.

↳ The grouping is edited.

### 8.9.15 Deleting a Grouping

✓ A grouping has been created.
✓ The grouping is not assigned to any batteries.

1. Start BT PRO Manager.
2. Click the **Definitions** button.
   The **Definitions** buttons are displayed in the **Display selection**.
3. Click the **Grouping** button.
   The created groupings are displayed in the **Display selection**.
4. Click the grouping you want to delete.
   The fields for specifying the manufacturer are displayed in the **Detail display area**.
5. Click the – button.
   A security prompt is displayed.
6. Confirm the security prompt.

↳ The grouping is deleted.

### 8.9.16 Entering a Battery (DUT)

Specifies a battery (device under test). If you only want to measure one block, enter a battery with just one block.

✓ A location has been created ⇨🗎49.
✓ A block type has been entered ⇨🗎48.

1. Start BT PRO Manager.
2. Click the **Definitions** button.
   The **Definitions** buttons are displayed in the **Display selection**.
3. Click the **Battery** button.
   The fields for specifying the battery are displayed in the **Detail display area**.
4. Click the + button.
   The fields are ready for input.
5. Specify the battery parameters. Enter the previously specified location and block types.

**Note**

The values entered here are mandatory because they are used for measurements. Enter all values, i.e., limit values, nominal values etc.

**Note**

Tour entries are only valid for filtering in the subsequently recorded measurement series after they have been added to the battery definitions. If all available measurement series need to be synchronized with all subsequent entries, this is done via the **Various Actions** menu ⇨🗎36.

**Note**

Some values are taken from the block-specific values (⇨ “Creating a Block Type” 🗎48), linked to other values and applied to the battery.

**Note**

Support blocks can be specified. Blocks of the same type and with the identical voltage (usually 2 V, 6 V or 12 V) are connected in series in a UPS system in order to arrive at the voltage level required for the output load. If load output voltage may not deviate from the specified load voltage, or may only deviate from it very slightly, so-called support blocks can be used. The voltage of these support blocks differs from standard voltages, and thus from the voltages of the blocks used in the system as well.
No extra limit values can be specified for the support blocks. This function cannot be implemented in METRACELL BT PRO.

(Yellow fields must be filled in. Permissible entries: A–Z, a–z, 0–9.)

6. Click the ✓ button.

↳ The battery is stored.

### 8.9.17 Editing a Battery

✓ A battery has been created.

1. Start BT PRO Manager.
2. Click the **Definitions** button.
   The **Definitions** buttons are displayed in the **Display selection**.
3. Click the **Battery** button.
   The created batteries are displayed in the **Display selection**.
4. Click the battery you want to edit.
   The fields for specifying the battery are displayed in the **Detail display area**.
5. Click the ✎ button.
   The fields are ready for input.
6. Change the desired battery parameters.
   (permissible entries: A–Z, a–z, 0–9.)
7. Click the ✓ button.

↳ The battery is edited.

### 8.9.18 Deleting a Battery

✓ A battery has been created.

1. Start BT PRO Manager.
2. Click the **Definitions** button.
   The **Definitions** buttons are displayed in the **Display selection**.
3. Click the **Battery** button.
   The created batteries are displayed in the **Display selection**.
4. Click the battery you want to delete.
   The fields for specifying the battery are displayed in the **Detail display area**.
5. Click the – button.
   A security prompt is displayed.
6. Confirm the security prompt.

↳ The battery is deleted.

## 8.10 Transferring the Battery Database to the Battery Tester

A wireless interface connection must be established between the PC and the battery tester before transferring the battery database to the battery tester. Make sure that the COM port in the operating system and in BT PRO Manager match up with each other.

The following instructions are provided as an example for a PC running the Microsoft® Windows® 10 operating system. The procedure is similar for all other Microsoft® Windows® operating systems.

✓ The battery database has been specified ⇨🗎45.

1. Start BT PRO Manager.
2. Click the **Definitions** button.
   The **Definitions** are is displayed in the **Display selection**.
3. Click the **Battery** button.
   The created batteries are displayed in the **Display selection**.

Optional: If you only want to transfer part of the battery database, follow steps 29–33. Otherwise go to step 34.

4. Click the ⩧ symbol.
   The **Filter** dialog appears.
5. Activate the desired filter by clicking the checkbox.
6. Specify the filter criterion in the field.
7. Click **Apply**.
   The battery database is filtered. The list window has a colored background.
8. Close the **Filter** dialog.
9. Under the **Display selection**, click ⮉.
   The **Transfer Battery Definitions** dialog is displayed.
10. Click the **OK** button.
11. After the transfer has been completed, click the **Deactivate Filter** button.
    The list window no longer has a colored background. All created batteries are displayed in the expanded folder view.

↳ The battery database has been transferred to the battery tester and can be used for measurements (⇨🗎34).

## 8.11 Assigning RFID Tags to Batteries (DUTs)

Battery parameters, such as the battery identification number, are required for measurements.

If you manage your system components with RFID technology, you can take advantage of this during on-site measurement to assign the performed measurement to a device under test.

Simply scan the RFID tag attached to the actual DUT with the battery tester's RFID reader during measurement (⇨🗎15). The corresponding digital DUT (battery) is automatically selected from the battery database.

To ensure that this works, you can enter the RFID manually to BT PRO Manager when you create the battery database, or link the RFID tags to the respectively associated database DUT after you create the battery database. You do not need to scan the RFID tag and assign it.

You can tell whether or not a DUT is already linked to an RFID tag by looking at the bottom-right corner of the DUT entry:

– **– –** = no RFID tag assigned
– **RF** = RFID tag assigned

✓ You have created a battery database which includes all devices under test ⇨ "Creating and Managing the Battery Database" 🗎45.
✓ The battery database has been transferred to the battery tester ⇨🗎53.
✓ The objects of the system are equipped with RFID tags.

1. Switch the battery tester on ⇨🗎19.
2. Press the **OK** key.
   The **main menu** is displayed.
3. In the **main menu**, use the ▼▲ keys to select ➔ **DATA**.
4. Press the **OK** key.
   The **DATA** menu is displayed.
5. In the **DATA** menu, use the ▼▲ keys to select ➔ **BATTERY DEF.**.
6. Press the **OK** key.
   The battery database appears which was previously loaded to the device.
7. Select the desired battery.
   (Batteries without RFID assignment can be recognized by the **– –** entry in the lower right corner.)
8. Press and hold the **OK** key.
   An acoustic signal indicates that the RFID reader is ready. The display shows the message **– – – – – > () < – – – – –** .

9. Hold the battery tester with its display approx. 1–2 cm above the RFID tag.
   The battery tester reads the RFID tag. A short beep confirms recognition. The battery entry is displayed and **RF** appears at the bottom right.

↳ The RFID tag is assigned to the battery. If you read the RFID tag during a measurement, the measurement data is assigned to the battery.

## 8.12 Importing Measurement Data

There are two ways to import measurement data to BT PRO Manager:

1. Connect the battery tester to the PC and read out the data.
2. Import an existing CSV file (⇨ “Saving Measured Values to a PC (Data Backup)” 🗎91).

### 8.12.1 Reading out Data

1. Start BT PRO Manager.
2. Click the **General Settings** button.
   The **General Settings** dialog appears.
3. In the **Read in Measurement Series** field, enter the number of measurement series to be transferred.
4. Check whether the number in the **COM Port** field matches the COM port number you noted earlier.
   – If they match: Go to step 27.
   – If they do not match: In the **COM Port** field, enter the COM port number and click the **Apply** button.
   The setting is saved.
5. Close the **General Settings** dialog by clicking the ✕ button.
6. Click the **Read In Measurement Series** button.
   The **Read in Measurement Series** menu appears in the **Display selection**.
7. Click the **BT PRO (read out)** button.
   The dialog for saving the export file opens.
8. Select a directory path and a file name for the export file here.
9. Confirm your entry.

↳ The data are read out of the battery tester and imported into BT PRO Manager. Information appears in the Detail display area (e.g., number of imported measurement series).
A CSV file is saved as well. The CSV file contains the measurement data and is intended as a backup copy. Store this file in a safe place to prevent data loss.

### 8.12.2 Reading in a CSV File

✓ The measurement data are available as a CSV file ⇨ “Saving Measured Values to a PC (Data Backup)” 🗎91.

1. Start BT PRO Manager.
2. Click the **Read In Measurement Series** button.
   The **Read in Measurement Series** menu appears in the **Display selection**.
3. Click the **Read In Data** button.
   The data entry dialog opens.
4. Select the CSV file.
5. Confirm that the file should be opened.

↳ The measurement data from the CSV file are imported.
Information appears in the Detail display area (e.g., number of imported measurement series). You can save this information as a log file. To do this, click the **Report** button above the Detail display area.

## 8.13 Viewing a Measurement Series and Creating Measurement Evaluations (Reports)

BT PRO Manager software not only allows you to view and edit measurement data, you can also evaluate data in report form.

### 8.13.1 Viewing a Measurement Series

✓ Measurement data are available in BT PRO Manager ⇨ “Importing Measurement Data” 🗎54.

1. Start BT PRO Manager.
2. Click the **Display Measurement Series** button.
   The **Measurements** menu is displayed in the **Display selection**.
3. Select the desired type of measurement from the list.
   Depending on the selected list entry, the following appears in the **Display selection**:
   – Folder view = locations and batteries
   – Most recent = all measurements in descending chronological order
   – Specific measuring function = all measurements of the selected type in descending chronological order
   The first measurement series is selected automatically.
   The measured values are displayed in the **Detail display area**.
4. In the **Display selection**, select the desired measurement series from the **Select Measurement Series** list.

↳ The measured values of the selected measurement series are displayed as a table in the **Detail display area**.

#### Filtering a Measurement Series

1. Click the ⩧ symbol.
   The **Filter** dialog appears.
2. Activate the desired filter by clicking the checkbox.
3. Specify the filter criterion in the field.
4. Click **Apply**.
   The measurements are filtered. The list window has a colored background.
5. Close the **Filter** dialog.

**Note**

Remember to deactivate the filter when it is no longer needed.
If the list window has a colored background, a filter is still active.

Other display options:

- Limit values:
  Depending on the measurement, lower and upper limit values are specified. If the values are within the limits, they are displayed in green. If they are outside the limits, they are displayed in red.
  To change the limit values for the current evaluation, enter new values in the **Limit Min.** and **Max.** fields and click ↻ to refresh the display. The evaluation is displayed with the corresponding changes, but the limit values are not changed permanently.
- Type of display:
  The measurement series can be displayed in a different format.
  To change the display format, click the icon for another display type above the **Detail display area**, such as a bar chart ılı or line/trend graph ↗.
- Line/trend graph display:
  The line/trend graph display compares older measurement series (of the same type taken at the same location or in the same system) with the current series. To select which measurement series you want to compare, either check or uncheck the boxes in front of the measurements.
  Add a measurement series to the block history:
  **Ctrl + left-click** on a measuring point of a measurement series in the upper display adds it to the block history below.
  **Refresh** resets the display to its initial state.

- Excerpt:
  In some display modes you can select an excerpt, in which case only the measurement data contained in the excerpt is displayed.
  To select an excerpt, left click on the left side at the beginning of the desired excerpt in the report and hold the mouse button down. Drag the mouse pointer to the right over the desired excerpt. A selection box appears. When you release the mouse button, the area included in the selection box is displayed in an enlarged format.
  Undo excerpt:
  Drag a selection box from right to left in the diagram.
  Move excerpt:
  Right click in the diagram and keep the mouse button pressed. Move the diagram.
  **Refresh** resets the display to its initial state.

**Note**

You can print some of the selected displays as individual reports ⇨ “Individual Report: Creating and Printing an Individual Measurement Evaluation” 58.

### Measuring Functions for Interval U+I

**Note**

Intervals are always displayed in a line/trend graph. Other displays are not possible.

Momentary voltage and current values are measured in the graph with the vertical cursor. This takes place at the points where the vertical cursor intersects with the curves. Instantaneous power is calculated as well.

The horizontal cursor does not have any measuring function. However, it can be used to compare the curve heights and to read Y-axis voltage and current values.

Time ranges for Ah and Wh can be integrated and added to the comment:

1. Place the cursor on the starting point of the time range.
2. Press the **S** key.
   The starting point is specified.
3. Place the cursor on the end point of the time range.
4. Press the **E** key.
   The end point is specified.
   The gray area represents the selected time range.
5. Press the **space bar**.
   A window with the integration values and measured values at the cursor position is displayed.
6. Click the ✓ button.

↳ Time ranges for Ah and Wh are integrated and added to the comments.

Additional keyboard commands:

**C**: Clears the currently selected time range.

**L**: Moves the cursor to the beginning of the measurement series.

**R**: Moves the cursor to the end of the measurement series.

### 8.13.2 Commenting a Measurement Series

You can add a comment to each measurement series to note of additional information. If you create a report, it will include the comment.

✓ Measurement data are available in BT PRO Manager ⇨ “Importing Measurement Data” 🗎54.

1. Start BT PRO Manager.
2. Click the **Display Measurement Series** button.
   The **Measurements** menu is displayed in the **Display selection**.
3. Select the desired type of measurement from the list.
   The measurement series is displayed in the **Display selection**. The first measurement series is selected automatically.
   The measured values are displayed in the **Detail display area**.
4. In the **Display selection**, select the desired measurement series from the **Select Measurement Series** list.
   The measured values of the selected measurement series are displayed in the **Detail display area**.
5. Click the 🗋 symbol above the **Detail display area**.
   The **Measurement Series Comment** dialog appears.
6. Enter your comment in the **Comment** field.
7. Click the ✓ button.

↳ The comment is stored.

### 8.13.3 Deleting a Measurement Series

✓ Measurement data are available in BT PRO Manager ⇨ “Importing Measurement Data” 🗎54.

1. Start BT PRO Manager.
2. Click the **Display Measurement Series** button.
   The **Measurements** menu is displayed in the **Display selection**.
3. Select the desired type of measurement from the list.
   The measurement series is displayed in the **Display selection**. The first measurement series is selected automatically.
   The measured values are displayed in the **Detail display area**.
4. In the **Display selection**, select the desired measurement series from the **Select Measurement Series** list.
5. Click the – symbol above the **Detail display area**.
   A security prompt appears.
6. Confirm the security prompt by clicking **Yes**.

↳ The measurement series is deleted.

### 8.13.4 Editing a Measurement Series

✓ Measurement data are available in BT PRO Manager ⇨ “Importing Measurement Data” 🗎54.

1. Start BT PRO Manager.
2. Click the **Display Measurement Series** button.
   The **Measurements** menu is displayed in the **Display selection**.
3. Select the desired type of measurement from the list.
   The measurement series is displayed in the **Display selection**. The first measurement series is selected automatically.
   The measured values are displayed in the **Detail display area**.
4. In the **Display selection**, select the desired measurement series from the **Select Measurement Series** list.
5. Right click the measured value to be edited in the table view for the measured values.
   A menu with the following selection options appears:
   - Edit
     The measured value can be edited and is highlighted in yellow.
     Highlighting cannot be undone, even if the original value is re-entered! The yellow highlighting appears in tables and diagrams, as well as in the evaluations.
   - Remove from calculation
     The measured value is removed from the calculations, e.g., “Total Battery Voltage (all blocks)”, and highlighted in gray.
   - Add to calculation
     The measured value is added back into the calculations. The gray highlighting disappears.
   - Back
     The menu closes. The current measurement series is selected in the **Select Measurement Series**.
6. Edit the measurement series with the displayed selection options.

↳ The measurement series is edited.

### 8.13.5 Individual Information in Reports

- Inspector's name in reports:
  In reports, the name of the user account used to load the measurement data into the database is automatically used as the inspector ⇨ "Importing Measurement Data" 🗎54.
  If **Created by** is selected, the username of the user account used to create the report appears. Log in via the user account whose name should appear in the report.
- Logos in reports:
  A logo is displayed in the individual report (individual measurement evaluation) and the multiple report (multiple measurement evaluation). The BT PRO Manager logo appears by default.
  You can replace this logo with your own graphic. It is scaled automatically.

✓Hidden folders are displayed on your Windows® system. Read the documentation included with your operating system for detailed information.

✓Your graphic must be a JPG file.

1. Rename your graphic. The file name must read as follows:
   – Individual measurement evaluation (individual report) = BTpro_Report_Logo.jpg
   – Multiple measurement evaluation (multiple report) = BTpro_Job_Logo.jpg
2. Start Windows® Explorer®.
3. Open the following path: **C:\ProgramData\Cellizer\CS-Manager\System**.
   This is a program subfolder.
4. If you want to keep the existing old graphics, copy them to another location.
5. Copy your graphic into the folder.
   The **Replace or Skip File** dialog appears.
6. Click the **Replace File in Target** button.

↳Your graphic is saved and appears as a logo in the report.

### 8.13.6 Individual Report: Creating and Printing an Individual Measurement Evaluation

You can display a graphic evaluation of an individual measurement series ⇨ "Viewing a Measurement Series" 🗎55.

You can print most display types (with some exceptions, such as table views) as a report on paper or electronically as an Adobe® PDF file. If you can print the evaluation as a report, a printer icon appears at the top left above the graphical evaluation.

✓ Measurement data are available in BT PRO Manager ⇨ "Importing Measurement Data" 🗎54.

1. Create a graphical evaluation, such as a bar chart or a line/trend graph ⇨ "Viewing a Measurement Series" 🗎55.
2. Click the 🖶 button.
   The **Preview** dialog is displayed.

> **Note**
>
> You can point at the diagram with the mouse pointer to display the measurement series selection menu. This menu can be used to select or deselect measurement series for printing. The button at the top of the measurement series selection menu toggles between 2D and 3D views.

3. Optional: Activate the **OK** or **NOK** checkbox for an evaluation of the measurement results.
4. Click the appropriate symbol for the desired type of print-out:
   – 🖶 for the printer specified on your PC.
   – Adobe® PDF logo for a PDF file.
   The respective print dialog opens.
5. Follow the instructions in the print dialog. If necessary, read any relevant product documentation.

↳ The report is printed.

### 8.13.7 Multiple Report: Creating and Printing a Multiple Measurement Evaluation

You can create and print multiple reports, i.e., evaluations of several measurement series.

A multiple report contains several measurement series, all of which originate from a single job. A job is a collection container for measurement series and is identified by an ID.

Jobs can be created for all types of measurements.

In order to obtain a job ID, right click the measurement series in the **display selection** and select **Show Job ID**.

Job IDs are not assigned to individual measurements, which is indicated by the number “0”. They can be added to a job which belongs to the same battery. In this case they are assigned the same job ID and appear in the multiple report. Conversely, the job ID can also be removed so that the measurement series no longer belongs to the job and does not appear in the multiple report.

In the **Display selection**, measurement series without a job ID are identified by an empty square. The square is filled in for measurement series with a job ID.

In addition to combining measurement series, you can customize the report, for example:

– Select elements to be printed
– Add evaluations: overall evaluation and element evaluations
  Green = OK
  Orange = warning
  Red = NOK
– Add images (PNG, JPG, JPEG or BMP format)
– Add notes and comments: any desired text or text modules for frequently occurring elements

Optionally, the report can be printed on paper or electronically as an Adobe® PDF file.

✓ Measurement data are available in BT PRO Manager ⇨ “Importing Measurement Data” 🗎54.

1. Start BT PRO Manager.
2. Click the **Display Measurement Series** button.
   The **Measurements** menu is displayed in the **Display selection**.
3. Select the desired type of measurement from the list.
   Depending on the selected list entry, the following appears in the **Display selection**:
   – Folder view = locations and batteries
   – Most recent = all measurements in descending chronological order
   – Specific measuring function = all measurements of the selected type in descending chronological order
   The first measurement series is selected automatically.
   The measured values are displayed in the **Detail display area**.
4. In the **Display selection**, select a measurement series with a job ID (indicated by a filled square) from the **Select Measurement Series** list.
   The measured values of the selected measurement series are displayed as a table in the **Detail display area**.
5. Right click the measurement series.
   The context menu appears.
6. Click **Open Job**.
   The job is displayed in the **Detail display area**.
7. Click the ✎ button.
   The job can be edited.
8. In the **Display selection**, click on another measurement series that belongs to the same battery (identifiable by the ID) and hold down the mouse button. Drag the measurement series to the **Assigned** area.
   The measurement series is added to the report.
9. Repeat step 8 as required.
10. In the **Print** area check the boxes for the items you want to include in the multiple report.

Optional – add an evaluation:

11. Create an evaluation in the **Evaluation**, **Battery-Specific** and **Block-Specific** areas. To do this, activate the checkboxes or fill in the fields with limit values.

Optional – add images:

12. Click the Image button.
    The **Open** dialog opens.

13. Select a graphic.
    The graphic is added. A **PHOTO** element appears in the **Assigned** area. To edit (add a comment to) or remove the graphic, right-click it and select the corresponding context menu item.
14. Repeat steps 12–13 for additional images.

Optional – add remarks and comments:
Create a text block or select an existing one. Alternatively, or in addition, you can enter any desired text.

15. Click the **+** button in the **Add Text Block** area.
16. Enter a name for the text block in the Selection field.
17. Enter any desired text to the text field.
18. Click the **+** button.
    The text block is saved and selected.
19. f a text block has already been created, select a text block from the list in the **Add Text Block** area.
    The text block is selected and is displayed in the **Comments** field.
20. Enter any desired text in the **Comments** field.

Then save the multiple report settings.

21. Click the ✓ button.
    The settings for the multiple report are saved.

Optional – print the report:

22. Click the 🖶 button.
    The **Preview** dialog is displayed.

**Note**

You can point at the diagram with the mouse pointer to display the measurement series selection menu. This menu can be used to select or deselect measurement series for printing. The button at the top of the measurement series selection menu toggles between 2D and 3D views.

23. Click the appropriate symbol for the desired type of print-out:
    – 🖶 for the printer specified on your PC.
    – Adobe® PDF logo for a PDF file.

    The respective print dialog opens.
24. Follow the instructions in the print dialog. If necessary, read any relevant product documentation.

↳ The report is printed.
Close the job by clicking the ✕ button to continue working with the program.

### 8.13.8 Copying a Measurement Series

**Note**

Only evaluations created with BT PRO Manager are legally compliant.
Evaluations created by the user using the measurement series and diagram copying functions described here are not legally compliant!

✓ Measurement data are available in BT PRO Manager ⇨ “Importing Measurement Data” 🗎54.

1. Start BT PRO Manager.
2. Click the **Display Measurement Series** button.
   The **Measurements** menu is displayed in the **Display selection**.
3. Select the desired type of measurement from the list.
   The measurement series is displayed in the **Display selection**. The first measurement series is selected automatically.
   The measured values are displayed in the **Detail display area**.
4. In the **Display selection**, select the desired measurement series from the **Select Measurement Series** list.
5. Copying measured values
   – Click the CSV file symbol above the measured values in the measured values table view.
   The measured values are copied to the clipboard in CSV format and can be pasted into other programs.
6. Copying diagrams
   – Click the copy symbol at the left above the respective diagram in the bar graph view or the line/trend graph view.
   The diagram is copied to the clipboard and can be pasted into other programs as a graphic file.

↳ The measurement series is copied.

# 9 Preparing Measurements

## 9.1 General Information (Procedure)

Certain preparations must be completed before performing measurements:

1. Install the BT PRO Manager software ⇨🗎34.
2. Create a battery database with BT PRO Manager ⇨🗎34.
   In the battery database, you can manage all of your devices under test (batteries), making it possible to select them during measurement. You also specify the limit values required for the measurement in the database. If the specified limit values are exceeded during a measurement, a brief acoustic signal is emitted and the measured value is displayed with a black background.

   If you have already completed this step, double check and update your battery database.

   **Note**

   Devices under test can also be specified on the device. However, manually created DUTs and their associated measurement data cannot be transferred to the battery database / BT PRO Manager. To transfer data, you must first enter the DUT (a second time) in the software.
   You should therefore avoid creating DUTs manually, and only in exceptional cases. For example, if you encounter unforeseen changes on-site.
3. Transfer the battery database to the battery tester ⇨🗎43.
4. Optional: If you are using an RFID system, assign the RFID tags to the DUTs (batteries) via the battery database ⇨🗎53.
5. Switch polarity on or off ⇨🗎62.
   If necessary, you do not have to take the polarity of the measured value into account for the **FLOAT**, **DISCHARGE**, **DISCHARGE** and **CONNECTOR** measurements. All recorded measured values are then positive (absolute values).
6. Learn how to use the accessories ⇨🗎63.
   The battery tester's accessories are used for some measurements. Before beginning a measurement, make sure you know how to connect the accessories and use them as intended.

↳ You can now perform the various measurements ⇨🗎65.

## 9.2 Switching Polarity On or Off

When this function is switched on, the polarity of the measured value is taken into account for the **float**, **discharge**, and **charge** measurements.

If the function is switched off, the polarity of the measured value is not taken into account for the **float**, **discharge**, and **charge** measurements. In this case, all recorded measured values are positive (absolute values).

1. Switch the battery tester on ⇨🗎19.
2. Press the **OK** key.
   The **main menu** is displayed.
3. From the **main menu**, use the ▼▲ keys to select
   → **SETTINGS**.
   The **SETTINGS** menu is displayed.
4. Press the **OK** key.
   The **SETTINGS** menu is displayed.
5. Use the ▼▲ keys to select → **MEASUREMENTS**.
6. Press the **OK** key.
   The **MEASUREMENTS** menu is displayed.
7. Use the ▼▲ keys to select → **POLARITY ON** or **POLARITY OFF**.
8. Press the **OK** key.

↳ The setting is applied and indicated by a preceding dot.

## 9.3 Connecting Measuring Accessories

Depending on the measurement, various measuring accessories are connected to the battery tester. Which accessories are used for which measurement is specified for each respective measurement ⇨ “PC Software “BT PRO Manager”” 🗎34.

Before using an accessory, read the following information and the product documentation for the accessory.

### 9.3.1 Set of Multimeter Test Probes (KS29)

The included set of multimeter test probes consists of measurement cables with test probes. Each test probe is equipped with a safety cap.

Table 9: Set of Multimeter Test Probes

| | |
|---|---|
| **Measurement Category** | See label on device. |
| **Test Probe Diameter** | 4 mm |
| **Plug** | 90° angled,<br>safety plug<br>(1 of which is a loop-through plug) |

**CAUTION**

**Dangerous voltage.**

Electric shock.

Only perform measurements with the measurement cables included in the test probe set with the safety caps attached.

The safety caps may only be removed when using the alligator clips. The safety caps must be reattached afterward ⇨ “Alligator Clips (KY95-3)” 🗎63.

**CAUTION**

**Dangerous voltage.**

Electric shock.

Never touch the conductive ends of the test probes.

Connection and use of the multimeter test probes are described in the context of each respective measurement ⇨🗎67ff.

### 9.3.2 Alligator Clips (KY95-3)

Alligator clips provide a detachable clamp connection for measurements conducted over longer periods of time.

Table 10: Alligator clips (KY95-3)

| | |
|---|---|
| **Measurement Category** | See label on device. |

**CAUTION**

**Dangerous voltage.**

Electric shock.

Never touch the conductive ends of the alligator clips.

The alligator clips are plugged onto the multimeter test probes:

✓ The multimeter test probe measurement cables are not connected to the battery tester.
✓ The multimeter test probes do not make contact.

1. Remove the protective cap from the red multimeter test probe.
   Keep the protective cap in a safe place. You will need it again later.
2. Attach the red alligator clip to the red multimeter test probe.
3. Repeat the previous steps with the black multimeter test probe and the black alligator clip.

↳ The alligator clips can be used for measurements ⇨🗎34.

After measurement has been completed, remove the alligator clips and return the protective caps:

✓ The multimeter test probe measurement cables are not connected to the battery tester.
✓ The alligator clips do not make contact.

1. Remove the alligator clip from the red multimeter test probe.

2. Attach a protective cap to the red multimeter test probe.
3. Repeat the previous steps with the black alligator clip and the black multimeter test probe.

↳ The multimeter test probes can be used for measurements ⇨🗎34.

### 9.3.3 Kelvin Probes (Z227D) and Angled Kelvin Probes (Z227W) for 4-Pole Measurement

Electrical resistance is a dipole which can generally be measured using two poles. To do this, a measuring current of predetermined magnitude is directed through the device under test and the resulting voltage drop is measured. The respective resistance value is derived from the quotient of these two values. The two points between which voltage is measured are critical for the measurement result. All resistances between these two points (e.g., cable resistance) add to the total measured resistance.

To avoid this, use the included Kelvin probes (Z227D) for measurements, or the optionally available angled Kelvin probes (Z227W ⇨🗎11) for hard-to-reach measuring points. To route the voltage measurement signals from the meter as close as possible to the device under test, the probe has separate connections for power supply and voltage measurement. This type of 4-pole connection is called a Kelvin connection.

Table 4: Probes for 4-wire measurement

| | Kelvin Probes (Z227D) | Angled Kelvin probes (Z227W) |
|---|---|---|
| **Measurement Category** | CAT O<br>**ATTENTION**<br>**Measurement in an invalid measurement category!**<br>Damage to the device.<br>Use the Kelvin probes only in environments of measurement category CAT O.<br>The Kelvin probes must not be used in measurement categories CAT II, III, or IV. | CAT O<br>**ATTENTION**<br>**Measurement in an invalid measurement category!**<br>Damage to the device.<br>Use the angled Kelvin probes only in environments of measurement category CAT O.<br>The angled Kelvin probes must not be used in measurement categories CAT II, III, or IV. |
| **Angle** | None (straight) | 90° |



**CAUTION**

**Dangerous voltage.**

Electric shock.

Never touch the conductive ends of the Kelvin probes and the angled Kelvin probes.

**ATTENTION**

**Exceeding the maximum test voltage of 24 V when using Kelvin probes and angled Kelvin probes!**

Damage to the product.

Use the Kelvin probes the angled Kelvin probes only for the “Measurement” function!

Instructions for connecting and using the Kelvin probes (Z22D) and the angled Kelvin probes (Z227W) are provided in the “Resistance” measurement section ⇨🗎74.

If necessary, you can order replacements for the delicate conductive ends ⇨ “Optional Accessories” 🗎11.

# 10 Performing Measurements

Various measurements can be performed with the battery tester:

| Measurement | Description |
|---|---|
| **MULTIMETER** | DC and AC voltage measurements without storing the measured values. |
| **FLOAT** | Periodic measurement of block voltages.<br>This measurement is used for quarterly recording of float voltage, for example, in UPS systems. |
| **DISCHARGE** | Multiple measurement of block voltages at short intervals during discharging (block capacity test). |
| **CHARGE** | Multiple measurement of block voltages at short intervals during charging (block capacity test). |
| **RESISTANCE** | Periodic measurement of the internal resistance of the blocks. |
| **TEMPERATURE** | Measurement of block temperature with an IR temperature sensor. |
| **CONNECTOR** | Measurement of voltage drop to determine connector loss between blocks. |
| **INTERVAL U** | Measurement of the voltage of a battery at any desired time interval (voltage curve / capacity test of the entire battery). |
| **INTERVAL U + I** | Measurement of the voltage and current of a battery at any desired time interval (voltage and current curves / capacity test of the entire battery).<br>Example: Recording of discharge current during discharging. |
| **DMA 35 (IrDA)** | Measurement of acid density and electrolyte temperature within a block.<br>Measurements are performed with the DMA 35 Basic density meter (Version 3) from Anton Paar GmbH. |
| **DMA 35 (BT)** | Measurement of acid density and electrolyte temperature within a block.<br>Measurements are performed with the DMA 35 density meter (Version 4) from Anton Paar GmbH. |

The following subsections describe how measurements are performed. First read the general information which contains basic information for all measurements (starting measurements, repeating measurement, etc.), and the information concerning on-site selection of DUTs.

## 10.1 General Information

### 10.1.1 Starting a Measurement

The following sections describe how specific measurements are performed. Follow the specified steps and make sure that the measuring points are properly contacted.

We recommend that you always contact the battery poles at the same measuring points when performing repeat measurements so that you obtain reproducible results.

### 10.1.2 Selecting the DUT for the On-Site Measurement

To assign the measured values to a device under test (battery), the DUT must be selected during measurement.

While preparing for measurement (⇨🗎34), you created a battery database with all DUTs and transferred it to the battery tester.

On site, you can select the DUT from the battery database:

1. Via RFID (by scanning the RFID tag)
2. Via manual selection (using the keys on the battery tester).

If you encounter an unforeseen change on site, for example a new battery about which you have not been informed, you can enter a DUT manually.



**Note**

Only create DUTs manually in exceptional cases.
Manually created DUTs and their associated measurement data cannot be transferred to the battery database / BT PRO Manager. To transfer the data, you must first enter the DUT (a second time) in the software ⇨ “PC Software “BT PRO Manager”” 🗎34.

All 3 options are described in the following sections as part of the measurement procedure.

### 10.1.3 Ending or Aborting Measurements

As a rule, measurements are performed over all specified blocks. As soon as all measured values have been acquired, measurement is ended automatically.

A measurement can also be aborted. There are 2 way to do this:

1. Abort and save:
   Press the **OK** key and confirm the security prompt with **OK**.
   The measurement is aborted and the measured values are saved.
2. Abort without saving:
   Press the **FUNCTION** key and confirm the security prompt with **OK**.
   The measured values are stored in the battery tester, but are not transferred during a subsequent data transfer.

If you abort a measurement by mistake, respond to the security prompt by pressing the **FUNCTION** key. The display returns to the measurement view.

An incomplete or faulty measurement is indicated on the display by **--------**. In addition, the measurement display shows **XXXXX** instead of the number of blocks measured under the measurement label.

You can reactivate an aborted measurement to complete it properly (see following section).

### 10.1.4 Reactivating an Aborted Measurement

A measurement identified as aborted (see above section) can always be reactivated.

1. Switch the battery tester on ⇨🗎19.
2. Press the **OK** key.
   The **main menu** is displayed.
3. From the **main menu**, use the ▼▲ keys to select
   → **DATA**.
   The **DATA** menu is displayed.
4. Use the ▼▲ keys to select → **MEASURED VALUES**.
5. Press the **OK** key.
   The menu for viewing the measurements opens ⇨ “Measured Values” 🗎30.
6. Use the ▼▲ keys to select the measurement you want to reactivate.
7. Press and hold the **FUNCTION** key until you hear a short beep.
   “XXXXX” changes to the number of blocks actually measured.

↳ The measurement is reactivated and can be continued.

### 10.1.5 Repeating a Measurement

Stored measurements can be repeated. This allows incorrect measurement values to be corrected or re-measured.

1. Switch the battery tester on ⇨🗎19.
2. Press the **OK** key.
   The **main menu** is displayed.
3. From the **main menu**, use the ▼▲ keys to select
   → **DATA**.
   The **DATA** menu is displayed.
4. Use the ▼▲ keys to select → **MEASURED VALUES**.
5. Press the **OK** key.
   The menu for viewing the measurements opens ⇨ “Measured Values” 🗎30.
6. Use the ▼▲ keys to select the measurement for which you want to measure a value again.
7. Use the ▼▲ keys to select the measured value you want to measure again.
   (Some measurements have only one measured value. No selection is possible in this case.)
8. Press the **OK** key.
   The detailed view is displayed.
9. Press and hold the **OK** key (approx. 2 seconds) until you hear a short beep.
10. Measure the measured value again.

↳ The measured value is saved.

### 10.1.6 Editing or Viewing Measurements

You can view and edit all measurements stored in the battery tester directly at the device. This makes it possible to perform an initial check of the measurement results on site.

Normally, the measured values are displayed in black text. However, if a limit value is violated, the measured value is displayed in a light text and a black background for emphasis.

For a better overview, and for evaluation of the measurement results, transfer the measurement data to the BT PRO Manager software. Reports can also be generated with this program.

Complete information on working with measurement data can be found in Section “Viewing, Editing, Transferring and Evaluating Measured Values” ⇨🗎89.

## 10.2 Multimeter Measurement

With the **MULTIMETER** measurement function, you can perform simple DC and AC voltage measurements.

| Sequence | Description of the Measurement | Display |
|---|---|---|
| 1 | Connect the measurement cables of the multimeter test probes to the connector sockets with the matching colors (⇨ “Measurement Inputs” 🗎13) in accordance with the measuring range:<br>±2.45 $V_{DC}$: P–/COM and S–<br>±24.5 $V_{DC}$: P–/COM and S+<br>±600 $V_{DC}$: P–/COM and S+<br>300 $V_{AC}$: P–/COM and S+ | |
| 2 | Press and hold the **FUNCTION** key for about 2 seconds to switch the battery tester on. | BTpro <date> <version><time> |
| 3 | Press any key to open the **main menu**.<br>If you are already in another menu, press the **FUNCTION** key repeatedly until the **main menu** appears. | ->MEASUREMENT DATA |
| 4 | Press the **OK** key to open the**MEASUREMENTS** menu.<br>The **MULTIMETER** measuring function is already selected. | ->MULTIMETER FLOAT |
| 5 | Press the **OK** key to open the menu for the measuring function. | ->2.45 VDC (S–)<br>24.5 VDC (S+) |
| 6 | Use the ▼▲ keys to select a measuring range. | 600 VDC (S+)<br>->300 VAC (S+) |
| 7 | Start the measurement by pressing the **OK** key. | <date> <time> |
| 9 | Contact the battery poles: Using suitable pressure, press the multimeter test probes against the poles. | -----HzX.XX $V_{AC}$ |
| 10 | The measured value is displayed. | |
| 11 | Remove the multimeter test probes from the poles. | |
| 12 | End the measurement by pressing the **OK** key. | ->MULTIMETER FLOAT |

## 10.3 Float Measurement

The **FLOAT** measurement is a test procedure in which the voltage values of all battery cells are measured. The measurement is performed regularly at certain intervals, e.g., as a quarterly inspection of a UPS system.

**Note**

Polarity can be switched off ⇨🗎62. If polarity is switched off, the absolute value of the measured value is recorded.

**Note**

Perform the **FLOAT** measurement before conducting temperature or acid density measurements.

| Sequence | Description of the Measurement | Display |
|---|---|---|
| 1 | Connect the measurement cables of the multimeter test probes to the P–/COM and S+ sockets with the matching colors (⇨ “Measurement Inputs” 🗎13). | |
| 2 | Press and hold the **FUNCTION** key for about 2 seconds to switch the battery tester on. | BTpro <date> <version><time> |
| 3 | Press any key to open the **main menu**.<br>If you are already in another menu, press the **FUNCTION** key repeatedly until the **main menu** appears. | ->MEASUREMENT DATA |
| 4 | Press the **OK** key to open the**MEASUREMENTS** menu.<br>The **MEASUREMENTS** menu is displayed. | ->MULTIMETER FLOAT |
| 5 | Use the ▼ key to select➔ **FLOAT**. | ->MULTIMETER FLOAT |
| 6 | Press the **OK** key to open the menu for the measuring function. | ->START BATT DATENB. |
| 7 | Before you start the measurement, you must set the parameters for location, battery, and limit values. You can:<br>– Select them in the battery database via RFID ⇨ Step 7a.<br>– Select them manually in the battery database⇨ Step 7b.<br>– Enter them manually on the battery tester ⇨ Step 7c. | START ->BATT DATENB. |
| 7a | ✓ A battery database has been created ⇨🗎45.<br>✓ The battery database has been transferred to the battery tester ⇨🗎53.<br>✓ You use RFID technology for your system.<br>✓ The DUTs in the battery database are linked to the corresponding RFID tags ⇨🗎53.<br>1. Use the ▼ key to select ➔ **BATT DATENB.**.<br>2. Press the **OK** key.<br>The battery database is displayed. A beep indicates that the RFID reader is ready.<br>3. Read the RFID tag (⇨🗎15).<br>An acoustic signal confirms that the reading has been taken and the DUT is displayed.<br>4. Press the **OK** key.<br>↳ The battery is selected. The battery tester returns to the **MEASUREMENTS** menu. | START ->BATT DATENB. |
| 7b | ✓ A battery database has been created ⇨🗎45.<br>✓ The battery database has been transferred to the battery tester ⇨🗎53.<br>1. Use the ▼ key to select ➔ **BATT DATENB.**.<br>2. Press the **OK** key.<br>The battery database is displayed. A beep indicates that the RFID reader is ready.<br>3. Use the ▼▲ keys to select a battery.<br>4. Press the **OK** key.<br>↳ The battery is selected and the battery tester returns to the **MEASUREMENTS** menu. | START ->BATT DATENB. |

| | | |
|---|---|---|
| 7c | 1. Use the ▼ key to select the **LOCATION:XXXX.** parameter.<br>2. Press the **OK** key.<br>The entry mode is active.<br>3. Enter the first digit of the parameter ⇨🗎14.<br>4. Confirm your entry with the **OK** key.<br>5. Repeat steps 1–4 for all other parameter digits for battery number, number of blocks, and upper and lower voltage limits. | BATT DATENB.<br>->LOCATION: 0000 |
| 8 | Press the ▲ key to return to **START**. | ->START<br>BATT DATENB. |
| 9 | Press the **OK** key to start the measurement. | BLOCK- - - - - - -<br>XXXX/X<br>SN:XXXXBN:XXXX |
| 10 | Wait for the beep that sounds when there is no voltage at the multimeter test probes. | Example:<br><br>BLOCK12.2500 V<br>0004/4<br>SN:0001BN:0010 |
| 11 | Contact the battery poles: Using suitable pressure, press the multimeter test probes against the poles. | |
| 12 | Wait for the beep which indicates that the measured value is stable.<br>This confirms the measurement. | |
| 13 | Remove the multimeter probes after the beep. | |
| 14 | Wait again for the beep, which indicates that the multimeter test probes are free of voltage again. | |
| 15 | Repeat the measurement procedures described above for further battery blocks.<br>The measurement ends automatically after you have completed measurements on all blocks. The measured values are saved.<br>The display shows the measured value evaluation ⇨🗎32. | |
| 16 | Press the **OK** key repeatedly to view the evaluation (scroll), and to then return the display to the **FLOAT** measurement. | SUM:<br>[XXXX] XX.XXXXV<br><br>AVER.:+XX.XXXXV |

## 10.4 Discharge Measurement

The **DISCHARGE** measurement function allows you to measure the voltages of the blocks in a battery multiple times at short intervals during a discharge (block capacity test).

**Note**

At least two test runs must be completed for the discharge measurement.

**Note**

Polarity can be switched off ⇨🗎62. If polarity is switched off, the absolute value of the measured value is recorded.

| Sequence | Description of the Measurement | Display |
|---|---|---|
| 1 | Connect the measurement cables of the multimeter test probes to the P–/COM and S+ sockets with the matching colors (⇨ “Measurement Inputs” 🗎13). | |
| 2 | Press and hold the **FUNCTION** key for about 2 seconds to switch the battery tester on. | BTpro <date> <version><time> |
| 3 | Press any key to open the **main menu**.<br>If you are already in another menu, press the **FUNCTION** key repeatedly until the **main menu** appears. | ->MEASUREMENT DATA |
| 4 | Press the **OK** key to open the **MEASUREMENTS** menu.<br>The **MEASUREMENTS** menu is displayed. | ->MULTIMETER FLOAT |
| 5 | Use the ▼▲ keys to select ➔ **DISCHARGE** . | FLOAT ->DISCHARGE |
| 6 | Press the **OK** key to open the selected menu for the measuring function. | ->START BATT DATENB. |
| 7 | Before you start the measurement, you must set the parameters for location, battery, and limit values. You can:<br>– Select them in the battery database via RFID ⇨ Step 7a.<br>– Select them manually in the battery database⇨ Step 7b.<br>– Enter them manually on the battery tester ⇨ Step 7c. | START ->BATT DATENB. |
| 7a | ✓ A battery database has been created ⇨🗎45.<br>✓ The battery database has been transferred to the battery tester ⇨🗎53.<br>✓ You use RFID technology for your system.<br>✓ The DUTs in the battery database are linked to the corresponding RFID tags ⇨🗎53.<br>1. Use the ▼ key to select ➔ **BATT DATENB.**.<br>2. Press the **OK** key.<br>The battery database is displayed. A beep indicates that the RFID reader is ready.<br>3. Read the RFID tag (⇨🗎15).<br>An acoustic signal confirms that the reading has been taken and the DUT is displayed.<br>4. Press the **OK** key.<br>↳ The battery is selected. The battery tester returns to the **MEASUREMENTS** menu. | START ->BATT DATENB. |
| 7b | ✓ A battery database has been created ⇨🗎45.<br>✓ The battery database has been transferred to the battery tester ⇨🗎53.<br>1. Use the ▼ key to select ➔ **BATT DATENB.**.<br>2. Press the **OK** key.<br>The battery database is displayed. A beep indicates that the RFID reader is ready.<br>3. Use the ▼▲ keys to select a battery.<br>4. Press the **OK** key.<br>↳ The battery is selected and the battery tester returns to the **MEASUREMENTS** menu. | START ->BATT DATENB. |

| | | |
|---|---|---|
| 7c | 1. Use the ▼ key to select the **LOCATION:XXXX.** parameter.<br>2. Press the **OK** key.<br>The entry mode is active.<br>3. Enter the first digit of the parameter ⇨🗎14.<br>4. Confirm your entry with the **OK** key.<br>5. Repeat steps 1–4 for all other parameter digits for battery number, number of blocks, and upper and lower voltage limits. | BATT DATENB.<br>->LOCATION: 0000 |
| 8 | Press the ▲ key to return to **START**. | ->START<br>BATT DATENB. |
| 9 | Press the **OK** key to start the measurement. | BLOCK- - - - - - -<br>XXXX/X<br>SN:XXXXBN:XXXX |
| 10 | Wait for the beep that sounds when there is no voltage at the multimeter test probes. | Example:<br><br>BLOCK12.2500 V<br>0004/4<br>SN:0001BN:0010 |
| 11 | Contact the battery poles: Using suitable pressure, press the multimeter test probes against the poles. | |
| 12 | Wait for the beep which indicates that the measured value is stable.<br>This confirms the measurement. | |
| 13 | Remove the multimeter probes after the beep. | |
| 14 | Wait again for the beep, which indicates that the multimeter test probes are free of voltage again. | |
| 15 | Repeat the measurement procedures described above for further battery blocks.<br>The measurement ends automatically after you have completed measurements on all blocks. The measured values are saved.<br>The display shows the measured value evaluation ⇨🗎32. | |
| 16 | Press the **OK** key repeatedly to view the evaluation (scroll) and then return the display to the **DISCHARGE** measurement. | SUM:<br>[XXXX] XX.XXXXV<br><br>AVER.:+XX.XXXXV |

## 10.5 Charge Measurement

The **CHARGE** measurement function allows you to measure the voltages of the blocks in a battery multiple times at short intervals during charging (block capacity test).

**Note**

At least two test runs must be completed for the **charge** measurement.

**Note**

Polarity can be switched off ⇨🗎62. If polarity is switched off, the absolute value of the measured value is recorded.

| Sequence | Description of the Measurement | Display |
|---|---|---|
| 1 | Connect the measurement cables of the multimeter test probes to the P–/COM and S+ sockets with the matching colors (⇨ “Measurement Inputs” 🗎13). | |
| 2 | Press and hold the **FUNCTION** key for about 2 seconds to switch the battery tester on. | BTpro <date> <version><time> |
| 3 | Press any key to open the **main menu**.<br>If you are already in another menu, press the **FUNCTION** key repeatedly until the **main menu** appears. | ->MEASUREMENT DATA |
| 4 | Press the **OK** key to open the **MEASUREMENTS** menu.<br>The **MEASUREMENTS** menu is displayed. | ->MULTIMETER FLOAT |
| 5 | Use the ▼▲ keys to select →**CHARGE**. | DISCHARGE ->CHARGE |
| 6 | Press the **OK** key to open the selected menu for the measuring function. | ->START BATT DATENB. |
| 7 | Before you start the measurement, you must set the parameters for location, battery, and limit values. You can:<br>– Select them in the battery database via RFID ⇨ Step 7a.<br>– Select them manually in the battery database⇨ Step 7b.<br>– Enter them manually on the battery tester ⇨ Step 7c. | START ->BATT DATENB. |
| 7a | ✓ A battery database has been created ⇨🗎45.<br>✓ The battery database has been transferred to the battery tester ⇨🗎53.<br>✓ You use RFID technology for your system.<br>✓ The DUTs in the battery database are linked to the corresponding RFID tags ⇨🗎53.<br>1. Use the ▼ key to select → **BATT DATENB.**.<br>2. Press the **OK** key.<br>The battery database is displayed. A beep indicates that the RFID reader is ready.<br>3. Read the RFID tag (⇨🗎15).<br>An acoustic signal confirms that the reading has been taken and the DUT is displayed.<br>4. Press the **OK** key.<br>↳ The battery is selected. The battery tester returns to the **MEASUREMENTS** menu. | START ->BATT DATENB. |
| 7b | ✓ A battery database has been created ⇨🗎45.<br>✓ The battery database has been transferred to the battery tester ⇨🗎53.<br>1. Use the ▼ key to select → **BATT DATENB.**.<br>2. Press the **OK** key.<br>The battery database is displayed. A beep indicates that the RFID reader is ready.<br>3. Use the ▼▲ keys to select a battery.<br>4. Press the **OK** key.<br>↳ The battery is selected and the battery tester returns to the **MEASUREMENTS** menu. | START ->BATT DATENB. |

| | | |
|---|---|---|
| 7c | 1. Use the ▼ key to select the **LOCATION:XXXX.** parameter.<br>2. Press the **OK** key.<br>The entry mode is active.<br>3. Enter the first digit of the parameter ⇨🗎14.<br>4. Confirm your entry with the **OK** key.<br>5. Repeat steps 1–4 for all other parameter digits for battery number, number of blocks, and upper and lower voltage limits. | BATT DATENB.<br>->LOCATION: 0000 |
| 8 | Press the ▲ key to return to **START**. | ->START<br>BATT DATENB. |
| 9 | Press the **OK** key to start the measurement. | BLOCK- - - - - - -<br>XXXX/X<br>SN:XXXXBN:XXXX |
| 10 | Wait for the beep that sounds when there is no voltage at the multimeter test probes. | Example:<br><br>BLOCK12.2500 V<br>0004/4<br>SN:0001BN:0010 |
| 11 | Contact the battery poles: Using suitable pressure, press the multimeter test probes against the poles. | |
| 12 | Wait for the beep which indicates that the measured value is stable.<br>This confirms the measurement. | |
| 13 | Remove the multimeter probes after the beep. | |
| 14 | Wait again for the beep, which indicates that the multimeter test probes are free of voltage again. | |
| 15 | Repeat the measurement procedures described above for further battery blocks.<br>The measurement ends automatically after you have completed measurements on all blocks. The measured values are saved.<br>The display shows the measured value evaluation ⇨🗎32. | |
| 16 | Press the **OK** key repeatedly to view the evaluation (scroll) and then return the display to the **CHARGE** measurement. | SUM:<br>[XXXX] XX.XXXXV<br><br>AVER.:+XX.XXXXV |

## 10.6 Resistance Measurement

The **RESISTANCE** measurement function measures the voltages and internal resistances of the battery blocks.

A special feature of internal resistance measurement is the simultaneous measurement of the “electrical resistance $R_{el}$“ and the “charge transfer resistance $R_{ct}$“. The combination of both resistances yields $R_{DC}$ (direct current resistance):

- The “electrical resistance $R_{el}$“ represents the purely electrical losses. These losses occur, for example, at the pole bridges, grids, and electrolytes. The battery delivers rapidly changing currents via this resistance, for example, for switched-mode DC/DC converters.
- The "charge transfer resistance $R_{ct}$“ characterizes a block's ability to accept and release charge. This makes it possible to identify battery blocks that are operating with a float deficit.

A 4-wire measurement is performed to compensate for cable resistance. To do this, use the included Kelvin probes (accessory Z227D) to this end, or the optionally available angled Kelvin probes (Z227W) for hard-to-reach measuring points ➪🗎64.



**CAUTION**

**Sparking.**

Electric shock.

Perform the resistance measurement

- Only at voltages below 24 V.
- Only when the hydrogen concentration in the air is below the level permitted by the DIN EN 50272-2 standard.
- Never immediately after the battery system has been charged. Wait for at least 30 minutes.
- Only in well-ventilated battery rooms.

✓ The Kelvin probes (Z227D) or the angled Kelvin probes (Z227W) are available.
✓ Polarity is switched on.

| Sequence | Description of the Measurement | Display |
|---|---|---|
| 1 | Connect the Kelvin probes (Z227D ➪🗎64) or the angled Kelvin probes (Z227W ➪🗎64) to the sockets (➪ “Measurement Inputs” 🗎13) as follows:<br>– Connect the black cable with the double plug so that the plug segment with the red ring is connected to S– and the purely black plug segment is connected to P–/ COM.<br>– Connect the red cable with the double plug so that the plug segment with the red ring is connected to S+ and the purely black plug segment is connected to P+. | |
| 2 | Use the Kelvin probes (Z227D ➪🗎64) or the angled Kelvin probes (Z227W ➪🗎64) and the included S-hooks to ensure a constant distance between the cables over their entire length. | |
| 3 | Press and hold the **FUNCTION** key for about 2 seconds to switch the battery tester on. | BTpro <date> <version><time> |
| 4 | Press any key to open the **main menu**.<br>If you are already in another menu, press the **FUNCTION** key repeatedly until the **main menu** appears. | ->MEASUREMENT DATA |
| 5 | Press the **OK** key to open the **MEASUREMENTS** menu.<br>The **MEASUREMENTS** menu is displayed. | ->MULTIMETER FLOAT |
| 6 | Use the ▼▲ keys to select ➔ **RESISTANCE**. | CHARGE ->RESISTANCE |
| 7 | Press the **OK** key to open the selected menu for the measuring function. | ->START BATT DATENB. |
| 7a | Before you start the measurement, you must set the parameters for location, battery, and limit values. You can:<br>– Select them in the battery database via RFID ➪ Step 7a.<br>– Select them manually in the battery database➪ Step 7b.<br>– Enter them manually on the battery tester ➪ Step 7c. | START ->BATT DATENB. |

| | | |
|---|---|---|
| 7b | ✓ A battery database has been created ⇨🗎45.<br>✓ The battery database has been transferred to the battery tester ⇨🗎53.<br>✓ You use RFID technology for your system.<br>✓ The DUTs in the battery database are linked to the corresponding RFID tags ⇨🗎53.<br>1. Use the ▼ key to select → **BATT DATENB.**.<br>2. Press the **OK** key.<br>The battery database is displayed. A beep indicates that the RFID reader is ready.<br>3. Read the RFID tag (⇨🗎15).<br>An acoustic signal confirms that the reading has been taken and the DUT is displayed.<br>4. Press the **OK** key.<br>↳ The battery is selected. The battery tester returns to the **MEASUREMENTS** menu. | START<br>->BATT DATENB. |
| 7c | ✓ A battery database has been created ⇨🗎45.<br>✓ The battery database has been transferred to the battery tester ⇨🗎53.<br>1. Use the ▼ key to select → **BATT DATENB.**.<br>2. Press the **OK** key.<br>The battery database is displayed. A beep indicates that the RFID reader is ready.<br>3. Use the ▼▲ keys to select a battery.<br>4. Press the **OK** key.<br>↳ The battery is selected and the battery tester returns to the **MEASUREMENTS** menu. | START<br>->BATT DATENB. |
| 8 | 1. Use the ▼ key to select the **LOCATION:XXXX.** parameter.<br>2. Press the **OK** key.<br>The entry mode is active.<br>3. Enter the first digit of the parameter ⇨🗎14.<br>4. Confirm your entry with the **OK** key.<br>5. Repeat steps 1–4 for all other parameter digits for battery number, number of blocks, and upper and lower voltage limits. | BATT DATENB.<br>->LOCATION: 0000 |
| 9 | Press the ▲ key to return to **START**. | ->START<br>BATT DATENB. |
| 10 | Press the **OK** key to start the measurement. | BLOCK----------<br>--<br>XXXX/X----------<br>-<br>R(el) =----------<br>R(ct) =---------- |
| 11 | Wait for the beep that sounds when there is no voltage at the Kelvin probes (Z227D) or angled Kelvin probes (Z227W). | Example:<br><br>BLOCK12.2500 V<br>0010/4<br>R(el)=23.00 mΩ<br>R(ct)=12.00 mΩ |
| 12 | Contact the battery poles: Press the Kelvin probes (Z227D) or the angled Kelvin probes (Z227W) onto the poles with suitable force. | |
| 13 | Wait for the beep which indicates that the measured value is stable.<br>This confirms the measurement. | |
| 14 | After the beep, remove the Kelvin probes (Z227D) or the angled Kelvin probes (Z227W). | |
| 15 | Wait again for the beep, which indicates that the Kelvin probes (Z227D) or the angled Kelvin probes (Z227W) are once free of voltage again. | |
| 16 | Repeat the measurement procedures described above for further battery blocks.<br>The measurement ends automatically after you have completed measurements on all blocks. The measured values are saved.<br>The display shows the measured value evaluation ⇨🗎32. | |
| 17 | Press the **OK** key repeatedly to view the evaluation (scroll) and then return the display to the **RESISTANCE** measurement. | SUM:<br>[XXXX] XX.XXV<br><br>AVER.:+XX.XXXXV |

## 10.7 Temperature Measurement

The **TEMPERATURE** measurement function allows you to measure the individual block temperatures of the battery. The optional METRATHERM IR BASE temperature sensor is required for this measurement ➪🗎11.

**Note**

Read and follow the documentation included with the METRATHERM IR BASE temperature sensor. Complete safety information and all other information required for use of the temperature sensor can be found there.

✓ The METRATHERM IR BASE temperature sensor is available.

| Sequence | Description of the Measurement | Display |
|---|---|---|
| 1 | Connect the temperature sensor as follows (➪ “Measurement Inputs” 🗎13):<br>– red plug to S–,<br>– black plug to P–/COM. | |
| 2 | Press and hold the **FUNCTION** key for about 2 seconds to switch the battery tester on. | BTpro <date><br><version><time> |
| 3 | Press any key to open the **main menu**.<br>If you are already in another menu, press the **FUNCTION** key repeatedly until the **main menu** appears. | ->MEASUREMENT<br>DATA |
| 4 | Press the **OK** key to open the **MEASUREMENTS** menu.<br>The **MEASUREMENTS** menu is displayed. | ->MULTIMETER<br>FLOAT |
| 5 | Use the ▼▲ keys to select ➔ **TEMPERATURE**. | RESISTANCE<br>->TEMPERATURE |
| 6 | Press the **OK** key to open the selected menu for the measuring function. | ->START<br>BATT DATENB. |
| 7 | Before you start the measurement, you must set the parameters for location, battery, and limit values. You can:<br>– Select them in the battery database via RFID ➪ Step 7a.<br>– Select them manually in the battery database➪ Step 7b.<br>– Enter them manually on the battery tester ➪ Step 7c. | START<br>->BATT DATENB. |
| 7a | ✓ A battery database has been created ➪🗎45.<br>✓ The battery database has been transferred to the battery tester ➪🗎53.<br>✓ You use RFID technology for your system.<br>✓ The DUTs in the battery database are linked to the corresponding RFID tags ➪🗎53.<br>1. Use the ▼ key to select ➔ **BATT DATENB.**.<br>2. Press the **OK** key.<br>The battery database is displayed. A beep indicates that the RFID reader is ready.<br>3. Read the RFID tag (➪🗎15).<br>An acoustic signal confirms that the reading has been taken and the DUT is displayed.<br>4. Press the **OK** key.<br>↳ The battery is selected. The battery tester returns to the **MEASUREMENTS** menu. | START<br>->BATT DATENB. |
| 7b | ✓ A battery database has been created ➪🗎45.<br>✓ The battery database has been transferred to the battery tester ➪🗎53.<br>1. Use the ▼ key to select ➔ **BATT DATENB.**.<br>2. Press the **OK** key.<br>The battery database is displayed. A beep indicates that the RFID reader is ready.<br>3. Use the ▼▲ keys to select a battery.<br>4. Press the **OK** key.<br>↳ The battery is selected and the battery tester returns to the **MEASUREMENTS** menu. | START<br>->BATT DATENB. |

| | | |
|---|---|---|
| 7c | 1. Use the ▼ key to select the **LOCATION:XXXX.** parameter.<br>2. Press the **OK** key.<br>The entry mode is active.<br>3. Enter the first digit of the parameter ⇨🗎14.<br>4. Confirm your entry with the **OK** key.<br>5. Repeat steps 1–4 for all other parameter digits for battery number, number of blocks, and upper and lower voltage limits. | BATT DATENB.<br>->LOCATION: 0000 |
| 8 | Press the ▲ key to return to **START**. | ->START<br>BATT DATENB. |
| 9 | Press the **OK** key to start the measurement. | BLOCK- - - - - - -<br>XXXX/X<br>SN:XXXXBN:XXXX |
| 10 | Aim the IR temperature sensor at a suitable measuring point (e.g., measuring point) on the block.<br>**Note**<br>Refer to the information regarding the size of the measurement point and the distance to the measurement point on the back of the accessory and in its operating instructions. | |
| 11 | Press and hold the measurement activation key on the sensor. | |
| 12 | Wait until a stable measured value is displayed. | |
| 13 | Confirm the measured value on the battery tester by pressing the **OK** key. | |
| 14 | Repeat the measurement procedures described above for further battery blocks.<br>The measurement ends automatically after you have completed measurements on all blocks. The measured values are saved.<br>The display shows the measured value evaluation ⇨🗎32. | Example:<br>BLOCK21.8 C<br>0004/2<br>SN:0001BN:0010 |
| 15 | Press the **OK** key repeatedly to view the evaluation (scroll) and then return the display to the **TEMPERATURE** measurement. | QUANTITY:<br>[XXXX]<br>AVER.:XX.XXXX C |

## 10.8 Connector Measurement

The **VERBINDER** measurement function determines the losses that occur at the connectors used to interconnect the battery blocks. During the measurement, the voltage drop between the connected poles is measured.

**Note**

Measure all connectors during a capacity test with constant current.

**Note**

Polarity can be switched off ⇨🗎62. If polarity is switched off, the absolute value of the measured value is recorded.

| Sequence | Description of the Measurement | Display |
|---|---|---|
| 1 | Connect the measurement cables of the multimeter test probes to the P–/COM and S– sockets with the matching colors (⇨ “Measurement Inputs” 🗎13). | |
| 2 | Press and hold the **FUNCTION** key for about 2 seconds to switch the battery tester on. | BTpro <date> <version><time> |
| 3 | Press any key to open the **main menu**.<br>If you are already in another menu, press the **FUNCTION** key repeatedly until the **main menu** appears. | ->MEASUREMENT DATA |
| 4 | Press the **OK** key to open the **MEASUREMENTS** menu.<br>The **MEASUREMENTS** menu is displayed. | ->MULTIMETER FLOAT |
| 5 | Use the ▼▲ keys to select ➔ **CONNECTOR**. | TEMPERATURE ->CONNECTOR |
| 6 | Press the **OK** key to open the selected menu for the measuring function. | ->START BATT DATENB. |
| 7 | Before you start the measurement, you must set the parameters for location, battery, and limit values. You can:<br>– Select them in the battery database via RFID ⇨ Step 7a.<br>– Select them manually in the battery database⇨ Step 7b.<br>– Enter them manually on the battery tester ⇨ Step 7c. | START ->BATT DATENB. |
| 7a | ✓ A battery database has been created ⇨🗎45.<br>✓ The battery database has been transferred to the battery tester ⇨🗎53.<br>✓ You use RFID technology for your system.<br>✓ The DUTs in the battery database are linked to the corresponding RFID tags ⇨🗎53.<br>1. Use the ▼ key to select ➔ **BATT DATENB.**.<br>2. Press the **OK** key.<br>The battery database is displayed. A beep indicates that the RFID reader is ready.<br>3. Read the RFID tag (⇨🗎15).<br>An acoustic signal confirms that the reading has been taken and the DUT is displayed.<br>4. Press the **OK** key.<br>↳ The battery is selected. The battery tester returns to the **MEASUREMENTS** menu. | START ->BATT DATENB. |
| 7b | ✓ A battery database has been created ⇨🗎45.<br>✓ The battery database has been transferred to the battery tester ⇨🗎53.<br>1. Use the ▼ key to select ➔ **BATT DATENB.**.<br>2. Press the **OK** key.<br>The battery database is displayed. A beep indicates that the RFID reader is ready.<br>3. Use the ▼▲ keys to select a battery.<br>4. Press the **OK** key.<br>↳ The battery is selected and the battery tester returns to the **MEASUREMENTS** menu. | START ->BATT DATENB. |

| | | |
|---|---|---|
| 7c | 1. Use the ▼ key to select the **LOCATION:XXXX.** parameter.<br>2. Press the **OK** key.<br>The entry mode is active.<br>3. Enter the first digit of the parameter ⇨🗎14.<br>4. Confirm your entry with the **OK** key.<br>5. Repeat steps 1–4 for all other parameter digits for battery number, number of blocks, and upper and lower voltage limits. | BATT DATENB.<br>->LOCATION: 0000 |
| 8 | Press the ▲ key to return to **START**. | ->START<br>BATT DATENB. |
| 9 | Press the **OK** key to start the measurement. | BLOCK- - - - - - -<br>XXXX/X<br>SN:XXXXBN:XXXX |
| 10 | Contact the connector: Using suitable pressure, press the multimeter test probes against the connection points. | Example:<br><br>BLOCK2513.15 mV<br>0004/2<br>SN:0001BN:0010 |
| 11 | Wait until the measured value is stable. | |
| 12 | Press the **OK** key to confirm the measured value.<br>The measured value is saved. | |
| 13 | Remove the multimeter probes after the beep. | |
| 14 | Repeat the measurement procedures described above for further connection points. The measurement ends automatically after you have completed measurements on all connection points. The measured values are saved.<br>The display shows the measured value evaluation ⇨🗎32. | BLOCK- - - - - - -<br>XXXX/X<br>SN:XXXXBN:XXXX |
| 15 | Press the **OK** key repeatedly to view the evaluation (scroll) and then return the display to the **CONNECTOR** measurement. | QUANTITY<br>[XXXX]<br><br>AVER.:XXXX.XXmV |

## 10.9 Interval U Measurement

The **INTERVAL U** measuring function is used to measure voltage at any desired time interval (voltage curve / capacity test for the entire battery). The shortest selectable time interval is 1 second. Measurement is continued at the specified time interval until ended by the user.

| Sequence | Description of the Measurement | Display |
|---|---|---|
| 1 | Connect the measurement cables of the multimeter test probes with alligator clips attached (⇨🗎63) to the P–/COM and S+ sockets with the matching colors (⇨ "Measurement Inputs" 🗎13). | |
| 2 | Connect the alligator clips to the power output of the battery:<br>Red to plus, black to minus. | |
| 3 | Press and hold the **FUNCTION** key for about 2 seconds to switch the battery tester on. | BTpro <date><br><version><time> |
| 4 | Press any key to open the **main menu**.<br>If you are already in another menu, press the **FUNCTION** key repeatedly until the **main menu** appears. | ->MEASUREMENT<br>DATA |
| 5 | Press the **OK** key to open the **MEASUREMENTS** menu.<br>The **MEASUREMENTS** menu is displayed. | ->MULTIMETER<br>FLOAT |
| 6 | Use the ▼▲ keys to select ➔ **INTERVAL U**. | CONNECTOR<br>->INTERVAL U |
| 7 | Press the **OK** key to open the selected menu for the measuring function. | ->START<br>BATT DATENB. |
| 8 | Before you start the measurement, you must set the parameters for location, battery, and limit values. You can:<br>– Select them in the battery database via RFID ⇨ Step 8a.<br>– Select them manually in the battery database⇨ Step 8b.<br>– Enter them manually on the battery tester ⇨ Step 8c. | START<br>->BATT DATENB. |
| 8a | ✓ A battery database has been created ⇨🗎45.<br>✓ The battery database has been transferred to the battery tester ⇨🗎53.<br>✓ You use RFID technology for your system.<br>✓ The DUTs in the battery database are linked to the corresponding RFID tags ⇨🗎53.<br>1. Use the ▼ key to select ➔ **BATT DATENB.**.<br>2. Press the **OK** key.<br>The battery database is displayed. A beep indicates that the RFID reader is ready.<br>3. Read the RFID tag (⇨🗎15).<br>An acoustic signal confirms that the reading has been taken and the DUT is displayed.<br>4. Press the **OK** key.<br>↳ The battery is selected. The battery tester returns to the **MEASUREMENTS** menu. | START<br>->BATT DATENB. |
| 8b | ✓ A battery database has been created ⇨🗎45.<br>✓ The battery database has been transferred to the battery tester ⇨🗎53.<br>1. Use the ▼ key to select ➔ **BATT DATENB.**.<br>2. Press the **OK** key.<br>The battery database is displayed. A beep indicates that the RFID reader is ready.<br>3. Use the ▼▲ keys to select a battery.<br>4. Press the **OK** key.<br>↳ The battery is selected and the battery tester returns to the **MEASUREMENTS** menu. | START<br>->BATT DATENB. |
| 8c | 1. Use the ▼ key to select the **LOCATION:XXXX.** parameter.<br>2. Press the **OK** key.<br>The entry mode is active.<br>3. Enter the first digit of the parameter ⇨🗎14.<br>4. Confirm your entry with the **OK** key.<br>5. Repeat steps 1–4 for all other parameter digits for battery number, interval, and upper and lower voltage limits. | BATT DATENB.<br>->LOCATION: 0000 |

| | | |
|---|---|---|
| 9 | Press the ▲ key to return to **START**. | ->START<br>BATT DATENB. |
| 10 | Press the **OK** key to start the measurement. | COUNT:- - - - - - -<br>XXXXXX<br>TIME:XX:XX:XX |
| 11 | Measurement is performed continuously until you either confirm or abort it.<br>The measured value is ascertained once per time interval and stored under the consecutive COUNT.<br>As soon as the specified limit values (Table 16 on page 28) are exceeded or fallen short of, a repeating beep sounds. | Example:<br><br>COUNT:<br>00000212.200 V<br>TIME:00:00:20 |
| 12 | Press the **OK** key to end the measurement. | END NOW?<br>(AND SAVE) |
| 13 | Disconnect the alligator clips from the battery poles. | |
| 14 | Confirm the prompt for saving the measured value by pressing the **OK** key.<br>The display shows the measured value evaluation ⇨🗎32. | |
| 15 | Press the **OK** key repeatedly to view the evaluation (scroll) and then return the display to the **INTERNVAL U** measurement. | COUNT:<br>00000212.200 V<br>TIME:00:00:40 |

## 10.10 Interval U+I Measurement

The **INTERVAL U+I** measuring function is used to measure voltage and current at any desired time interval (voltage and current curve / capacity test for the entire battery). The shortest selectable time interval is 1 second. Measurement is continued at the specified time interval until ended by the user. An optional AC/DC current clamp sensor (CP1800 or CP330) is required for the measurement ⇨🗎11.

**Note**

Read and follow the documentation included with the AC/DC current clamp sensor (CP1800 or CP330).

**CAUTION**

**Arc due to short circuit.**

Electric shock.

All measurement inputs are referenced to ground and the reference potential, P–/COM input. The measuring connections are not electrically isolated from each other. Only use the CP1800 or CP330 AC/DC current clamp sensor for current measurement (⇨ “Optional Accessories” 🗎11).

✓ An AC/DC current clamp sensor is available: CP1800 for measurements up to 1250 $A_{DC}$ or CP330 for measurements up to 300 $A_{DC}$.

| Sequence | Description of the Measurement | Display |
|---|---|---|
| 1 | Connect the measurement cables of the multimeter test probes with alligator clips attached (⇨🗎63) to the P–/COM and S+ sockets with the matching colors (⇨ “Measurement Inputs” 🗎13). | |
| 2 | Connect the alligator clips to the power output of the battery:<br>Red to plus, black to minus. | |
| 3 | Connect the current clamp sensor: red measurement cable to socket S– and black measurement cable to the multimeter test probe connection at socket P–/COM (⇨ “Measurement Inputs” 🗎13). | |
| 4 | Press and hold the **FUNCTION** key for about 2 seconds to switch the battery tester on. | BTpro <date><br><version><time> |
| 5 | Press any key to open the **main menu**.<br>If you are already in another menu, press the **FUNCTION** key repeatedly until the **main menu** appears. | ->MEASUREMENT<br>DATA |
| 6 | Press the **OK** key to open the **MEASUREMENTS** menu.<br>The **MEASUREMENTS** menu is displayed. | ->MULTIMETER<br>FLOAT |

| | | |
|---|---|---|
| 7 | Use the ▼▲ keys to select ➔ **INTERVAL U+I**. | INTERVAL U<br>->INTERVALL U+I |
| 8 | Press the **OK** key to open the selected menu for the measuring function. | ->START<br>BATT DATENB. |
| 9 | Before you start the measurement, you must set the parameters for location, battery, limit values, and current clamp sensor. You can:<br>– Select them in the battery database via RFID ⇨ Step 9a.<br>– Select them manually in the battery database⇨ Step 9b.<br>– Enter them manually on the battery tester ⇨ Step 9c. | START<br>->BATT DATENB. |
| 9a | ✓ A battery database has been created ⇨🗎45.<br>✓ The battery database has been transferred to the battery tester ⇨🗎53.<br>✓ You use RFID technology for your system.<br>✓ The DUTs in the battery database are linked to the corresponding RFID tags ⇨🗎53.<br>1. Use the ▼ key to select ➔ **BATT DATENB.**.<br>2. Press the **OK** key.<br>The battery database is displayed. A beep indicates that the RFID reader is ready.<br>3. Read the RFID tag (⇨🗎15).<br>An acoustic signal confirms that the reading has been taken and the DUT is displayed.<br>4. Press the **OK** key.<br>↳ The battery is selected. The battery tester returns to the **MEASUREMENTS** menu. | START<br>->BATT DATENB. |
| 9b | ✓ A battery database has been created ⇨🗎45.<br>✓ The battery database has been transferred to the battery tester ⇨🗎53.<br>1. Use the ▼ key to select ➔ **BATT DATENB.**.<br>2. Press the **OK** key.<br>The battery database is displayed. A beep indicates that the RFID reader is ready.<br>3. Use the ▼▲ keys to select a battery.<br>4. Press the **OK** key.<br>↳ The battery is selected and the battery tester returns to the **MEASUREMENTS** menu. | START<br>->BATT DATENB. |
| 9c | 1. Use the ▼ key to select the **LOCATION:XXXX.** parameter.<br>2. Press the **OK** key.<br>The entry mode is active.<br>3. Enter the first digit of the parameter ⇨🗎14.<br>4. Confirm your entry with the **OK** key.<br>5. Repeat steps 1–4 for all other parameter digits for battery number, interval, and upper and lower voltage limits.<br>6. Use the ▼▲ keys to navigate to the parameters **CLAMP A** and **CLAMP mV**.<br>7. Specify the values for amperage and voltage for **CLAMP A** and **CLAMP mV** in accordance with the ampere-volt ratio set at the current clamp.<br>Example: Current clamp ratio =<br>1 A/1 mV **CLAMP A** = 0001 and **CLAMP mV** = 0001<br>1 A/1 V **CLAMP A** = 0001 and **CLAMP mV** = 1000 | BATT DATENB.<br>->LOCATION: 0000<br>CLAMP A:0001<br>->CLAMP mV:0010<br>CLAMP A:0001<br>->CLAMP mV:0010 |
| 10 | Press the ▲ key to return to **START**. | ->START<br>BATT DATENB. |
| 11 | Switch the current clamp sensor on. | |
| 12 | Press the zero adjustment button for offset adjustment. | |
| 13 | Open the jaws of the current clamp sensor by opening the release. | |
| 14 | Enclose the positive line to the consumer with the open clamp jaws. | |
| 15 | Close the clamp jaws. Make sure they are fully closed. | |
| 16 | Press the **OK** key to start the measurement. | COUNT:- - - - - - -<br>XXXXXX<br>TIME:XX:XX:XX |

| | | |
|---|---|---|
| 17 | Measurement is performed continuously until you either confirm or abort it.<br>The measured value is ascertained once per time interval and stored under the consecutive COUNT.<br>As soon as the specified limit values (Table 17 on page 29) are exceeded or fallen short of, a repeating beep sounds. | Example:<br><br>COUNT:<br>00000212.200 V<br>TIME:00:00:20 |
| 18 | Press the **OK** key to end the measurement. | END NOW?<br>(AND SAVE) |
| 19 | Switch the current clamp sensor off. | |
| 20 | Remove the current clamp sensor. | |
| 21 | Disconnect the alligator clips from the battery poles. | |
| 22 | Confirm the prompt for saving the measured value by pressing the **OK** key.<br>The display shows the measured value evaluation ⇨📄32. | |
| 23 | Press the **OK** key repeatedly to view the evaluation (scroll) and then return the display to the **INTERNVAL U+I** measurement. | COUNT:<br>00000212.200 V<br>TIME:00:00:40 |

## 10.11 DMA35 Measurement (IrDA)

This measurement function does not allow measurements to be taken directly with the battery tester.

Instead, the measured density and temperature values recorded and stored with the portable DMA 35 Basic density meter (Version 3) from Anton Paar are transferred to the battery tester.

**Note**

Read the documentation included with the DMA 35 density meter from Anton Paar GmbH.

Data is transferred via infrared (IrDA).

✓ A CSV file is transferred from the DMA 35.
✓ The CSV file uses different characters as field separators and decimal characters.
(Use the default values as settings for the DMA 35.)

| Sequence | Description of the Measurement | Display |
|---|---|---|
| 1 | Press and hold the **FUNCTION** key for about 2 seconds to switch the battery tester on. | BTpro <date><br><version><time> |
| 2 | Press any key to open the **main menu**.<br>If you are already in another menu, press the **FUNCTION** key repeatedly until the **main menu** appears. | ->MEASUREMENT DATA |
| 3 | Press the **OK** key to open the **MEASUREMENTS** menu.<br>The **MEASUREMENTS** menu is displayed. | ->MULTIMETER FLOAT |
| 4 | Use the ▼▲ keys to select → **DMA35 (IrDA)**. | INTERVAL U+I<br>->DMA35 (IrDA) |
| 5 | Press the **OK** key to open the selected menu for the measuring function. | ->START<br>BATT DATENB. |
| 6 | Before you start the measurement, you must set the parameters for location, battery, and limit values. You can:<br>– Select them in the battery database via RFID ⇨ Step 6a.<br>– Select them manually in the battery database⇨ Step 6b.<br>– Enter them manually on the battery tester ⇨ Step 6c. | START<br>->BATT DATENB. |
| 6a | ✓ A battery database has been created ⇨🗎45.<br>✓ The battery database has been transferred to the battery tester ⇨🗎53.<br>✓ You use RFID technology for your system.<br>✓ The DUTs in the battery database are linked to the corresponding RFID tags ⇨🗎53.<br>1. Use the ▼ key to select → **BATT DATENB.**.<br>2. Press the **OK** key.<br>The battery database is displayed. A beep indicates that the RFID reader is ready.<br>3. Read the RFID tag (⇨🗎15).<br>An acoustic signal confirms that the reading has been taken and the DUT is displayed.<br>4. Press the **OK** key.<br>↳ The battery is selected. The battery tester returns to the **MEASUREMENTS** menu. | START<br>->BATT DATENB. |
| 6b | ✓ A battery database has been created ⇨🗎45.<br>✓ The battery database has been transferred to the battery tester ⇨🗎53.<br>1. Use the ▼ key to select → **BATT DATENB.**.<br>2. Press the **OK** key.<br>The battery database is displayed. A beep indicates that the RFID reader is ready.<br>3. Use the ▼▲ keys to select a battery.<br>4. Press the **OK** key.<br>↳ The battery is selected and the battery tester returns to the **MEASUREMENTS** menu. | START<br>->BATT DATENB. |

| | | |
|---|---|---|
| 6c | 1. Use the ▼ key to select the **LOCATION:XXXX.** parameter.<br>2. Press the **OK** key.<br>The entry mode is active.<br>3. Enter the first digit of the parameter ⇨🗎14.<br>4. Confirm your entry with the **OK** key.<br>5. Repeat steps 1–4 for all other parameter digits for battery number, number of blocks, and upper and lower voltage limits. | BATT DATENB.<br>->LOCATION: 0000 |
| 7c | Press the ▲ key to return to **START**. | ->START<br>BATT DATENB. |
| 8 | Press the **OK** key to start the measurement.<br>The battery tester is waiting for data from the infrared interface. | WAITING FOR<br>DMA 35 |
| 9 | Switch the **DMA 35** on. | |
| 10 | On the **DMA 35**, select the following function sequence: **Menu → Measurement Data→ Export → Export All**. | DMA 35: Calculate |
| 11 | Position the top of the **DMA 35** approx. 10 cm away from the infrared symbol on the battery tester.<br><br>**Note**<br>Ensure an unobstructed and uninterrupted infrared connection:<br>• The infrared transmitters and receivers of the devices must be facing each other.<br>• The distance must not exceed 10 cm.<br><br>The connection is established. | WAITING FOR<br>DMA 35 (RECEIVING DATA)<br><br>DMA 35: Connection to PC |
| 12 | The data is transferred.<br>Transmission progress is displayed at the DMA 35: **<Export XXX%>**. | DMA 35: <Export XXX%> |
| 13 | Data are transferred from the DMA 35 to the battery tester.<br>The battery tester shows the measured value evaluation ⇨🗎32. | QUANTITY:<br>[XXXX]<br>AVER.:X.XXXkg/l |
| 14 | Press the **OK** key repeatedly to view the evaluation (scroll) and then return the display to the **DMA35 (IrDA)** measurement. | QUANTITY:<br>[XXXX]<br>AVER.:X.XXXkg/l |

## 10.12DMA35 (BT) Measurement

This measurement function does not allow measurements to be taken directly with the battery tester.

Instead, the measured density and temperature values recorded and stored with the portable DMA 35 density meter (Version 4) from Anton Paar are transferred to the battery tester.

**Note**

Read the documentation included with the DMA 35 density meter from Anton Paar GmbH.

Data are transferred via wireless interface.

✓ A CSV file is transferred from the DMA 35.
✓ The CSV file uses different characters as field separators and decimal characters.
(Use the default values as settings for the DMA 35.)

| Sequence | Description of the Measurement | Display |
|---|---|---|
| 1 | Press and hold the **FUNCTION** key for about 2 seconds to switch the battery tester on. | BTpro <date><br><version><time> |
| 2 | Press any key to open the **main menu**.<br>If you are already in another menu, press the **FUNCTION** key repeatedly until the **main menu** appears. | ->MEASUREMENT DATA |
| 3 | Use the ▼▲ keys to select → **SETTINGS**. | DATA<br>->SETTINGS |
| 4 | Press the **OK** key.<br>The **SETTINGS** menu is displayed. | SYSTEM<br>->MEASUREMENTS |
| 5 | Use the ▼▲ keys to select →**BT SETTINGS**. | MEASUREMENTS<br>->BT SETTING |
| 6 | Press the **OK** key. | LINK COMPUTER<br>->LINK HEADSET |
| 7 | Use the ▼▲ keys to select → **LINK DMA35 V4**. | LINK HEADSET<br>->LINKDMA35 V4 |
| 8 | Press the **OK** key.<br>The battery tester can now be detected by the density meter. | PLEASE SEARCH<br>WITHR BTpro DMA. |
| 9 | On the density meter, select the following function sequence: **Menu → Settings → Data Transfer→ Configure Export Target → OK → Start** .<br>A search for the export target is started. | 1: Start search<br>2: Activate wireless interface<br>3: Search for devices<br>4: Select device |
| 10 | Press the Edit key to select **BTPRO** from the **Select Device** list.<br>The connection is established. | BTPRO ▼ |
| 11 | Confirm our selection with **OK**. | 4: Select device<br>BTPRO ▼ |
| 12 | Press **Next**. | 5: Save your selection. |
| 13 | Confirm with **OK**.<br>The selection is saved and the **Data Transmission** menu is displayed. | Configure export target<br>Configure printing destination<br>Configure printer<br>Configure data format |
| 14 | Select the function sequence **Back → Back**.<br>The **Menu** menu is displayed. | Data storage<br>Probe IDs<br>Methods<br>Settings |
| 15 | Go to the main menu on the battery tester. | ->MEASUREMENT DATA |

| | | |
|---|---|---|
| 16 | Press the **OK** key to open the**MEASUREMENTS** menu.<br>The **MEASUREMENTS** menu is displayed. | ->MULTIMETER<br>FLOAT |
| 17 | Use the ▼▲ keys to select ➔ **DMA35 (BT)**. | DMA35 (IrDA)<br>->DMA35 (BT) |
| 18 | Press the **OK** key. | ->START<br>BATT DATENB. |
| 19 | Before you start the measurement, you must set the parameters for location, battery, and limit values. You can:<br>– Select them in the battery database via RFID ⇨ Step 19a.<br>– Select them manually in the battery database⇨ Step 19b.<br>– Enter them manually on the battery tester ⇨ Step 19c. | START<br>->BATT DATENB. |
| 19 a | ✓ A battery database has been created ⇨🗎45.<br>✓ The battery database has been transferred to the battery tester ⇨🗎53.<br>✓ You use RFID technology for your system.<br>✓ The DUTs in the battery database are linked to the corresponding RFID tags ⇨🗎53.<br>1. Use the ▼ key to select ➔ **BATT DATENB.**.<br>2. Press the **OK** key.<br>The battery database is displayed. A beep indicates that the RFID reader is ready.<br>3. Read the RFID tag (⇨🗎15).<br>An acoustic signal confirms that the reading has been taken and the DUT is displayed.<br>4. Press the **OK** key.<br>↳ The battery is selected. The battery tester returns to the **MEASUREMENTS** menu. | START<br>->BATT DATENB. |
| 19b | ✓ A battery database has been created ⇨🗎45.<br>✓ The battery database has been transferred to the battery tester ⇨🗎53.<br>1. Use the ▼ key to select ➔ **BATT DATENB.**.<br>2. Press the **OK** key.<br>The battery database is displayed. A beep indicates that the RFID reader is ready.<br>3. Use the ▼▲ keys to select a battery.<br>4. Press the **OK** key.<br>↳ The battery is selected and the battery tester returns to the **MEASUREMENTS** menu. | START<br>->BATT DATENB. |
| 19c | 1. Use the ▼ key to select the **LOCATION:XXXX.** parameter.<br>2. Press the **OK** key.<br>The entry mode is active.<br>3. Enter the first digit of the parameter ⇨🗎14.<br>4. Confirm your entry with the **OK** key.<br>5. Repeat steps 1–4 for all other parameter digits for battery number, number of blocks, and upper and lower voltage limits. | BATT DATENB.<br>->LOCATION**:** 0000 |
| 20 | Press the ▲ key to return to **START**. | ->START<br>BATT DATENB. |
| 21 | Press the **OK** key.<br>The battery tester waits for data. | WAITING FOR<br>DMA 35 |
| 22 | On the **DMA 35**, select the following function sequence **Data Memory ➔ Export Measurement Data ➔ OK**.<br>A security prompt appears. | Export<br>Export all data? |
| 23 | Confirm **Export All Data** with **Yes**. | |
| 24 | The data is transferred. | WAITING FOR<br>DMA 35 (receiving data).<br><br>DMA 35: Export data |

| | | |
|---|---|---|
| 25 | Data are transferred from the DMA 35 to the battery tester.<br>The battery tester shows the measured value evaluation ⇨🗎32. | Quantity:<br>[XXXX] XX.XXXXV<br>AVER.:+XX.XXXXV<br><br>DMA 35: export finished |
| 26 | On the density meter, press the **OK** key -> Back -> Back -> Back.<br>The start screen is displayed. | |
| 27 | Press the **OK** key repeatedly to view the evaluation (scroll) and then return the display to the **DMA35 (BT)** measurement. | QUANTITY:<br>[XXXX]<br>AVER.:X.XXXkg/l<br>DMA 35: export finished |

# 11 Viewing, Editing, Transferring and Evaluating Measured Values

Up to 300,000 data records can be stored to the device.

Measured values and measurement series stored to internal memory at the battery tester can be viewed and edited directly at the device. You can also view a brief measured value evaluation on the device. We recommend this method for a quick, initial visual assessment on site.

Transfer the measurement data to the BT PRO Manager PC software for storage and further evaluation.

You can also save a backup copy of the data on a PC.

This section describes how to view and edit measured values at the device, and how to make data backups. The evaluation of measurement data is described in Section “PC Software “BT PRO Manager”” ⇨🗎34.

## 11.1 Viewing Measured Values / Measured Value Details at the Device

Stored measured values, including measured value details, can be viewed directly at the device.

1. Switch the battery tester on ⇨🗎19.
2. Press the **OK** key.
   The **main menu** is displayed.
3. In the **main menu**, use the ▼▲ keys to select → **DATA**.
4. Press the **OK** key.
   The **DATA** menu is displayed.
5. Use the ▼▲ keys to select → **MEASURED VALUES**.
6. Press the **OK** key.
   The measurements are displayed.
   – The most recently stored measurement is displayed.
   – The measurements are listed chronologically.
7. Use the ▼▲ keys to select the measurement you want to view.
   – Use the ▼ key to scroll forward in time.
   – Use the ▲ key to scroll backward in time.
8. Press the **OK** key.

↳ The detailed view is displayed. The display differs depending on the selected measurement ⇨ “Data Menu” 🗎30. If there are several measurements per measurement function (e.g., in the case of a measurement series), you can scroll among the measured values in the detailed view using the ▼▲ keys.

**Note**

Normally, the measured values are displayed in black text. However, if a limit value is violated, the measured value is displayed in a light text and a black background for emphasis.

## 11.2 Viewing Measured Value Evaluations on the Device

The battery tester automatically determines the sum, the mean value, and the smallest and largest measured values for all stored measured values of a measurement series. You can view this brief evaluation at the device.

1. Switch the battery tester on ⇨🗎19.
2. Press the **OK** key.
   The **main menu** is displayed.
3. In the **main menu**, use the ▼▲ keys to select → **DATA**.
4. Press the **OK** key.
   The **DATA** menu is displayed.
5. Use the ▼▲ keys to select → **MEASURED VALUES**.
6. Press the **OK** key.
   The measurements are displayed.
7. Use the ▼▲ keys to select the measurement you want to view.
8. Press the **OK** key repeatedly until the calculated values associated with the respective measurement appear in the display.

↳ The measured value evaluation is displayed ⇨ “Data Menu” 🗎30. If several measured values were ascertained during a single measurement, you can scroll through the data using the ▼▲ keys.
After running through a full display cycle with the ▼▲ keys, the display automatically switches back to the higher-level **MEASURED VALUES** menu.

## 11.3 Excluding a Measurement from Transmission (Deactivating a Measurement)

If you have performed and saved a measurement that you do not want to take into account, you can deactivate it later.

Deactivated measurements remain stored in the battery tester, but are not transferred during data transfer and are thus excluded from the evaluation.

1. Switch the battery tester on ⇨🗎19.
2. Press the **OK** key.
   The **main menu** is displayed.
3. From the **main menu**, use the ▼▲ keys to select
   → **DATA**.
   The **DATA** menu is displayed.
4. Use the ▼▲ keys to select → **MEASURED VALUES**.
   – Press the **OK** key.
   The menu for viewing the measurements opens ⇨ “Measured Values” 🗎30.
5. Use the ▼▲ keys to select the measurement you want to deactivate.
6. Press and hold the **FUNCTION** key until you hear a short beep.
   The number of blocks changes to “XXXXX”.

↳ The measurement is deactivated.

## 11.4 Deleting Measured Values

Measurement data stored in the battery tester must be transferred to an external PC for data evaluation and storage.

After successful transmission, the measurement data in the battery tester can be deleted so that sufficient memory space is available again for future measurements.

**Note**

All measurement data are deleted. Individual measurements cannot be deleted separately.

1. Switch the battery tester on ⇨🗎19.
2. Press the **OK** key.
   The **main menu** is displayed.
3. In the **main menu**, use the ▼▲ keys to select →**DATA**.
4. Press the **OK** key.
   The **DATA** menu is displayed.
5. Use the ▼▲ keys to select → **DELETE VALUES**.
6. Press the **OK** key.
   The security prompt **DELETE NOW?** appears.
7. Press the **OK** key.

**Note**

To abort the deletion process, press the **FUNCTION** key.

↳ All measured values stored at the battery tester are irretrievably deleted.

## 11.5 Saving Measured Values to a PC (Data Backup)

We recommend backing up measurement data to a PC or other external storage medium at regular intervals. This can prevent any possible loss of data.

When measurement data is transferred to the BT PRO Manager software, an additional CSV file that contains the measurement data is automatically saved on the PC ⇨ “Importing Measurement Data” 🗎54.

If you are not using BT PRO Manager, you can transfer the measurement data as a CSV file from the battery tester to a PC for backup via a wireless interface or a IrDA connection.

In either case, save your file to the PC. You can then transfer the file to another medium or edit it with a text editor.

**Note**

The file may be damaged during editing.
–Before editing, save an additional backup copy.
–Edit the CSV file with a text editor only.
Microsoft® Excel® and other programs may destroy the file.

Before you transfer the data, you must specify the file name for the CSV file. The battery tester and the PC must also be connected via wireless interface. Follow the steps in the following sections, in the order specified, in order to transfer the measurement data.

### 11.5.1 Specifying the File Name Nomenclature

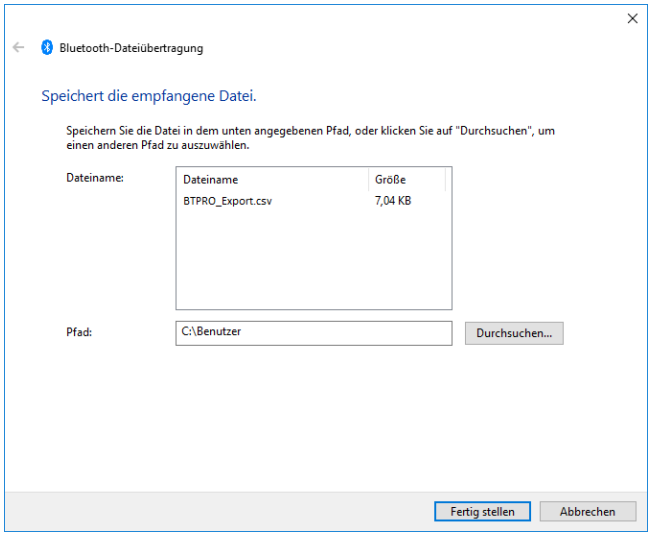
You can choose between a uniform (always identical) or changing file name (with date and timestamp).

1. Switch the battery tester on ⇨🗎19.
2. Press the **OK** key.
   The **main menu** is displayed. In the **main menu**, use the ▼▲ keys to select➔ **SETTINGS**.
3. Press the **OK** key.
   The **SETTINGS** menu is displayed.
4. Use the ▼▲ keys to select ➔ **CSV EXPORT**.
5. Press the **OK** key.
   The **CSV EXPORT** menu is displayed.
6. Use the ▼▲ keys to select the nomenclature:
   – **FILENA. fixed:** same file name
     During transfer, the CSV file is named “BTPRO_Export.csv”.
   – **FILENA. AUTO**: different file name
     The file is named “BTPRO_Export_<system-ID>_<date>_<time>.csv”.
7. Press the **OK** key.

↳ The setting is saved.

### 11.5.2 Transferring a CSV File to the PC

1. Switch the battery tester on ⇨🗎19.
2. Press the **OK** key.
   The **main menu** is displayed.
3. In the **main menu**, use the ▼▲ keys to select ➔ **SETTINGS**.
4. Press the **OK** key.
   The **SETTINGS** menu is displayed.
5. Use the ▼▲ keys to select ➔ **CSV EXPORT**.
6. Press the **OK** key.
   The **CSV EXPORT** menu is displayed.
7. Use the ▼▲ keys to select ➔ **EXPORT TARGET**.
8. Press the **OK** key.
   **SCANNING FOR BT DEVICES** appears in the display.
9. After some time, the name of your PC appears on the display.
10. Open the Windows start window on the PC.
    The Windows Start menu is displayed.




11. Click **Settings**.
    The **Windows Settings** dialog appears.
    Click **Devices**.
    The **BT and Other Devices** dialog is displayed.
12. Click **More BT Options** in the list on the right.
    The **BT Settings** dialog is displayed.
13. On the **Options** tag, activate the **Allow BT Devices to Find This PC** checkbox.
    The PC can be found by other devices.
14. Activate the other checkboxes as well.
15. Click the **OK** button.
    The settings are saved. The **BT Settings** dialog closes.
16. In the **BT and Other Devices** dialog, click **Send or receive files via BT** in the list on the right.
    The **BT File Transfer** dialog is displayed.
17. Click the **Receive Files** button.
18. In the battery test, use the **main menu**
    to select the function sequence➔ **DATA** ➔ **EXPORT (CSV)**.
19. Press the **OK** key.
    The message **CONNECT BT CSV EXPORT** appears briefly in the display. The dialog box for entering the directory path then opens on the PC.
20. In the **BT File Transfer** dialog, specify a location for the file.
21. Click the **Finish** button.

↳ The data is transferred. Information on the transmission status is displayed on the battery tester, e.g., **CONNECTING, CALCULATING DATA, TRANSMITTING DATA**. When **EXPORT (CSV)** appears on the display again, the data transfer has been completed.

# 12 Maintenance

## 12.1 Updating Firmware

If a firmware update is available, you can update the battery tester's firmware to ensure it always operates reliably and safely. In addition, new firmware can add additional features to the battery tester.

1. Switch the battery tester on ⇨🗎19.
2. Press the **OK** key.
   The **main menu** is displayed.
3. From the **main menu**, use the ▼▲ keys to select
   → **INFO**.
4. Press the **OK** key.
   The current firmware version of the device is displayed.
5. Open the myGMC service portal in a browser:
   http://www.gmc-instruments.de/services/mygmc/
6. Log in with the account you created when installing the BT PRO Manager software ⇨🗎34.
7. Select your METRACELL BT PRO from the registered products by clicking **Details**.
   The **Additional Information** page is displayed.
8. Compare the version of the currently available firmware with that of your device.
   – If these are identical, no action is required.
   – If a newer firmware version is available, follow the steps listed below.
9. Read and note the **Description of the Changes and New Features**.
10. Download the new firmware to your PC.
11. Establish a wireless interface connection between your PC and the battery tester ⇨ "The setting is saved." 🗎91.
12. Switch the battery tester off.
13. Press and hold the **OK** key. Additionally, press the **Function** key until **BOOTLOADER START SYSTEM** appears on the display.
    After a short time, the message **WAITING FOR COM** appears.
14. Run the EXE file on your computer.
15. Follow the instructions displayed by the installation wizard.
16. The battery tester's firmware is updated.
    Various messages appear during the update. The message **FLASHING COMPLETED** appears on the display as soon as the update has been completed.
17. Press the **OK** key.
    The device is switched to its initial display.
18. Press any key.

↳ The start screen changes to the **main menu**. The device can now be used.

## 12.2 Housing and Display

**ATTENTION**

**Unsuitable cleaning agents!**

Unsuitable cleaning agents such as aggressive or abrasive agents will damage the device/accessories.

Clean the instrument by wiping it gently with a damp cloth or alcohol.

Do not use cleaning agents, abrasives, solvents, or liquids based on gasoline or hydrocarbons.

## 12.3 Measurement Cables

Inspect the measurement cables, i.e., all cables, for damage at regular intervals. Pay particular attention to broken insulation and kinked cables.

**CAUTION**

**Damaged measurement cables!**

Electric shock.

Replace damaged measurement cables immediately.

## 12.4 Fuse

A fuse is built into the device for protection.

The fuse is located in current-carrying conductor P+, which is connected directly to the power transistor for resistance measurement. If the fuse blows, resistance measurement is no longer possible.

**CAUTION**

**Damaged fuse!**

Electric shock.

The fuse is permanently installed. The fuse must not be replaced by the user.

All devices delivered until 30/6/2023 are equipped with a 10 A/600 V fuse. The voltage drop across this fuse is very low so that it is possible to measure resistances on blocks with a voltage of 1 $V_{DC}$ (e.g., NiCd block). This fuse has a breaking capacity of approx. 50 kA at 600 $V_{AC}$. The breaking capacity for DC is considerably lower.

Measurements of the overall voltage of a battery may only be performed in fuse-protected electrical systems/on fuse-protected connections.

Measurements may only be conducted as described in these operating instructions or in the quick start guide.

As of 1/7/2023, the devices are equipped with a fuse with 2 A/1000 V. This fuse has a breaking capacity of 30 kA at 1000 $V_{DC}$. With this fuse it is possible to measure the overall battery voltage directly. On account of the higher voltage drop, no resistance measurements on CiCd blocks can be performed. The revision level is indicated on a label on the back of the device, specifying the installed fuse.

If the fuse blows, the battery tester must be sent to our repair service department or the relevant representative abroad ⇨95.

Only when the fuse is replaced by the repair service or the relevant representative abroad can it be guaranteed that type-tested fuses with the correct trip characteristic, the correct rated current, and the correct breaking capacity are used. At the same time, technical safety inspection is also conducted on the device.

**Note**

For service technicians:
Use only the specified type-tested fuse!
If fuses with other blowing characteristics, other current ratings or other breaking capacities are used, you and the operator are placed in danger and protective diodes, resistors, and other battery tester components may be damaged.
The use of repaired fuses or short-circuiting the fuse holder is prohibited.

### 12.5 Accessories

No special maintenance is required for the accessories. Keep outside surfaces clean.

Use a slightly dampened cloth to clean the multimeter test probe set (KS29), alligator clips (KY95-3), Kelvin probes (Z227D), angled Kelvin probes (Z227W), rubber case, carrying strap, and carrying case.

**ATTENTION**

**Unsuitable cleaning agents!**

Unsuitable cleaning agents such as aggressive or abrasive agents will damage the device/accessories.

Do not use cleaning agents, abrasives, or solvents.

Never touch or clean the conductive ends of the test probes.

Never clean the power pack.

## 13 Service and Support

Gossen Metrawatt GmbH can be reached directly and simply – we have a single number for everything! Whether you require support or training, or have an individual inquiry, we can answer all of your questions here:

| | | |
|---|---|---|
| +49 911 8602-0 | Monday to Thursday: | 08:00 a.m. – 4:00 p.m. |
| | Friday: | 08:00 a.m. – 2:00 p.m. |
| Or contact us by e-mail at: | info@gossenmetrawatt.com | |

Do you prefer support by e-mail?

| | |
|---|---|
| Measuring and test technology: | support@gossenmetrawatt.com |
| Industrial measuring technology: | support.industrie@gossenmetrawatt.com |

Please contact GMC-I Service GmbH[1)] for repairs, replacement parts and calibration:

+49 911 817718-0
service@gossenmetrawatt.com
https://www.gmci-service.com/en/

Beuthener Str. 41
90471 Nürnberg
Germany

1) DAkkS calibration laboratory per DIN EN ISO/IEC 17025.
Accredited by the Deutsche Akkreditierungsstelle GmbH under reference number D-K-15080-01-01.

# 14 Certifications

## 14.1 CE DECLARATION

The device fulfills all requirements of applicable EU directives and national regulations. We confirm this with the CE mark.

You can find the CE declaration on our website:

https://www.gossenmetrawatt.de/en/service-support/download-center/

## 14.2 CALIBRATION CERTIFICATE

A calibration certificate is included with the device.

Use of your device and the resulting stress affect the device and lead to deviations from the guaranteed accuracy.

In the case of strict measuring accuracy requirements, as well as in the event of severe stress (e.g., severe climatic or mechanical stress), we recommend a relatively short calibration interval of once per year. If this is not the case, a calibration interval of 2 to 3 years is usually adequate.

Please contact GMC-I Service GmbH for calibration services⇨ “Service and Support” 🗎95.

A sticker with an device-specific guideline value for the calibration interval and information regarding the service provider is included on the device as an aid.

**Note**

**Date on Calibration Certificate / Calibration Interval Begins upon Receipt**

Your device is delivered with a calibration certificate that shows a date. This date may be further in the past if your device has been stored for some time prior to sale.

Devices are stored in accordance with the specified conditions. Drift is thus negligible for a duration of 1 year, and longer storage periods are highly unusual.

Consequently, the device’s characteristic values lie within the specifications and the first calibration interval can be determined as of the date of receipt.

## 14.3 TEST REPORT

Link to the test report:

https://www.gossenmetrawatt.de/services/mygmc/

# 15 Disposal and Environmental Protection

Proper disposal makes an important contribution to the protection of our environment and the conservation of natural resources.

**ATTENTION**

**Environmental damage**

Improper disposal results in environmental damage.

Follow the instructions concerning return and disposal included in this section.

The following comments refer specifically to the legal situation in the Federal Republic of Germany. Owners or end users who are subject to other regulations must comply with the respective local requirements and implement them correctly on site. Further information is available, such as from the responsible authorities or local distributors.

### Waste Electrical Equipment, Electrical or Electronic Accessories and Waste Batteries (including rechargeable batteries)

Electrical devices and (rechargeable) batteries contain valuable raw materials that can be recycled, as well as hazardous substances which can cause serious harm to human health and the environment, and they must be recycled and disposed of correctly.



The symbol on the left which depicts a crossed-out garbage can on wheels refers to the legal obligation of the owner or end user (German Electrical and Electronic Equipment Act (ElektroG) and German Battery Act (BattG)) to not dispose of used electrical equipment and batteries with unsorted municipal waste (“household trash”). Used batteries must be removed from the old device (where possible) without destroying them, and the old device and used batteries must be disposed of separately. The battery type and its chemical composition are indicated on the battery’s label. If the abbreviations “Pb” for lead, “Cd” for cadmium, or “Hg” for mercury are included, the battery exceeds the limit for the respective metal.

Please note that the owner or end user is personally responsible for deleting personal data and, if applicable, other sensitive data from the old devices to be disposed of before handing them over.

Old devices, electrical or electronic accessories and waste batteries (including rechargeable batteries) used in Germany can be returned free of charge to Gossen Metrawatt GmbH or the service provider responsible for their disposal in compliance with applicable regulations, in particular laws concerning packaging and hazardous goods. Waste batteries must be returned in the discharged state or with appropriate precautions against short circuiting. For more information on returns, see our website.

### Packaging Materials

We recommend retaining the packaging in case you might require servicing or calibration in the future.



**WARNING**

**Danger of asphyxiation from foils and other packaging materials**

Children and other vulnerable persons may suffocate if they wrap themselves in packaging materials, their components, or foils or if they pull these over their heads or swallow them.

Keep packaging materials, their components, and foils out of the reach of babies, children, and other vulnerable persons.

In accordance with the German Packaging Act (VerpackG), the user is obligated to correctly dispose of packaging and its components separately and not together with unsorted municipal waste (“household trash”).

Private end consumers can dispose of packaging free of charge at the designated collection point. Packaging that is not subject to mandatory system participation is taken back by the contracted service provider. For more information on returns, see our website.

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