BCS 5400 (m) +

BQC2 battery quick tes
BQCC2 battery intensiv

Battery testing device with 2 testing

high-quality testing for tool batteries

Operating Manual

(V. 1)

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BQCC2 technical data:

Device type:	Modular battery testing device (2 modules). Alternatively consisting of 2 BCC2s (intensive testers) or 1 BCC2 and 1 BQC2 quick tester.
Cell detection:	Automatic battery type detection for NiCd/NiMh/Li-Ion up to max. 40 V. Special types with integrated electronics able to be programmed via update.
Charge/discharge:	Microprocessor-controlled electronic charge based on precise impedance measurement at the electrode-electrolyte transition. Active discharge via specification of active/passive[1] discharge module.
Charging/discharge current:	up to max. 5 amperes (effective)
Capacities (battery):	0.1 to > 100 Ah.

Battery voltage:	NiCd, NiMh, 2.4 to 36 V (optionally higher) Li-Ion and SLA	
Connection:	EU: 230 V - 50 Hz (mains fuse 3.15 A) US: 110 V - 60Hz (mains fuse 6.30 A) Separately secured mains connection featuring cold device plug and glass fuses (EU-230 V/5 AT or US-110 V/10 AT).	
Cooling:	Thermo-management function: Charge-independent ventilation with cooling automation. Automatic temperature monitoring[2] before and during the test.	
Housing dimensions:	W x H x D in cm	weight in Kg
BCS 5400 (m) +	49.5 x 20.0 x 30.5	8.8
BCS 5401 (m) +	30.0 x 32.5 x 30.5	8.8

(Technical changes reserved!)

[1] dependent on the model: BCC2=active, BQC2 = passive

[2] Requirement is the technical testability by the battery manufacturer

Foreword:

Charging/discharge process - application purpose

The applied charging process is patented worldwide and has received innovation awards. Starting with **BCS 54XX or BCC** device series, we are working with a new and unique technology for charging batteries, especially for detecting the causal 100% charge level of a battery. Analogous to the current process, fully new methods are applied to charge batteries. This enables the 100% full charge level to be specified for batteries featuring different types of technology (NC, NMH, LiIon, Pb, and more). This was possible because an alternating current equivalent circuit diagram has been used for the first time to calculate the process inside the cell (interior impedance at the electrode-electrolyte transition). Originally used for applications with maximum reliability requirements, e.g. involving medical technology like life-support systems, and this technology is also found in other

applications like safety equipment, UPS systems, electrical vehicles, radio stations, data collection devices, mobile telephones, laptops, and specific applications in the automotive industry.
Discharge takes places via regulated current that may be specified by the user, but that may also be monitored and regulated via the controller and additional technical program information. The discharge takes place via a fan-cooled, actively regulated discharge module and a passive discharge module for short-term discharge during quick testing.

Thank you for choosing this Nordisch system, which is a highly developed device. Our customers' requirements for protection against overheating, modularity, operation and service-friendliness have now motivated us to develop the continuation of the type multiple charging system BCS-5400 (m) + multiple charging system by constructing this intensive testing device for industrially applied tool batteries. By regularly and cyclically charging/discharging your batteries, you can increase

their tool life (up to 2,000 charging cycles for NiMh or 5,000 charging cycles for NiCd batteries).

The device is also used for preparation of new tool batteries for permanent use prior to production for regeneration of overlapping batteries. To check this, increase the available capacity of previously used batteries (NiCd/NiMh & Li-Ion) as necessary and as a quality test before any possible disposal!

Notice:

BQCC2 consists of two modular testing devices working independent of each other. These may be:

a) **2 BCC2 modules** – intensive testing devices for detecting the performance level, for refreshment of cells in case of a memory effect or in case of overlapping. And for precise detection of the capacity with logging function.

b) **1 BCC2 module** (right device side) & **1 BQC2 module** (left device side) for speedy inspection of relevant basic functions of the tool battery. (cell closure, voltage drop under load, temperature, and electronic component function of the battery) before use in the tool.

Properties of the BQCC2:

- Combination of quick test (approx. 30 sec.) and intensive testing module possible.
- Independent of battery type (Li-Ion/NiCd/NiMh/lead acid/fleece or acid.)
- Micro-computer controlled, automatic charging
- Charge without memory effect, no gases
- Optimal full charging and detection of removed capacity
- Quick test function[1] for performance level of used batteries
- Permanent temperature monitor with safety shut-off.

- Automatic transition to conservation/stop mode (after full charging)
- Automatic battery and voltage detection
- Long lifespan of battery during regular use
- Charging, refreshing, or production preparation of overlapping batteries possible
- Independent of battery capacity and cell quantity
- Display of results on the screen
- Error analysis and indication via LED signal encoding
- Optional test results output on PC or direct printer[2]

- Optional programming of individual charging and discharge parameters

- Automatic configuration of charging rates via processor in the adapter.
- Update and evaluation data transmission via USB interface.
- Optional combination with quick tester in a single housing.
- Optional accessories available.

First steps:

(1) Remove the device from the packaging and place it on a stable underlay.

(2) Connect the device to a protective contact plug socket (a matching mains cable is provided in the packaging).

(3) Slide the corresponding battery adapter of the battery to be tested (accessory, see adapter list) into the charging slot (figure 1). Do not use force, since the adapter will snap into the insert with slight pressure. Note that the adapter with the direct connector must face to the left side of the charging slot when it is inserted. The pressure pieces snap the adapter onto the charging slot. This locks them against unintentional removal. The Nordisch adapter system is the further development of a technology that is still used on the market. Nordisch equipment is not compatible with other, similar or equivalently designed charging adapters with 4 or 8-pin connectors.

Please use original Nordisch adapters only, which are recognisable due to their direct connectors with 10-pin contacts. (Please contact us if you have any questions.)

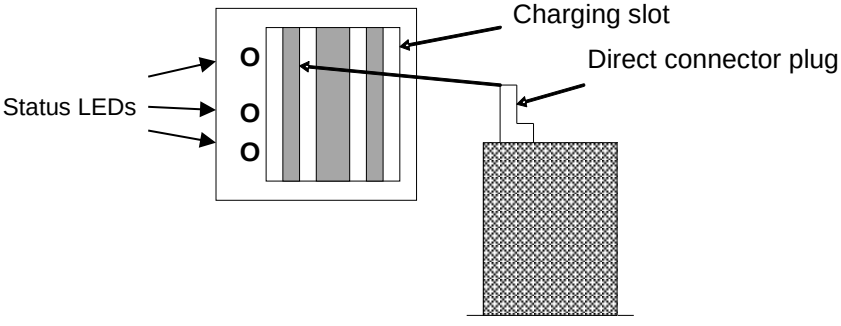

Figure -1, Functional principle: Insert

(4) Switch on: After you have inserted the necessary adapters, switch on the device with the main switch (rear side). After switching on, all optical signal lamps glow in sequence to check the functionality (LEDs) for approx. 0.5 seconds, and then the red and blue signal maps (LEDs) go out, while the green signal lamps indicate that the charging/testing slots are ready for operation. The display shows the device types and software version in sequence. This signals the readiness for operation as soon as the manufacturer's name and the battery type selection appear.

(for 4) BQCC2 ready for operation:

Figure -2, BQCC2 display: Device ready for

Notice:

If an adapter is not inserted correctly or is not inserted at all, activation will issue a signal (optically and acoustically) via the red LED. The red LED flashes until an adapter has been inserted correctly or until the parameter sets of the adapter have been imported for the charging circuit board.

Figure -3, BCC2: Signal encoding without inserted adapter

Do not use force to insert the charging adapter. If the adapter is inserted in the correct direction in the adapter mount, use soft pressure to slide the last 5 mm up to the end stop in the connector device. Never hammer the charging adapter into the mount!

Charging slot description:

The charging slot is the receptacle for the charging adapter (types, see separate adapter list) and indicates all of the necessary information to the user for the respective device or the battery level in this slot.

Battery technologies that can be charged.

4 fastening screws of the charging slot.

Function LED:

Green: Charging function (ready/complete)
Blue: Notice
Red: Charging or errors & messages in combination with red or blue.

Charging slot number

Charging slot voltage range (min./max.)

Figure, charging slot (front view):

Interface/rear side of device:

All charging and testing devices in the BCS/BQCC series are future-proofed due to their freely programmable structure. Battery technologies that are not on the market and batteries that will be only be used years from now may be used by individually adjusting the parameter sets of the circuit boards and the adapter itself. This enables us to take care of future, unknown requirements even today. The properties on the chip of the adapter and saved on the main circuit board that are relevant are updated to the state of the art via the bus up to the adapter using a software update. The combination of rotary switch, USB type b (3.0), bi-directional interface, and the RJ45 network connection (figure-4 from left) provide the system maximum flexibility. An update is possible using a conventional USB cable and a PC including user software. Alternatively, this may also be used to output measurement values or to operate the independent BTP-01 label printer. The network socket is provided for the network connection of the AM 5400 battery management system and is not important for normal charging.

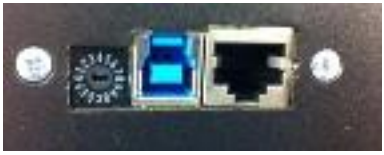

Figure-4, rear side of BCS/BQCC2 interface:

Notice:

Programming the device and parameter sets in the adapter may only be completed by trained technical personnel. A manual for installing the firmware and a current version are available upon request. In case of doubt, ask us directly.

Additional battery information:

The design of a battery is different according to the manufacturer. Make sure that the battery you use

a) matches the adapter mechanically
b) matches the internal contact arrangement
in the adapter

It is possible that the battery in fact matches the shape of the adapter you wish to use, but the connection contacts inside the adapter still do not match those of the battery. Please also note that the configuration of the contacts must match, since sometimes the arrangement of the

contacts is different.

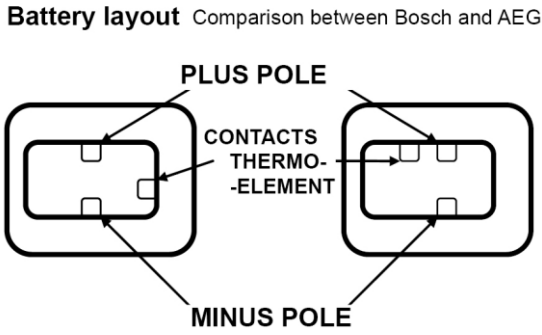

Figure-5 Illustration: Sample contacting principle

For this reason, always ensure that the battery type is pressed on to the adapter properly. If you observe the previously indicated points and the adapter type matches the battery, then you can slide the battery into the corresponding charging/testing slot. Nevertheless, if an acoustic signal sounds, please compare the contact configuration of the battery with that of the adapter again. The BQCC2 is completely compatible with the adapters in our BCS charging stations, i.e. all Nordisch adapters mechanically match the test devices like the BQCC2. If the programming parameters on the adapter are obsolete, then the system updates them automatically when it is connected for the first time. This process requires approx. 2 sec. and takes place in the background so

that you can continue working uninterrupted. For safety reasons, all batteries after the year 2011 may only still be tested and charged with the new OWC adapters (one-wire chip), which may be recognised by its 10-pin connector plug. We can convert older adapters for you after checking them. In case of doubt, please read the troubleshooting chapter, contact the technical service department, or talk with us directly.

Testing process:

After you have commissioned the device and it is ready for use, work according to the information on the display before you attach the battery. Essentially, the test is a target/actual comparison, which is why adherence to the specifications is important for correct test results and execution is completed by the user. All entries must be confirmed with the red acknowledge button.

BCC2 intensive testing module (installation location: right device side)

Example: Bosch Li-Ion 14.4 V battery:

- Step 1: Select the battery type to test

Line selection button:

- Up
- Confirm
- Down

Lateral cursor movement selection

Enter the following data as follows (as described previously):

- Step 2: … desired mode (charging o capacity measurement)
- Step 3: … target capacity (see test battery).
- Step 4: … charging current (please note recommendation!)
- Step 5: … discharge current (please note recommendation!)
- Step 6: … number of discharges (results relevant).
- Step 7: … final battery condition (charged / discharged)
- Step 8: … attached test battery and confirm.

Notice:

a) If you did not complete your entry completely or if it was accidentally incorrect, select “cancel” in step 8 or remove the battery from the adapter. In this case, the BCC2 assumes a battery error or you are instructed concerning an operating error. The menu guidance requests your entry again.

b) “Charging” selection in step 2: After you have slid the battery into the charging slot, the system checks the battery briefly, the green signal lamp goes out, and the red signal lamps start to glow. The automatic charging process has now started.

   During the charging process, the internal temperature of the battery is monitored continuously. If the temperature exceeds its threshold value during the charging process, this will stop immediately. If an overheated battery is inserted into the charging slot, the charging process only begins after the battery has cooled off. This may extend the charging time accordingly.

   In order to start the charging process directly, do not insert overheated batteries into the charging device (e.g. batteries that were previously discharged under extreme conditions).

During charging, voltage & current are regularly monitored. Upon reaching its maximum capacity, the battery is immediately disconnected from the charging current. The measurement applied in the device for internal impedance detection therefore rules out overcharging. Therefore, a charged battery does not need to be removed from the charging slot, but instead remains full thanks to the automatically activated conservation mode (this compensates the self-discharge caused by the battery's interior resistance). The battery is therefore always available in an optimal state. Li-Ion batteries are charged directly in dialogue with the battery, and the final shut-off and charge conservation is completed in dialogue with the battery or the adapter chip as required.

The flashing green LED indicates the availability of the battery.

This signals that:

- the battery in the battery is fully charged
- Conservation mode is active (as required).

If the temperature of the battery is already excessive during insertion, the blue LED indicates instructions for cooling down prior to the actual charging process.

Notice regarding testing environment for the BCC2 intensive testing module with used batteries:

If you insert older batteries in this device (basically NiCd or NiMh) that were charged previously in a conventional manufacturer's charging device, these could nevertheless possess less capacity initially in spite of complete charging.

In contrast to numerous opinions, this so-called "memory effect" is present for all battery technologies, which results from the various charging processes. After charging these batteries multiple times with the BCC2 or Nordisch BCS charging devices, this effect should be completely corrected again (provided the battery is not yet damaged).

Several overlapping Li-Ion batteries behave similarly, which are often very weak after long storage or due to a lack of charging by the manufacturer, which barely accept any charge in the beginning.

Temperature:
Selecting the charging/discharge current too high is not recommended for detecting the battery status. If the charging/discharge currents are too high, batteries may overheat depending on the cell quality and condition. (The test process is cancelled in time before

damage.) Charging/discharging the battery with defined power levels (specified by the BCC2) also provides a statement that is easier to compare with the specifications printed on the test battery. In order to avoid premature cancellation due to a temperature shut-down, the charging or discharge current must be selected during calibration as suits the purpose prior to starting testing.

Sample results log:
These recorded values can be transmitted automatically to the printer as a label for application:

Battery intensive test: BQCC2	**10:52h/02.05.2015**	
Result:	**Battery ok**	
Battery type:	**Makita Li-Ion 18V**	
Result (actual):	87%	(Lower limit 60%)
Capacity (actual/target):	2.61 Ah	3 Ah
Cancel/ error?:	No	(no objection)

BQC2 quick testing module (installation location: left device side)

Example: Makita Li-Ion 14.4 V battery:

- Step 1: Select the battery type to test

Enter the following data as follows (as described previously):

- Step 2: … position the battery
- Step 3: … query “battery charged?”

Test starts (no additional entry required):

- Step 4: … load test is completed for approx. 10 sec (automatic)
- Step 5: … voltage drop is displayed during the test.
- Step 6: … electronics test*
- Step 7: … temperature test*
- Step 8: … final result of the quick test is displayed. (Battery not OK/not OK)

* (interface for electronics or NTC must be available on manufacturer's battery)

Notice regarding testing environment for the BQC2 quick testing module with used batteries:

Basically, all batteries must be charged completely before the testing procedure so that the device is able to evaluate the test subject with a fully functional battery.

In order to remove weak-performing or obsolete batteries from the production process, batteries should be subjected to the quick test permanently before each use in a tool. This enables a clean, objective evaluation to be made, which saves an enormous amount of F-time due to accidental use of defective batteries. The BQC2 quick testing device is therefore very frequently also used as a single module directly in production in addition to the BCS battery charging device.

If you receive the test result “battery not OK” in spite of a fully charged battery, provide it to maintenance for an intensive test with the Nordisch-BCC2 or an alternative testing device. In particular, this makes complete evaluation of older NiCd/NiMh or overlapping Li-Ion batteries possible. Furthermore, always evaluate the total condition of the housing and contacts thoroughly as well. The newest generation of Li-Ion batteries feature a significantly higher power

potential than NiCd/NiMh batteries and should be regularly subjected to a safety-relevant evaluation in addition to economic evaluation, especially in case of a higher Wh specification. Dispose of batteries only after the battery intensive test as required, since this will save your company a lot of money and conserve the environment at the same time.

Signal description for the LED during charging/testing:

GREEN	**glowing** - charging/testing slot ready
GREEN	**flashing** - end of the process, conservation charging or test end
GREEN/RED	**alternating** - BQC2 test procedure running
RED	**glowing** - BATTERY charging/discharging
RED	**flashing** - ERROR MESSAGE (Battery damaged or electronics faulty)
BLUE	**glowing** - NOTICE - battery cooling off Automatic charging only continues after cooling.

The description of the signal encoding is also provided to you for all BCS devices on an included sticker. This may be attached to the device as required.

Messages/error codes

BCS/BQCC2 type devices are equipped with numerous extensive self-monitoring and analysis functions. The goal is to examine the individual requirements of the battery manufacturers to achieve the max. life cycle of the battery or to restore it. If a battery or system function deviates from the specified criteria during the charging cycle, an optical and acoustic signal message will be provided to the user. The optical signal message takes place during registration via the attached LED together with an acoustic signal. The LED flashes again during the signal tone after the process has been completed. If the battery is removed from the adapter, the signal tone repeats for BCS charging devices and provides information about the situation. The meaning of the signal tones differs according to the frequency of the

repetitions. The colours of the diodes differ according to:

RED & **GREEN**

Status message (uncritical situation - battery should be evaluated or tested manually. E.g. overloading, over-temperature, etc.

BLUE

Information: The charging process has been interrupted temporarily by the cooling phase, will start after cooling automatically.

For all devices, the errors may be read via the interface and recorded as required.

After removing the battery, the type of error is indicated to the user by an acoustic signal. The error codes indicated below describe the errors that occurred:

(please also see: “Technical service information for software version XX”)

The exact meaning of the instruction/warning message and the error code is directed at trained personnel. The signals differ from the software version of the device and can be provided upon request. Firmware updates are basically provided free of charge; in case of doubt, ask for an updated version of the associated documents if required.

Security system:

The device features a regular security query and works redundantly during each charging process, the necessary battery detection, and shut off. After the supply voltage switches on, the charging device electronics are checked for any possible errors by a self-test. If the detected parameters do not match the saved ones, this is indicated to the user by a message.

These system checks take place as described above and during charging or the testing procedure. If errors occur in this case that could endanger the battery, then the message indicated above will be displayed and the affected charging slot will be switched off.

Safety instructions/disposal:

- Note the voltage supply!
  The device may only be connected to the following alternating current mains:
  a) 230 V/50 Hz (EU) or
  b) 110 V/50-60 Hz (US)

- Only batteries marked NiCd (nickel cadmium), NiMh (nickel metal hydride), and Li or Li-Ion (lithium ions are charged with the adapters provided for this. Other battery types permitted only after confirmation by Nordisch.

- In commercial institutions, the accident prevention regulations of the Association of Commercial Trade Associations for electrical systems (BGV-A3) must be observed.

- Adapters are subject to wear. The devices in the BCS/BQC/BCC series are maintenance-free. Based on experience, the interior of the devices should be dusted off at regular annual intervals (depending on the density of particles in the ambient air). If faults occur nevertheless that require an alteration in the device required, then this may only be completed by trained technical personnel.

- Defective safeguards on the device may only be replaced with equivalent designs. (EU= 230 V/5 AT; US= 110/10 AT)

- The equipment may only be operated in dry rooms.

- Ensure sufficient ventilation! The ventilation slits on the respective device may never be covered during operation to prevent possible heat accumulation. In spite of the innovative, sophisticated cooling concept, the worst case could result in damage to individual electronic components!

- In case of transport from a cold into a warm environment, wait until the charging/testing device has reached room temperature before switching it on.

- Damaged batteries and charging systems are able to be recycled or must be disposed of correctly as special waste. Provide these to your dealer accordingly. Your dealer is obligated to accept them free of charge.

Troubleshooting:

Error	Cause	Remedy
After switching on, not all prepared displays glow	The device is defective	Contact our customer service
After inserting the battery, an acoustic warning signal sounds	The adapter used is not compatible with the battery type	Use an adapter that matches the corresponding battery
	The inserted battery is defective	Replace the defective battery
After inserting the battery, the red Signal lamp flashes	The adapter used is not compatible with the battery type No adapter inserted.	Use an adapter that matches the corresponding battery and insert it correctly.
	The thermo-element in the battery is defective	Replace the defective battery
After approx. 100 min, The signal lamps flash	The maximum charging time has been exceeded	Replace the defective battery
The battery does not provide power in spite of a full charge	One or more cells in the battery are defective	Replace the defective battery

Available charging and testing adapters for the specified voltage range of batteries ranging 2.4 V-36 V:

Technologies: NiCd-/NiMh batteries /Li-Ion batteries:

Battery manufacturers: Atlas Copco, Bosch, Cooper (Cleco), Dewalt,

Desoutter, Fein, Hitachi, HST,
Uruy, Makita,
Gesipa, Panasonic, Milwaukee,
and more

An updated list of matching charging and testing adapters, testing devices, and accessories is available at our website:

www.nordisch-gmbh.de

In case of questions, please contact us personally.

Sincerely, the Nordisch team!

CE

Declaration of conformity with ES standards

The signing party,
Nordisch GmbH, Carsten-Dressler-Str. 10, Germany,
hereby declares that the following industrial charging devices:

Model: BQCC2
(serial no.: serial production)

According to the guidelines 2004/108/EC (ex 89/336/ECC), guideline 2006/95/EC (ex 73/23/ECC) and guideline 2006/42/EC for safe & fault-free operation matching the following standards or standard documents:

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EN 60065, EN 55014, EN 55011, EN 61000-3-2, EN 61000-6-2

Bremen,
01.03.2015

Dipl. –Wirtsch.- Ing. (FH)

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