Quickstart
BACS Installation
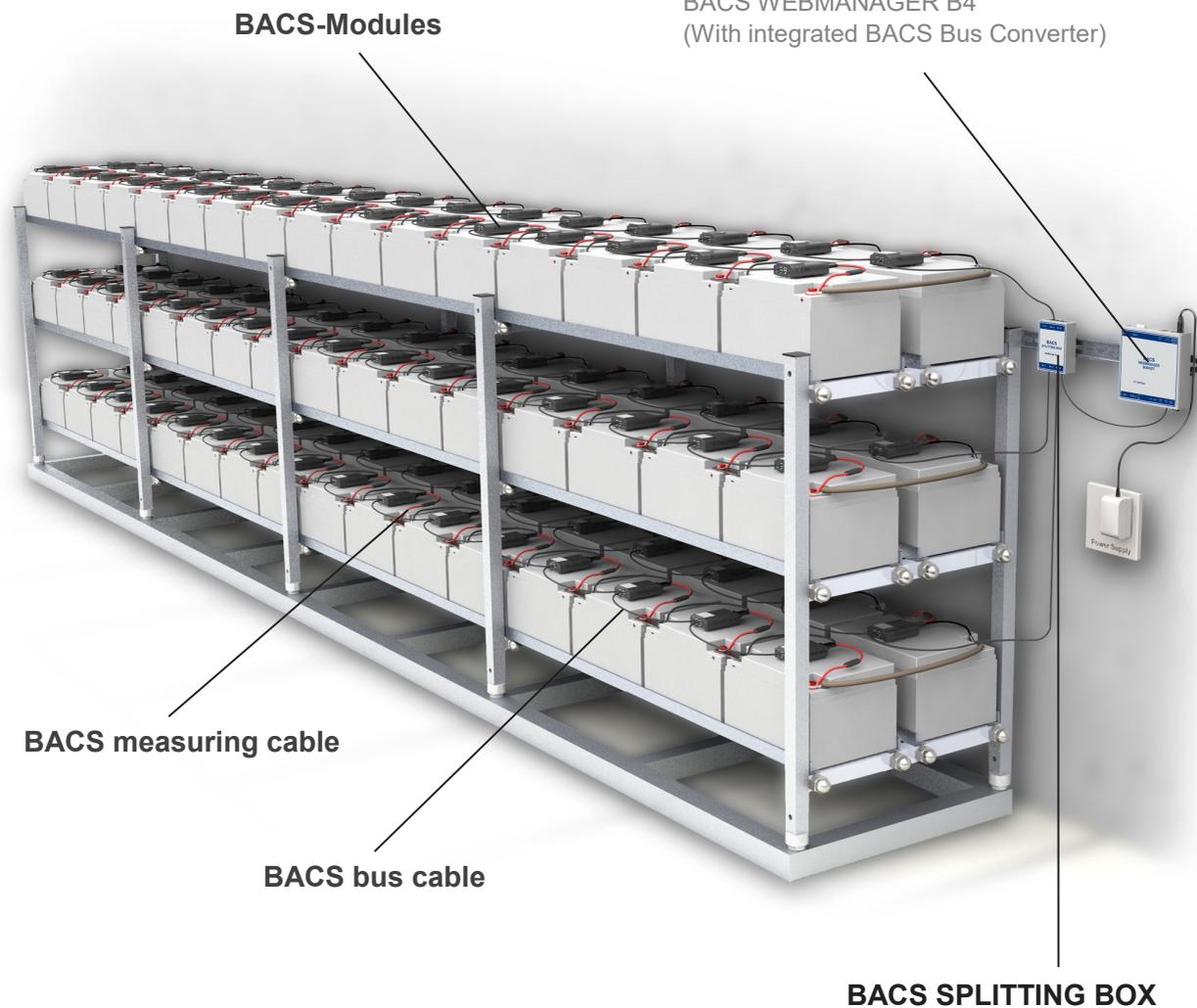
GENEREX

BACS-System
Hardware components:

BACS WEBMANAGER

CS141+ BACS Bus Converter
As slot version and external version

CS141 MODBUS/RS485 + BACS Bus Converter
as slot version and external version

CS141 MINI & R_2 + BACS Bus Converter
as Slot version

BACS WEBMANAGER B4
(With integrated BACS Bus Converter)

BACS-Modules

BACS measuring cable

BACS bus cable

BACS SPLITTING BOX

General warning and safety instructions for batteries and electrical systems

Improper use of the products described in this manual may result in personal injury and/or property damage.

GENEREX is not liable for any injury or damage resulting from improper use of these products.

Risks of improper use include: explosion, fire and short circuits.

Danger: The battery terminals are always live. Therefore, never place metal objects or tools on the batteries. Battery electrolyte solutions are highly corrosive. If you notice electrolyte leaking from a battery, be aware that these liquids are harmful to both eyes and skin.

Installation, maintenance and repair of batteries and battery equipment should only be carried out by trained professionals. Persons who have not been trained in battery safety or who are not authorized to work on batteries must not handle batteries.

Please observe the following regulations:
⇒ ZVEI publication "Instructions for the safe handling of electrolytes and lead-acid batteries" ZVEI publication "Safety data sheet for battery acid"
⇒ ZVEI publication "Safety data sheet for accumulator acid
⇒ VDE 0510 Part 2: 2001-12 with EN 50272-2:2001: "Safety requirements for battery installations – Part 2: Stationary batteries"
⇒ IEEE Standard 450-2002: "Recommended Training for Maintenance, Testing, and Replacement of Degassed Lead Acid Batteries for Stationary Applications"
⇒ IEEE Standard 1375-1998: "Guide for the Protection of Stationary Battery Systems".

Working on electrical systems

1. **Make sure that all electrical loads and power supplies/chargers (including battery isolators, fuses and switches) are switched off. This must be done by qualified personnel.**
2. Remove all watches, rings, necklaces, jewelry and other metal objects before working with batteries.
3. Only use insulated tools and wear insulating rubber gloves and rubber shoes.
4. Make sure the battery(s) are not accidentally grounded. If the system is grounded, disconnect it. Accidentally touching a grounded battery can result in severe electric shock.
5. Before making any connections to the battery terminals, be sure to pay attention to the polarity.
6. Lead-acid batteries can produce highly explosive hydrogen-air mixtures. **Never smoke, handle open flames or create sparks near the batteries.** Always avoid electrostatic discharges and wear suitable safety clothing and equipment.

When putting the batteries into operation, please also observe the instructions and operating manuals of the respective battery manufacturer.

Warning and safety instructions for BACS

High voltage warning
Do not open the BACS sensor; do not place any objects on the battery or on the BACS modules! The BACS modules and cables could be under high voltage in the event of a fault!

Magnetic emissions
Remember that every current-carrying cable creates a magnetic field around itself. The strength of the magnetic field depends on the current strength, so that a large UPS system can generate very large electromagnetic interference - so-called EMI - if the shielding is inadequate. Therefore, avoid installing or operating devices that are sensitive to electromagnetic fields, including network components such as the BACS WEBMANAGER or devices connected to them. Personnel with a pacemaker should not work near such EMI fields. Do not place any devices that are sensitive to magnetic fields in or near the UPS.

Installation only by qualified personnel!

The BACS installation may only be carried out by trained and qualified specialists. BACS is installed on batteries where high voltages can cause injury or even death in the event of a fault! The BACS connection cables (temperature cable, bus cable, measuring cable) could be under high voltage in the event of a fault! Never touch, change or cut the BACS cables before you have disconnected the system from the batteries.

Warning when installing on previously damaged batteries

BACS modules must NOT be installed on

already defective batteries. Explanation: If a battery is already so damaged that the internal resistance is extremely high, the charging current or discharging current may no longer be able to flow through the battery, but would seek the path of least resistance via the BACS module. This would destroy the fuses in the cable or BACS module and, in the event of a fault, cause heating, which could also damage the BACS module itself.

Checking the module measurements during installation and first charge

During installation, the BACS technician should observe the BACS modules during the first charge. It should be checked whether the BACS modules become extremely hot or show implausible values. This would be an indication of defective batteries or installation errors. Do not leave the installation site until the BACS system has been completely installed and the charge has been run for at least 60 minutes. If the BACS system shows normal impedance values and the voltages are stable, the system is safe and can now be monitored remotely.

Accurate monitoring of battery temperature up to 12 hours after discharge:

temperature very carefully for up to 12 hours after a discharge! Thermal runaways are the most common occurrence immediately after a discharge - massive temperature increases in damaged batteries that can lead to fire. The risk of battery failure and damage to the system is greatest up to 12 hours after a discharge. Only then can a battery system be considered stable and reintegrated into the normal alarm chain. Until then, a higher warning level applies and you must react immediately by switching off the charger if the battery temperature continues to rise after the discharge instead of remaining constant or falling slowly.

Warning and safety instructions – BACS installation locations and configuration

Never install BACS in the following areas:
1. In open spaces or in non-waterproof, enclosed spaces (exception: ATEX BACS) 2. In damp or dusty places (exception: ATEX BACS) 3. In areas with high concentrations of saline or oxidizing gasses (exception: ATEX BACS) 4. Near open flames, sparks or heat sources, as well as in areas of extreme heat or in places with large temperature fluctuations 5. In areas with strong vibrations or mechanical stress 6. In areas with gas concentrations or flammable substances (exception: ATEX BACS)
Monitoring system - Set and observe warning/alarm messages!
BACS is a monitoring system and should be treated accordingly – ensure that the warning and alarm limits are set correctly and that you respond to alarms!
BACS can be used to extend the service life of batteries, but its most important function is to monitor the batteries in order to warn of failures. Make sure that warnings or alarms are responded to within a few hours! BACS cannot permanently compensate for battery or charger errors, but its control technology and alarm function offers an advance warning time, which should always be used to avoid serious consequential damage! **Never mix different BACS module versions or BACS measuring cable types!** BACS C REV 2 and 3 or 4 must not be used in the same battery system. Also, different BACS BC measuring cables must not be used. This would damage the modules and measuring cables or trigger fuses and/or lead to incorrect measurement results.

Questions and problems:

If you have any questions, please contact BACS Support:

DE: www.generex.de / support@generex.de
US: www.generex.us / support@generex.us

Installing the BACS system

Preparing the batteries

To ensure an optimal connection of the BACS Velcro strips, the surface of the batteries should be dry and free of dirt and silicone/grease residues and care should be taken to use the correct adhesives for the selected batteries.

Please note that you ought only use cleaning products recommended by your battery manufacturers.

If you are unsure, simply use soapy water as a cleaning agent and carefully dry the surface of the battery with an anti-static cloth.

Installation of the BACS measuring cables

Attach the cables to the batteries according to the installation diagrams on the next page.

The cables should be installed as close as possible to the battery terminals, but above the battery connectors.

The measuring cables are color-coded:
Black: Negative pole (-) of the battery
Red: Positive pole (+) of the battery

For the correct torque with which the pole screw is tightened please refer to the operating instructions of your battery.

Please note that reverse polarity of the measuring cables may trigger the integrated fuse and thus render the cable unusable.
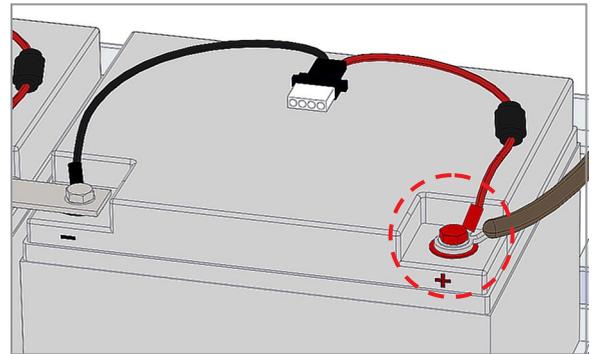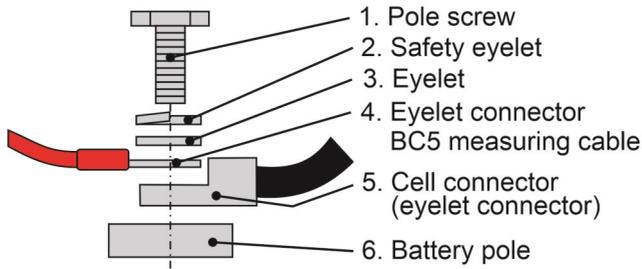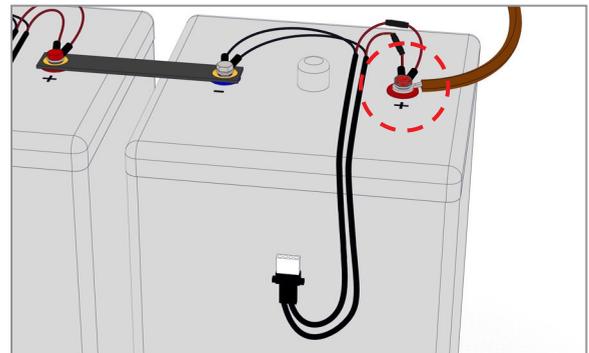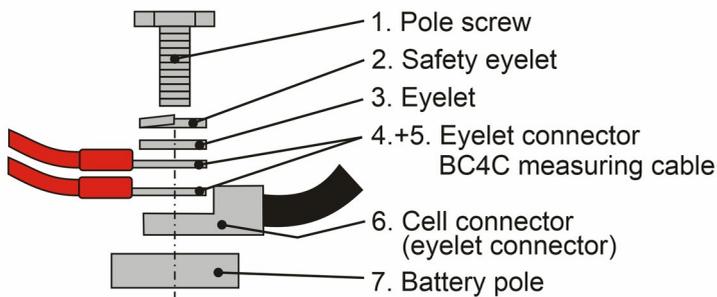
Article no.: **BC5xx**

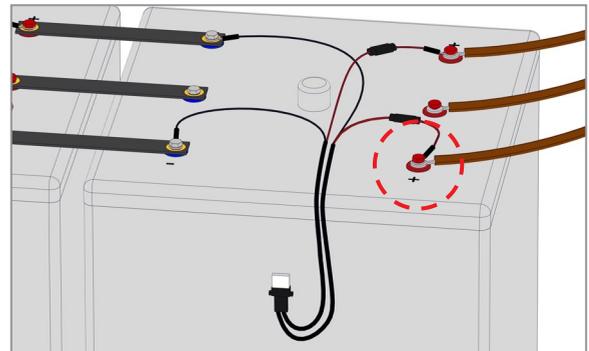Article no.: **BC4Cxx**
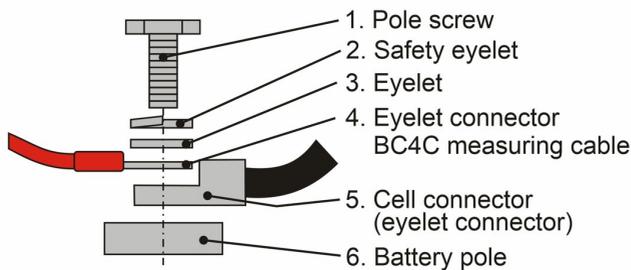
Installation of the BACS measuring cables

4V – 16V battery + BC5 measuring cable

1. Pole screw
2. Safety eyelet
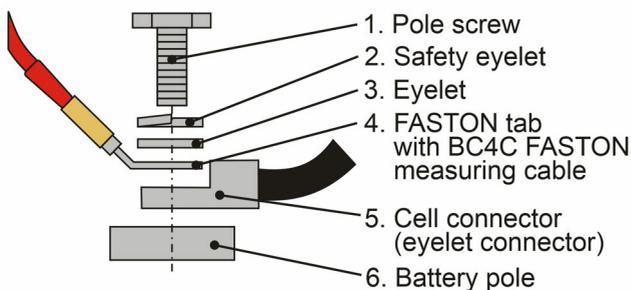3. Eyelet
4. Eyelet connector BC5 measuring cable
5. Cell connector (eyelet connector)
6. Battery pole

1.2V-2V-Battery with 2 Poles + BC4C Measuring Cable

1. Pole screw
2. Safety eyelet
3. Eyelet
4.+5. Eyelet connector BC4C measuring cable
6. Cell connector (eyelet connector)
7. Battery pole

1.2V-2V-Battery with 4 or more poles + BC4C Measuring Cable

1. Pole screw
2. Safety eyelet
3. Eyelet
4. Eyelet connector BC4C measuring cable
5. Cell connector (eyelet connector)
6. Battery pole

1.2V-2V-Battery with 4 or more poles + BC4C-Faston Measuring Cable

1. Pole screw
2. Safety eyelet
3. Eyelet
4. FASTON tab with BC4C FASTON measuring cable
5. Cell connector (eyelet connector)
6. Battery pole
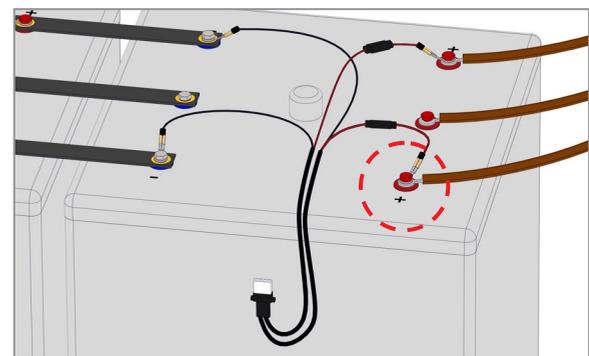
For batteries with four poles, please connect the BACS measuring cable to all poles.
Note: If the battery has more than 4 poles, it is sufficient to connect the BACS cable to four battery poles (identical for all batteries).

Note: The connection types specified here in the quick start ensure the greatest precision in the internal resistance measurement. Please note that the values do not always match those specified in the manufacturer's data sheet, as different measuring methods are usually used to determine them.

# Installation example for batteries with 2 poles (BC5 6V-16V) and 4 poles (BC4 1.2V—4V)

BC5xx - Measuring cable

BC4Cxx - Measuring cable
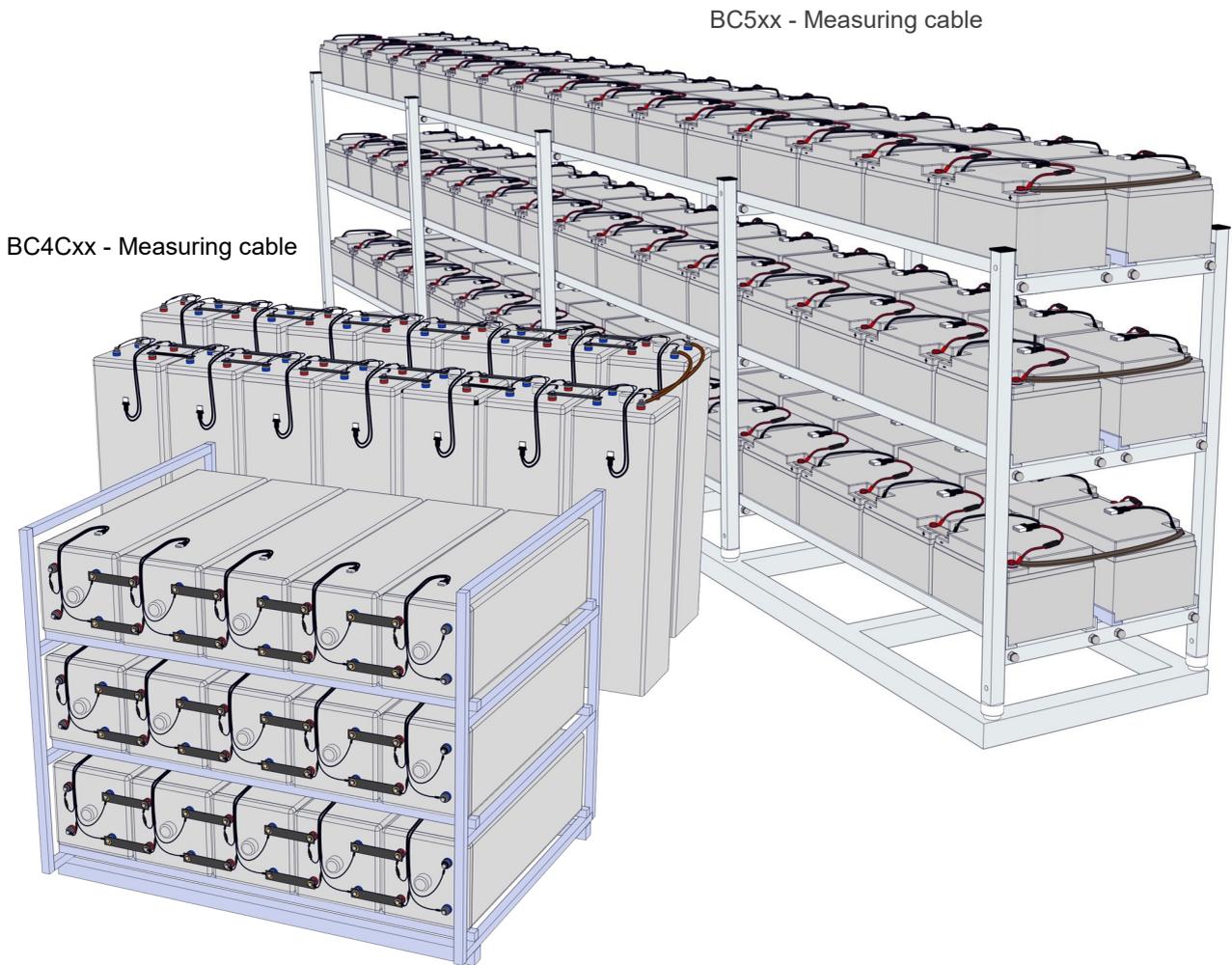
Installation of the BACS modules

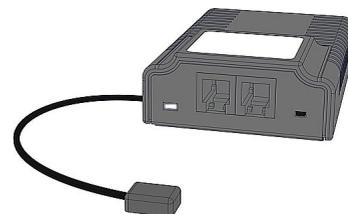This installation guide refers to the Modules of the following series:

Article no.: **BACS C20**
Article no.: **BACS C23**
Article no.: **BACS C30**
Article no.: **BACS C40**

The BACS module is equipped with an integrated temperature sensor.

The BACS module is also optionally available with an external temperature sensor.
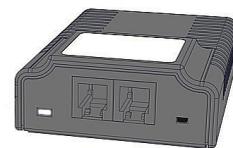
BACS Modul REV 3
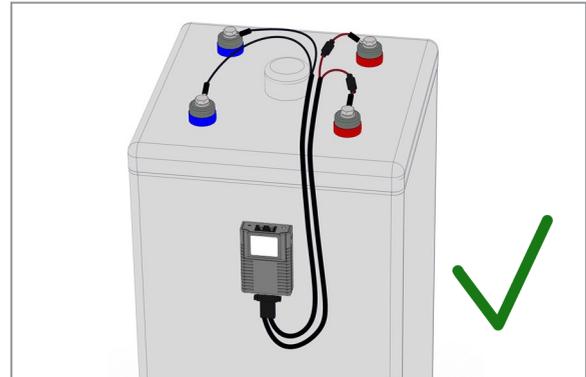With integrated temperature sensor
(standard)

BACS Modul REV 3
with external temperature sensor
(optional)

Please note before placing the BACS modules

General installation instructions

If there is not enough space on the top of the battery, the BACS module can also be positioned on the front!

Vents and cooling fins

Under **no circumstances should the modules be attached with their Velcro adhesive over any cooling fins, sealing plugs or ventilation caps** that may be present. A blocked ventilation opening can have a negative effect on the functionality of the battery.

.
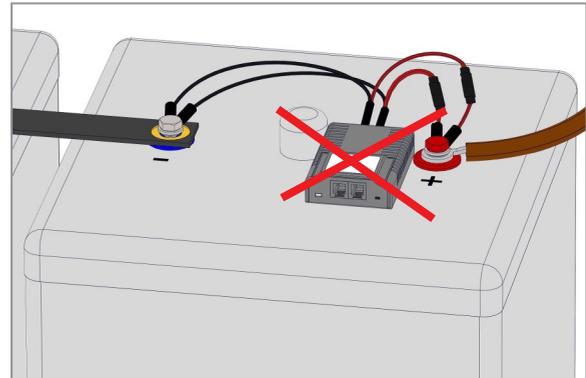
Wet Cells

For wet cells and low-maintenance batteries, a distance of at least **10cm (3.94in.)** to the vent nozzle must be maintained to avoid corrosion damage and explosions from possibly escaping gases!


Important

It is recommended that the measuring cables run into the modules via a "safety loop" on the front of the cells. The lowest point of the BACS measuring cable runs below the module and any electrolyte that may leak out drips off the cable and cannot run into the BACS housing and destroy it.
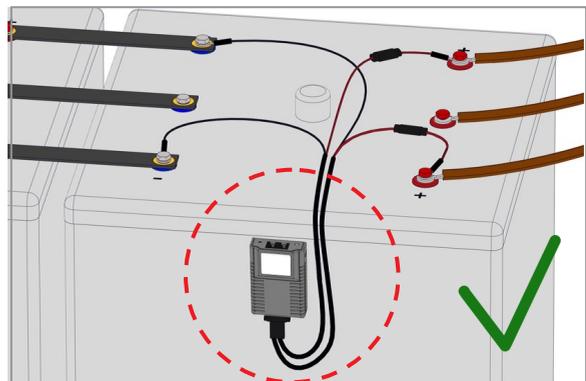
BACS modules
with external temperature sensor

Instead of the internal temperature sensor (standard), BACS modules are also available with a pre-mounted external temperature sensor. The external temperature sensor is located at the end of a cable that is approximately 23cm (9.06in.) or approximately 90cm (35.43in.) long and should be glued directly to the surface of the battery (in the same position for all batteries) or, when using the temperature sensor with FASTON connection, the sensor should be attached to a battery terminal.
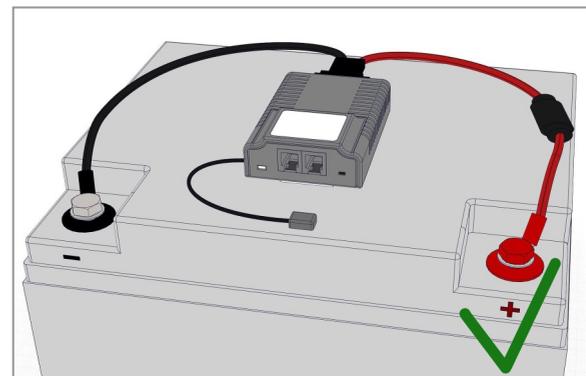
Preparation of the BACS modules

Battery container are available in different plastic materials that can affect the adhesive strength of the BACS adhesive strips we supply. The standard adhesive strips supplied are ideal for ABS plastics and all smooth surfaces. Battery casings made of polypropylene have reduced adhesive strength due to the rough surface, which can lead to detachment. In this case, we recommend replacing the 2 BACS adhesive strips (battery side) with polypropylene adhesive strips (item no. BACS_STRIP_6).
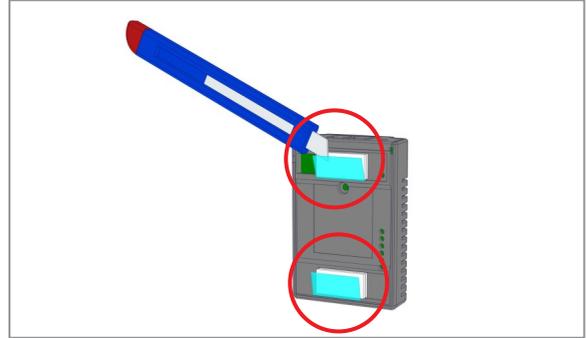
Installing the modules

1. There are two Velcro or pressure strips on the back of the BACS modules. Remove the adhesive film from both strips.

2. Installation of the BACS module:
   Position the BACS module, press it firmly with your thumb and maintain the pressure for about 5-10 seconds.

3. Check the adhesive bond for stability after approx. 1 hour.
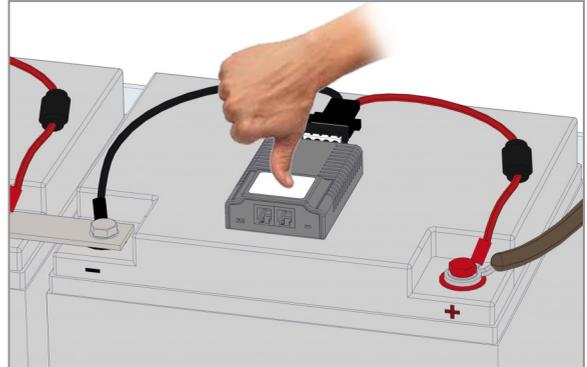
Connecting the BCx measuring cables

The connector plug of the BCx measuring cable has mechanical reverse polarity protection. Insert the BCx connector of the measuring cable into the socket provided on the back of the module.
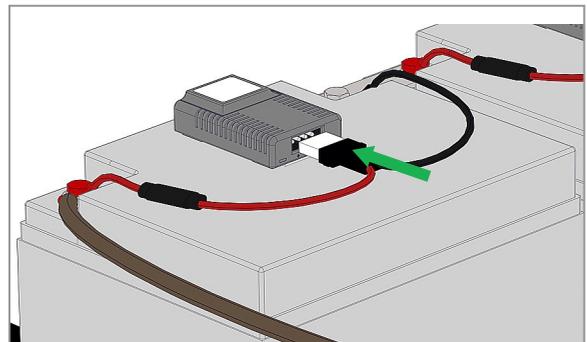
Installation example

BACS modules with connected measuring cables

Installation of the BACS bus cables

Article no.: **B4BCRJXX**

The BACS bus cables are specially developed components (twisted cables, special sheath). If other cables are used, the overall functionality of the system cannot be guaranteed. To avoid unnecessary cable lengths, the bus cables are available in different lengths.

Installation instructions

Cable lengths

The maximum cable length between the last module and the BACS WEBMANAGER/BACS Bus Converter **must not exceed 60m (2364 in.)** - this also applies when using a SPLITTING BOX.

Number of modules per bus line

A maximum of 50 modules can be connected to a BACS bus cable harness. The modules can be connected in any order. It is **not** necessary to connect the modules one after the other according to the addressing order.

Connection to the BACS WEBMANAGER / BACS Bus Converter

The most obvious module must be connected to the BACS Bus Converter or the BACS WEBMANAGER via a bus connection.

Increasing reliability

In principle, the BACS bus benefits from the ring topology with higher reliability of the data lines. However, ring cabling also carries the risk of a poor data signal due to electromagnetic interference: As the number of modules increases, the data lines become more sensitive to electromagnetic interference. If there are increasing communication disruptions, it is advisable to avoid ring cabling, as this can take on the function of an antenna despite all the shielding.

Installation of the BACS bus cables

Insert the bus cable plugs into the sockets of the BACS modules using the connection diagrams shown opposite.

„Side by side":
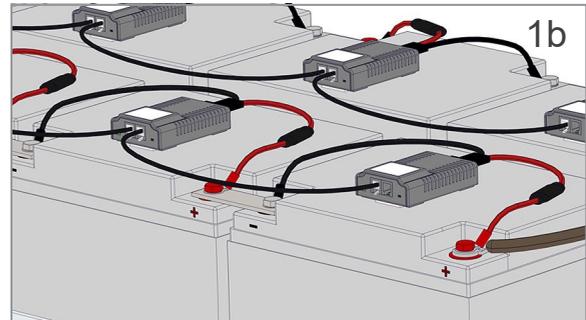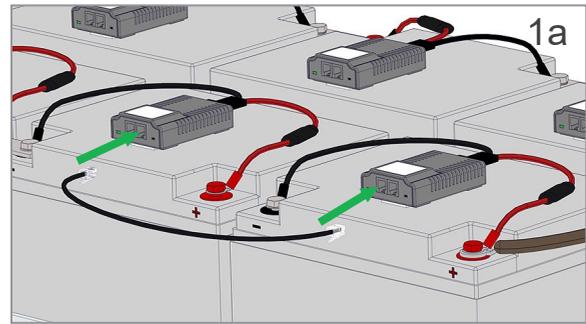
„Behind":

„Between levels":

General information for BACS-BUS cable lengths

Make sure not to exceed the specified cable lengths. Since the cable lengths can be customized, the following diagram ought be considered a general guide for calculating the respective cable lengths.

BACS WEBMANAGER wiring example

1. The max. cable length for connecting a device via RS232/COM1 is 15m. Typical devices are UPSs, diesel generators, transfer switches, frequency converters or chargers.

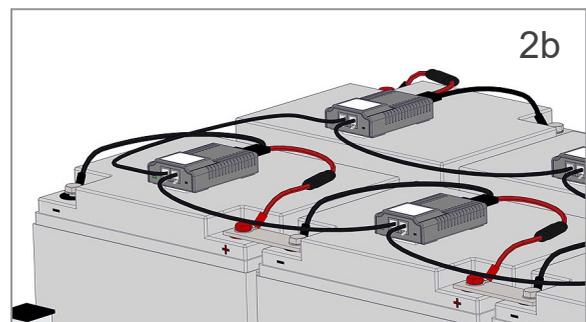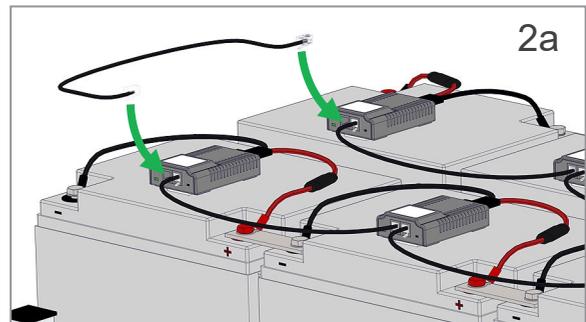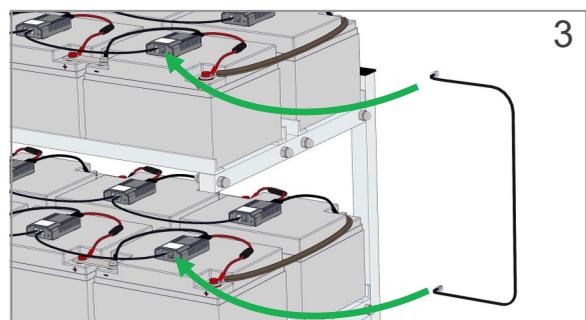2. The max. cable length for connecting a device via RS232/COM2 is 15m. Typical devices are SM_T_COM, SM_T_H_COM, SEN-SORMANAGER or GSM modem.

3. The standard power supply with 12V/2A (UPS-backed) supplies up to 300 modules. For 300 or more BACS modules, a 12V/3A power supply is required.

4. The maximum cable length between BACS WEBMANAGER and BACS SPLIT-TING BOX is 10m (if this limit is exceeded, the maximum cable length of 60m is reduced accordingly).

5. The length of the connections between the BACS SPLITTING BOXes reduces the max. length of 60m accordingly.

6. Measured by the BACS WEBMANAGER/BUS CONVERTER, the total length (4th + 6th) of a bus line must not exceed 60m. Also, no more than 50 BACS modules may be connected per bus line.

7. Shows the bus connections between the individual BACS modules; the total length (sum of all individual connections) should not exceed 50m in this example.

8. A maximum of 512 BACS modules can be connected per BACS system.

9. The maximum cable length between BACS WEBMANAGER and the BACS current sensors/BACS GX_R_AUX is 10m and should not be exceeded.

10. The maximum cable length between BACS GX_R_AUX and the potential-free contacts to be monitored is 50m.
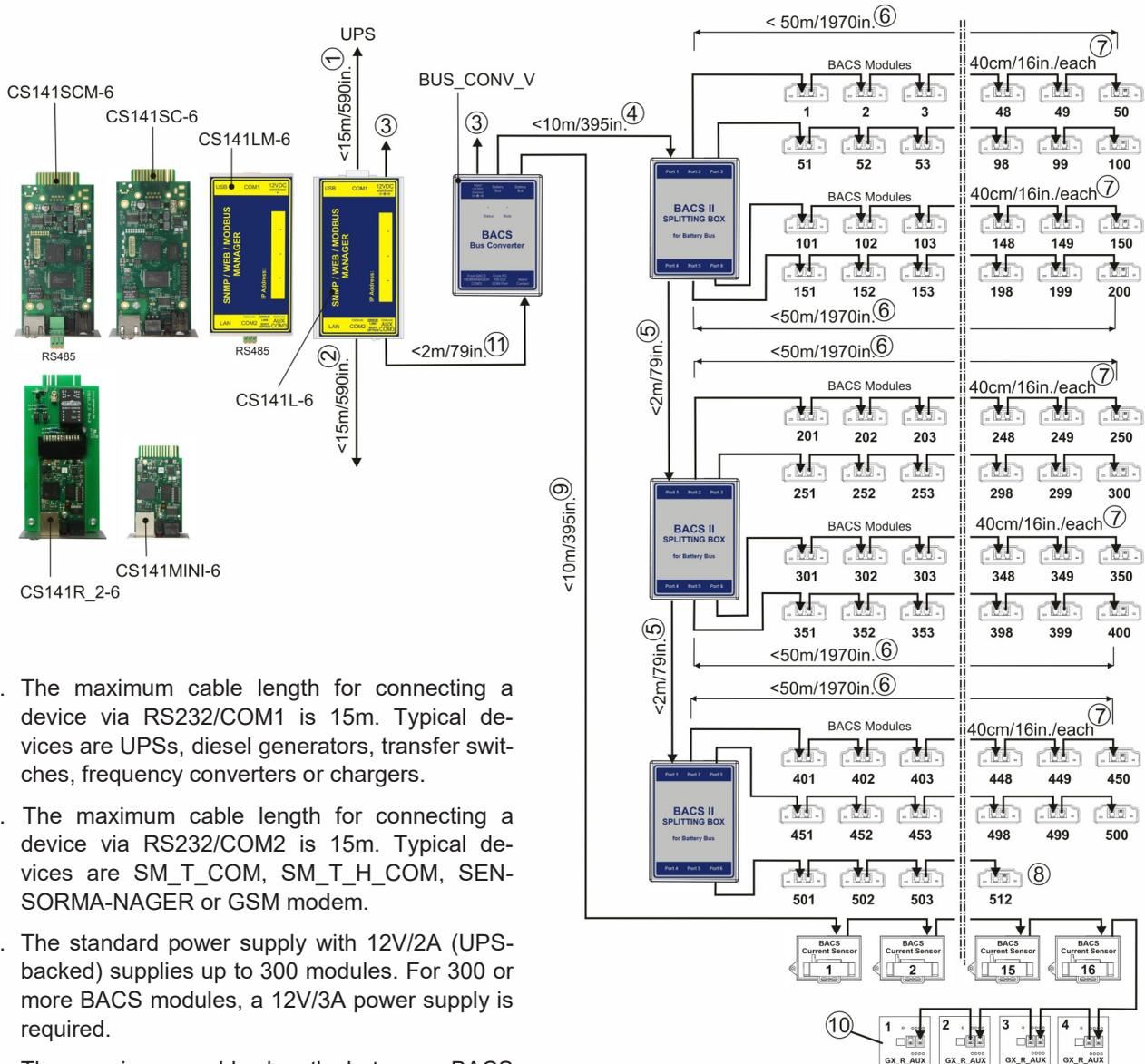
General information for BACS-BUS cable lengths

Make sure not to exceed the specified cable lengths. Since the cable lengths can be customized, the following diagram ought be considered a general guide for calculating the respective cable lengths.

CS141 wiring example

1. The maximum cable length for connecting a device via RS232/COM1 is 15m. Typical devices are UPSs, diesel generators, transfer switches, frequency converters or chargers.

2. The maximum cable length for connecting a device via RS232/COM2 is 15m. Typical devices are SM_T_COM, SM_T_H_COM, SENSORMA-NAGER or GSM modem.

3. The standard power supply with 12V/2A (UPS-backed) supplies up to 300 modules. For 300 or more BACS modules, a 12V/3A power supply is required.

4. The maximum cable length between BACS WEBMANA-GER and BACS SPLITTING BOX is 10m (if this limit is exceeded, the maximum cable length of 6m is reduced accordingly).

5. The length of the connections between the BACS SPLITTING BOXes reduces the max. length of 60m accordingly.

6. Measured by the BACS WEBMANAGER/BUS CONVERTER, the total length (4th + 6th) of a bus line must not exceed 60m. Also, no more than 50 BACS modules may be connected per bus line.

7. Shows the bus connections between the individual BACS modules; the total length (sum of all individual connections) should not exceed 50m in this example.

8. A maximum of 512 BACS modules can be connected per BACS system.

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10. The maximum cable length between BACS GX_R_AUX and the potential-free contacts to be monitored is 50m.

11. The maximum distance between CS141 and BACS Bus Converter is 2m and must not be exceeded.

Variants of BACS WEBMANAGER

There are different versions of the BACS Web Manager. The main difference is in the way the CS141 base module is supplied with power. The external CS141 / BACS versions are operated entirely with their own power source (AC/DC power supply is included). The slot cards are supplied with power via the UPS, the BACS Bus Converter requires its own separate power source. An AC/DC power supply is also included for this article. Other differences relate to the slot formats and range of functions.

External versions
+ integrated BACS Bus Converter

BACSKIT_B4-6

BACSKM4-6
with Modbus RS485

External versions
+ BACS Bus Converter

BACSK4L-6

BACSK4LM-6
with Modbus RS485

Slot Versions
+ BACS Bus Converter

BACSK4SC-6

BACSK4SCM-6
with Modbus RS485

BACSK4MINI-6

BACSK4R2-6

The BACS Bus Converter

The BACS Bus Converter galvanically isolates the BACS bus from the BACS WEBMANAGER and converts the BACS bus protocol into an RS232 protocol. In addition, active EMI filtering is carried out to protect the current measurement results from interference.

Article no.: **BUS_CONV_V**

BACS WEBMANAGER with
warning sign on COM3/AUX port

Important: Only use the original 6-pin RJ12 cable included in the scope of delivery of the BACS WEBMANAGER for the connection BACS WEBMANAGER -> BACS Bus Converter!

If the 4-pin RJ10 bus cable is accidentally plugged in, the spring contacts of the COM3/AUX port will be damaged and addressing and communication problems will occur between the BACS WEBMANAGER and the connected modules!

Connection types of the BACS WEBMANAGER

Make sure that the BACS Web Manager and all components are protected by an uninterruptible power supply, otherwise BACS will not be able to work in the event of a power failure. If there is no UPS-backed power supply, you can also power the BACS Web Manager directly from the battery using special DC power supplies. Please contact BACS Support if the supplied AC/DC power supplies cannot be used.

BACS WEBMANAGER
(Integrated BACS Bus Converter)

BACS Bus cable

Power Supply
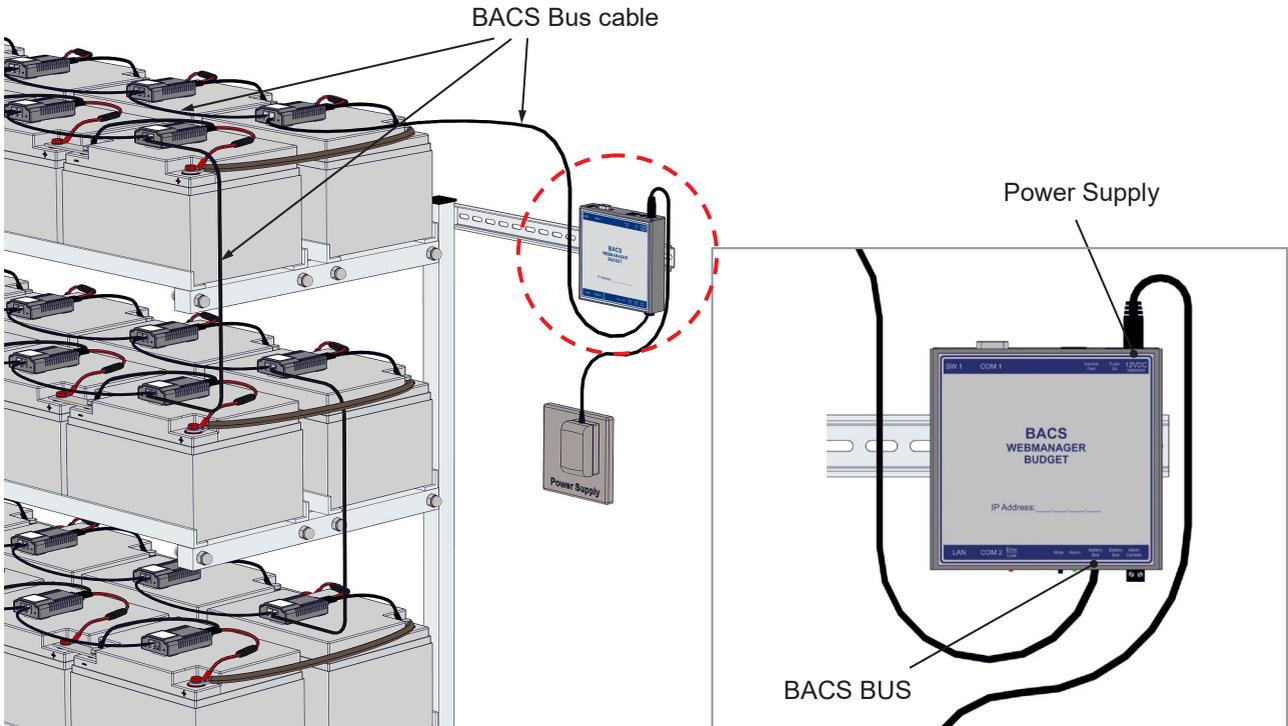
BACS BUS

BACS WEBMANAGER EXTERNAL Box CS141
with external BACS Bus Converter

BACS Bus cable

Power Supply   BACS BUS   Power Supply

AUX/COM3   Special Cable RJ12   AUX/COM3
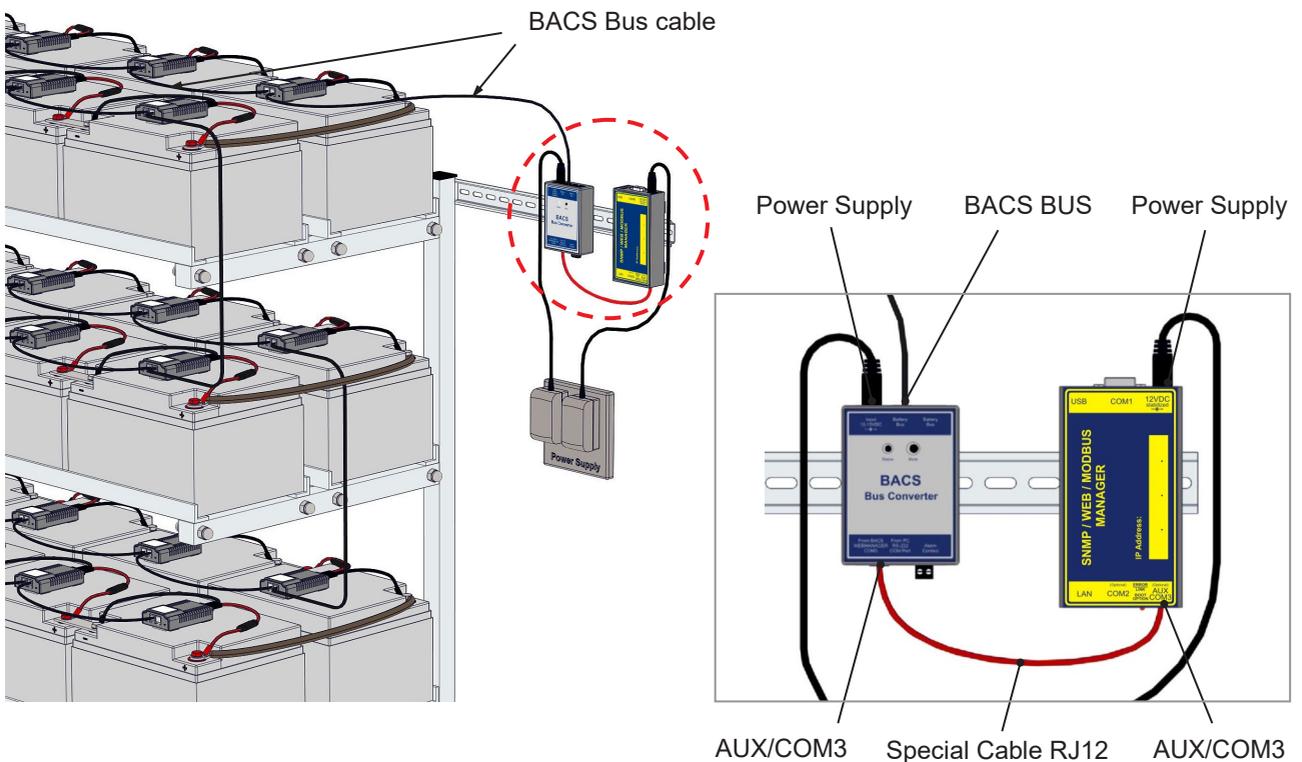
BACS WEBMANAGER as slot version
for UPS with external BACS bus converter

The slot card version of the BACS WEBMANAGER is powered via the UPS installation slot. The BACS Bus Converter turns the CS141 into a fully-fledged BACS Web Manager. However, the BACS Bus Converter requires a separate power supply that should be secured by the UPS - or, if powered directly from the batteries - a special DC power supply is required.

BACS bus cable

Power Supply   BACS BUS

AUX/COM3   Special Cable RJ12   AUX/COM3
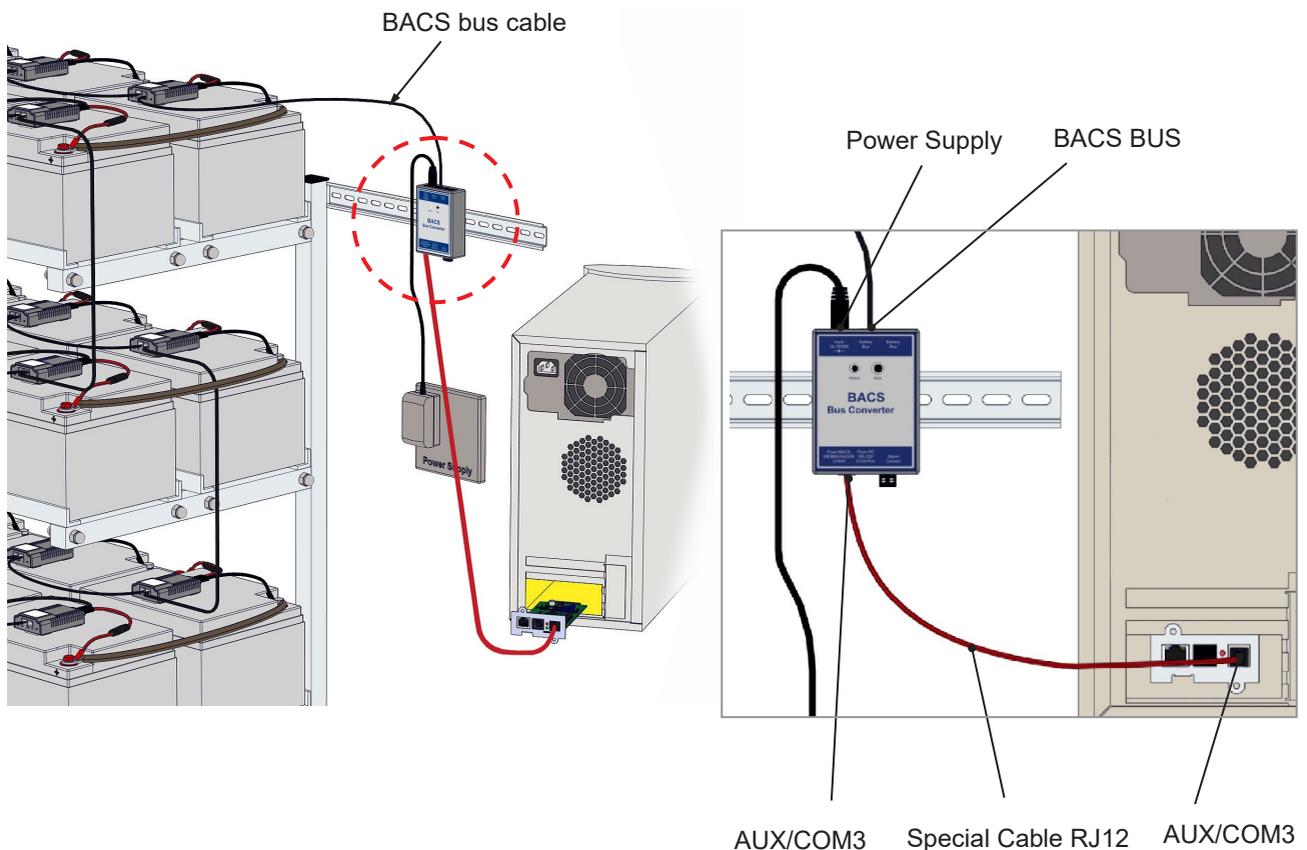
The BACS SPLITTING BOX

For battery systems with more than 50 batteries, we recommend using a BACS SPLITTING BOX.
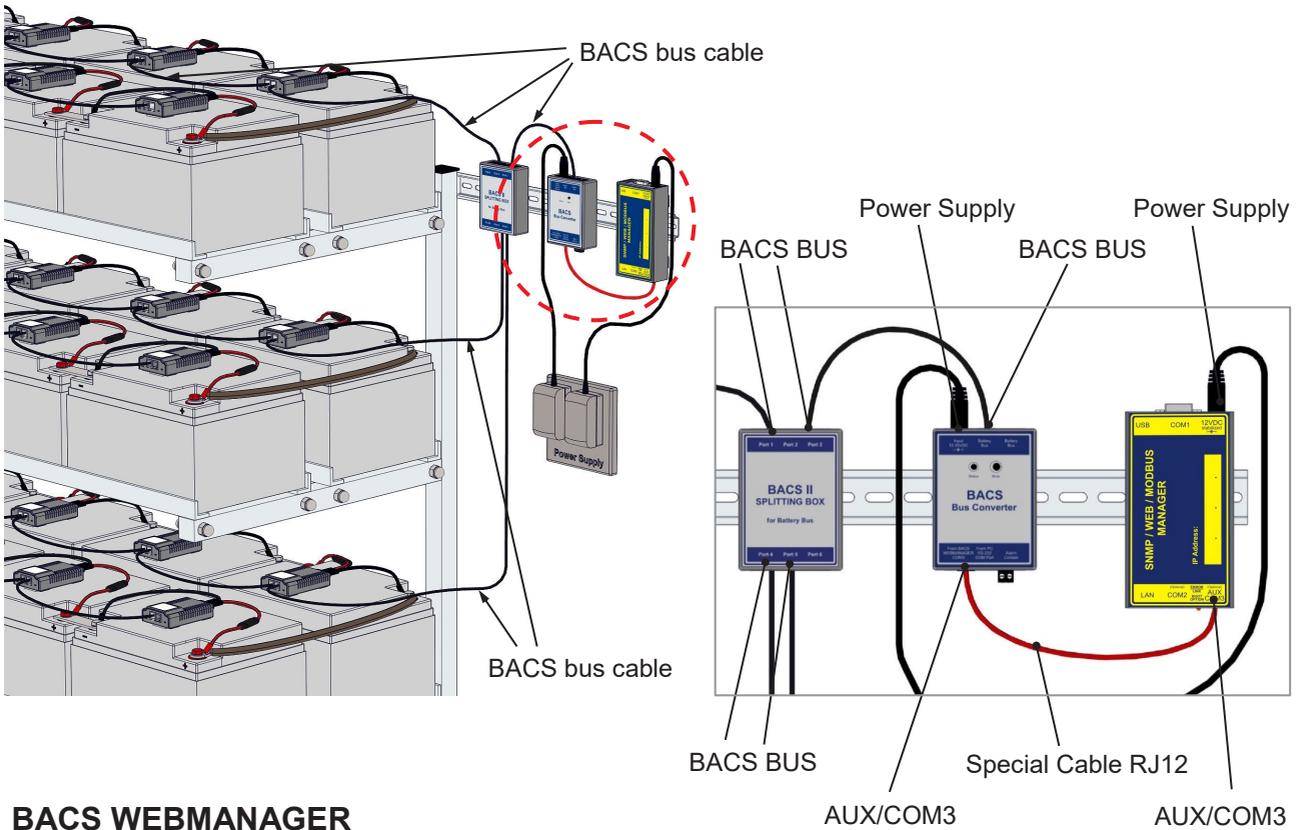
It is used to reduce the total bus cable length and enables star-shaped bus cabling. Several SPLITTING BOXES can also be used per system. The SPLITTING BOX is a passive element that does not require its own power supply to operate.

Please distribute all BACS modules evenly across the ports of the SPLITTING BOX. Note that each port can manage a maximum of 50 BACS modules and that the bus cable lengths should be as short as possible.
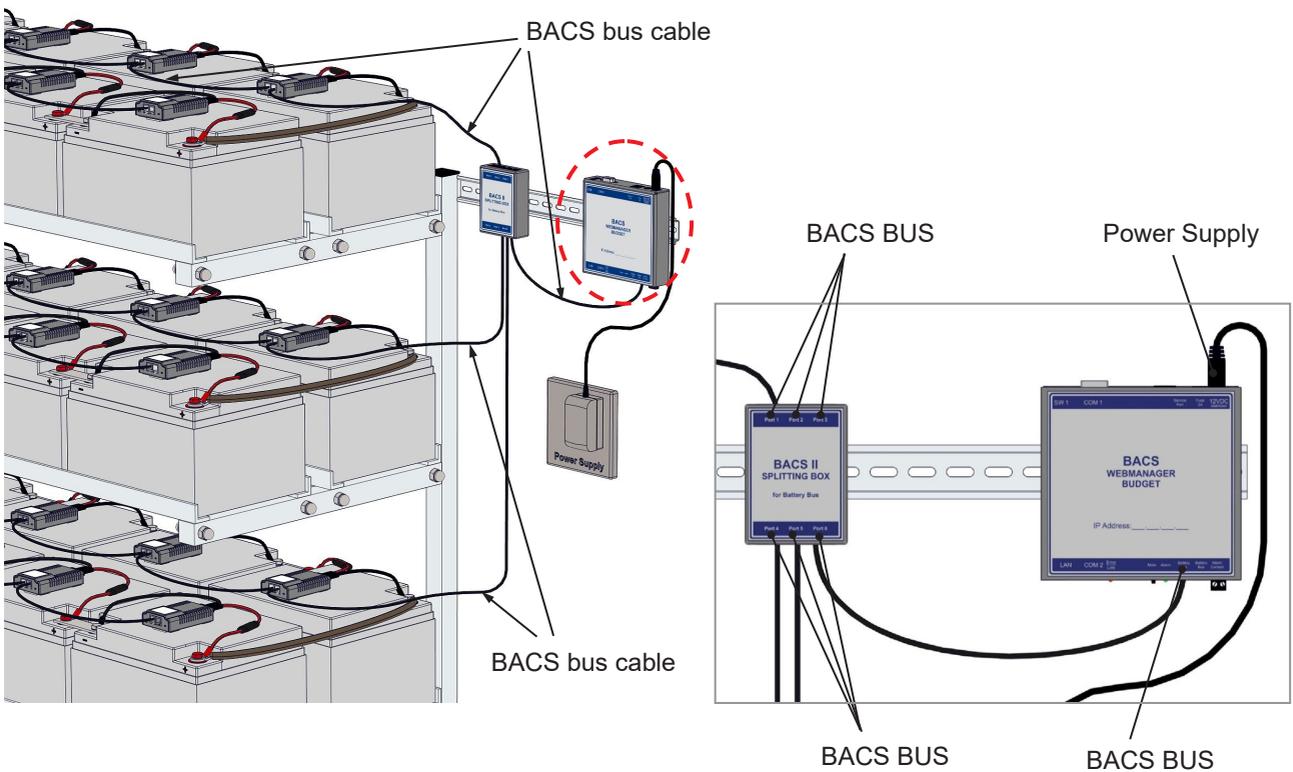

Article no.: **BCII_SPLITT**

BACS WEBMANAGER EXTERNAL CS141
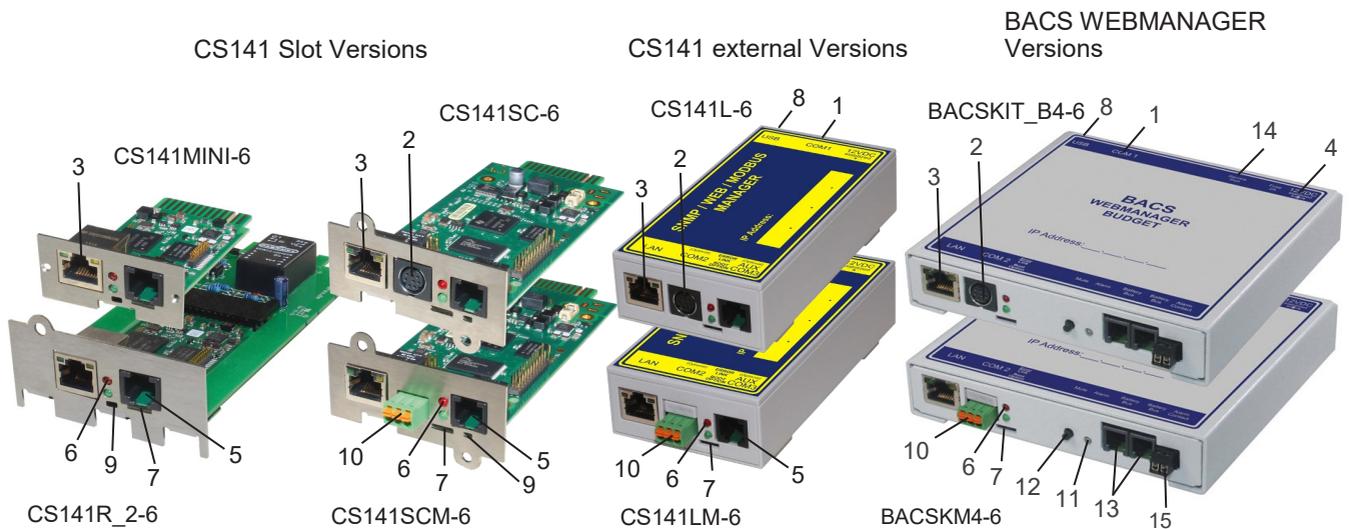## with BACS SPLITTING BOX and BACS Bus Converter

BACS bus cable

BACS bus cable

Power Supply

Power Supply

BACS BUS

BACS BUS

BACS II SPLITTING BOX for Battery Bus

Port 1 Port 2 Port 3

Port 4 Port 5 Port 6

BACS Bus Converter

SNMP / WEB / MODBUS MANAGER

USB COM1 12VDC

LAN COM2 AUX

BACS BUS

Special Cable RJ12

AUX/COM3

AUX/COM3

BACS WEBMANAGER
with BACS SPLITTING BOX

BACS bus cable

BACS bus cable

BACS BUS

Power Supply

BACS II SPLITTING BOX for Battery Bus

Port 1 Port 2 Port 3

Port 4 Port 5 Port 6

BACS WEBMANAGER BUDGET

IP Address:

SW 1 COM 1

LAN COM 2

BACS BUS

BACS BUS

The installation of the BACS hardware is now complete.
The next step is to set up the BACS WEBMANAGER
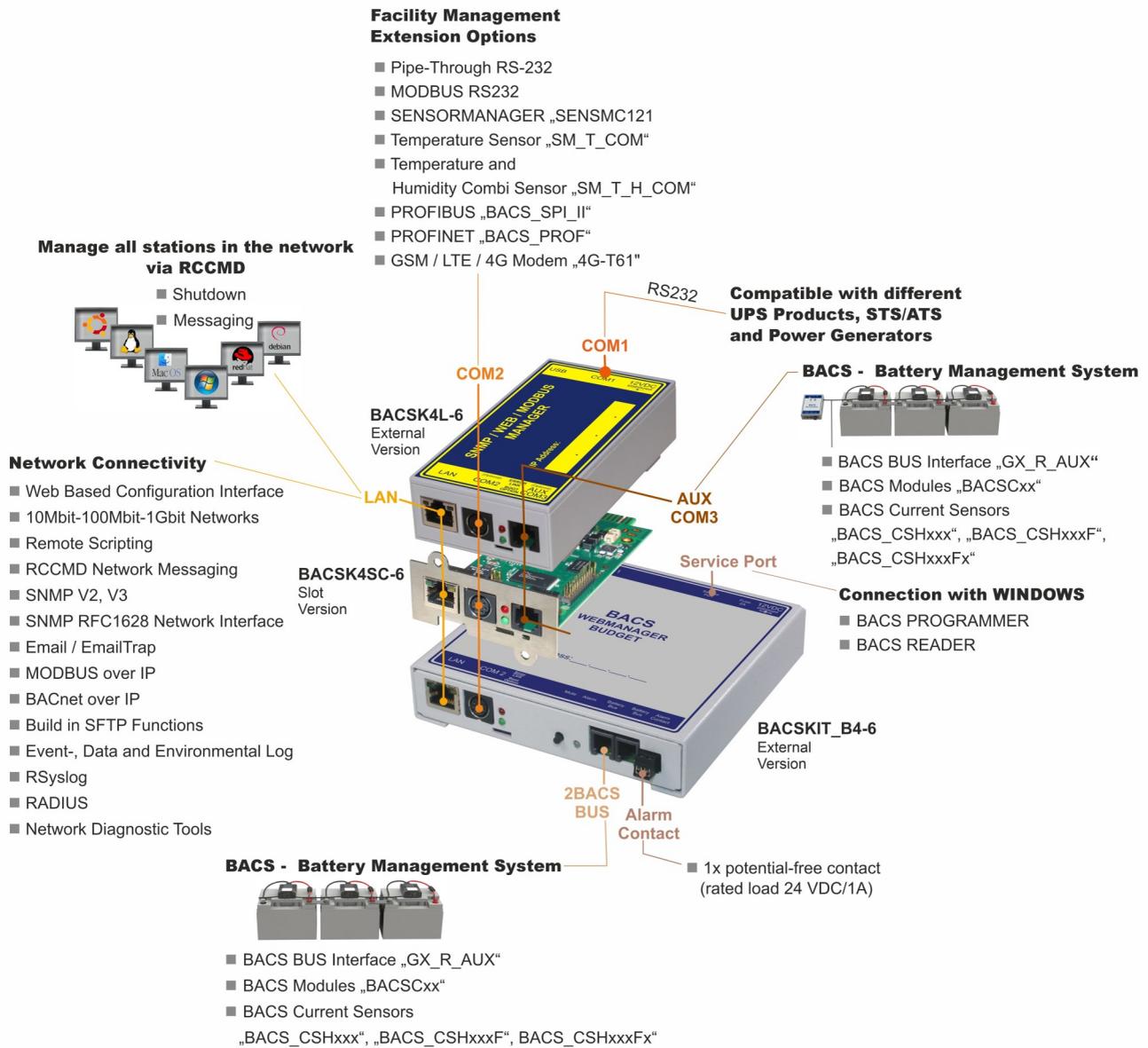
BACS WEBMANAGER Hardware overview

CS141 Slot Versions
CS141 external Versions
BACS WEBMANAGER Versions

CS141MINI-6
CS141SC-6
CS141L-6
BACSKIT_B4-6

CS141R_2-6
CS141SCM-6
CS141LM-6
BACSKM4-6

Description	Function		
1 COM1 Port	Serial interface for connecting a UPS or other end devices with the original RS232 cable		
2 COM2 Port	For connecting additional devices, such as GSM modem, temperature and humidity sensor, SENSOR MANAGER, fieldbus devices (MODBUS RS232, Profibus, LONBus, etc.).		
3 LAN Socket	Ethernet 10/100/1000 Mbit interface with integrated status LEDs (Green LED: connection to the network exists, yellow LED: network activity)		
4 DC Input	Supply via 12VDC regulated plug-in power supply externally, DC plug outside (-) minus, inside (+) plus		
5 AUX/COM3	For connecting the BACS® Bus Converter (internal for BACSKIT_B4) via 6-pin/RJ12 cable max.1m. For MINI/R2: COM2 and COM3 use a combined port.		
6 Status LEDs (red and green)	**WEBMANAGER operating status**	**LED signal**	
	Unpacking the operating system (update process)	Flashing red	🔴⚫
	Error unpacking operating system	Red fast flashing	🔴⚫
	Boot phase of the operating system	Red long on	🔴
	Connection to external device lost (UPS), or BACS general alarm (high / low voltage Temp/Ri alarm, etc.)	red and green	🔴🟢
	Normal operation	Flashing green	🟢⚫
7 Slide switch	To switch configuration/operation mode and DHCP		
	Slider in center position: sets the BACS WEBMANAGER to the configuration mode and activates the default IP address 10.10.10.10 after a warm or cold start.		▭■▭
	Slider right: Automatic IP addressing: DHCP is enabled and a IP address is set automatically. Check the MAC address of your BACS WEBMANAGER to identify the IP address in the DHCP server table can.		▭▭■
	Slider left: Use the values configured in the HTTP interface. With DHCP is also possible with a separate setting.		■▭▭
8 USB	For internal use only		
9 Reset Button	Restarts the CS141 immediately. All unsaved data will be lost.		
10 RS485 Port	MODBUS-Variants: BACSKIT_SCMB4 und BACSKIT_LMB4		
11 Alarm LED	BACS-Alarm LED (green / red / yellow)		
12 MUTE Taster	Alarm confirmation and muting of the audible alarm. Alarm LED changes to yellow.		
13 BACS Bus	2 x Rj10 connectors for connecting the BACS C modules / SPLITTINGBOX / BACS_CSXXX / GX_R_AUX.		
14 BACS Service Port	For connection to a PC. RS232 port for addressing or reading the BACS modules by the BACS Programmer / BACS Reader software via RS232 cable (DSub9 -> MiniDin8).		
15 Alarm Contact	BACS General Alarm Relays for connection to building management systems		

Communication options BACS WEBMANAGER & CS141

All BACS WEBMANAGERs in the CS141 product family offer numerous options for integration into building management systems and monitoring concepts and are also fully-fledged management systems that can autonomously manage UPS systems, sensors and actuators in addition to batteries and can initiate automated counter-reactions in emergency situations. This includes switching acoustic and optical signaling devices, switching relays or initiating shutdowns in networks.

The following graphic shows an overview of possible functions:

Facility Management Extension Options
- Pipe-Through RS-232
- MODBUS RS232
- SENSORMANAGER „SENSMC121"
- Temperature Sensor „SM_T_COM"
- Temperature and Humidity Combi Sensor „SM_T_H_COM"
- PROFIBUS „BACS_SPI_II"
- PROFINET „BACS_PROF"
- GSM / LTE / 4G Modem „4G-T61"

Manage all stations in the network via RCCMD
- Shutdown
- Messaging

Network Connectivity
- Web Based Configuration Interface
- 10Mbit-100Mbit-1Gbit Networks
- Remote Scripting
- RCCMD Network Messaging
- SNMP V2, V3
- SNMP RFC1628 Network Interface
- Email / EmailTrap
- MODBUS over IP
- BACnet over IP
- Build in SFTP Functions
- Event-, Data and Environmental Log
- RSyslog
- RADIUS
- Network Diagnostic Tools

RS232

Compatible with different UPS Products, STS/ATS and Power Generators

COM1
COM2

BACSK4L-6
External Version

LAN

AUX
COM3

BACSK4SC-6
Slot Version

Service Port

2BACS BUS

Alarm Contact

BACSKIT_B4-6
External Version

BACS - Battery Management System
- BACS BUS Interface „GX_R_AUX"
- BACS Modules „BACSCxx"
- BACS Current Sensors „BACS_CSHxxx", „BACS_CSHxxxF", „BACS_CSHxxxFx"

Connection with WINDOWS
- BACS PROGRAMMER
- BACS READER

- 1x potential-free contact (rated load 24 VDC/1A)

BACS - Battery Management System
- BACS BUS Interface „GX_R_AUX"
- BACS Modules „BACSCxx"
- BACS Current Sensors „BACS_CSHxxx", „BACS_CSHxxxF", BACS_CSHxxxFx"

The following steps describe the quick setup of a BACS Webmanager. Parts of the quick setup are identical to the setup of a CS141, only the configuration of the battery sensors differs from the CS141, which is primarily designed for the management of power supplies (UPS, chargers, transfer switches, etc.).

For the configuration of all other services and sensors shown above, please consult the official CS141 / BACS user manual, which you can download from the Support area at www.generex.de.

We also recommend the Cybersecurity Hardening Guide, which is available separately and provides you with clear step-by-step instructions on how to best protect your BACS system against hacker attacks.

Initial configuration of the BACS Web Manager

Connecting a UPS or charger

Depending on the design and model, the options for connecting the web manager to a UPS/charger and querying status information vary. When connected to a UPS/charger, the BACS web manager can include the UPS status in the evaluation and thus, for example, react more quickly to a power failure than without the UPS information. This reaction time is set by configuring the "Discharge Detection Source" in the BACS setup.

External version
BACS Kit / Web Manager

The external version of the web manager is connected to the UPS via an RS232 cable at **COM1**. The appropriate cable is typically included in the scope of delivery of the UPS or is optionally available from the UPS manufacturer.

The web manager is powered by an external power supply unit that is included with the web manager. **Make sure that the web manager's power supply is secured by the UPS, otherwise the device will not record in the event of a power failure!**

Power connection
BACS Kit / Webmanager Budget

US: 120V AC / 12V DC
EU: 230V AC / 12V DC

RS232 UPS Cable

Slot card version

The slot card is powered by the internal power supply in the UPS installation frame via a "gold contact" and starts as soon as you insert the card.

The UPS and slot card are independent. You can remove the slot card from the installation frame at any time and the UPS will not be affected.

Communication takes place internally, no additional cable is required for the UPS.

Slot card

Insert the card into the designated slot

Get access to the web manager Static IP address (initial setup)

When started for the first time, every BACS Web Manager or CS141 has the standard IP 10.10.10.10 (subnet mask 255.255.255.0) and the slide switch on the Web Manager is preset accordingly (slide switch in the left position). In this position, the IP address you configured via the web server is adopted directly. When the slide switch is in the middle position, the IP address remains fixed at 10.10.10.10 until it is moved to the right (DHCP) or left (fixed IP address).

Tip: If at some point you no longer have access to the device via the IP address, move the slide switch to the middle position and restart the device: This activates the configuration mode and the IP address is set to 10.10.10.10 on the hardware side. You can then check your configuration and move the slide switch back to the static IP (or DHCP) position and restart.

To access the web manager, additional settings on your laptop are necessary!

Start- IP: 10.10.10.10

Ethernet Cable

Slide switch: left

Switch

Hard coded IP address 10.10.10.10:
Slide switch: center
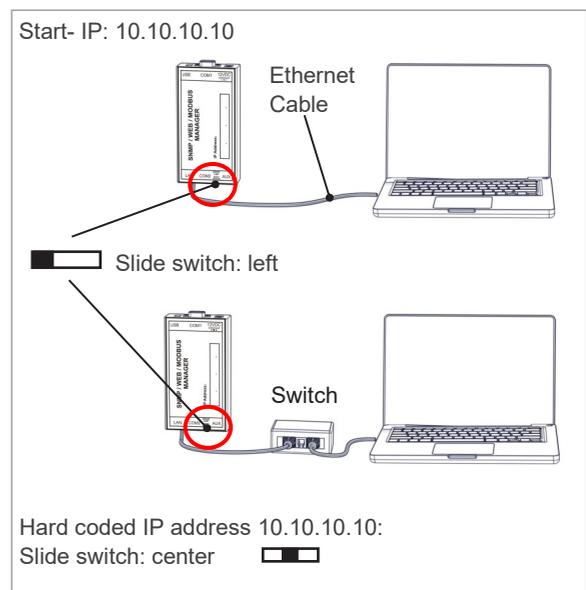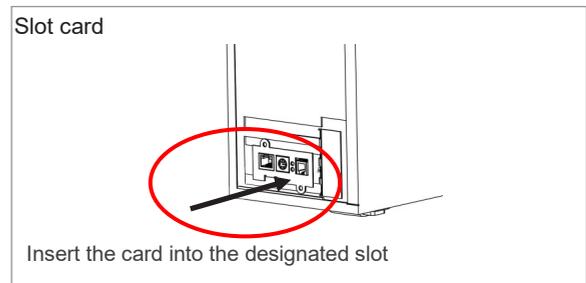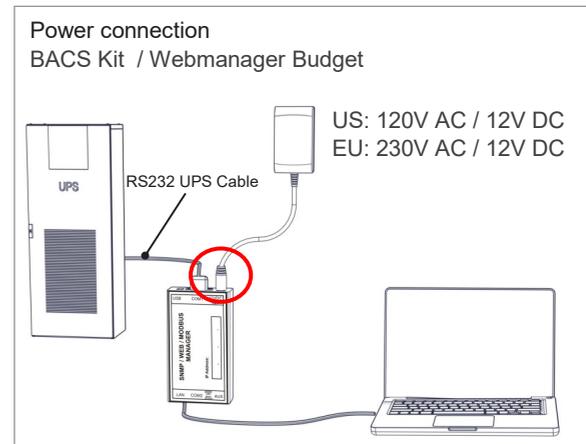
Setting the IP address of the BACS WEBMANAGER using a Windows PC

In order to be able to access the web interface of the web manager using the standard address 10.10.10.10, you must assign the LAN connection on your computer a suitable IP address from the same range 10.10.10.xxx. Configure the network card with which your computer is connected to the BACS WEB-MANAGER using a network cable, for example, the following settings:

IP address: 10.10.10.50
Subnet: 255.255.255.0
Gateways: 10.10.10.10

You can then access the web server login by calling http://10.10.10.10 in your browser.

Use the web manager's DHCP mode

If you want to use DHCP mode for automatic IP address assignment during initial setup, **set the Slide switch of the web manager to the right position** and then restart the web manager. This will give your web manager and your computer in the same network a suitable IP address from the responsible DHCP server. You can see which address your device has received by looking at the MAC address in the DHCP server or by asking the network administrator. The standard host name of a BACS CS141 is "CS141" (configurable).

Tip: With the tool "Netfinder" you can find the current IP address of the web manager you are looking for even without a network administrator. You can find the tool Netfinder for Windows in the download area of **www.generex.de**

Login and Setup Wizzard

After you have successfully added the device's address **10.10.10.10** to the network, the device will be ready for the first login via web browser as soon as the red LED on the device has changed to green. This can take up to 1 minute. Now enter "http://10.10.10.10" in your browser's address line and the login screen will appear. Log in with the following access data:

Name: **admin**
Default password for initial setup: **cs141-snmp**

Depending on the version of the BACS WEBMANA-GER, it may be mandatory to set an administrator password when logging in for the first time for security reasons - in this case you must RESET the standard password!

"System Setup Wizard"

After the first login, the Setup Wizard starts automatically. This will guide you through the basic configuration menus. If you do not want to use this service and want to enter the most important settings later via the menus, click on "CANCEL". Otherwise, follow the system instructions and skip the next page of this quick start.
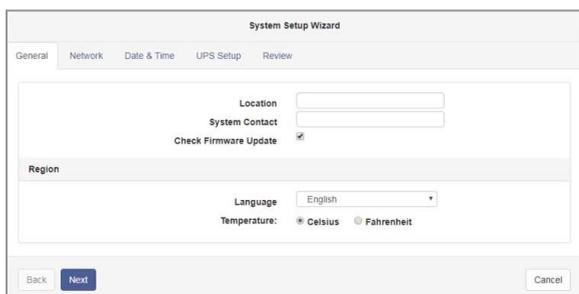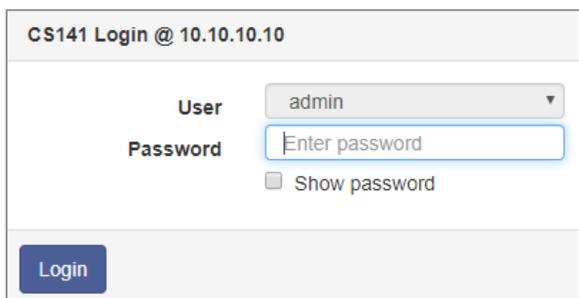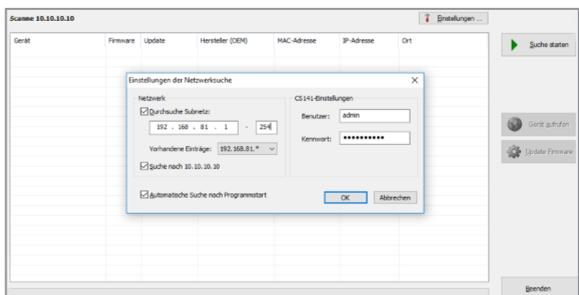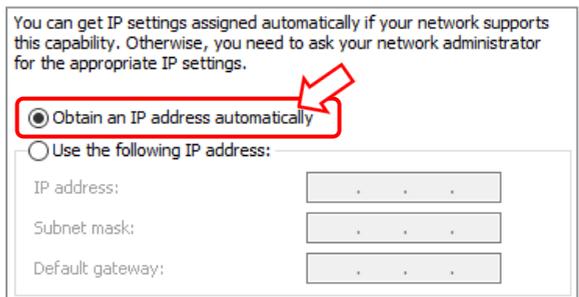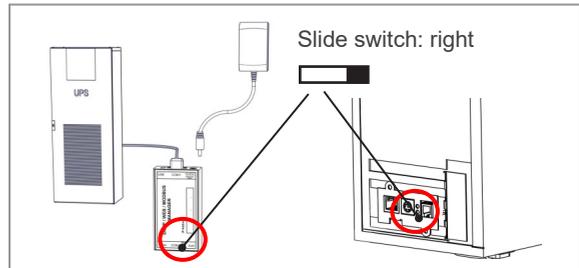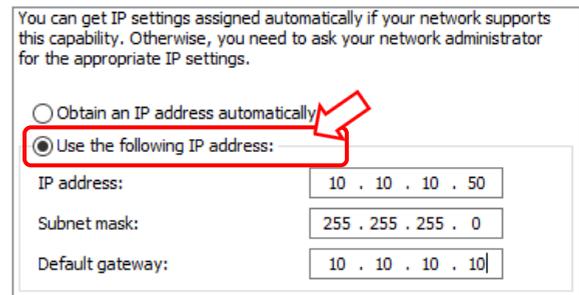
System settings for operating BACS

The following settings are at least necessary for the web manager to be able to perform its tasks. If you have completed the setup wizard, you can skip this page.

Choose language

The default setting is English Active, though the user can set their desired language. To do this, open the menu:- "**System** > **General**" Select the desired "**Language**".

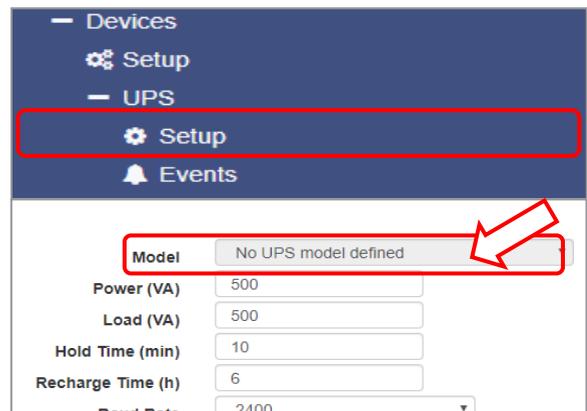Click "**Apply**" to save the setting.

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Optional: The UPS setting

If you do not have a UPS in use or do not want to monitor it, you can skip this step:

Open the menu

„**Devices** > **UPS** > **Setup**"

Under "**Model**", select the UPS that you want to connect to the web manager. If you only want to use BACS, leave the default setting "No UPS model defined".

Click "**Apply**" to save your entries.

Set the system time

Time is important for precise control and logging of events. Open the menu "**System** > **Date & Time**"

For quick configuration, click "**Set system time**".

Tip: For permanently correct time stamps, we recommend using an NTP service. Please contact the responsible administrator for the necessary settings.
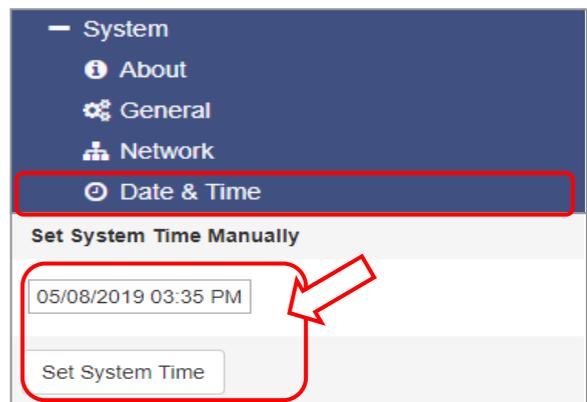
Setting up the IP address

Since this is a device in continuous operation, it is advisable to use a static IP address. This from your network administrator.

Open the menu "**System** > **Network**"

Enter the desired data
- „**IP address**"
- „**Subnet mask**"
- „**Default Gateway**"
- „**DNS Server**"

Important: If the slider is set to the left, the web manager will immediately adopt the new IP address.

At this point, restart the BACS WEBMANAGER / CS141 to check your network settings.
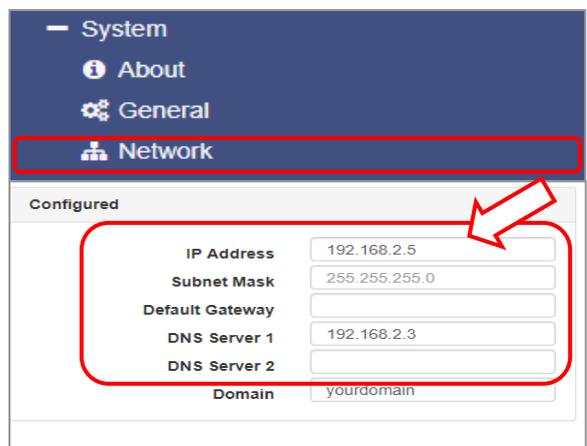
Login as admin with the new password

Log in to the device again with the user name "**admin**" and use your „**new password**".

You should see a graphic representation of a UPS or batteries. An "OK" should appear at the top. The graphic on the right of the image is different for each device and is just an example of a UPS display.

Checklist of previous settings
1. Are the date and time displayed correctly?
2. Admin password set and noted in a safe place?
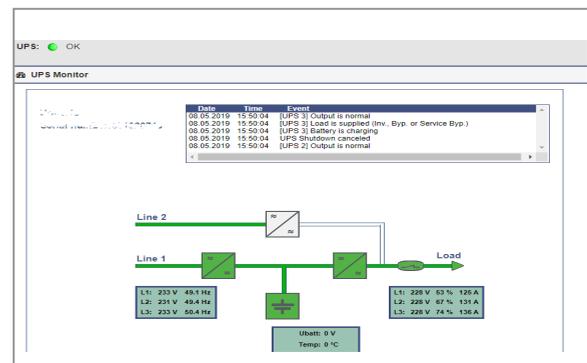
Setting up the BACS system

Depending on the CS141 model, the BACS device interface **COM3** is pre-activated in the "**Devices** > **Configuration**" menu at the factory or must be set manually. You can tell that it is activated by the fact that "BACS" is displayed in the device menu. If this is not the case, COM3 must be set to **BACS** in the device menu.

BACS WEBMANAGER

As soon as the BACS WEBMANAGER starts, the integrated BACS Bus Converter will automatically search for a BACS module with the address 1.

If it does not find it, alarm tone will be emitted. You can mute the alarm tone by clicking OFF in the Device Menu / BACS / Functions or simply pressing the MUTE button on the device.
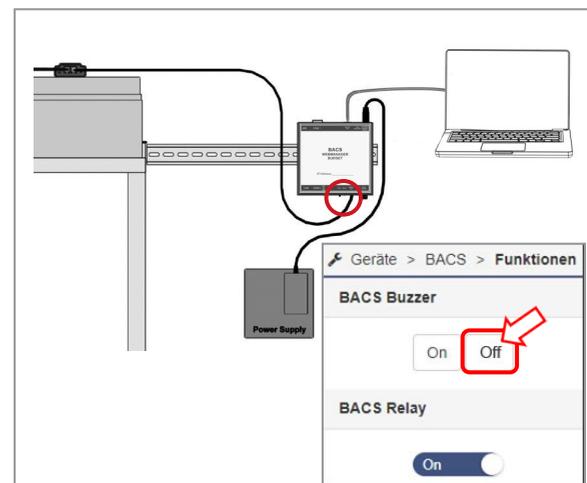

CS141 with BACS BUS CONVERTER

Connect the BACS BUS CONVERTER to a power source using the power supply unit supplied and connect the communication cable to **COM3** on the CS141. Log in to the CS141 and first set **COM 3** to BACS under **Devices** > **Configuration**. The BACS Bus Converter will click quietly and then automatically search for a BACS module with the address 1. If this is not found, an alarm tone will be emitted. You can set the alarm tone to "mute" by clicking OFF in the Devices menu / BACS / Functions or simply pressing the MUTE button on the device.

.

The following pages describe how to set up BACS for initial operation as quickly as possible and thus protect the batteries.

For further options please consult the official CS141 / BACS User Manual, which describes in detail all the options that technicians and administrators can use to unlock the full potential of a BACS system.
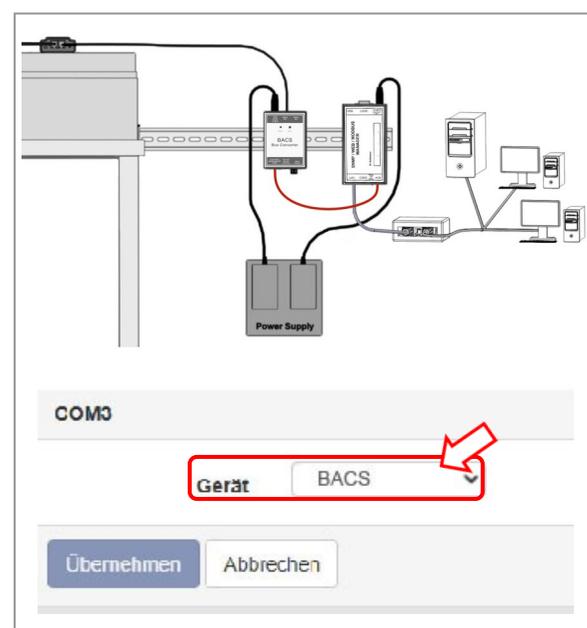
Status display of the BACS modules

The quick installation describes how you can carry out all the necessary installation work on site yourself using the BACS programmer integrated in the web server. Before installation, clarify whether it is a standard delivery state or "pre-addressed" modules:
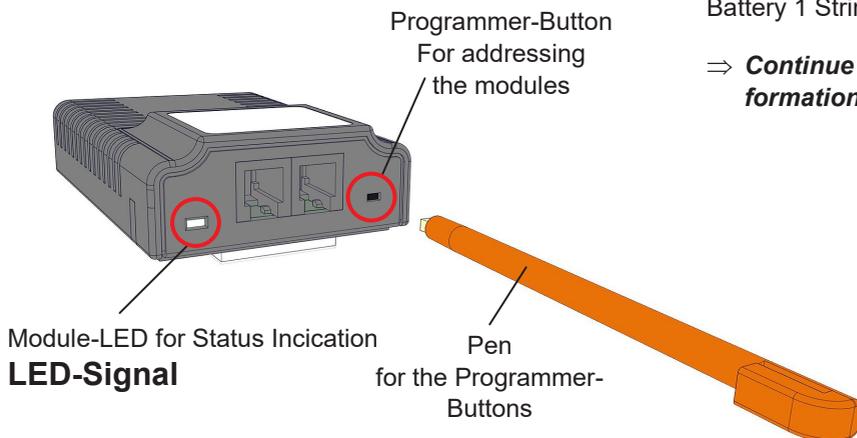
1. Standard delivery state - Not pre-addressed

Status display of the module LED:
●● All slowly flashing red = **Default address = 0**

Important: **Before** addressing is started, **ALL** BACS modules must be in this state! If you are not sure whether this is the case, start the BACS programmer before programming, select the "Reset" function, enter the address range 1 - 512, and click on Start. As a result, all modules will be reset to their delivery state.

Reset	☑
Start	1
End	512
Start	Stop

⇒ *In this case, continue with the next page.*

2. Pre-addressed

optional service - Article no. „BACS_PGM"
Status display of the module LED:
●● All <u>slow</u> flashing green = this means that the BACS module has received an address, currently no BACS communication is indicated by the flashing.

● <u>Static</u> green = normal operation, address available and BACS Web Manager communicates with the module.

Pre-addressed modules have already been assigned a unique address (ID) during production at the factory, and this has been printed clearly on the module. In this case, no further programming is necessary; please just ensure that the addressed modules are mounted on the correct batteries. (Address 1 = Battery 1 / String 1 etc., in case of 2 battery strings with 32 batterys: Adress 33 = Battery 1 String 2, etc.)

Programmer-Button
For addressing the modules

Module-LED for Status Incication
LED-Signal

Pen
for the Programmer-Buttons

Module Operating Status	LED-Signal	
Unprogrammed (delivery status)	flashing red	🔴⚫
Programming mode active	fast flashing red	🔴⚫
Programmed & Communication	green static	🟢
Programmed & no communication	flashing green	🟢⚫
Threshold exceeded/ undershot	red static	🔴
Detection mode	red / green flashing	🔴🟢

„Sleep Mode"

Status display of the module LED:
● no LED active!

The modules > Rev 3.xx are in "Sleep Mode" after being connected to the measuring cable. They automatically go into "Sleep Mode" if the BACS WEBMANAGER does not send any requests. To "wake up" the modules, it is necessary to connect and start the BACS WEBMANAGER or the "BACS Programmer" tool. The modules are activated after a short time.

BACS Programmer

Addressing the BACS modules in automatic mode

The BACS Programmer is required to assign a unique address (ID) to BACS modules during initialization. To start the BACS Programmer, click on Devices > BACS > Programmer and set the slider for BACS Programmer to ON. BACS is temporarily put into a special operating mode in which it is possible to assign a unique ID to modules or to read and change the ID of individual modules:

Module Programmer: Automatic/Manual Mode:

Address your BACS modules.

Automatic Mode:
Define an address range from which an ID is automatically assigned when the button on the BACS module is pressed.

Manual Mode:
Assign a new ID to a specific module.

BACS Address Search:
Find a BACS module with a specific address.

**the Automatic Mode -
Addressing the BACS modules**

Under "Start" you define the first address to be used. Under "End" you define the last address to be assigned — this means the first battery and the last battery in the system. With each successful addressing, the address is automatically incremented by one, which prevents duplicate address assignment.

> **Addressing example 1:**
> The start address is 1 and the end address is 40:
> The BACS programmer will address exactly 40 modules, starting with the number 1.
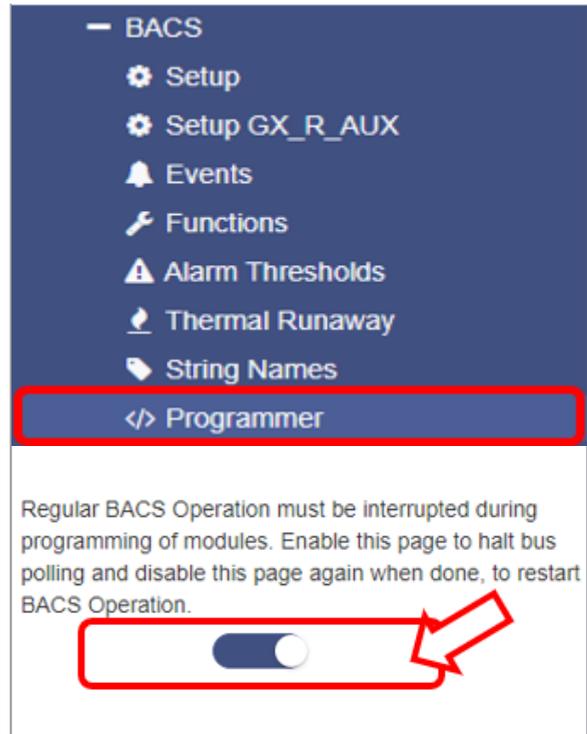
> **Addressing example 2:**
> The start address is 76 and the end address is 120:
> The BACS programmer will address exactly 44 modules, assigning 76 to the first module and 120 to the last module.
> Click start to begin the addressing procedure.

BACS installations on battery systems with multiple strings

In battery systems, the capacity or redundancy is achieved by setting up several battery strings. All addresses of the BACS modules—even with several strings—must be CONSECUTIVE. For example, starting with No. 1 in the first string and ending (with maximum expansion) at No. 512.

Make sure that ALL BACS modules are accessible during the first start, i.e. they are correctly connected, otherwise BACS cannot start.

Regular BACS Operation must be interrupted during programming of modules. Enable this page to halt bus polling and disable this page again when done, to restart BACS Operation.

Configuration example for automatic address assignment

Enter Start / End address

For large s ... ge

Optional: Acoustic feedback for each assigned address

Click Start to begin
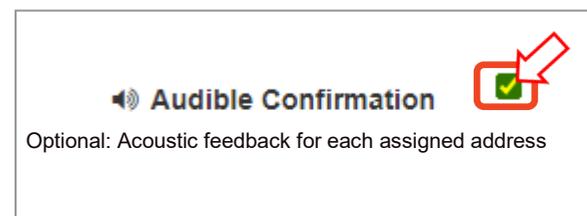
Addressing the BACS modules

As soon as you press "Start" in the BACS Programmer, the blinking frequency of the BACS module LED increases to confirm that it is ready for addressing. Any module with a fast red blinking frequency is ready to receive an address.

Using the BACS PEN or another suitable pointed object, briefly press the button on the BACS module that is to receive address number 1. Successful addressing is confirmed by the address incrementing on the BACS Programmer website, the module LED changing to green and an acoustic signal.

Repeat the process until all modules light up green and the last address has been assigned.

Error during automatic programming

In automatic addressing mode, all LEDs must flash red quickly. If this is not the case, there is an error. Check the wiring or address only up to the affected module and continue your work from that point after solving the problem.

To start from the beginning, you can also check the box for "Set all addresses to 0" in the programmer and start again from the beginning. During this process, all modules should now slowly flash red again, as they did when delivered.

End conditions of addressing

Once you have pressed Start, the status bar will automatically increment an ID number each time you have successfully registered a module. The process is completed under the following conditions:

All entered module addresses were assigned successfully.

In this case, the BACS WEBMANAGER ends the addressing process and reports successful addressing. Press X to close the programming progress display.

The last module was addressed

If you have specified more modules than will be installed, you can stop the process manually by clicking on "**Stop**" ("X") in the top right corner of the BACS Programmer.

In both cases, the status indicators of the modules that have received an address must flash green, indicating that they have been assigned an address that is not "0".
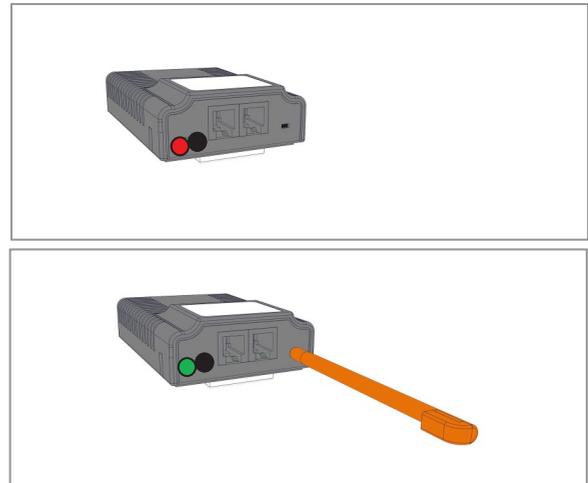
Addressing the BACS modules in manual mode

The manual mode allows you to set and change individual BACS module addresses. This function is required when the address (ID) of a BACS module needs to be found and re-addressed, for example when two modules have received the same address (ID) when addressing sub-areas, or because a defective module needs to be replaced. If the automatic addressing was completed successfully, this section is obsolete and this page can be skipped.

Programming a single module

Make sure that only **a single module is connected to the manager**. There should only be a BACS bus cable connection to this desired module, not to any other modules in the system.

Enter the current module ID under "**Old**" and the desired ID under "**New**". With "**Set**" the module will immediately adopt the new address.
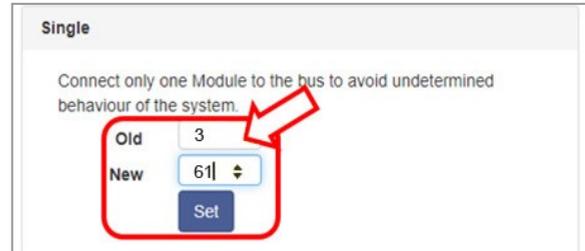
Request a single module address

Again, make sure that only a single module is connected to the manager. After you have connected the module to the BACS Web Manager, click "**Search**" under Address.

The current address of the module is displayed.
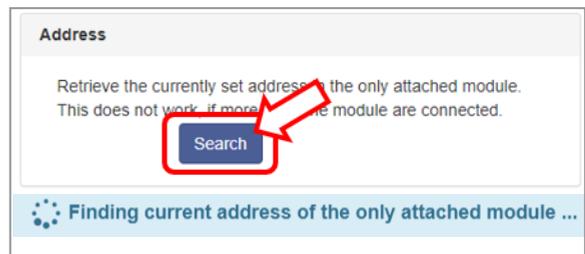
Search modules

If **ALL** modules are connected with bus cables, you can specifically search for a single module within the BACS system.

Enter the address (ID) you are looking for and press "**Show**" - the module will flash red/green accordingly until you have either pressed the addressing button on the module or alternatively confirmed your request with a mouse click in the BACS programmer. If an address (ID) has been assigned twice by mistake, BOTH modules with the duplicate address will flash red/green alternately, indicating the location of the error.

You can assign the incorrectly addressed module with the BACS Programmer in manual mode directly assign the correct ID.
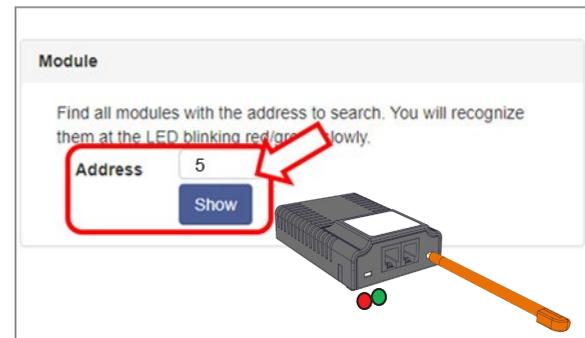
Finish BACS programming

Once all modules have been addressed, you can exit the BACS Programmer mode. Move the slide switch back to **OFF**—The BACS Programmer will exit and the BACS system will re-initialize and restart. Later, this start-up progress will be indicated by green module numbers, see the start-up screen on page 28.

At this point, enter the basic battery information on the following page.
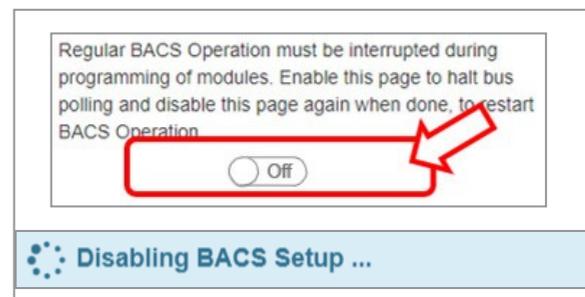
Basic Battery Information

Enter the basic battery information for your system. The battery information is needed to determine the total number of batteries and modules belonging to the system.

Open the **BACS** > **Configuration** menu Enter the following information:

- ♦ **Nominal battery voltage:**
  24V,16V,12V,6V,4V,2V,1.2V
- ♦ **Battery chemistry:** All types of Lead, Nickel Cadmium or Lithium based cells. In case of unknown chemistry use "Other"
- ♦ **Number of batteries:** Total number of all BACS modules in the system or that you have addressed. This number must be identical to the number of batteries that belong to this system.
- ♦ **Number of battery strings:** Stationary batteries are often redundant or designed in parallel to increase capacity. A string represents the number of cells/batteries that are required at least to operate the end device. Each additional string contains the same number of cells/batteries, so the total number must be divided by the number entered here.
- ♦ **Two Jars /Cells:** This is a type of representation that NiCd or other cells are used whose Voltage should be below 2 volts. Often this involves a BACS module connected via 2 cells so that the actual number of batteries is exactly double the number of BACS modules.
- ♦ Status Screen this condition is displayed.
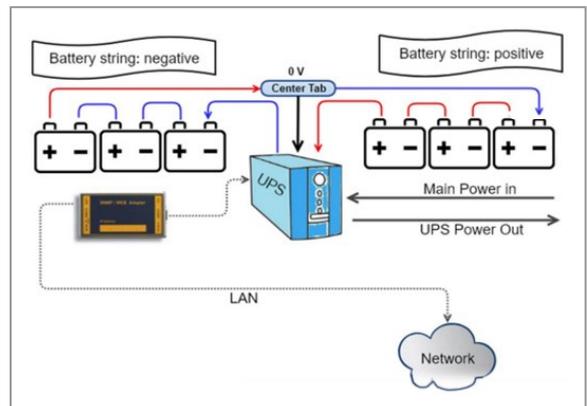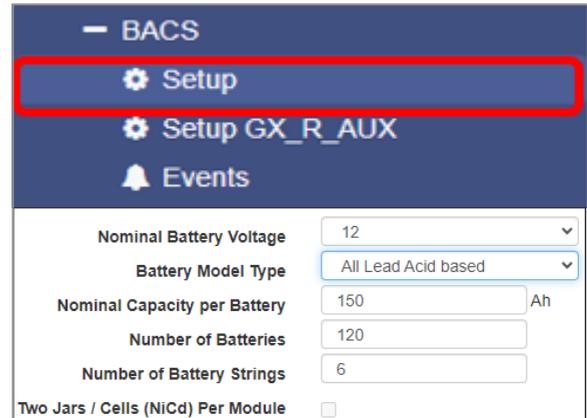
UPS with center tab, positive and negative strings

With this UPS battery distribution, the charging voltages between the positive and negative strings are generally slightly different and the balancing must regulate each string separately. For this purpose, at least 2 strings must be configured in such a system, or 4 or 6 if there is a single or double parallel configuration, as in the example on the right.

If you are unsure how many strings to enter, please contact your UPS manufacturer for further information on your UPS system.

Show modules per string: This changes the display of the numbering in the BACS status and in the log file. If the checkbox "**List modules per string**" is selected, the module numbers in all strings are always displayed in the BACS monitor starting from 1, e.g. string 1 battery number 1-20, string 2 battery number 1-20 etc. For this purpose, the batteries are identified in the BACS log file with a prefix, e.g. 4S2 = module 4 in string 2. This facilitates the physical identification of a battery in large battery rooms that is often numbered according to the same scheme.

Configuration examples:
  2 parallel strings (2 x positive / 2 x negative)
  Number of configured BACS strings: 4

  3 parallel strings (3 x positive / 3 x negative)
  Number of configured BACS strings: 6
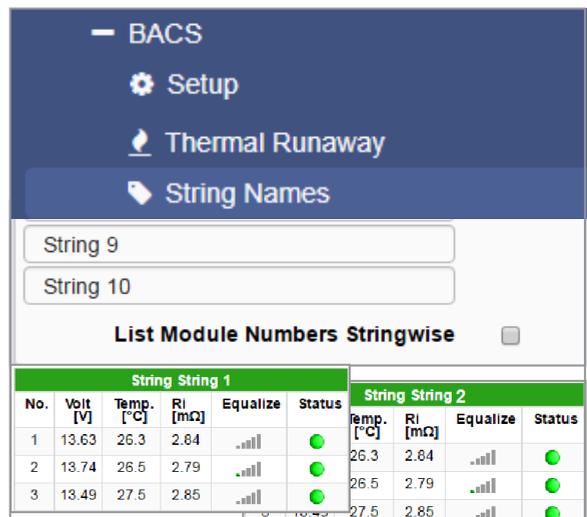
First BACS start after addressing and configuration

The BACS Monitor displays a start-up screen with the progress of communication to the BACS modules.
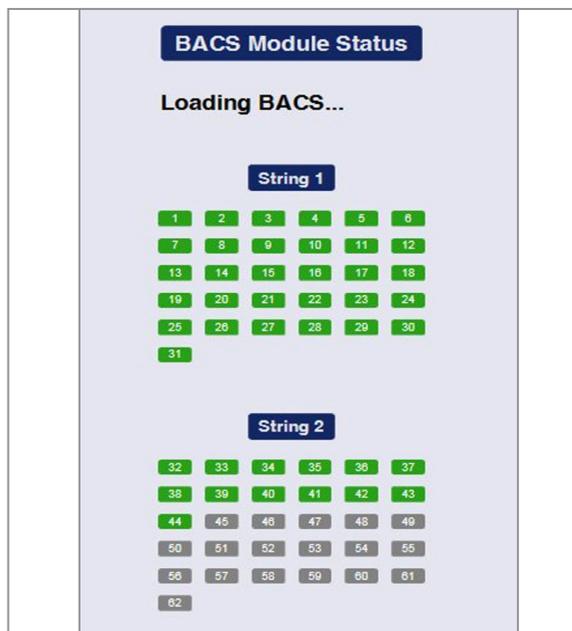
The colors have the following meaning:

- 🟩 BACS module initialized and ready for operation
- 🟥 BACS module not accessible
- ⬜ BACS module not yet queried

After successful initialization, the BACS status page with the battery measurements and status is displayed for the first time. The BACS web manager needs about 20 seconds after the last module has been initialized.

After about 10 minutes the first measurement of the Impedance is carried out as long as in the column Ri only N/A is displayed. Wait until the first RI Measurement is performed before you start to set alarm thresholds.

The chapter on configuring alarm thresholds is part of the BACS user manual and is no longer covered in this quick guide.

Illustration: Excerpt from a BACS STATUS screen with activated balancing

The quick start is now complete and further fine-tuning must be carried out using the BACS user manual.

For the complete user manual, visit the the download area of www.generex.de or www.generex.us