OPERATION MANUAL
Version 1.1

Battery Measuring Module
Model 2511

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Declaration of Conformity

THE MEASUREMENT SOLUTION.

EU-Konformitätserklärung (nach EN ISO/IEC 17050-1:2010)

EU-Declaration of conformity (in accordance with EN ISO/IEC 17050-1:2010)

Name des Ausstellers: burster präzisionsmesstechnik gmbh & co kg
Issuer's name:

Anschrift des Ausstellers: Talstr. 1-5
Issuer's address: 76593 Gernsbach, Germany

Gegenstand der Erklärung: Batteriemessmodul
Object of the declaration: *Battery measurement module*

Modellnummer(n) (Typ): 2511
Model number / type:

Diese Erklärung beinhaltet obengenannte Produkte mit allen Optionen
This declaration covers all options of the above product(s)

Das oben beschriebene Produkt ist konform mit den Anforderungen der folgenden Dokumente:
The object of the declaration described above is in conformity with the requirements of the following documents:

Dokument-Nr. *Documents No.*	**Titel** *Title*	**Ausgabe** *Edition*
2011/65/EU + delegD (EU) 2015/863	Richtlinie zur Beschränkung der Verwendung bestimmter gefährlicher Stoffe in Elektro- und Elektronikgeräten *Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment*	2011 + 2015
2014/35/EU	Richtlinie zur Harmonisierung der Rechtsvorschriften der Mitgliedsstaaten über die Bereitstellung elektrischer Betriebsmittel zur Verwendung innerhalb bestimmter Spannungsgrenzen auf dem Markt *Directive on the harmonization of the laws of the Member States relating to the making available on the market of electrical equipment designed for use within certain voltage limits*	2014
2014/30/EU	Richtlinie zur Harmonisierung der Rechtsvorschriften der Mitgliedsstaaten über die Elektromagnetische Verträglichkeit *Directive on the harmonization of the laws of the Member States relating to electromagnetic compatibility*	2014
EN 61010-1	Sicherheitsbestimmungen für elektrische Mess-, Steuer-, Regel- und Laborgeräte – Teil 1: Allgemeine Anforderungen *Safety requirements for electrical equipment for measurement, control and laboratory use – Part 1: General requirements*	2020 + A1:2022 + A2:2023
EN 61326-1	Elektrische Mess-, Steuer-, Regel- und Laborgeräte – EMV-Anforderungen – Teil 1: Allgemeine Anforderungen *Electrical equipment for measurement, control and laboratory use – EMC requirements – Part 1: General requirements*	2022
EN 55011	Industrielle, wissenschaftliche und medizinische Geräte – Funkstörungen – Grenzwerte und Messverfahren, Gruppe 1, Grenzwertklasse A *Industrial, scientific and medical equipment – Radio-frequency disturbance characteristics – Limits and methods of measurement, group 1, class A*	2022

Gernsbach	12.04.2023	ppa. Christian Karius
Ort / *place*	Datum / *date*	*Quality Manager*

Dieses Dokument ist entsprechend EN ISO/IEC 17050-1:2010 Abs. 6.1g **ohne Unterschrift** gültig /
According EN ISO/IEC 17050 this document is valid without a signature.

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1 For your safety

The following symbols on the model 2511 battery measuring module and in this operation manual warn of hazards.

1.1 Symbols used in the operation manual

1.1.1 Signal words

The following signal words are used in the operation manual according to the specified hazard classification. The signal words introduce warnings that must be followed and acted upon with care to prevent accidents, injuries and damage to property.

DANGER
High degree of risk: indicates a hazardous situation which, if not avoided, will result in death or serious injury.
WARNING
Moderate degree of risk: indicates a hazardous situation which, if not avoided, may result in death or serious injury.
CAUTION
Low degree of risk: indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
NOTICE
Property damage to the equipment or the surroundings will result if the hazard is not avoided.

Please note: It is important to heed these safety notices in order to ensure you handle the model 2511 battery measuring module correctly.

IMPORTANT: Follow the information given in the operation manual.

1.1.2 Pictograms

	Electric shock hazard.
	Electrostatic discharge. Do not touch! Avoid electrostatic discharge. Dissipate electrostatic charge.
	Observe the advice for protecting the instrument.

1.2 Symbols on the device

Symbol	Description
	See manual! It is essential to observe the information and notes in the operation manual for the model 2511 battery measuring module. **Follow safety instructions – professional servicing only.**

2 Introduction

IMPORTANT: Read the operation manual carefully before using the equipment, and keep it for future reference.

The operating manual must be read carefully before putting the device into service or carrying out maintenance or other work on the model 2511 battery measuring module. All safety instructions and safety regulations relating to accessory equipment / attachments must be observed to ensure safe and proper handling of the device.

Only qualified personnel may perform maintenance work on electrical components (see section 2.5 Personnel). These safety instructions must be included when the model 2511 battery measuring module is sold.

2.1 Intended use

The model 2511 is a measurement and quality assessment device for battery cells in individual and quickly recurring production processes. This quick measurement device is preferred in partially and fully automated processes. It is capable to measure the open circuit voltage (OCR) and/or the complex internal resistance (IR_{AC} and IR_{DC}) of battery cells and assess the results through comparators.

The result of this assessments can be output with „OUT_COMP_=“ (good) or „OUT_COMP_<“ (value to small) or OUT_COMP_> (value to high) via a variety of interfaces.

IMPORTANT: This device is not a substitute for safety devices and protective equipment. For example, it is not designed to replace an emergency shutdown.

2.2 Customer service

2.2.1 Customer service department

For repair inquiries, please call our customer service department on +49 7224 645-53, or email service@burster.de (in Germany only). In other countries please contact your local representative (see also https://www.burster.com).

Please have the serial number to hand. The serial number is the only way to clearly identify the technical version of the instrument so that we can provide help quickly. You will find the serial number on the type plate of the model 2511 battery measuring module.

2.2.2 Contact person

If you have any questions relating to the model 2511 battery measuring module, please go directly to burster präzisionsmesstechnik gmbh & co. kg, or if outside Germany, please contact your burster representative (see also https://www.burster.com).

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2.3 Download the test certificate

You have the option to download the test certificate for your model 2511 battery measuring module online. Please use the following link https://www.burster.de/en/service-calibration/download-your-test-and-calibration-certificates-here. You can then download the test certificate directly by entering the serial number.

2.4 Ambient conditions

2.4.1 Storage conditions

The following requirements must be met when storing the model 2511 battery measuring module:

- Store at temperatures between -10 °C and +70 °C
- The model 2511 battery measuring module must be packed in clean packaging
- Store in a dry environment
- No condensation

2.4.2 Operating conditions

The following requirements must be met when operating the model 2511 battery measuring module:

- Indoor operation only
- Maximum altitude 2000 m
- Operate at temperatures between 0 °C … +40 °C
- Humidity: 70% up to +31 °C, decreasing linearly above that temperature to 50% at T_{max}, non-condensing
- Protection class: 3
- Transient overvoltage category: CAT II
- Supply voltage 11 … 30 V DC

2.4.3 Restrictions on use

DANGER

The model 2511 battery measuring module is **not** a substitute for safety devices and protective equipment.
Use safety devices and protective equipment.

The model 2511 battery measuring module does not pose a hazard if used within its specification and in accordance with the safety regulations.

The manufacturer does not accept liability for any personal injury or property damage arising from misinterpretation of measurement results.

2.4.4 Cleaning

DANGER

Electric shock hazard!
Disconnect the model 2511 battery measuring module from the power supply before cleaning.

Disconnect the model 2511 battery measuring module from the power supply and use a dry cloth to clean the unit.

NOTICE

Do not immerse the model 2511 battery measuring module in water or hold it under running water. Do not use strong cleaning agents as these may damage the instrument. Use a slightly damp cloth to clean the instrument.

2.5 Personnel

Qualified personnel are persons who, due to their training, experience, instruction and knowledge of the relevant standards, regulations, accident prevention rules and working conditions have been authorized by the person responsible for the safety of the machine/product to carry out the relevant activities and are therefore able to recognize and avoid potentially dangerous situations (for the definition of *Fachkräfte* (competent persons) see VDE 0 105 or IEC 364, which also specify that unqualified persons must not be employed). Knowledge of first aid and the local emergency medical services organization is also required.

Transportation, assembly, installation, putting into service, maintenance and repairs must be carried out by qualified personnel or checked by a responsible competent person.

burster is happy to provide your operating personnel with training. To find out more, please look at our range of services at www.burster.com

2.6 Contents of pack

The following components are supplied:

- Battery measuring module, model 2511
- Test certificate
- Operation manual to download from our website.
- Free version of the DigiControl configuration and analysis software to download from our website.

2.7 Unpacking

DANGER

Electric shock hazard!
Never switch on the device if it shows signs of damage incurred in transit. Only ever use the device within the conditions specified in this operating manual.

Inspect the device for damage. If you suspect that the device has been damaged during shipping, notify the delivery company within 72 hours.

The packaging should be retained for examination by a representative of the manufacturer and/or the delivery company.

The model 2511 battery measuring module should be shipped only in its original packaging or in packaging capable of providing an equivalent degree of protection.

2.8 Warranty

burster präzisionsmesstechnik gmbh & co kg provides a manufacturer's warranty for a period of 24 months after delivery.

Any repairs required during this time will be made without charge. This does not include damage arising from improper use.

Please note the following when sending the model 2511 battery measuring module in for repair:

- If there is a problem with the device, please attach a note to the body of the device summarizing the fault.
- Technical specifications subject to change at any time without notice.
  We also state explicitly that we do not accept liability for consequential damage.
- The device must always be dispatched in suitable packaging.
- The model 2511 battery measuring module should be shipped only in its original packaging or in packaging capable of providing an equivalent degree of protection.

2.9 Conversions and modifications

Please note: The warranty shall be deemed void **immediately** if you open or dismantle the model 2511 battery measuring module during the warranty period.

The model 2511 battery measuring module does not contain any parts that are intended to be serviced by the user. Only the manufacturer's own qualified personnel are permitted to open the model 2511 battery measuring module.

It is not permitted to make any changes to the model 2511 battery measuring module without the written agreement of burster präzisionsmesstechnik gmbh & co kg. burster präzisionsmesstechnik gmbh & co kg does not accept liability for damages or injury if this condition is disregarded.

3 Device concept

Please refer to the model 2511 battery measuring module data sheet for full details of dimensions, weight, degree of protection etc.

3.1 Functional scope

The model 2511 battery measuring module is used for the acquisition and processing of battery cell parameters (open circuit voltage, AC/DC internal resistance and temperature).

The model 2511 battery measuring module is a user-configurable one to five channel device. The device is configured via the Fieldbus interface, USB port and/or via the buttons on the device (only the version with a display). The model 2511 battery measuring module is particularly suitable for fast, multi-channel measurement of battery cells and modules in automation – regardless of the cell technology.

3.2 Versions

Please refer to the data sheet for details of the different versions. You can obtain the latest data sheet and additional information on the model 2511 battery measuring module at https://www.burster.de/fileadmin/user_upload/redaktion/Documents/Products/Data-Sheets/Section_2/2511_EN.pdf or simply use the QR code below:

3.3 Power supply

The model 2511 battery measuring module can be operated with a voltage of +11 … 30 V DC, nominal 24 V. The maximum power consumption of the model 2511 battery measuring module is 3 W.

4 Controls and connections

4.1 LED Assignment

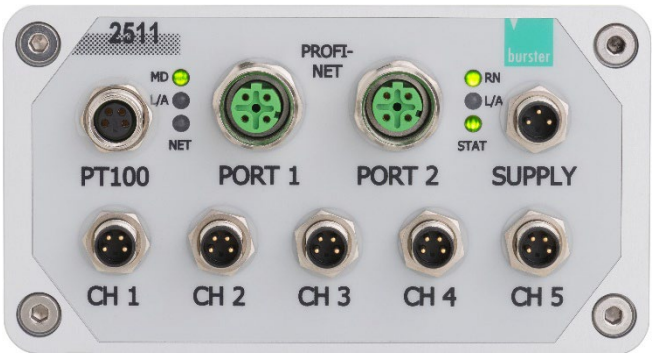


Figure 1: LED Assignment

Item	Description
MD	Module status LED
L/A	Link/Activity Fieldbus status LEDs **Please note:** The LEDs for the Fieldbus interfaces are described in the relevant supplementary documentation (e.g. BA_2511_PROFINET).
NET	Network status LED
RN	Run LED
STAT	Status LED

4.2 Interfaces

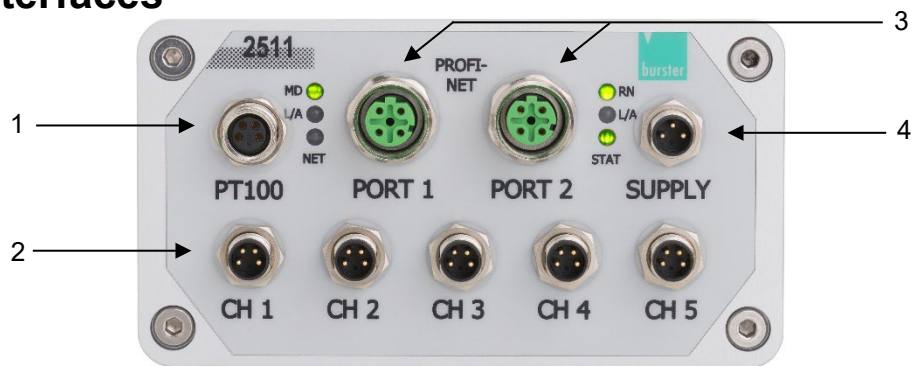


Figure 2: Interfaces

Item	Description
1	Connection for a Pt100 temperature sensor
2	Measurement inputs 1 - 5
3	Fieldbus ports
4	Connection for supply voltage +11 … 30 V DC

4.2.1 Connection: Pt100 sensor

PT 100 sensors are connected to the 4-pin M8 socket. The sensor plug to be connected must be tightened with a maximum tightening torque of 0.5 Nm.

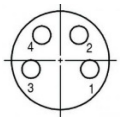


Figure 3: Pt100 connection

PIN	Meaning
1	Pt100_I+
2	Pt100_U+
3	Pt100_U-
4	Pt100_I-

4.2.2 Connection: Measurement input (channel 1 - 5)

The devices under test are connected to the 4-pin M8 panel connector. The coupling of the test lead must be tightened with a maximum torque of 0.5 Nm.

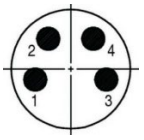


Figure 4: Measurement input connection

PIN	Meaning
1	Sense+
2	Force+
3	Sense-
4	Force-

4.2.3 Connection: Fieldbus Port1 & Port2

The fieldbus port 1 and port 2 are connected to the respective 4-pin M12 socket. The respective plugs of the communication cables must be tightened with a maximum tightening torque of 0.5 Nm.

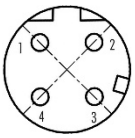


Figure 5: Fieldbus Port1 & Port2 connection

PIN	Meaning
1	TD+
2	RD+
3	TD-
4	RD-

4.2.4 Connection: Supply voltage

The supply voltage is connected to the 3-pin M8 panel connector. The coupling of the supply cable must be tightened with a maximum torque of 0.5 Nm.

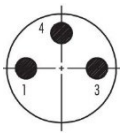


Figure 6: Power supply connection

PIN	Meaning
1	+Supply voltage (+11 … 30 V DC, nominal 24 V)
3	- Supply voltage (0 V)
4	- Supply voltage (0 V)

4.2.5 USB connector

Figure 7: USB connector (Depicted in open state)

The model 2511 battery measuring module has a type B USB port on the top.

4.3 Connecting the battery measuring module

4.3.1 Connecting the power supply

Only for Version 2511-V2XXX:

The model 2511 battery measuring module must be connected disconnectable to the power supply. Therefore, a switch or a relay must be integrated into the power supply cable.

4.3.2 Grounding, shielding and connection wiring

The model 2511 battery measuring module is to be grounded via the grounding connector on the backside of the device.

In compliance with EN 61010-1, exposed parts that carry live voltage in the event of a fault are grounded. This prevents such parts from carrying hazardous voltages.

4.3.3 Connection for single cell testing

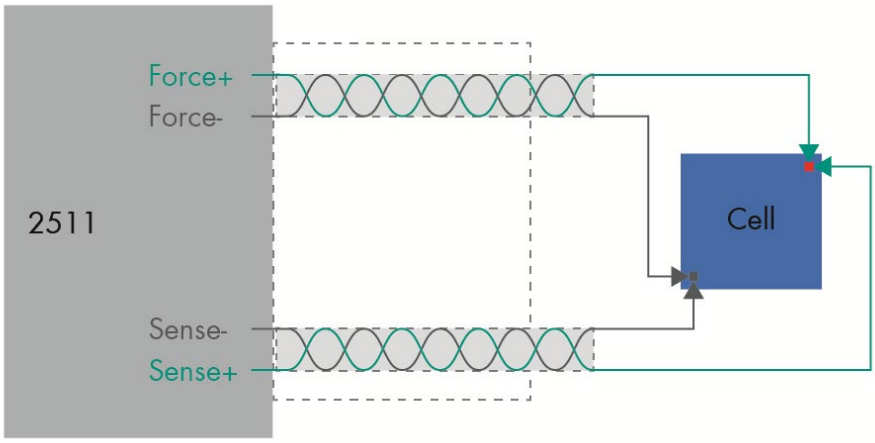


Figure 8: Connecting the model 2511 to a cell under test

A four-wire connection configuration is required, i.e. a force and a sense lead must be connected to each battery pole. The force connections should be low impedance and have low inductance, which is achieved by twisting.

To reduce magnetic crosstalk, both pairs of wires (pairs: [Force+, Force-], [Sense+, Sense-]) must be well twisted. The twisted sense leads must be shielded together. Also, the twisted force leads must be shielded together. Additionally, the whole measuring lead must be shielded.

Only one end of the shielding should be connected, to the device.

If the twisting of the measuring leads ends, both shieldings must also end.

In addition, we strongly recommend:

- When using control lines from remote PLC systems, make sure all the system components are suitably grounded.
- Position signal lines away from power supply lines (in particular when laying cables near servomotors).
- Preferably use the recommended burster test leads to connect test objects. The test lead must be connected in accordance with regulations and must not be exposed to mechanical disturbance or electromagnetic interference. Particular care must be taken to avoid metal objects in the immediate vicinity of the untwisted measuring cables.

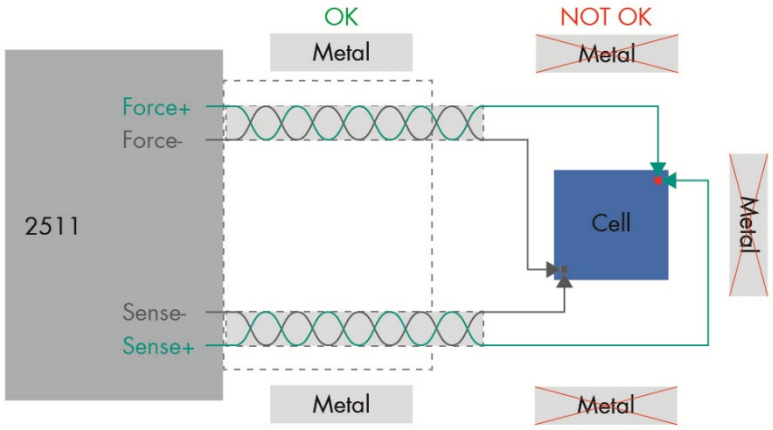


Figure 9: Metallic objects in the vicinity of the measuring cables cause interference.

- Ensure that cable lengths are kept to the minimum required.
- Use a suitable connecting cable with a dual-shield construction (aluminum foil plus braided shield) for the communication and fieldbus interfaces and for the PLC I/O signal control lines.
- Only connect sensors with shielded cables to the Pt100 connection. If the grounding on the sensor is unknown, the cable shield should not be connected to the connector housing, as this can cause measurement errors due to double grounding stray currents.
- When using power cables from other manufacturers or a mains connection outside Germany, you must ensure that there is a proper connection to ground.

4.3.4 Testing the repeat accuracy with the Battery Cell Simulator model 2500-Z100

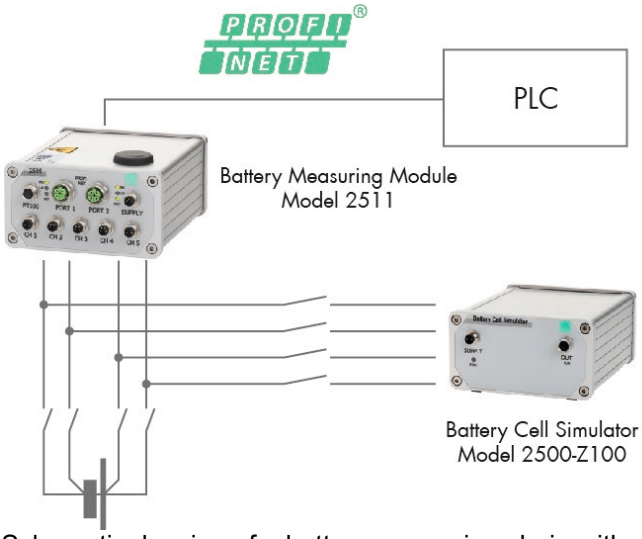


Figure 10: Schematic drawing of a battery measuring chain with a model 2500-Z100 battery cell simulator

A functional test of the model 2511 battery measuring module can be performed with a model 2500-Z100 battery cell simulator. Through this test the stable repeat accuracy of the model 2511 battery measuring module can be proved.

Connecting the battery cell simulator must be done in a 4-wire configuration. There are two contacting possibilities:

- The model 2500-Z100 battery cell simulator can be connected directly to a model 2511 battery measuring module.
- The model 2500-Z100 battery cell simulator can be connected via a contacting adapter, that represents a battery cell, to a model 2511 battery. The contacting adapter is swiveled in to test the repeat accuracy.

Note: The test setup is influencing the measurement results. Please refer to the descriptions given in this operation manual. As a consequence, a variance will result, when comparing measurements using a direct connection of the model 2500-Z100 battery cell simulator to a model 2511 battery measuring module to measurements using a connection via a test setup.

Note: More information on contacting the model 2500-Z100 battery cell simulator and further information about this device can be obtained at https://www.burster.de/en/measure-test-devices/battery-test-and-measuring-modules/p/detail/2500 or simply use the QR code below:

5 Using the instrument for the first time

DANGER

Electric shock hazard!

- Never switch on the model 2511 battery measuring module if it shows signs of damage incurred in transit. Only ever use the model 2511 battery measuring module under the conditions specified in this operation manual.
- Only use the model 2511 battery measuring module outside of potentially explosive areas.
- Do not connect voltages that are higher than the specification. For the supported ranges, see the data sheet for the model 2511 battery measuring module.

CAUTION

No special steps need to be taken before using the device for the first time, although the model 2511 battery measuring module must first have reached thermal equilibrium. If the storage location is colder than the location where the unit is to be operated, the model 2511 battery measuring module must remain switched off for a suitable period of time because of the possibility of condensation forming. Choose the installation site so that the model 2511 battery measuring module is not exposed to extreme temperatures (see operating temperature range in the data sheet for the model 2511 battery measuring module) or temperature fluctuations. Keep moisture, dust, oils, organic solvents, aerosols and strong vibrations away from the model 2511 battery measuring module, and avoid installation in the immediate vicinity of strong sources of electrical interference. In particular, route the connecting cables so that they are not in the vicinity of sources of electromagnetic interference.

5.1 Installation / removal

The model 2511 battery measuring module is supplied with rubber feet as standard. A mounting rail kit or wall mounting kit are optionally available.

WARNING

Mount the model 2511 battery measuring module only on a grounded mounting rail in a grounded control cabinet (mounting on a mounting rail) or on grounded surfaces / machine components (wall mounting).

5.1.1 Mounting on a mounting rail

The mounting rail kit is available as an accessory.

Installation

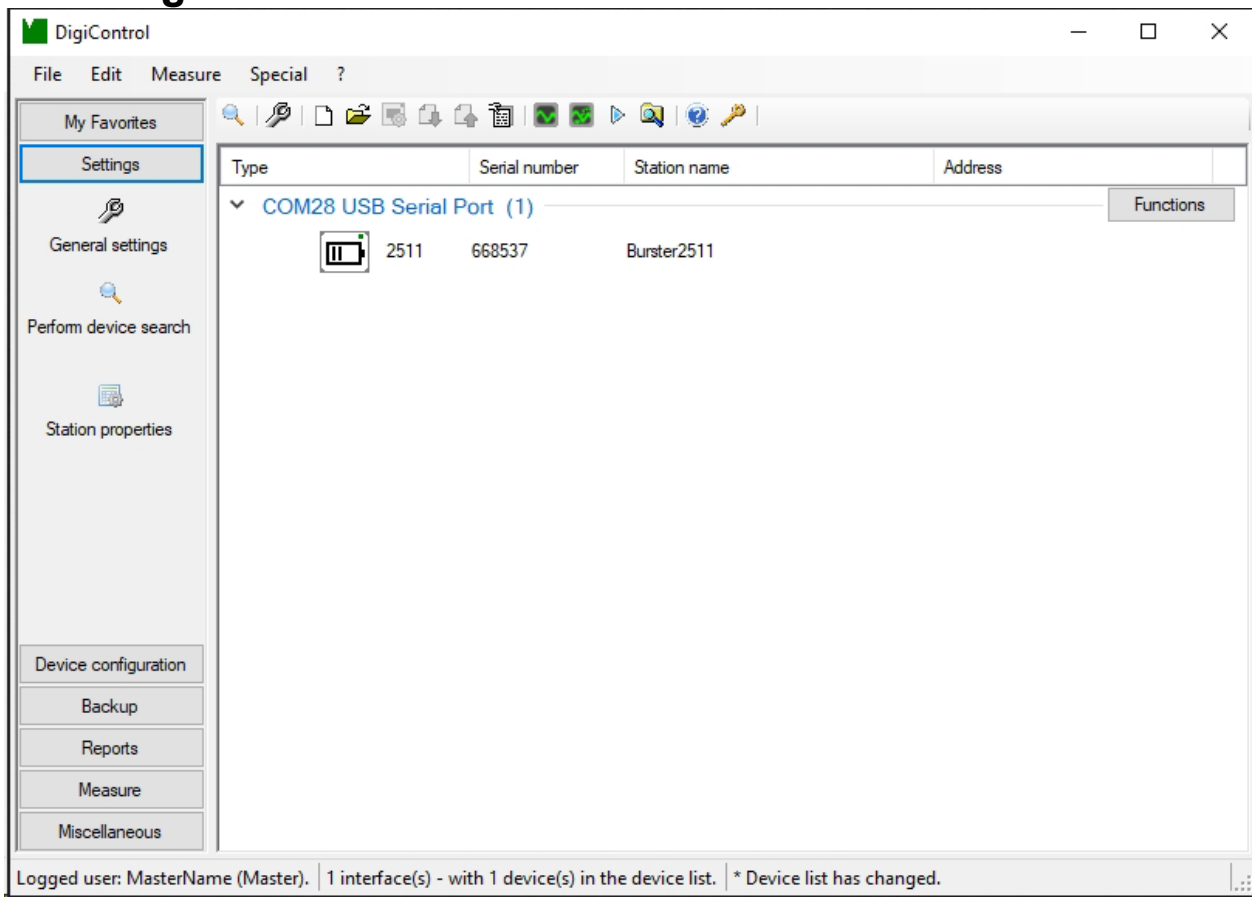
1. Place the upper edge of the mounting section on the mounting rail.
2. Press the model 2511 battery measuring module from the front against the mounting rail until it audibly engages.
3. Pull lightly on the model 2511 battery measuring module to check it is securely mounted.

Removal

1. Press down slightly on the rear end of the 2511 battery measuring module until the bottom edge is unhooked.
2. Then tilt the 2511 battery measuring module slightly upward, grip its top edge and lift it off the mounting rail.

Figure 11: Model 2511 Battery Measuring modules attached to a mounting rail.

5.2 DigiControl PC software



For device configuration and to use the model 2511 battery measuring module in Lab Mode, you need the DigiControl PC software. You can download the basic version from https://www.burster.com.

The model 2511 battery measuring module can only be configured via its interfaces (USB or Fieldbus). With the DigiControl PC software, in addition to Lab Mode and complete device configuration, you can also save data backups of the settings (for data backups see section 9.1 on page 39). In Lab Mode, measurement data can be read out manually and printed or logged.

Please note: The main functions of the DigiControl PC software can be found in the quick start bar on the left or via the menu bar at the top.

5.2.1 Controls and symbols

The following control elements and icons occur repeatedly in the DigiControl PC software:

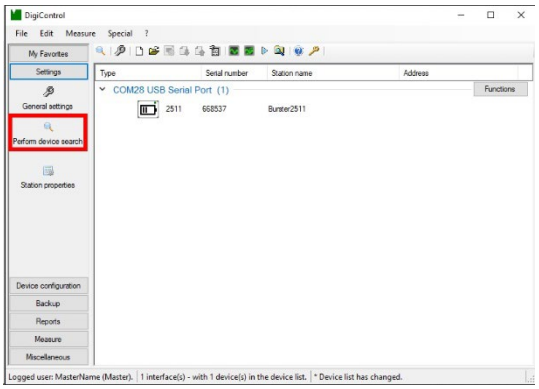
Icon	Meaning
	This icon always takes you to the Online Help facility of the DigiControl PC software
☒ ✓ ! ☐	Checkbox enabled / disabled
⦿ / ○	Radio button enabled / disabled

6 Device configuration

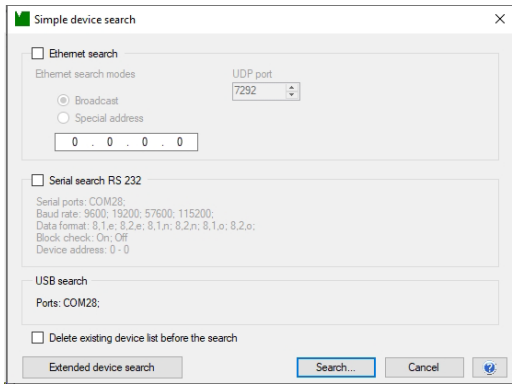
Device configuration is done entirely via the USB interface or alternatively via the Fieldbus interfaces. To do this, use the basic version of the DigiControl PC software or the Fieldbus interface description.

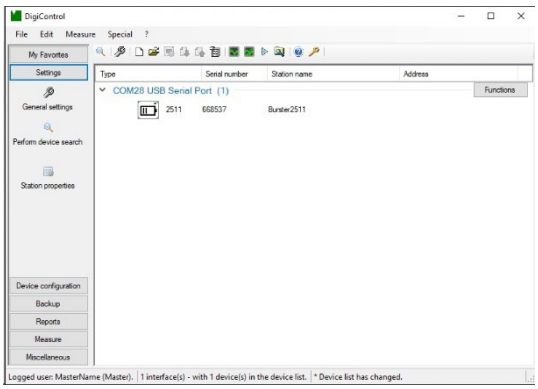
6.1 Connecting to the DigiControl PC software

1. To connect to the DigiControl PC software after installation, connect the model 2511 battery measuring module to the PC via the USB port.
2. Start the DigiControl PC software.
3. Click on “Perform device search”



4. Specify the desired search parameters.
   The device search via USB always takes place (the virtual COM port to the 2511 battery measuring module is always displayed).
   Please uncheck “Ethernet Search” and “Serial Search RS-232”.

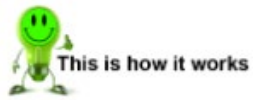




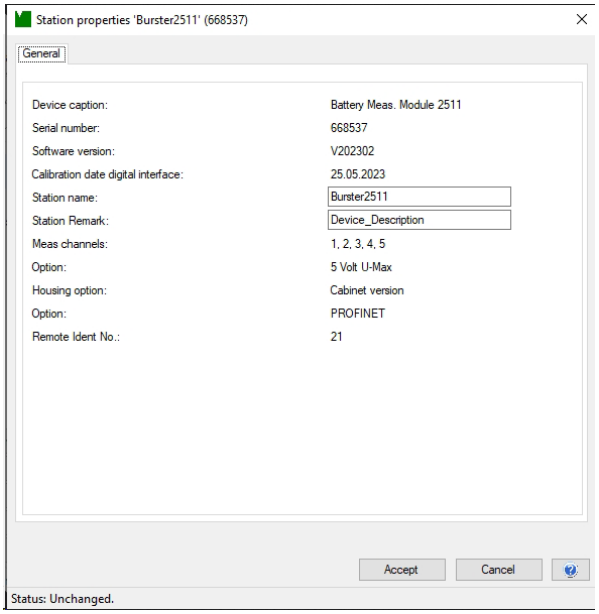
6.2 Model 2511 battery measuring module device information (properties)

6.2.1 Station properties

In the “Station properties” menu you will information about the serial number, software version, calibration date, number of measurement channels and Fieldbus option. In addition, you can enter a station name here which is relevant e.g. for the measurement data recording documentation.

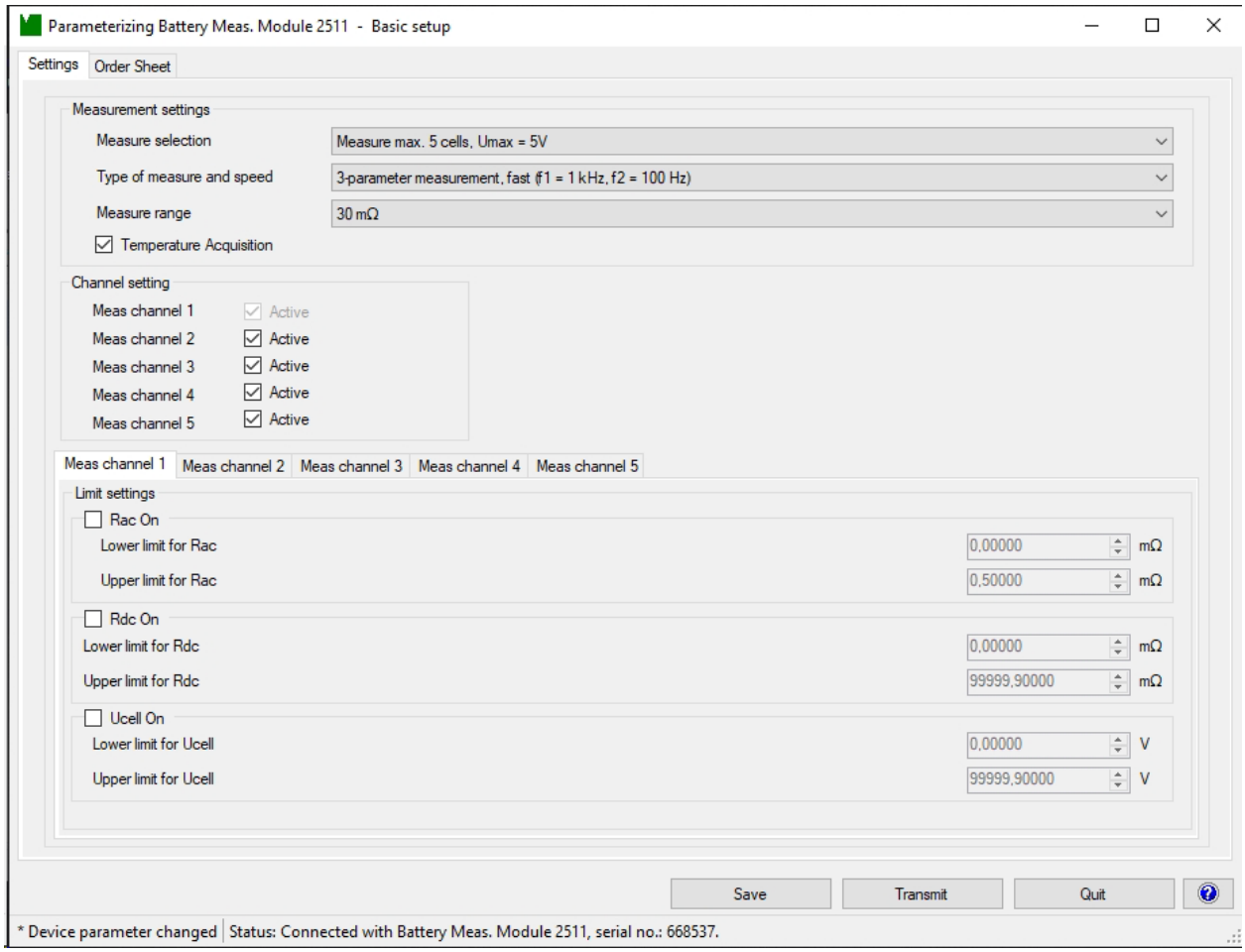


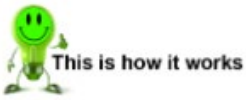
1. Double-click on the model 2511 battery measuring module in the device list. The “Properties for station ‘XXXX’” window opens.
2. Enter the desired parameters.



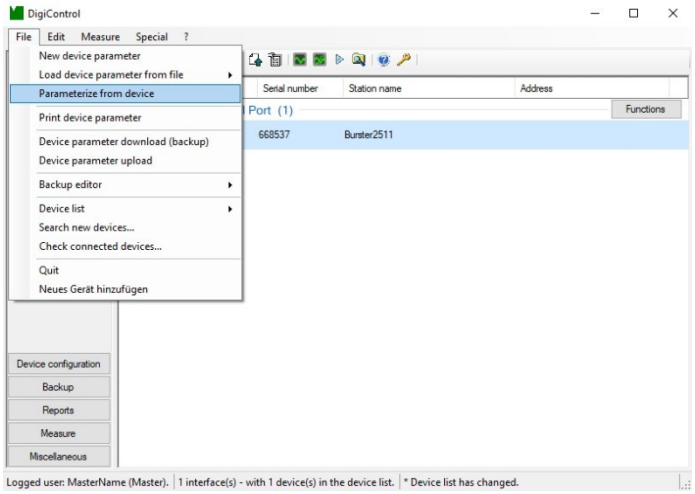
6.3 Device settings

When configuring the model 2511 battery measuring module online via the DigiControl PC software, you can make all settings via the “Parameterize from device” menu.

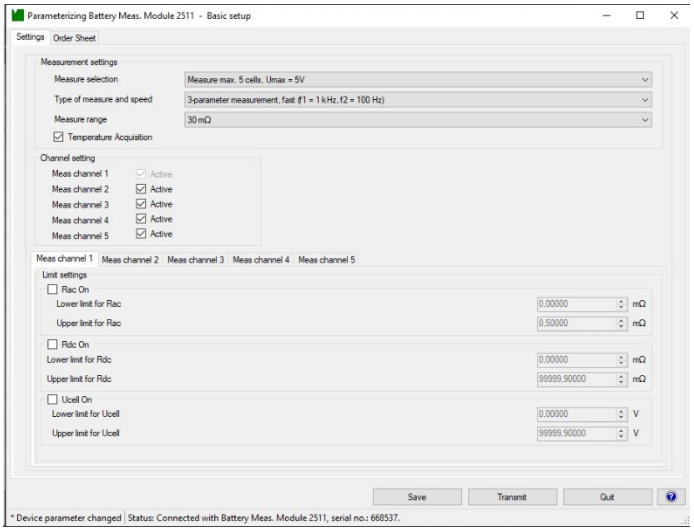




1. Go to File > Parameterize from device.

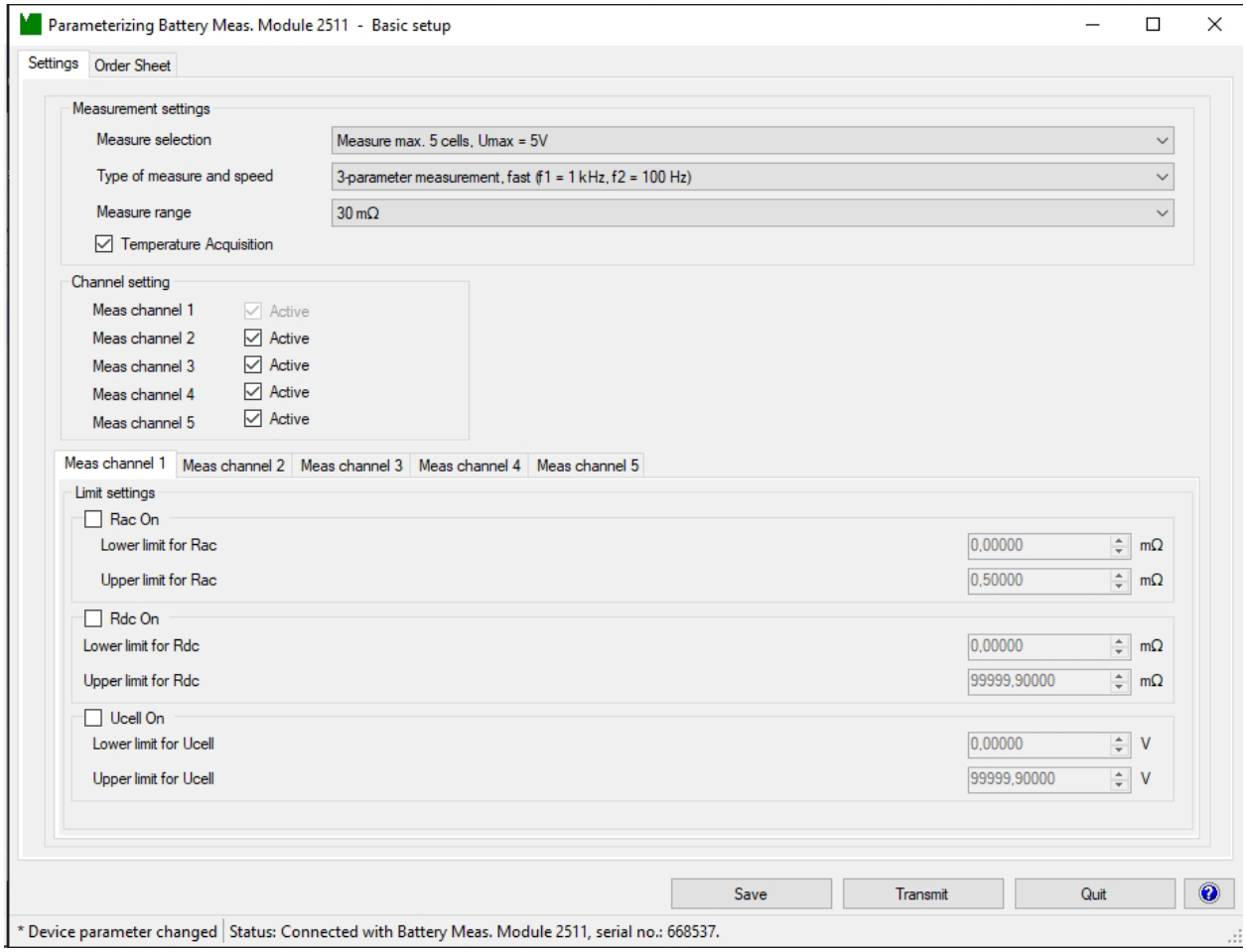


2. You are in the “Battery Measuring Module 2511 Configuration – Basic Settings” menu.



6.3.1 Settings

On the “Settings” tab, you can change the global measurement settings across all measurement channels, select and deselect temperature recording, activate or deactivate measurement channels depending on the version of the device, and activate/deactivate comparators individually for each measurement channel and define their upper and lower limits.



6.3.2 Measurement settings

Measurement selection

In general, the following setting can be made:

“Measure max. 5 cells, Umax = 5 V” to be able to measure battery cells across all channels (depending on version) with up to ±5 V open circuit voltage.

Measurement method and speed

The model 2511 battery measuring module offers 8 operating modes with defined parameters that have different effects on the measuring time. Therefore, it is possible to select the appropriate setting for each application. A fixed component is always the measurement of the open circuit voltage. The impedance can be measured at up to two different frequencies.

Measuring times per channel in ms						Measuring times / 5 Channel in ms *
STANDARD	**Voltage**	**1 kHz**	**2. Frequency**	**Other**	**Total**	**Total**
U, 1 kHz, 1 Hz	100	100	1000	55	1255	6325
U, 1 kHz, 10 Hz	100	100	100	55	355	1825
U, 1 kHz, 100 Hz	100	100	100	55	355	1825
U, 1 kHz	100	100	-	50	250	1300
SLOW	**Voltage**	**1 kHz**	**2. Frequency**	**Other**	**Total**	**Total / 5 Channel ***
U, 1 kHz, 1 Hz	100	100	3000	55	3255	16325
U, 1 kHz, 10 Hz	100	100	200	55	455	2325
Fast	**Voltage**	**1 kHz**	**2. Frequency**	**Other**	**Total**	**Total / 5 Channel ***
U, 1 kHz, 100 Hz	20	20	20	55	115	625
U, 1 kHz	20	20	-	50	90	500

** Query/cycle times of the downstream PLC are also added*

Note: In the case of device cascading and parallel communication via PROFINET of several devices (5 measuring channels in the full expansion stage), it can be assumed that the measuring and evaluation times per 5 channel device in FAST mode with the parameters U/1 kHz are not exceeded (Query/cycle times of the downstream PLC are also added).

Example:

	Fieldbus	Parameters	Measuring/ Evaluation time
5 Channel	PROFINET	U, 1 kHz	500 ms
10 Channel	PROFINET	U, 1 kHz	500 ms
15 Channel	PROFINET	U, 1 kHz	500 ms

Measuring range

Depending on the expected measured value, the appropriate measuring range should be selected:

- 10 mΩ
- 30 mΩ
- 100 mΩ
- 300 mΩ

Temperature recording

Use this checkbox to activate or deactivate temperature recording.

6.3.3 Channel setting

Depending on the version of the model 2511 battery measuring module, the measurement channels can be activated or deactivated with the respective checkboxes (except for channel 1, which is always active).

6.3.4 Comparator setting

Via the tabs “Measurement Channel 1” – “Measurement Channel 5” (depending on version), comparator evaluation can be activated or deactivated on a channel-specific basis for the AC internal resistance, DC internal resistance, and cell voltage. The upper and lower limits for the respective measured variable are defined via the input fields.

Once all settings have been made, you have the possibility to save the configuration as a backup on the PC via the “Save” button.

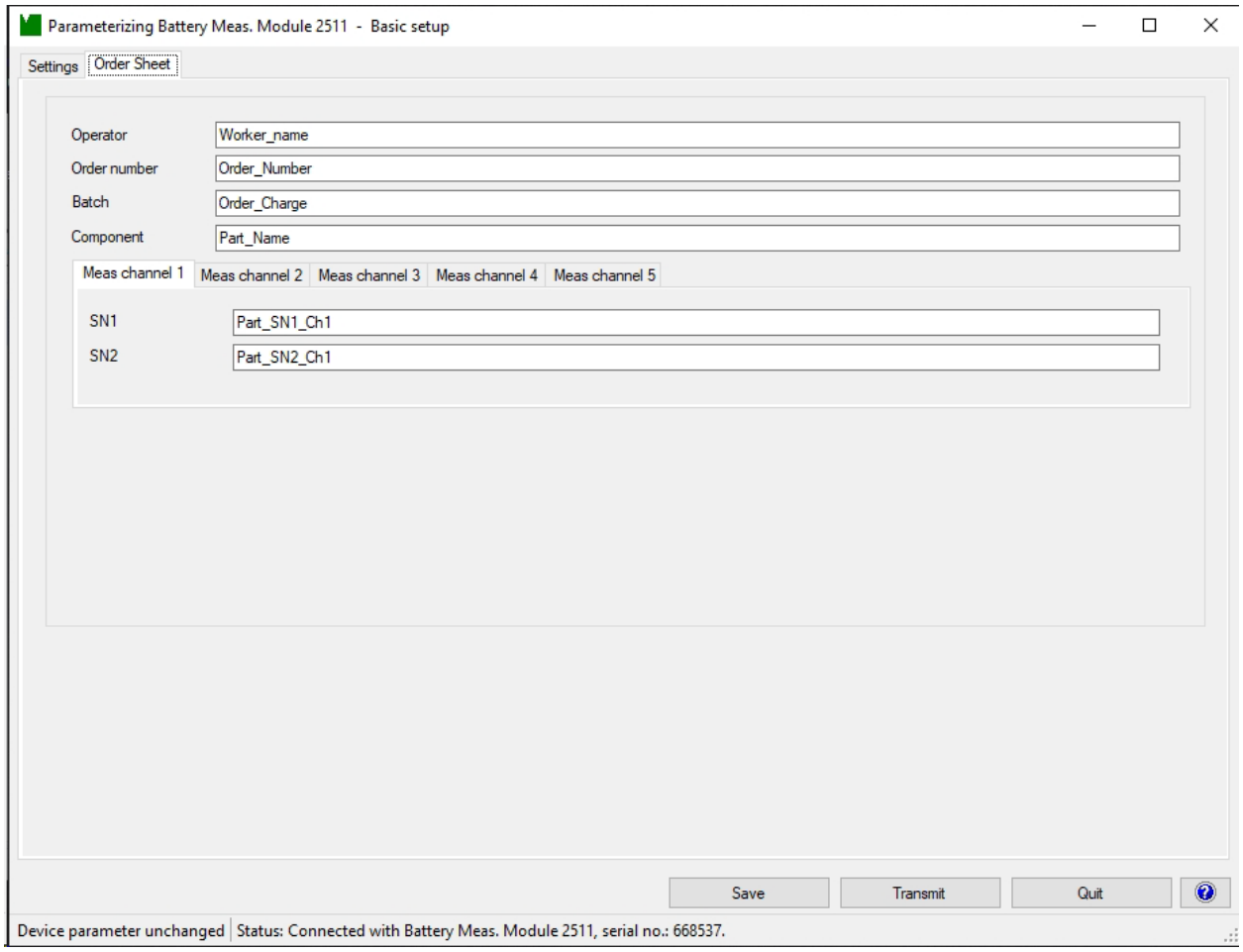
To activate the measurement settings on the model 2511 battery measuring module, you have to click the “Transmit” button. The DigiControl PC software now transfers the selected settings to the model 2511 battery measuring module.

Use the “Quit” button to close the configuration of the 2511 battery measuring module and return to the home window of the DigiControl PC software.

6.3.5 Order sheet

On the “Order Sheet” tab you can store and retrieve a wide range of background information on the measurement, some of which is channel-specific. All entries can be read/written via the available Fieldbus interfaces.

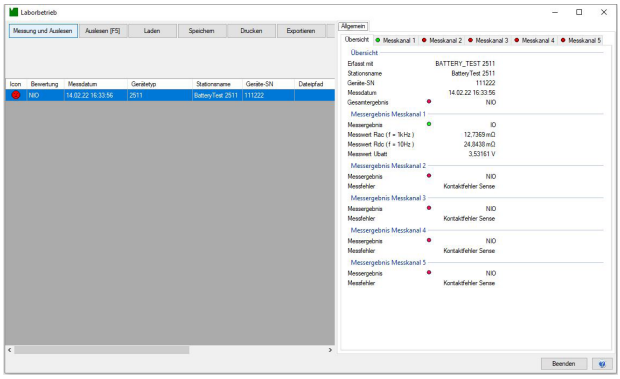
• Name of operator	• Component name
• Order number	• Serial number 1 (channel-specific)
• Batch	• Serial number 2 (channel-specific)



Parameters	Meaning
Operator	Name of operator (string [64 characters])
Order number	Number of the order (string [64 characters])
Batch	Number of the batch (string [64 characters])
Component	Component name (string [64 characters])
SN1	Serial number SN1 (string [64 characters])
SN2	Serial number SN2 (string [64 characters])

PLC transfers data to the battery measuring module, model 2511 (e.g. operator, component, order number)

DigiControl PC software logs measurement data and additional information



7 Diagnostics

7.1 Status LEDs

7.1.1 Module status LED (MD)

The module status LED is a two-color LED that indicates the general status of the module.

LED behavior	Indication	Description
Off	Not initialized	No power supply or module in SETUP or NW_INIT* state
Constant green	Initialized	NW_INIT* initialization phase completed
Flashing green	Diagnostic event(s)	Diagnostic event(s) occurred
Constant red	Exception error	Module in exception state
	Fatal event	Serious internal error
Alternating red/green	Firmware update	DO NOT switch off the module. Switching the module off during this phase may cause permanent damage.

7.1.2 Link/Activity (L/A)

The two LINK/Activity LEDs are green LEDs that indicate the status of the respective port.

LED behavior	Indication	Description
Off	No Link	No connection, no communication taking place
Constant green	Link	Ethernet connection established, no communication taking place
Flashing green	Activity	Ethernet connection established, communication taking place

7.1.3 Network status LED (NET)

The network status LED is a two-color LED that indicates the module's network status.

LED behavior	Indication	Description
Off	Offline	No power, no connection with IO controller
Constant green	Online (RUN)	Connection with IO controller established. IO controller in RUN state
Green, 1 flash	Online (STOP)	Connection with IO controller established. IO controller in STOP state or IO data faulty
Flashing green	Flashing	Is being used by engineering tools to identify nodes in the network
Constant red	Fatal event	Serious internal error (this indicator is combined with a red module status LED)
Red, 1 flash	Station name error	Station name not defined
Red, 2 flashes	IP address error	IP address not defined
Red, 3 flashes	Configuration error	Expected identification is different than actual identification

7.1.4 Run LED (RN)

The Run LED is a green LED that lights when the internal setup is complete and the module is running.

7.1.5 Status LED (STAT)

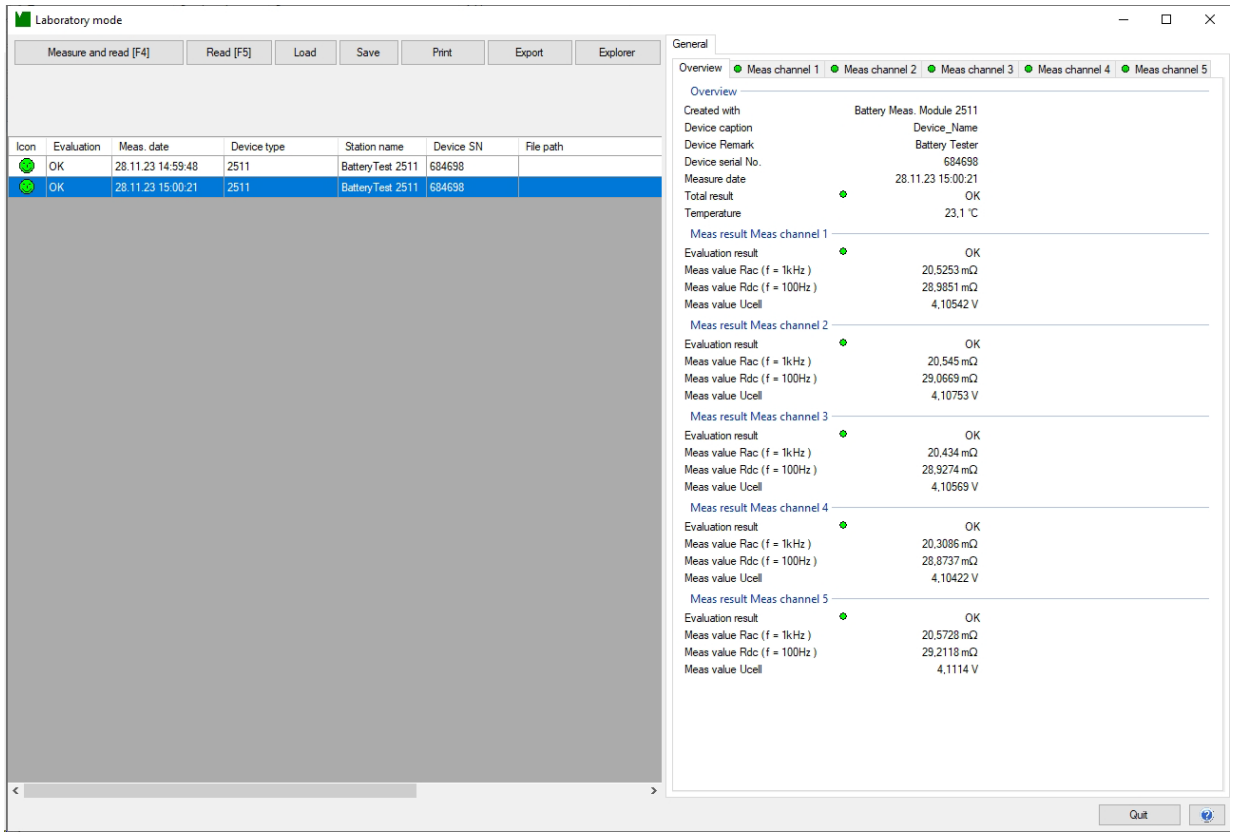
The status LED is a two-color LED that indicates the module's basic status.

Flashing pattern	Color	Description
Fast	Green	Boot-up
Slow (~2 Hz)	Green	Normal operation
x-times repetition 3 4 5 6 7	Red	Fieldbus module error: Module not recognized Module not supported Module not responding Module shutting down Unexpected error
Slow (~2 Hz) & permanent	Green Red	Analog input overload

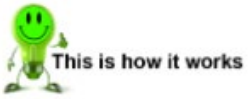
8 Read out measurement results

8.1 Lab Mode

The analysis and configuration software (DigiControl basic version) supplied with the model 2511 battery measuring module supports a manual readout of measurements results in “Lab Mode”.



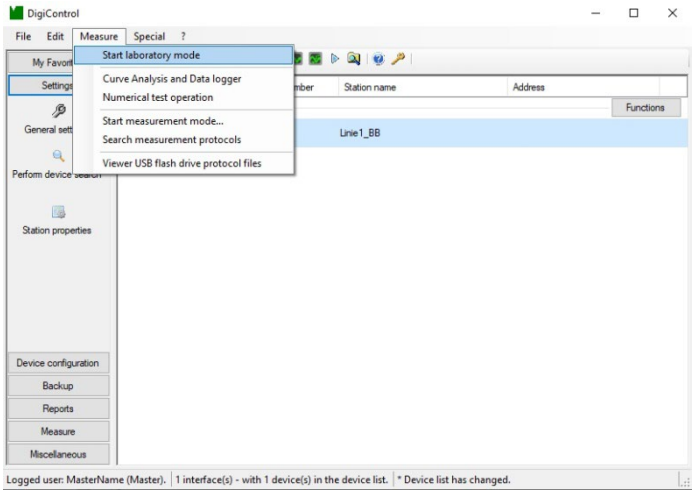
In “Lab Mode”, you can start a measurement via the model 2511 battery measuring module, display it, analyze it, save it as a log file, print it and export the data as an Excel or ASCII raw file (*.csv). Saved log files can be loaded again later.



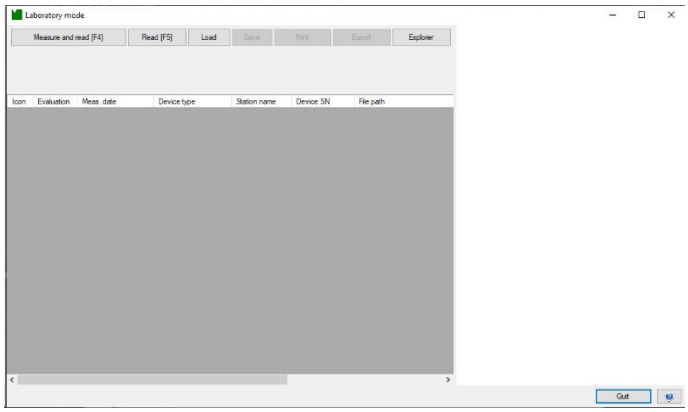
1. Select the model 2511 battery measuring module in the device list.

2. Click on “Measure” > “Start Lab Mode”.

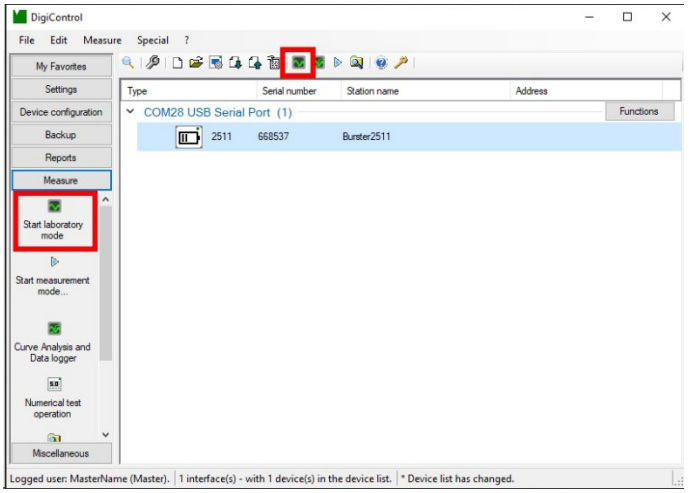
   Please note: You can only select “Start Lab Mode” once you have selected the model 2511 battery measuring module in the device list.



3. You are in the “Lab Mode” menu.



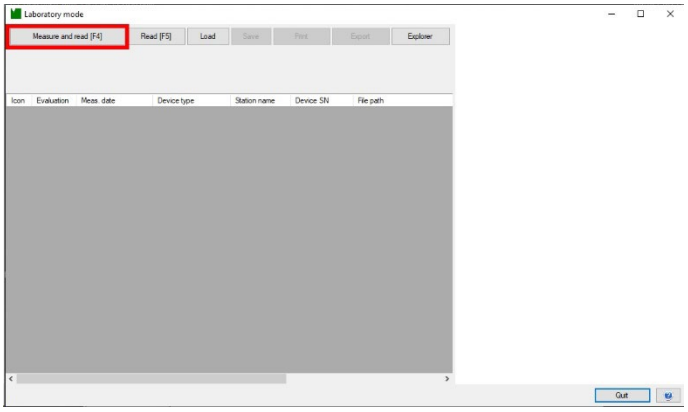
4. Alternatively, you can open Lab Mode by clicking on “Start Lab Mode” in the sidebar or clicking on the Lab Mode icon.



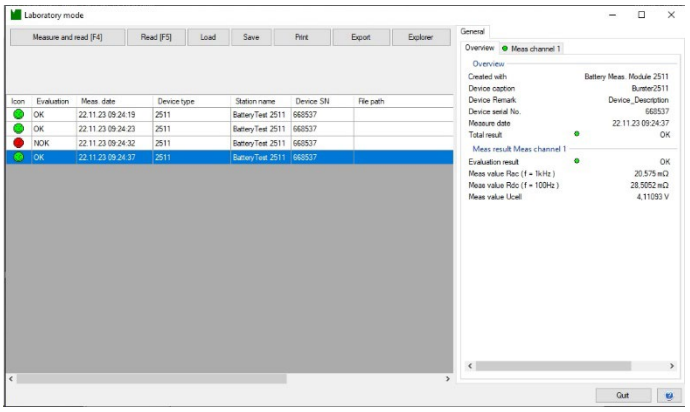
8.1.1 Set up Lab Mode

Measure and Read Out

1. Click on **[Measure and Read Out [F4]]**.

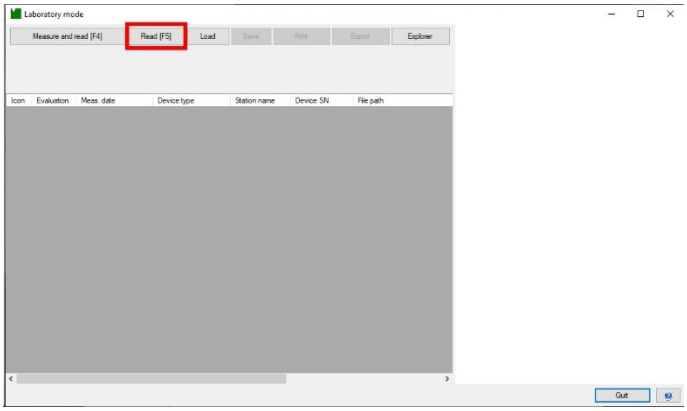


2. A measurement is started, read out and displayed for you.
   A message is displayed if there is a measurement error or poor contact error.

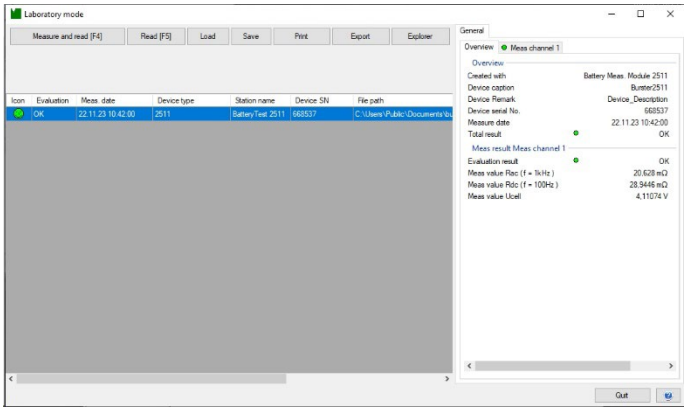


Read out measurement data

1. Click on **[Read [F5]]**.



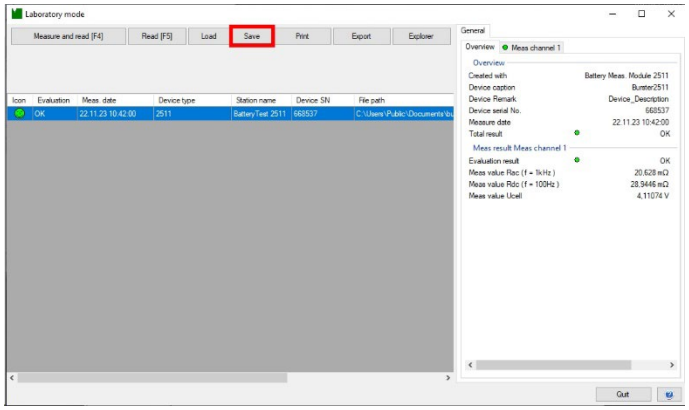
2. The measurement data from the latest measurements are displayed for you. A message is displayed if there is no measurement data in the model 2511 battery measuring module.



Save

The displayed measurement data can also be saved in a special format that can be read by the DigiControl PC software.

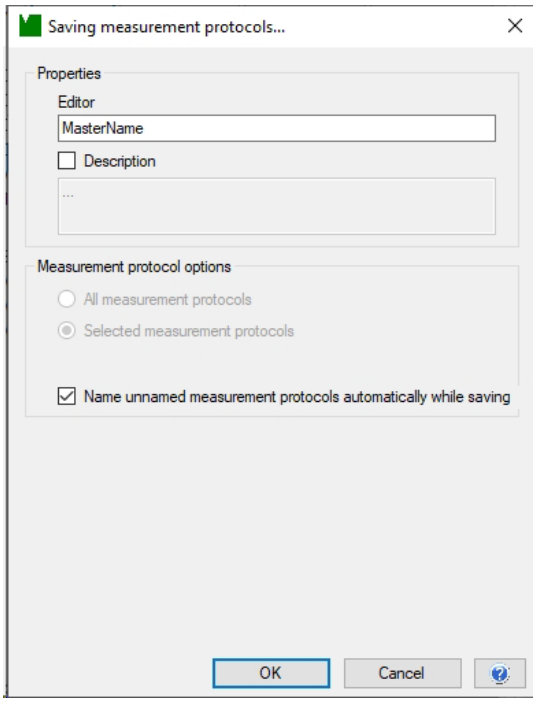
1. Click on **[Save]**.



2. Enter the desired parameters and click on **[OK]**.

   Please note: When saving measurement data, a digital signature is generated that can be used to tell if the file has been tampered with.

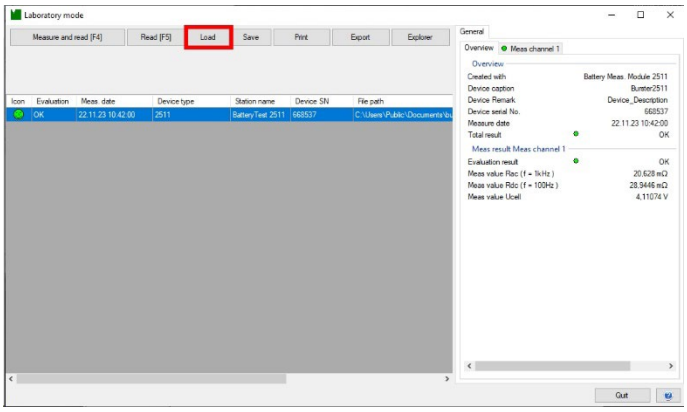
   You can specify the default destination directory for the measurement data in the General settings (Data storage).



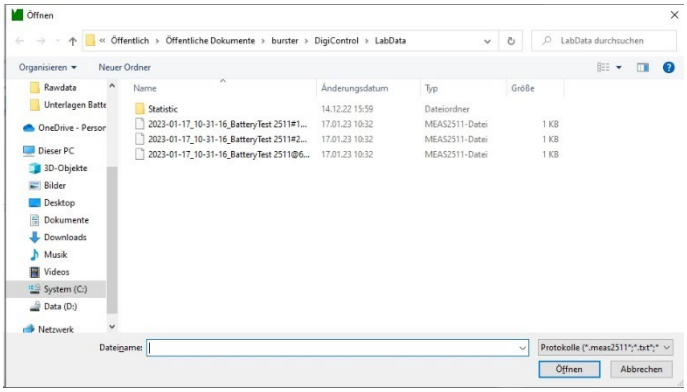
Load

Measurement data previously saved using **[Save]** can be displayed in the Lab Mode window again using **[Load]**. Here too, you can specify the default directory for the measurement data in the General settings (Data storage).

1. Click on **[Load]**.

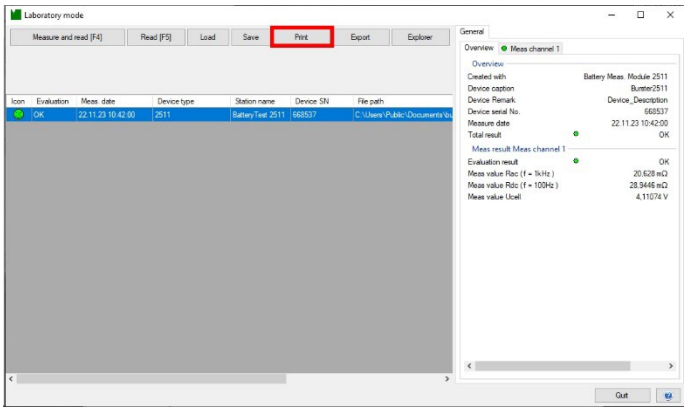


2. In the folder, select the desired previously saved measurement data, then click on **[Open]**.

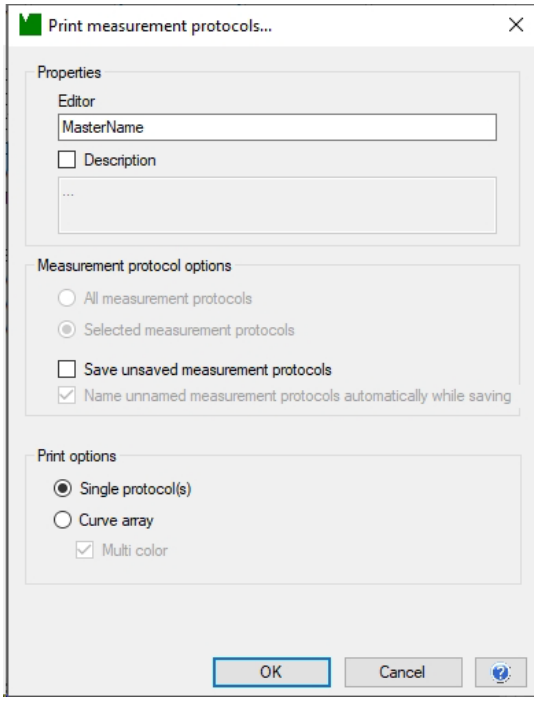


Print

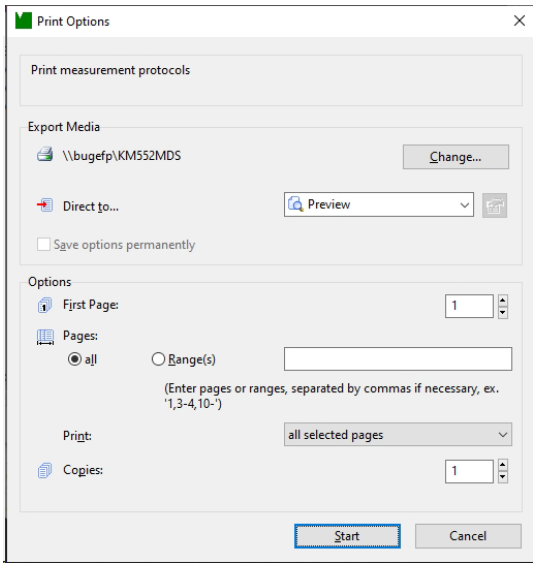
1. Click on **[Print]**.



2. Enter the desired parameters and click on **[OK]**.

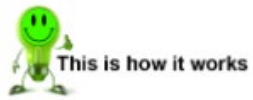


3. Enter your desired print options, then click on **[Start]**.

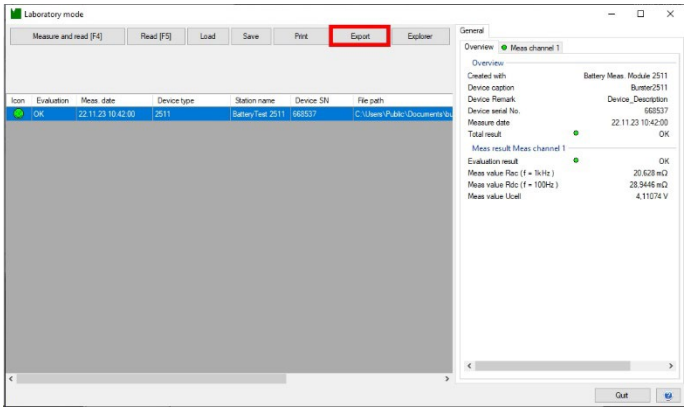


Export

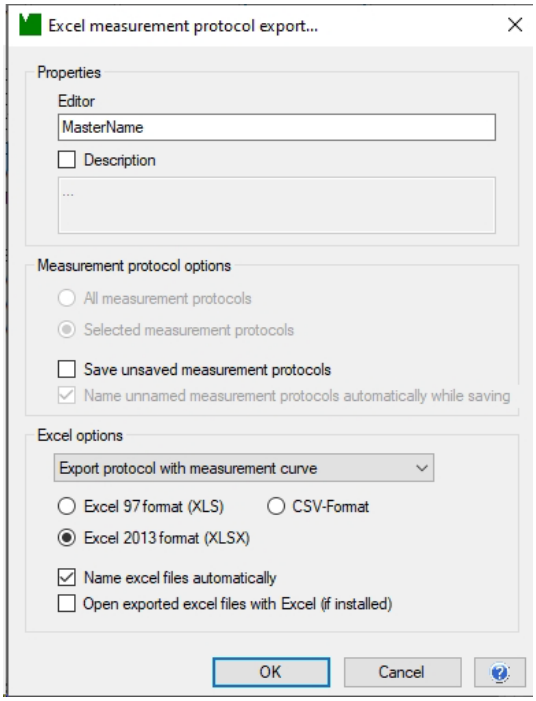
You can export the measurement data transferred from the model 2511 battery measuring module e.g. as an Excel or ASCII raw file.



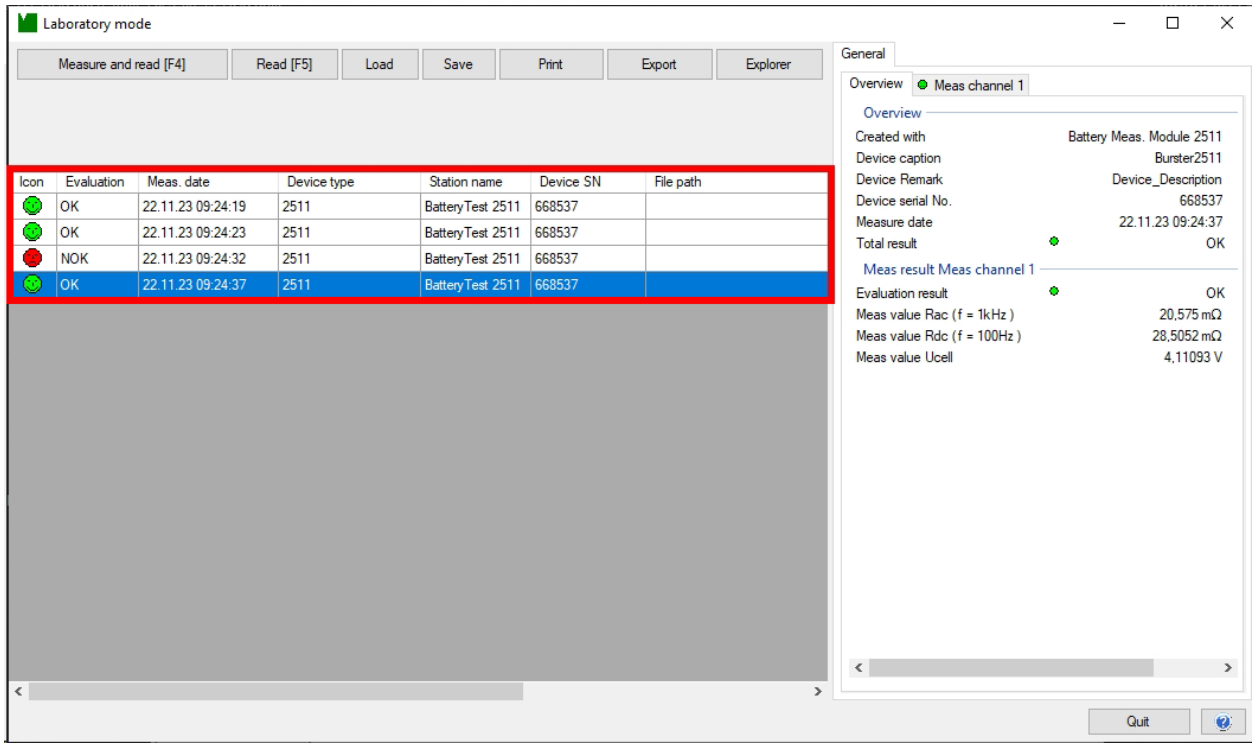
1. Click on **[Export]**.



2. Enter the desired parameters and click on **[OK]**.



Evaluation

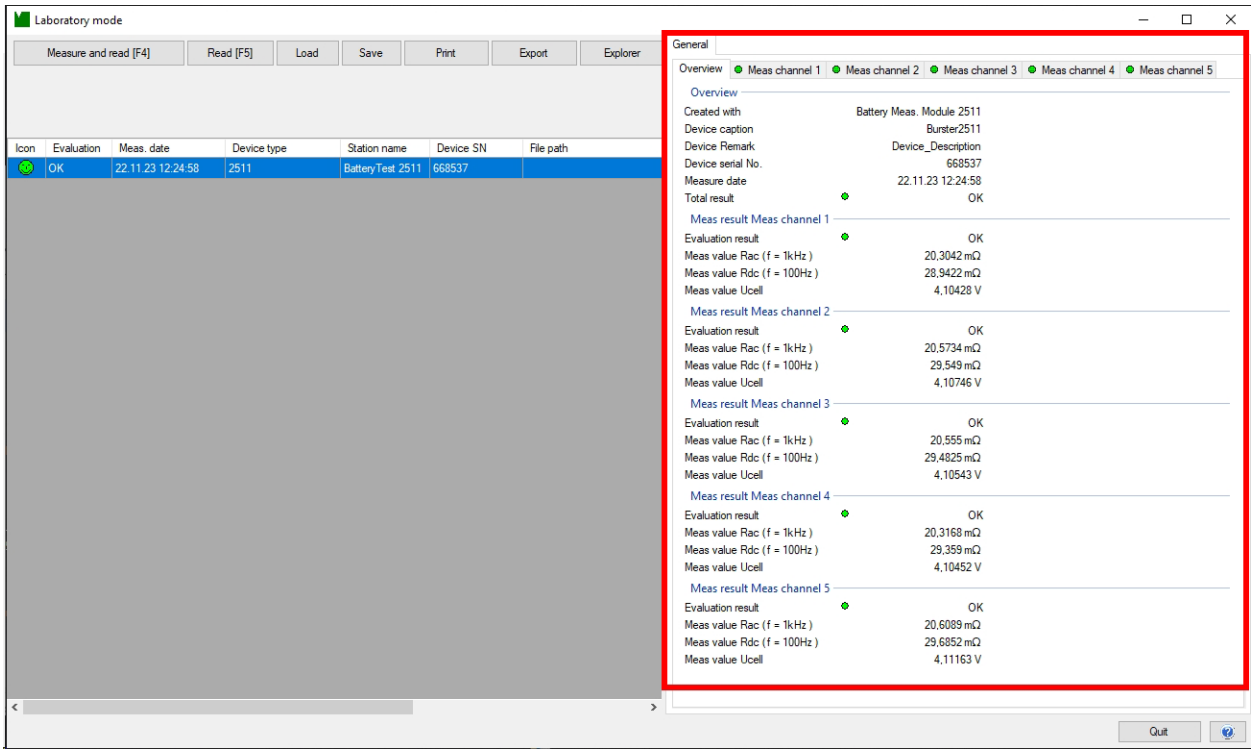


After measuring or reading out the measurement data, you receive a wide variety of information on the individual measurement parameters and their evaluation.

The following information is available:

- Icon (evaluation as a smiley)
- Evaluation (OK/NOK)
- Measurement date
- Device type
- Station name
- Device serial number
- File path
- Number of measurements

General – Overview

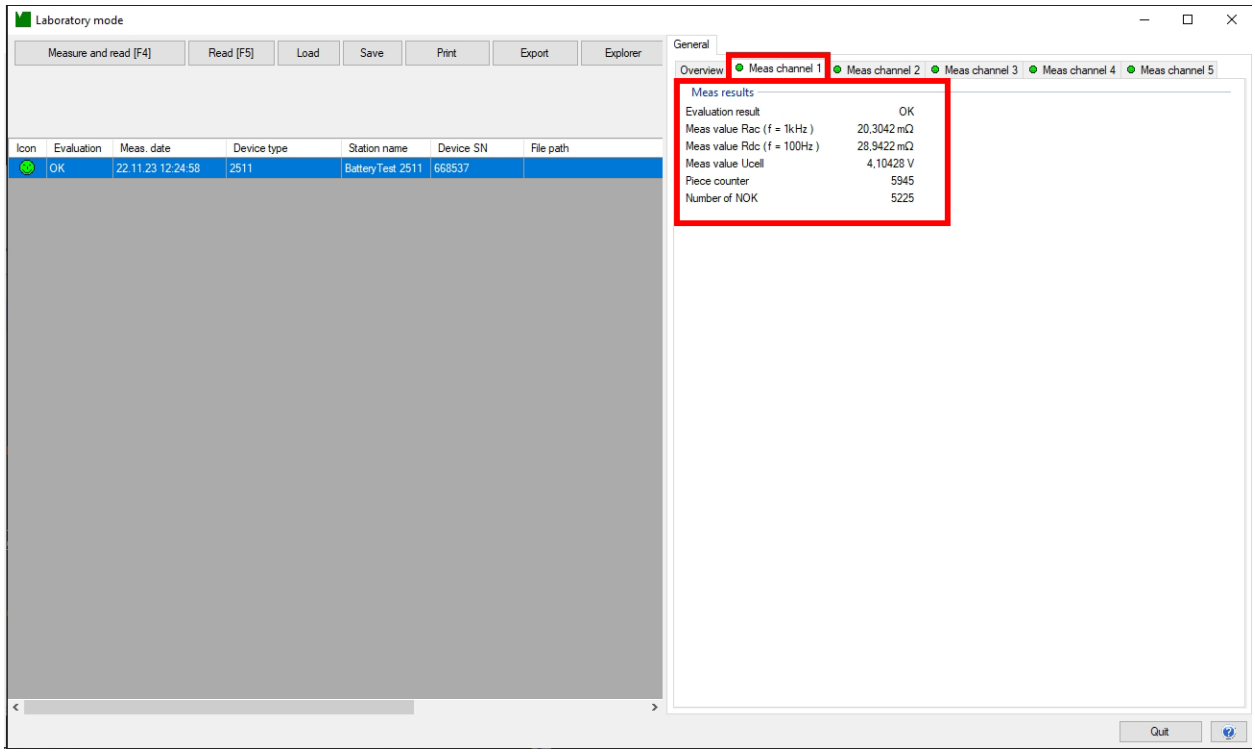


On the Overview tab, you can view the following information for the current measurement data:

- Device type
- Device name
- Device remark
- Device serial number
- Measurement date
- Overall evaluation of all channels OK/NOK
- Temperature if activated
- Evaluation result channel-specific OK/NOK
- Measured values of active channels:
  - AC-impedance*
  - DC-impedance*
  - Cell voltage

* Depending on the set operating mode.

General – Measurement Channel X

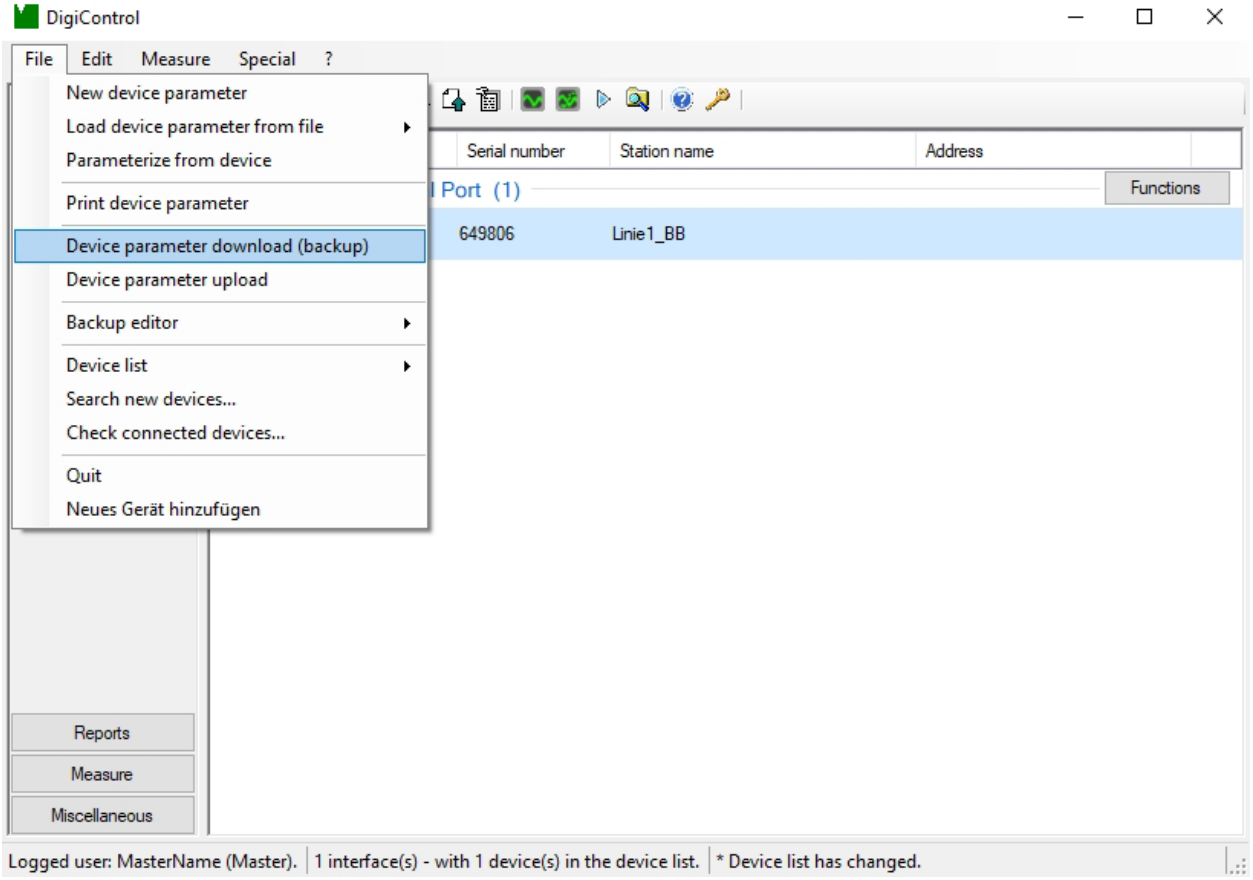


On the Measurement Channel X tab, you can view the following channel-specific information for the current measurement data:

- Measurement channel number
- Evaluation result OK/NOK
- Measured value AC impedance*
- Measured value DC impedance*
- Measured value cell voltage
- Part counter
- NOK counter

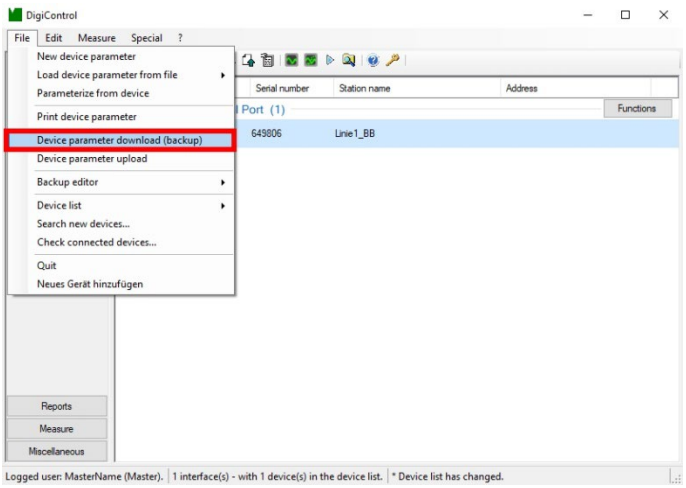
9 Backup

You can use the DigiControl PC software to download a data backup of your settings and the device parameters in the model 2511 battery measuring module, or to overwrite the existing settings and device parameters with a data backup.

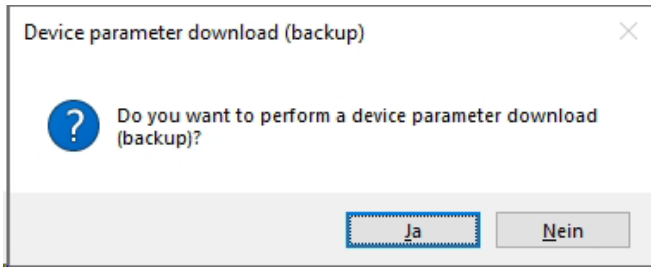


9.1 Create backup (read) – Download

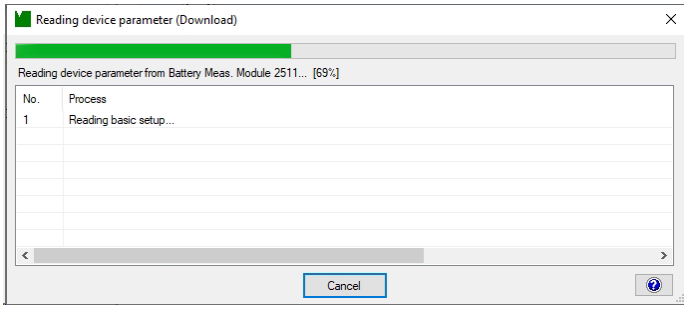
1. Select the model 2511 battery measuring module in the device list.
2. Go to File > Download Device Parameters (Backup):



3. Click on **[Yes]**.

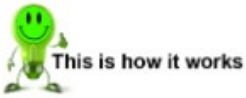


4. The device parameters are read from the model 2511 battery measuring module and downloaded.

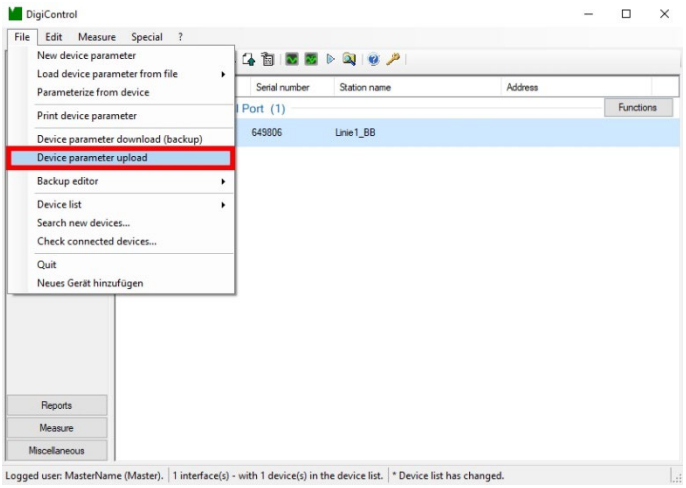


5. Select the desired location, then click on **[Save]**.

9.2 Send data backup to model 2511 battery measuring module – Upload



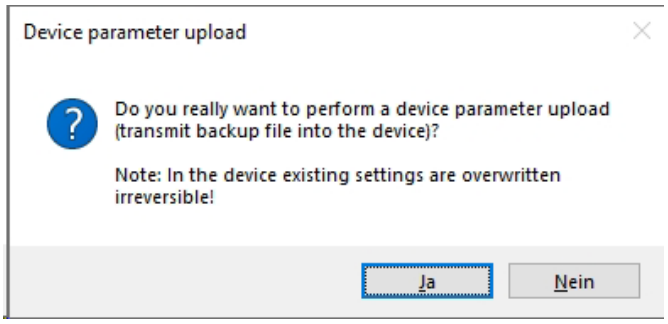
1. Select the model 2511 battery measuring module in the device list.
2. Go to File > Upload Device Parameters.



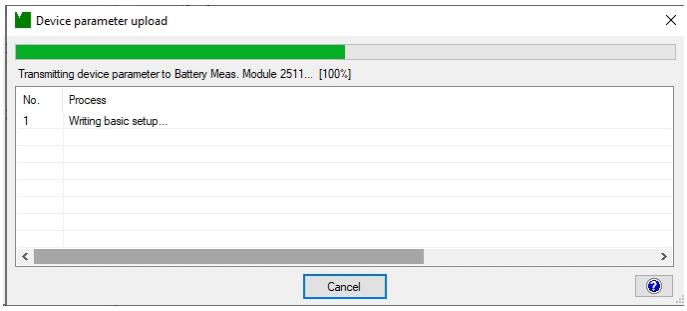
Please note: You can only select “Upload Device Parameters” once you have selected the model 2511 battery measuring module in the device list.

3. Select the desire data backup that you want to use to overwrite all settings on the device.

4. If you want to completely overwrite the device parameters, click on **[Yes]**.



5. The device parameters are written to the model 2511 battery measuring module.



6. The “Upload Device Parameters” window closes automatically. You have successfully overwritten the settings and parameters on the device.

10 Customer services for your model 2511 battery measuring module

To complement the model 2511 battery measuring module package you have purchased, burster präzisionsmesstechnik gmbh & co kg offers the following customer services:

- Test measurements by arrangement
- On-site support for preparing the instrument for use
- Product training (online)
- Initial calibration and recalibration

For customer service inquiries relating to the model 2511 battery measuring module, please call our customer service department on +49 7224 645-53, or email service@burster.de (in Germany only). In other countries please contact your local representative (see also https://www.burster.com).

11 Technical data

Please refer to the data sheet for the technical specification. You can obtain the latest data sheet and additional information on the model 2511 battery measuring module at https://www.burster.de/en/measure-test-devices/battery-test-and-measuring-modules/p/detail/2511 or simply use the QR code below:

11.1 Electromagnetic compatibility

11.1.1 Interference immunity

Interference immunity in compliance with EN 61326-1:2013

Industrial environment

11.2 Interference emission

Interference emission in compliance with EN 61326-1:2013

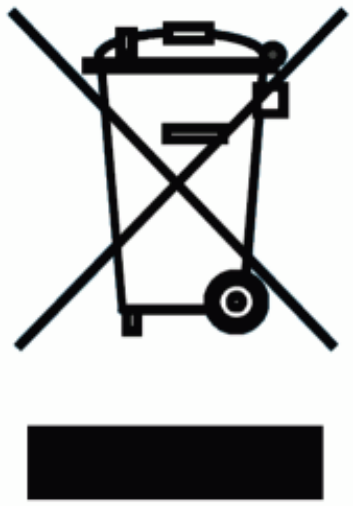
12 Accessories available

Please refer to the data sheet for details of the accessories available. You can obtain the latest data sheet and additional information on the model 2511 battery measuring module at https://www.burster.de/en/measure-test-devices/battery-test-and-measuring-modules/p/detail/2511 or simply use the QR code below:

12.1 Software

The current version of the DigiControl PC-Software and additional information on the model 2511 battery measuring module can be obtained at https://www.burster.de/en/measure-test-devices/battery-test-and-measuring-modules/p/detail/2511 or simply use the QR code below:

13 Disposal



Battery disposal

In Germany, the end user is legally obliged to return all used batteries, and it is illegal to dispose of batteries in the household waste. This law may also affect you as purchaser of the instrument described here. Please dispose of your used batteries properly and in accordance with national statutory regulations. Either take them to the relevant collection point in your organization or to the collection points provided by your local authority, our company or any battery retail outlet.

Instrument disposal

If your instrument is no longer usable, please comply with your legal obligations by disposing of the instrument described here in accordance with statutory regulations. You will then be helping to protect the environment!