

BACS ATEXC20ex3/C30ex3/C40ex3

Zone 1 / 2

Area 21/22

Installation and Operating Instructions

introduction

This manual contains information on the installation, commissioning, maintenance and disposal of ATEX devices in zones 1 and 2. ATEX devices are devices intended for use in potentially explosive atmospheres. Hazardous areas are areas in which an explosive atmosphere can form. A potentially explosive atmosphere consists of a mixture of gases, vapours, mists or dusts with air which can cause an explosion.

When using ATEX equipment, it is important to follow safety regulations. The safety regulations are defined in the ATEX directives. The ATEX directives are directives intended to ensure the safety of workers in potentially explosive atmospheres.

This guide contains information on the following topics:

- General safety instructions
- Installation of ATEX equipment
- Commissioning of ATEX devices
- ATEX equipment maintenance
- Disposal of ATEX equipment

This manual is a valuable source of information for anyone using ATEX Zone 1/21 and 2/22 equipment. The manual contains all the important information you need to use ATEX equipment safely and properly.

Safety instructions

- Read this manual carefully before using ATEX equipment.
- Follow all instructions in this manual.
- Only use ATEX devices in potentially explosive atmospheres.
- Use ATEX equipment only for its intended purpose.
- Do not use ATEX equipment if damaged.
- Have ATEX devices installed, commissioned, maintained and disposed of by qualified specialists.

By following these safety instructions, you can ensure the safety of yourself and others.

Part 1. What is ATEX?

This chapter deals with the following points:

- Description of potentially explosive atmospheres
- Description of ATEX equipment
- Description of ATEX protective measures
- Importance of training for ATEX protection
- Importance of documentation for ATEX protection
- Importance of audits for ATEX protection

Definition of ATEX

ATEX stands for Atmospheres Explosibles.

It is a designation for European legislation that ensures the safety of people and systems in potentially explosive atmospheres. The ATEX directives specify requirements for the design, installation, commissioning and use of devices and systems in potentially explosive atmospheres. A potentially explosive atmosphere is an atmosphere containing a mixture of air and combustible materials in the correct concentration to cause an explosion. Explosions can be caused by a number of ignition sources such as: B. sparks, open flames or electrostatic discharges.

The ATEX guidelines apply to all devices and systems that are used in potentially explosive areas. These include e.g. B. machines, tools, electrical appliances and lighting systems. The ATEX directives specify requirements for the design, installation, commissioning and use of this equipment and systems to prevent explosions.

The ATEX guidelines are divided into two areas:

- ATEX 95

ATEX 95 is a European directive that ensures the safety of electrical equipment in potentially explosive atmospheres. It specifies requirements for the construction, installation and use of this equipment. This directive applies to all electrical equipment used in potentially explosive atmospheres, including machinery, tools, lighting and controls. The ATEX 95 directive states that electrical equipment must be designed and used in such a way that it is not a source of ignition for an explosion.

The directive also contains requirements for the installation and maintenance of electrical devices and equipment in potentially explosive atmospheres. The ATEX 95 directive helps to improve the safety of people and systems in potentially explosive atmospheres.

- ATEX 137

ATEX 137 is a European directive that ensures the safety of non-electrical equipment in potentially explosive atmospheres. It specifies requirements for the construction, installation and use of this equipment. This directive applies to all non-electrical equipment used in potentially explosive atmospheres, including machinery, tools, fittings, lighting and controls. The ATEX 137 directive states that non-electrical

equipment must be designed and used in such a way that it does not present an ignition source for an explosion.

The directive also includes requirements for the installation and maintenance of non-electrical devices and equipment in potentially explosive atmospheres. The ATEX 137 directive helps to improve the safety of people and systems in potentially explosive atmospheres.

EX-BACS systems consist of both electrical and non-electrical parts; both directives may have to be observed during installation, maintenance and disposal!

What is an explosive atmosphere?

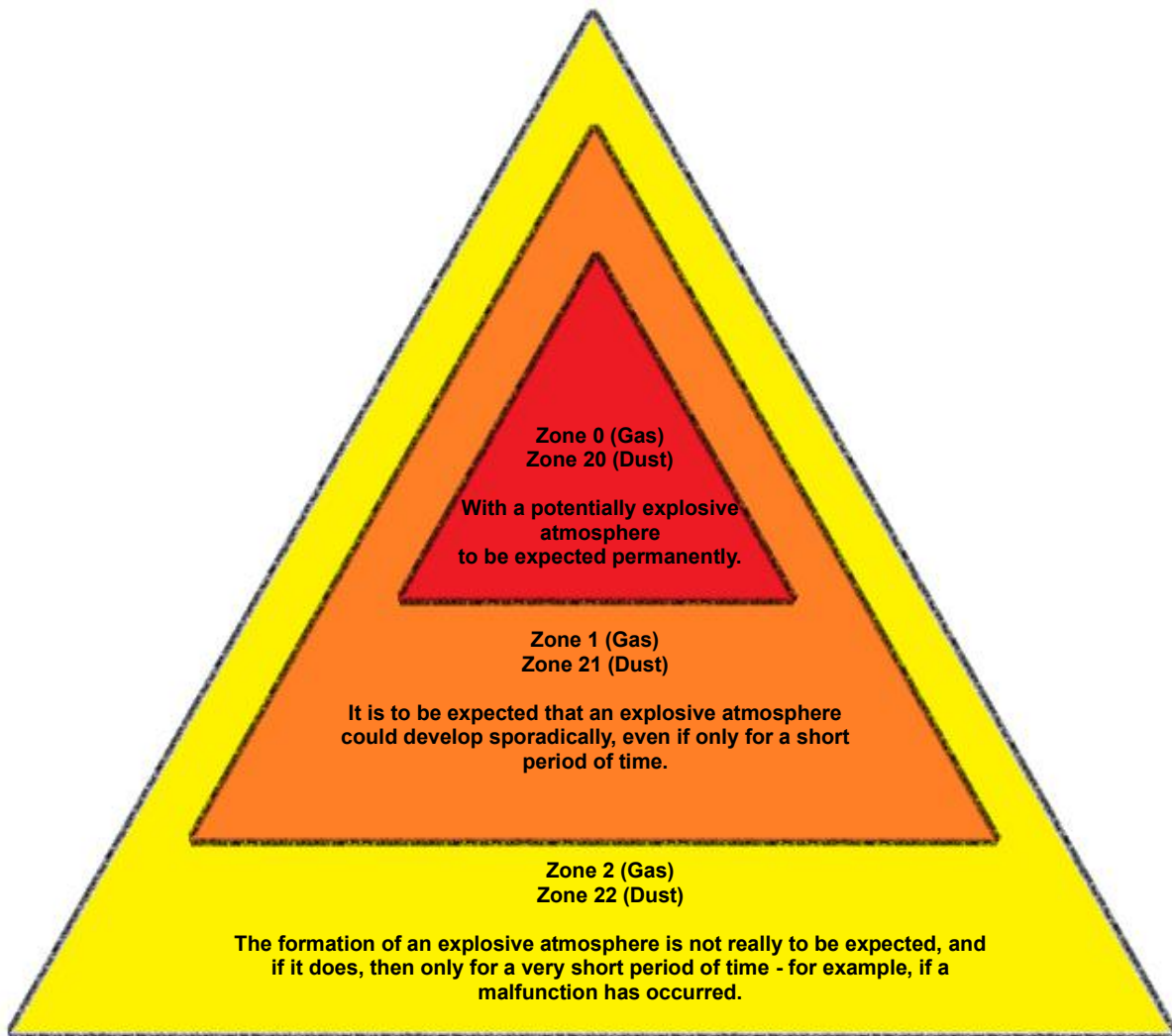
Most often it is a localized environment where combustible material is released into the environment and mixes with the existing air. If the critical mass of combustible material in relation to the air is reached, an explosive atmosphere can develop suddenly. The real danger here is that these mixtures of gases, vapours, mists or dust in combination with air and oxygen are unpredictable and only require ignition energy to start the chain reaction, which ends in an explosion. There are many different types of substances that are explosive. These include, for example:

- Gases: gasoline, propane, butane, natural gas, hydrogen
- Vapors: acetone, alcohol, petrol, diesel
- Fog: Varnishes, paints, solvents
- Dust: flour, wood, coal, grain

The speed with which an explosive environment develops depends on a number of factors, such as B. the type of flammable substance, the concentration of the flammable substance in the air, temperatures, air circulation, existing pressure, etc. ... For this reason, explosive environments are very dynamic and can be both immediate by the release of highly flammable gases or also creeping over you from over a long period of time, for example when a combustible substance slowly evaporates or dust is picked up and whirled up by air currents.

It is important to be aware of the danger of explosive atmospheres and to take the necessary safety measures if necessary.

The ATEX zone classification for gas/dust explosion endangered areas



	<p>An area in which an explosive atmosphere consisting of a mixture of air and combustible substances in the form of dust particles, gas, vapor or mist is present continuously or for long periods.</p>
	<p>An area in which it is to be expected that an explosive atmosphere from a mixture of air with combustible substances in the form of dust particles, gas, vapor or mist could arise for a short time during normal operation - for example when filling and emptying a Attachment.</p>
	<p>An area in which it is unlikely that an explosive atmosphere consisting of a mixture of air with combustible substances in the form of dust particles, gas, vapor or mist will occur during normal operation, and if it does, then only rarely and only briefly.</p>

The BACS ATEX version C20ex3Z1/C30ex3Z1/C40ex3Z1 are both developed and certified for zone 1 / 21 and zone 2 / 22 (gas and dust areas). The models C20ex3Z2/C30ex3Z2/C40ex3Z2 are only certified for Zone 2 / 22.

Measures to prevent incidents

In principle, a distinction is made between primary and secondary / tertiary measures to prevent an incident within an ATEX zone:

The primary measures are aimed at controlling the environment in such a way that the possibilities in which a correspondingly explosive atmosphere can develop are directly avoided. These measures include, for example, sensors and/or ventilation and aeration systems whose only task is to free the environment from combustible gases, or sprinkler systems that bind dust particles through moisture.

The secondary and tertiary measures describe a series of regulations on how the electrical and mechanical devices and tools within a zone must be designed in order not to supply the ignition energy in case of doubt, as well as catalogs of measures regarding logistics and the behavior of people who are within this zone must.

In addition to the measures and security guidelines officially defined as standard, there are also national and company-specific security guidelines that may still have to be observed.

Project and system documentation

The ATEX directives provide a number of measures to reduce the risk of explosion. These include, among others:

- The use of explosion-proof devices and equipment.
- Compliance with safety regulations.
- The training of the employees.

Please note that your documentation is an important part of the ATEX directives and is accordingly carefully prepared and maintained by all companies operating in potentially explosive atmospheres.

The documentation must contain all relevant information to be able to assess the risk of explosion and to take appropriate measures.

This includes:

- The risk assessment.
- The explosion protection plan.
- The operating instructions for the devices and equipment used.
- The training documents for the employees.

The documentation must be written in a clear and understandable language and be available to all employees who work in potentially explosive areas. By complying with the ATEX guidelines, companies can reduce the risk of explosion and increase the safety of their employees:

- The documentation helps companies to assess and reduce the risk of explosion.
- The documentation helps companies document compliance with the ATEX directives.
- The documentation helps companies train and inform employees.
- The documentation helps companies to determine the causes of accidents and incidents and to take the right measures.

Please note:

The documentation of an EX system is a central part of the ATEX specifications and important for compliance with the ATEX guidelines:

- The documentation should be updated regularly.

This is particularly necessary when working conditions or the equipment used change.

- The retention of the documentation

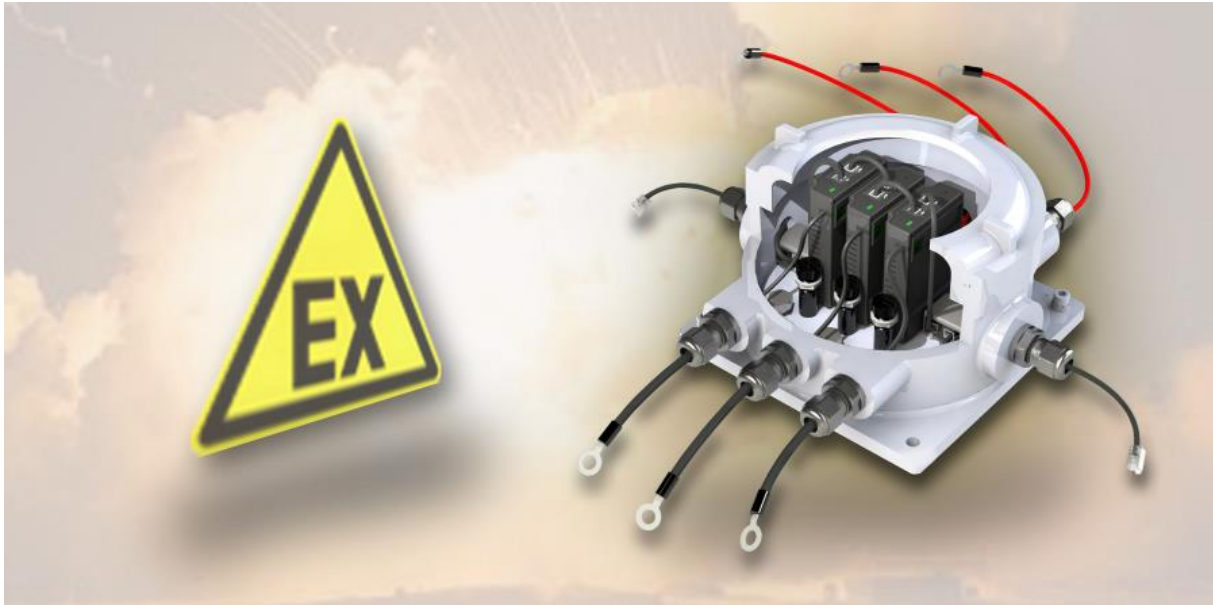
The documentation should be kept in a safe place. It should be accessible to all employees working in hazardous areas.

- The documentation should be kept for at least 10 years.

This also applies to documentation created for products that are no longer placed on the market.

Keep the documentation of the EX-BACS system you are using, as it is not only an integral part of your project documentation, but should also be part of the employee training according to the ATEX guidelines

Part 2: Preparatory measures: Installation / commissioning



Checklist: Installation work in ATEX zones



The EX version of BACS may be installed and operated in zones 1/21 or 2/22, depending on the model.

- If in doubt, contact the authority having jurisdiction for a definition of zones and zone plans

Observe the safety guidelines that are prescribed for ATEX protection zones.

- Only use ATEX-compliant tools for any type of electrical and mechanical work
- Observe the ATEX directives and local and internal safety standards for working within an ATEX zone
- The work may only be carried out by instructed or certified specialists.
- Make sure that all documentation required for the work is available

Plan your use according to the ATEX specifications

- Keep the mission as short as possible
- Check the atmosphere before and during work
- Make sure that the wiring is de-energized if possible
- Discard damaged items IMMEDIATELY
- Only use approved tools
- Make sure that the atmosphere is suitable for the planned work.
- During the entire work, continuously monitor the atmosphere for explosive gases and particles
- Only ATEX-certified personnel may carry out installation work

The owner or the company commissioned with this work is responsible for monitoring and complying with national and international guidelines during assembly/installation, commissioning, regular operation and maintenance work.

BACS installation checklist

Installation of the BACS modules

Warning:

Please bear in mind that batteries, battery racks and current-carrying systems as well as ATEX housings may be under high voltage - if you touch high-voltage components, there is an acute risk of death and explosion!



Improper handling of modern battery systems can sometimes be life-threatening. There are also numerous legal requirements that personnel must meet when installing, operating and maintaining electrical systems. For this reason, we ask you to read the following safety instructions carefully and, in case of doubt, to consult trained and specially trained specialists:

Basics when working on battery systems

1. *Make sure that the basic conditions for installing BACS are met.*

Improper handling can lead to personal and material damage! GENEREX is not responsible or liable for any direct or indirect damage caused by improper handling.

2. *Risk of explosion and fire*

avoid short circuits! Especially the metal parts of a battery are always charged, never put metal objects or metal tools on the battery!

3. *Electrolytes are severely corrosive.*

Electrolytes from battery leaks are harmful to eyes and skin.

4. *Pay attention to specially trained personnel*

Working with batteries, especially installation and maintenance, should only be carried out by trained personnel or by personnel authorized by the battery manufacturer. The personnel must be familiar with the handling of batteries and the necessary precautionary measurements.

For inexperienced personnel, there is sometimes an acute danger to life from high voltage!

5. *Follow the legal regulations carefully*

- ZVEI publication "Instructions for the safe handling of electrolytes and lead-acid accumulators".
- ZVEI publication "Safety Data Sheet for Accumulator Acid".
- VDE 0510 Part 2: 2001-12, corresponding to EN 50272-2:2001: "Safety requirements for battery installations - Part 2: Stationary batteries".
- IEEE Standard 450-2002: "Recommended training for the maintenance, testing and replacement of degassed lead-acid batteries for stationary applications".
- IEEE Standard 1375-1998: "Handbook for Securing Stationary Battery Systems".

Tip:

The legal requirements can vary depending on the country and state and can be adapted to the circumstances over time. If in doubt, get information from the responsible local authorities beforehand in order to be able to meet the current local legal requirements.

6. Observe the safety rules when handling electrical conductors and components

- Ensure that all electrical loads and power supplies (chargers) are switched off (fuses, switches). This must be done by qualified personnel.
- Remove all watches, rings, chains, and other metal objects before working on batteries.
- Only use insulated tools
- Wear insulated rubber gloves and rubber shoes
- Never place tools or metallic components on the batteries.
- Make sure the batteries are not accidentally grounded. If the system is grounded, disconnect it. Touching grounded batteries can cause electric shock.
- Check for correct polarity before making connections.
- Filled lead-acid batteries contain highly explosive gas (hydrogen/air mixture). Never smoke or create sparks near the batteries. Always avoid electrostatic discharge; wear cotton clothing and ground yourself if necessary.
- Wear the appropriate and, if necessary, legally required safety and protective clothing.

7. Avoid installations in inappropriate areas

Avoid installations with BACS standard modules (non EX-protected modules from the BACS series)...

- in open spaces or in non-waterproof, closed spaces
- in dusty rooms or places with high dust generation
- in areas with high concentration of saline or oxidizing gases
- near open flames, sparks, or sources of heat or extreme heat
- in places with high temperature fluctuations
- in areas with high vibration or mechanical movements
- in areas with gas concentration or flammable substances.

Tip:

In some cases, the boundary between whether a location is suitable or unsuitable for the installation of a BACS system can be fluid. If in doubt, contact the GENEREX Support Team, we will be happy to advise you in such cases.

You can reach the support team at the email address support@generex.de.

If you need to install BACS in a location that deviates from a standard installation for technical or environmental reasons: GENEREX offers specially insulated and sealed modules such as the EX BACS series for this case.

Notes during the installation of BACS

1. high voltage hazard

Do not open the BACS sensor; Do not attach any objects to the battery or the BACS modules! The BACS modules and cables could be under high voltage!

2. Watch out for magnetic fields

Remember that any live wire creates a magnetic field around itself. The strength of the magnetic field depends on the current strength: A large UPS system can generate very large electromagnetic interferences - so-called EMI - with insufficient shielding. Therefore, avoid installing or operating devices that react sensitively to electromagnetic fields - this may also include qualified personnel with a pacemaker!

3. Pay attention to trained and BACS qualified personnel

BACS is installed on batteries that may have high voltage. As soon as the BACS measurement and connection cables are connected to the batteries, they may also be under high voltage. To avoid short circuits, make sure you have disconnected the system from the batteries before doing any

maintenance or installation work on the BACS cables. Sometimes a certain order has to be followed, which is usually only known to trained specialists.

Tip:

Do you need BACS training for your technicians? Talk to us - our training team will be happy to advise you on the best way for you to receive a BACS training course.

4. Replace damaged batteries before installing BACS for the first time

Damage to batteries can often not be determined by a mere visual inspection. They only show up during a measurement of the internal resistance. The higher the internal resistance, the worse the condition of the battery.

The problem:

If a battery is already so damaged that the internal resistance is extremely high, the charging current or discharging current would no longer be able to flow through the battery, but would seek the path of least resistance through the BACS module. This leads to heating, which can damage or destroy the BACS module in the medium term.

Therefore, under no circumstances continue to use batteries in a battery bank that are already externally recognized as defective or that have extreme internal resistance using BACS!

5. *Never mix different BACS module versions or BACS measuring cable types.*

BACS modules differ technically within the revisions. The measuring cables have been specially matched to the corresponding revision of the BACS module. If you mix different BACS modules, it will not work in the simple case. Unfortunate combinations, on the other hand, lead to damage to the cables or BACS modules. Before you start the installation, check that you do not have any mixed stocks in your installation and sort them out beforehand.

Rework, maintenance and care

Regularly check the measured values of the modules and the temperature development of the batteries

- ... during installation and during the first charge/discharge cycle

During its initialization, BACS carries out its own diagnostic measurements to determine whether hidden defects occur within the battery network. Until BACS has completely recorded the batteries with the measurements and can reliably report defective batteries:

As soon as unusual temperature fluctuations and unusual increases are noticed, the battery should be replaced as soon as possible.

- ... up to 12 hours after a discharge!

The most common "thermal runaways" take place directly after a regular discharge caused by a power failure - a massive rise in temperature in damaged batteries, which can become so hot that there is an acute risk of fire. It has been shown that the risk of battery failure with damage to the electrolyte inside the battery is greatest in a time window of 0 to 12 hours after discharge. Only after this time window can a battery group be considered stable and reintegrated into the normal alarm chain.

If the battery temperature continues to rise after discharging instead of staying the same or slowly falling, the charging cycle should be ended manually immediately and the affected battery replaced.

- *Take the warnings that BACS sends you seriously and react in a timely manner*

BACS was specially developed to extend the service life of accumulators many times over. In addition to cyclical status messages, BACS will also inform you if a different behavior is detected in the monitored systems. Thanks to the unique control technology in connection with the efficient early warning and alarm functions, you can react before the incident occurs.

Please keep in mind that the trademarked technologies behind BACS can cushion any damage to the battery or charge control for a certain period of time from the first warning message, but cannot compensate for real defects in the long term.

Part 3 Installation of BACS:

Preparation for installation

Structure of the ATEX BACS housing

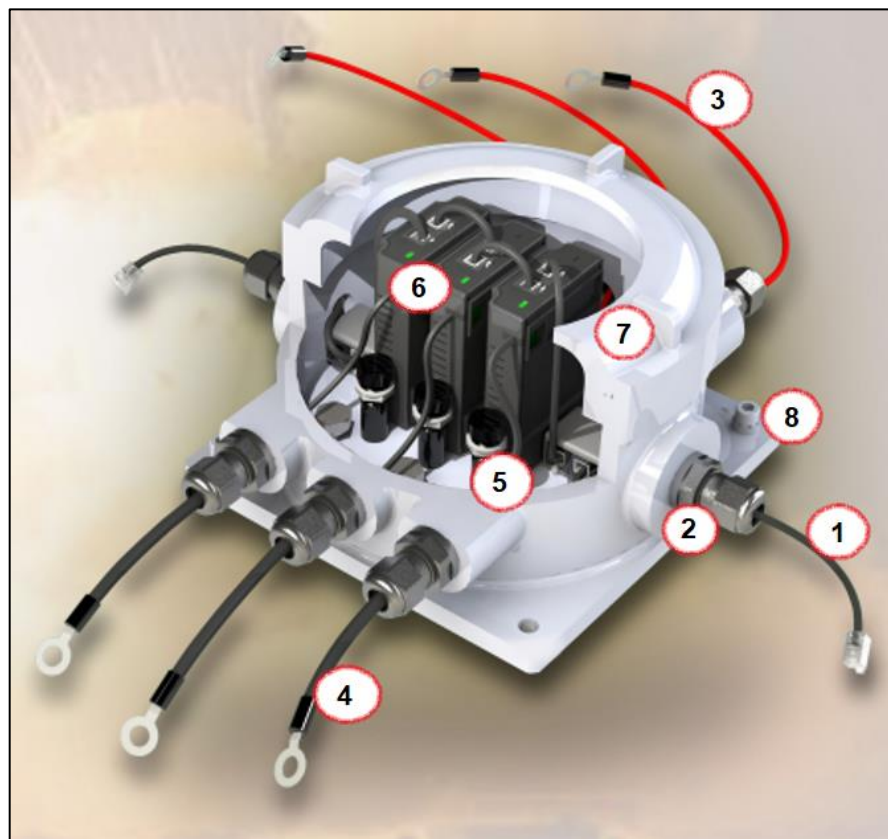
The ATEX BACS housing differs from the classic BACS installation. The main differences are an external temperature sensor integrated in the BACS measuring cable, fuses integrated in the housing and 3 modules per housing.

1. Connection cable BACS bus. These connection cables are used for BACS bus communication with the neighboring BACS ATEX module (or with the BACS WEBMANAGER / SPLITTINGBOX which is usually outside the hazardous area). The bus cables are either assembled on site to the desired length by the installer, or can be ordered pre-assembled in different lengths. The cables must be routed through the screw terminal (2) by the installer and sealed by tightening the screw.

2. Screw terminal with seal: After inserting the BACS bus cable, tighten the screw terminal - the integrated seal will wrap around the cable and thus seal it gas-tight.

3. Cable to battery positive pole (RED) : This connects the first of the 3 positive battery poles. The other remaining red measuring cables are connected to the 2nd and 3rd battery at the positive pole. The red cables are individually adaptable and can be shortened to the desired length by the installer and fitted with new cable lugs.

4. Cable connector negative pole (black): This is used to connect the first of the 3 negative battery poles. The other remaining black measuring cables are connected to the negative pole of the 2nd and 3rd



battery. These cables are slightly thicker than the red positive cables because a temperature sensor has been incorporated into the cable lug.

Important: Adjustment of the lengths of measuring cables

The cable lugs are set and sealed according to the ATEX standard! Cutting to length and crimping new contacts is therefore only permitted via the connections inside the housing!

5.BACS module fuse: The 2 fuses associated with each BACS module are located on the main circuit board and can be replaced if necessary.

6.BACS module : Each C20ex3xxxx can hold up to 3 BACS modules. Each BACS module is connected to a BACS bus cable (as a ribbon cable) and the 1st and 3rd module is connected to the next BACS ATEX housing (or to the BACS WEBMANAGER or SPLITTINGBOX outside the hazardous area) via the BACS bus cable and the screw terminal.

Each BACS module has the identification number ID 0 on delivery - this still has to be configured. Please read the BACS addressing guide in this manual which explains the addressing procedure.

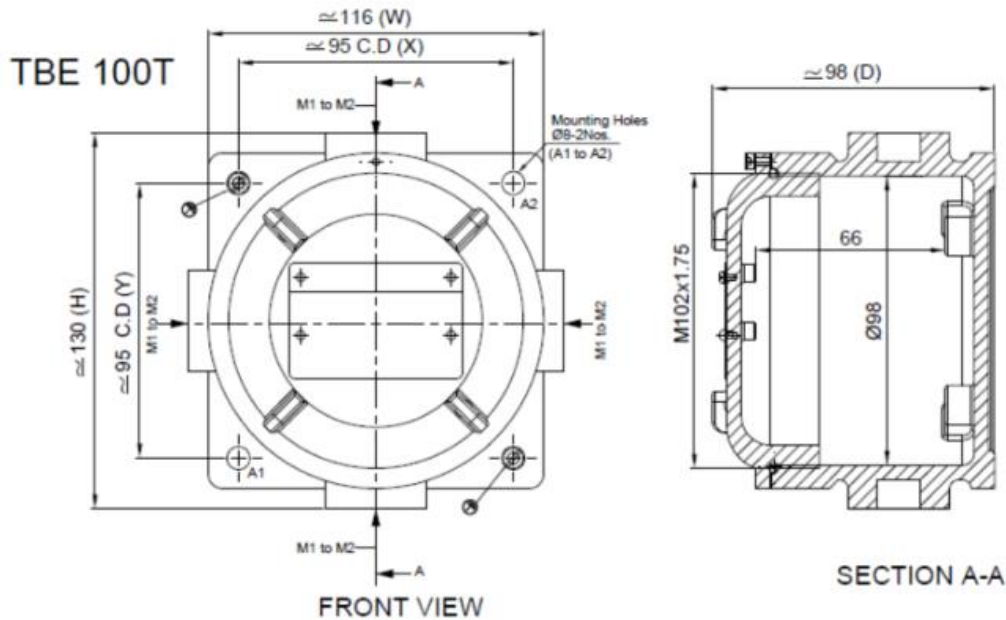
7. Screw cover with viewing window: Once the addressing and wiring has been completed, the screw cover can be closed and the locking screw tightened. The housing is then ready for use within ATEX zones 1 and 2 and can be put into operation. Read the BACS commissioning in this manual.

8. Mounting holes for stationary attachment and grounding: The BACS module can be attached to the battery rack, wall or other location and grounded using these 4 mounting holes.

The installation of the ATEX housing:

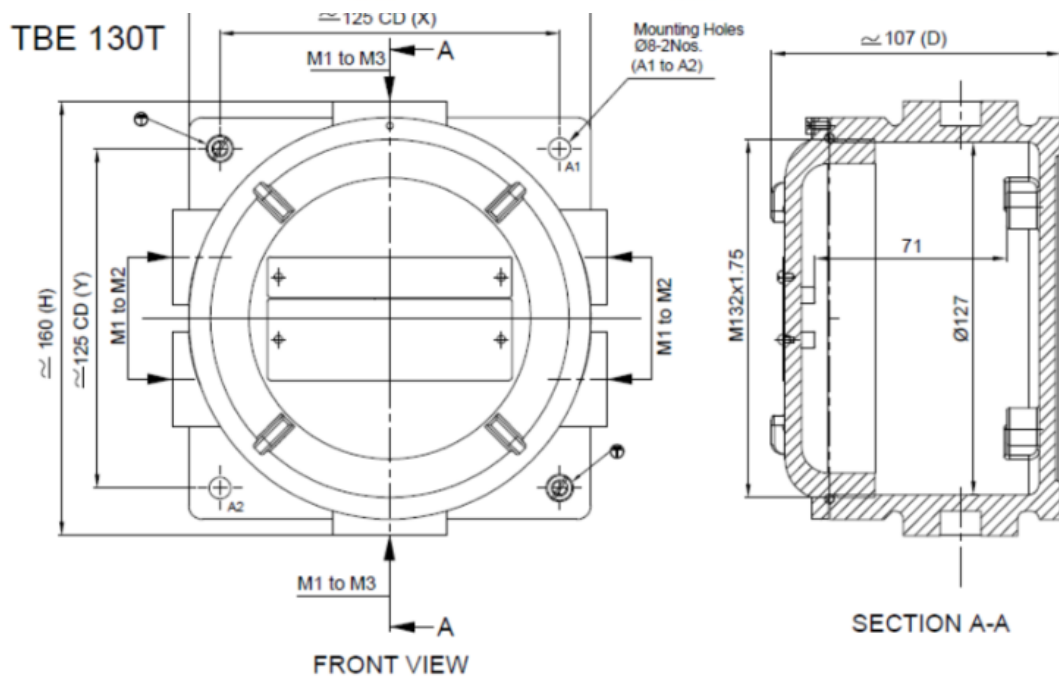
Step 1: Place and fasten the ATEX enclosures on site

Be sure to observe the regulations and drawings for ATEX zones 1/2 and 21/22. The housing must not be installed in zone 0 or 20. Ensure sufficient distance to the corresponding danger zone. Use the screw holes (8) to permanently attach and fix the case on site to ensure a stable setup.



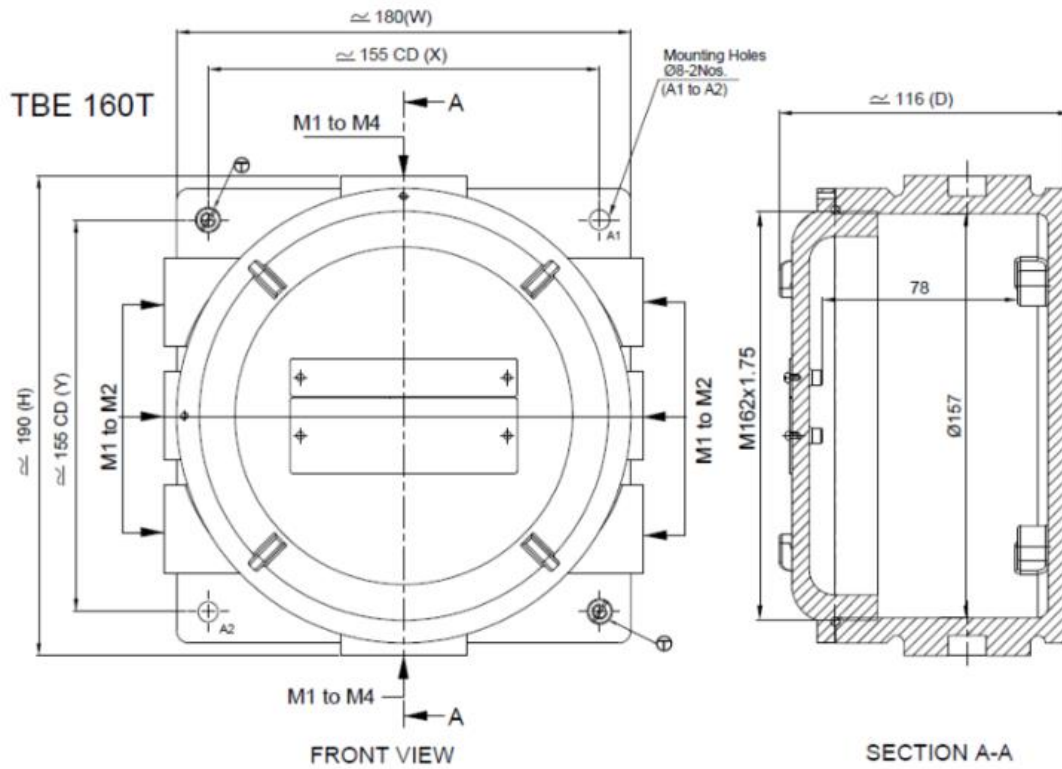
Weight in Al: 1.1 Kg

Weight in SS: 3.0 Kg



Weight in Al: 1.8 Kg

Weight in SS: 5.2 Kg

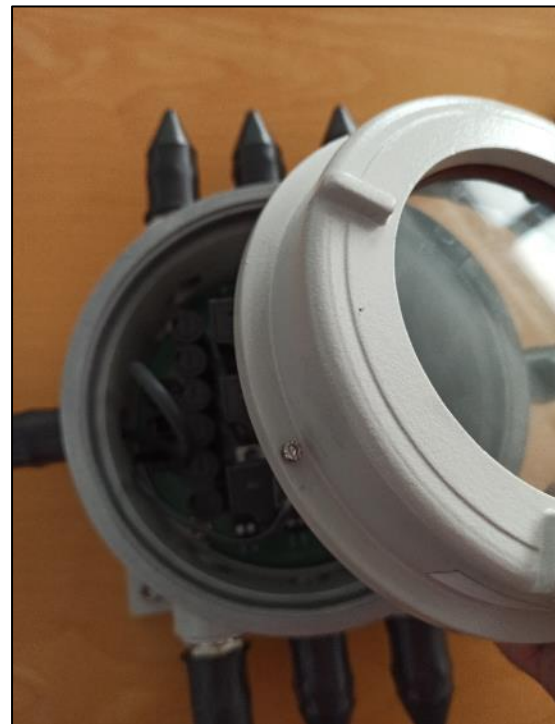


Weight in Al: 2.8 Kg Weight in SS: 8.4 Kg

Step 2: Remove the screw cap to access all housings

Loosen the locking screw (see figure on the right) on the front and carefully turn the cover (7) counterclockwise. Make absolutely sure that the seal on the screw cap remains clean and free of dust and is not damaged during the screwing process:

Damaged components must no longer be used!



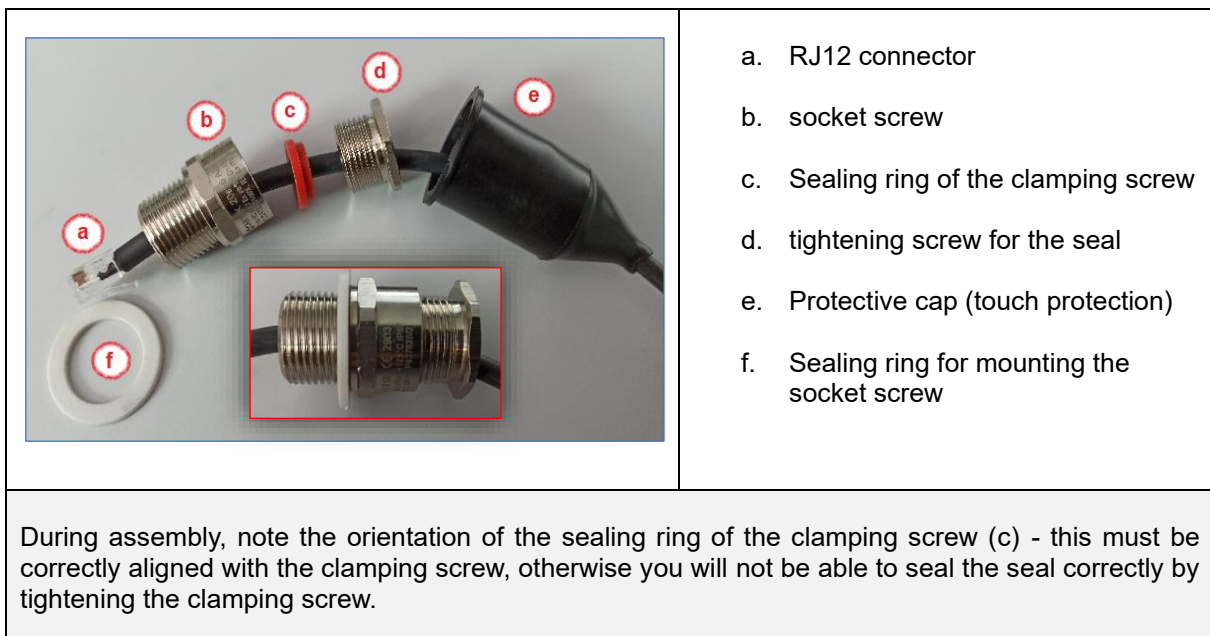
Step 3: Connect the BACS modules with the BACS bus cable**Tip**

If possible, we recommend using pre-assembled cables, as these have been checked for possible sources of error at the factory.

*Step 3a: Prepare the BACS bus cables**Self-assembled cables and different cable lengths*

Other cable lengths or specially adapted cables can also be assembled by an electrotechnically trained specialist if required. Before crimping the RJ-12 plug, make sure that all necessary elements are attached to the cable in the correct order. The crimp instructions and cable assignment can be found in the appendix of this manual.

Structure of the housing seal for self-assembled cables:



When installing the seal, make sure not to over-tighten the tensioning screw (d). the cable must be able to slide freely in the seal for installation. If the tensioning screw is tightened too much, you will twist the cable, which can lead to damage.

Factory pre-assembled cables

Pre-assembled cables have the advantage that the seals are already installed. These cables can be installed directly on the housing. The BACS bus cables for the connection between two housings have a pre-installed seal on both cable ends in front of the connector.

The feed line to the BACS web manager only has a seal installed on one side.



1. Carefully pull back the touch guard to reveal the screw connection.
2. Loosen the tightening screw for the seal (d) so that you can easily turn and move the screw cap around the BACS bus cable.

Step 3b: Inserting the cable

Insert the cable so far that the RJ12 plug with a cable length of approx. 10 cm is on the inside of the housing.

Screw the socket screw all the way in that into the case. Be careful when tightening the Socket nut ensure that the white sealing ring not damaged by excessive screwing pressure becomes.

**Step 3c: Connection of the BACS modules**

There are up to 3 pre-installed BACS modules in each housing. Use the connector on the motherboard to connect the BACS bus cable.

Tip:

BACS uses a BUS system, which as such cannot have a network short circuit within the BACS bus. So you can choose any RJ-12 connection for the BACS-BUS cable on the main board

**Step 3d: Sealing the connector**

In the last step, tighten the clamping screw for the gasket (d) until the BACS cable is firmly in the Seal is seated and can no longer move.

Check the position of the cables again and then pull out the protection against accidental contact about the seal.






Repeat the process until all ATEX-BACS enclosures are connected.

Step 4: The Blind Plugs

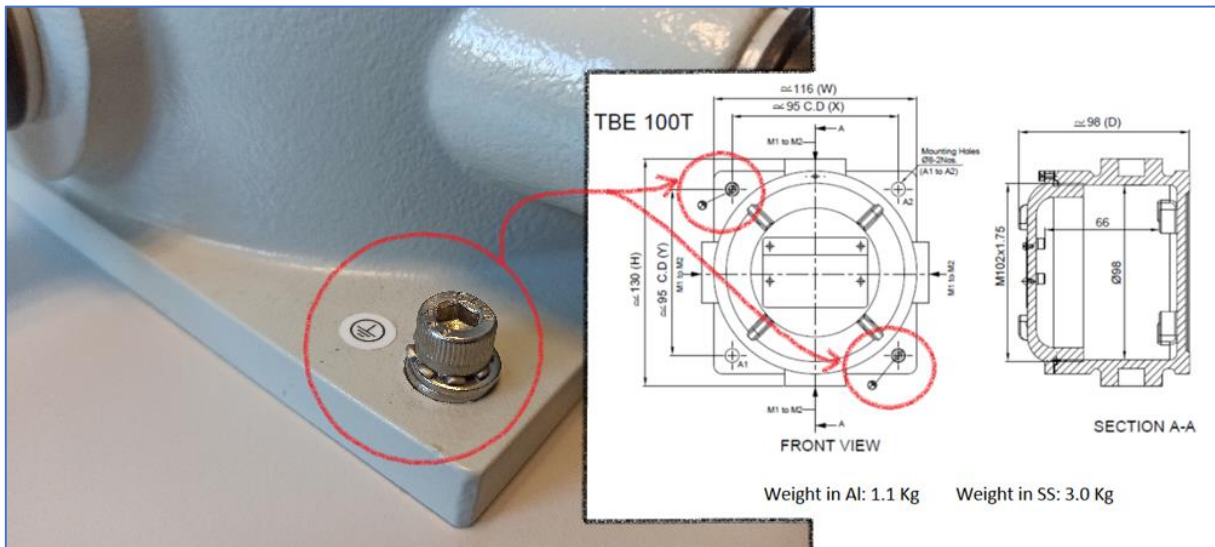
Blanking plugs are important - according to ATEX specifications, they must be used wherever cables with seals are not used. The contact protection made of rubber pulled over a seal is not sufficient to provide effective protection as a "seal with protection against sparks".

When connecting the BACS BUS cable, a blind plug must be placed at the last housing outlet for the BACS bus cable.

	
<p>Remove the nut from the blind plug. The sealing ring is required here, so leave it on the blind plug.</p>	<p>Insert the blind plug and tighten it. Make sure that the sealing ring on the blind plug is not damaged.</p>
	
<p>Tip:</p> <p>According to the ATEX specification, the blind plug must be placed at every open input and secured with a protection against accidental contact in order to protect the EX-I environment from potential sparks. The cable sealing with touch protection is not sufficient to ensure the specifications for operation in an ATEX protective environment.</p>	

Step 5: Ground all metal parts

Before connecting power sources of any kind, make sure that all metal housings have been carefully grounded and pulled to 0 potential.



Make sure the ATEX enclosures are properly grounded to avoid false charges. Live metal parts can be dangerous:

- Discharges can cause ignition sparks within the ATEX zone
- Touching live metal parts poses an acute danger to life!
-

Step 6: Connecting the Batteries**Warning:**

With this installation step you energize the BACS modules! Before carrying out the work, be sure to check whether the ambient conditions meet the conditions required for this work step (gas-free / dust-free atmosphere)!

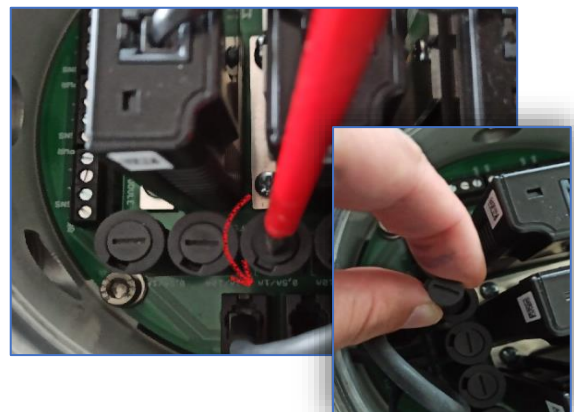
Immediately stop all work on live elements if a dangerous atmosphere develops.

This step consists of several subsections:

Section 6.1: Remove fuses

Insert a suitable screwdriver into the fuse holder and turn counterclockwise until it locks.

The bracket can then be easily removed from the base together with the fuse.



Section 6.2 Installing the BACS measurement cables

The ATEX BACS system is available both with a pre-assembled cable and with the cables included. If you do not want to make any changes to the cable lengths, please see Section 3 – Connecting the Batteries. Otherwise, see subsections 6.2a and 6.2b:

Section 6.1: Pre-assembled and already installed measuring cables

Changing the cable lengths for measuring cables

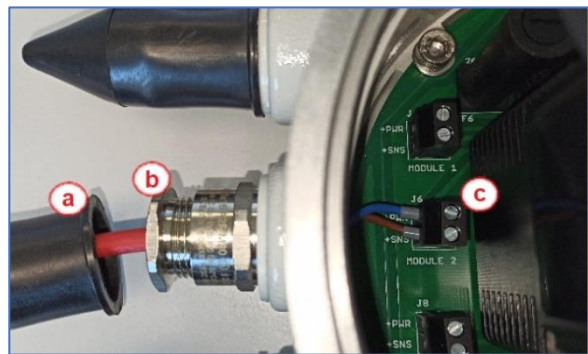
Important:

The modifications must never be made on the side of the cable lugs as they are specially sealed according to the ATEX directives. All manual cable work must only be carried out on the open contacts inside the housing.

Carefully pull off the contact protection (a), loosen the tightening screw of the seal (b) and the luster terminals (c). The measuring cable can now simply be pulled out of the housing.

Important:

During assembly work, ensure that you do not damage the seal and, if in doubt, replace it!

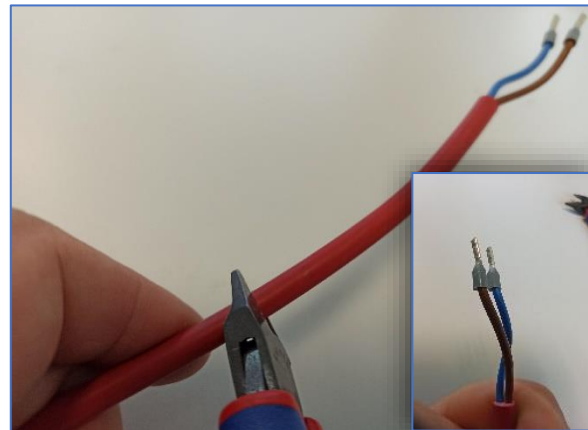


Now shorten the measuring cable to the desired length:

Remove the cable jacket and then crimp two new cable lugs.

Important:

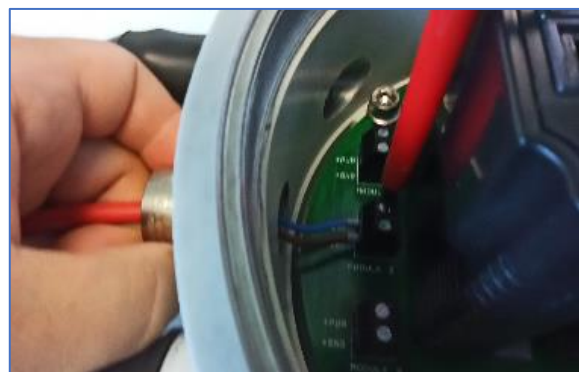
The cables are pre-assembled and tested ex works. Changes to the cable lengths should only be carried out by a qualified specialist in order to be able to guarantee error-free operation.



Now insert the measuring cable through the seal into the terminal blocks of the main circuit board and fix the cable by carefully tightening the luster terminals

Important:

The screws should be tightened hand-tight, overtightening the screws can damage the terminal block and thus the main circuit board.



Check the correct orientation of the sealing washer before inserting and tightening the tension screw: the narrow end should point away from the housing towards the tension screw.

Important

When tightened, the incorrectly installed sealing washer can lead to the seal not closing properly and being damaged.



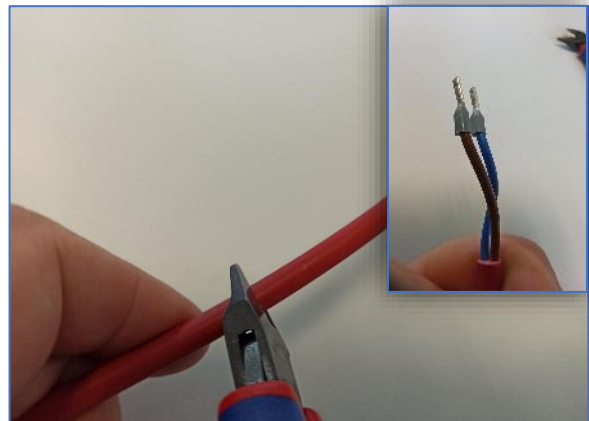
Subsection 6.2b: Measuring cables included for self-assembly

The difference to pre-assembled cables is that you have to cut the cables to length yourself and crimp the cable sleeve accordingly:

Cut the measuring cable to the desired length. Remove the cable jacket and then crimp two new cable lugs.

Important:

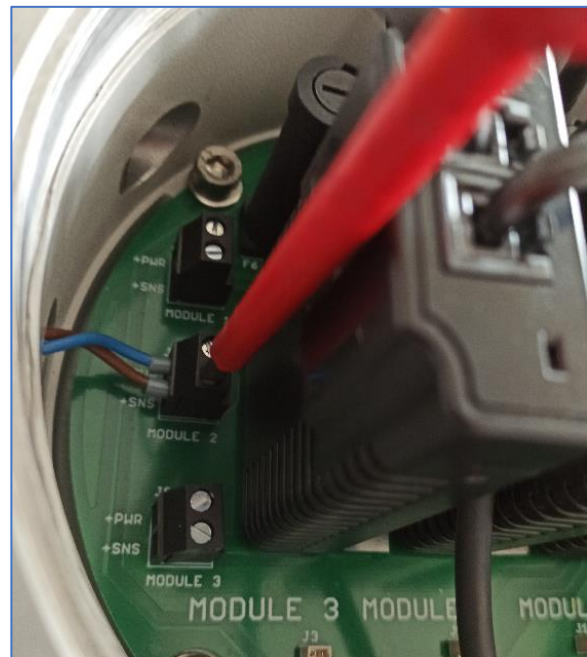
The cable lug must NOT be removed and set again, since it was set and glued or sealed according to the ATEX standard. **With the removal of the cable lug you remove the operating permit within the ATEX zone!**



Loosen the gasket tightening screw and insert the measurement cable through the gasket into the motherboard terminal blocks and secure the cable by gently tightening the luster terminals

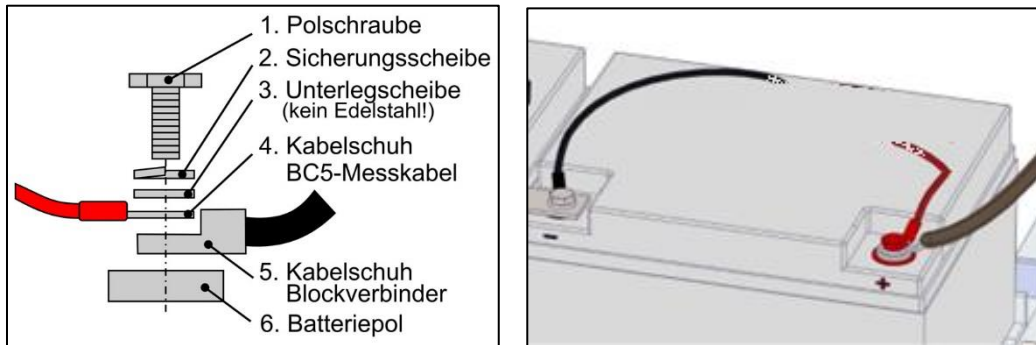
Important:

The screws should be tightened hand-tight, overtightening the screws can damage the terminal block and thus the main circuit board.



Section 6.3 - Connecting the Batteries

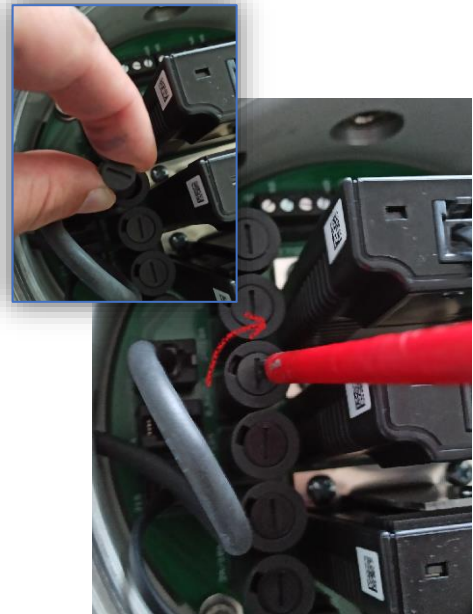
Connection terminals of the batteries at 6V - 16V - battery with an ATEX BACS measuring cable



When connecting the battery clamps, please observe the torque values specified by the manufacturer, otherwise you could damage both the battery and the connection clamps. Depending on the manufacturer, there may be differences due to the design.

Section 6.4 - Installing the fuses

Place the fuse holder back into the socket and lock the holder by turning it slightly clockwise. Be careful not to damage the socket by excessive turning



Step 7: Connection of the BACS web manager

Important:

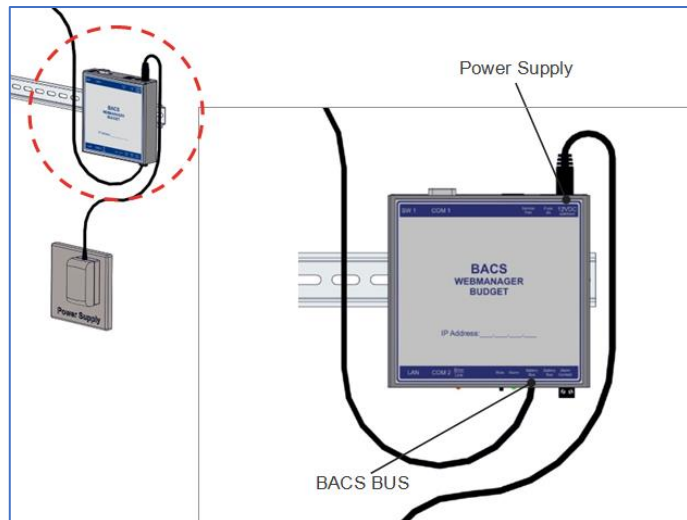
Please note that the BACS web manager must not be operated within the designated ATEX zones 1/2 or 21/22.

Connect the BACS bus cable to the BACS web manager. After connection, start the BACS web manager.

Make sure that the supply line to the first ATEX BACS housing only requires a corresponding sealing sleeve on one side.



As soon as you have established the connection to the BACS web manager, you can boot up the web manager and start with the configuration.



Step 8 Configuration / Commissioning

The configuration is divided into several individual steps:

1. Assignment of the IP address / basic configuration
2. Entry of the general battery data / configuration of the BACS modules
3. Initialization and completion of the first boot
4. Integration into the customer network

Preparatory actions

Prepare computer Add route on computer

1. Run the command prompt with the option "run as administrator" from the Windows context menu.
2. Enter the following command:
route add 10.10.10.10 <local IP address>(Example: "route add 10.10.10.10 192.168.1.54")
3. Windows confirms the input with "OK"



access options

1. Open a web browser

2a. Direct access during initial configuration

Enter Default IP
"https://10.10.10.10" a

2 B. Access in DHCP mode: The Netfinder

Netfinder is a tool that can display the IP and MAC addresses of web managers connected to your network. It helps if your IP addresses are assigned using DHCP.

You can find the tool in the download area of

www.generex.de

For UPS users

A notice. If you want to configure BACS, press "Cancel" here and go to step 3.

The web manager starts with a configuration tool, the "System Setup Wizard".



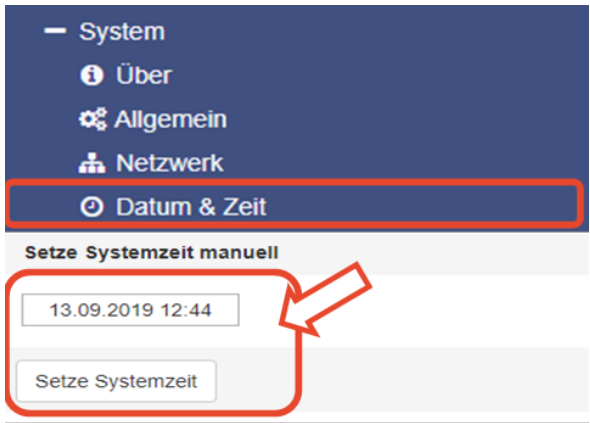
This guides you through the most important installation points.

Tip:

If the wizard does not start automatically, click on

- "systems"
- "wizard"

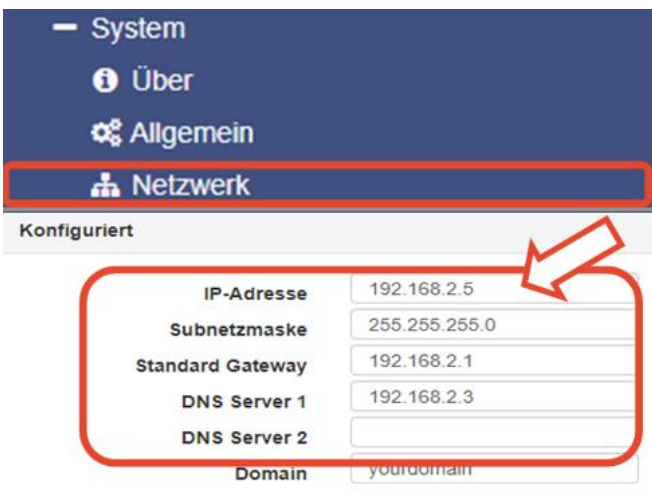
1. Assignment of the IP address / basic configuration

<p>Select your language</p> <p>1.Go to the menu - "System" - "General"</p> <p>2.Select the "Language" you want.</p> <p>Save the setting with "Apply".</p>	
<p>Turn off the UPS</p> <p>1.Choose in the menu - "Devices"- "Configuration"-</p> <p>2.For COM 1 under Device select "none" The UPS menus are automatically hidden in the current configuration.</p> <p>3.Save your entries with "Apply".</p>	
<p>Set the system time</p> <p>Time of day is important for precise control and logging of events.</p> <p>1.Go to the menu - "System" - "Date & Time"</p> <p>2.For quick configuration, press the button: "Set system time"</p>	

Set up the IP address

Assigning a static IP address is recommended in larger networks:

1. Choose in the menu
 - "System" - "Network"
2. Enter the desired data
 - "IP address" - "Subnet mask" - "Default gateway" - "DNS server"
3. Save your entries with "Apply".



The BACS web manager will automatically adopt the new IP address and restart. Important: As soon as the IP address changes, you may have to adjust the IP address of your computer, otherwise you will no longer be able to access the web manager.

2. Entering the general battery data / configuration of the BACS modules

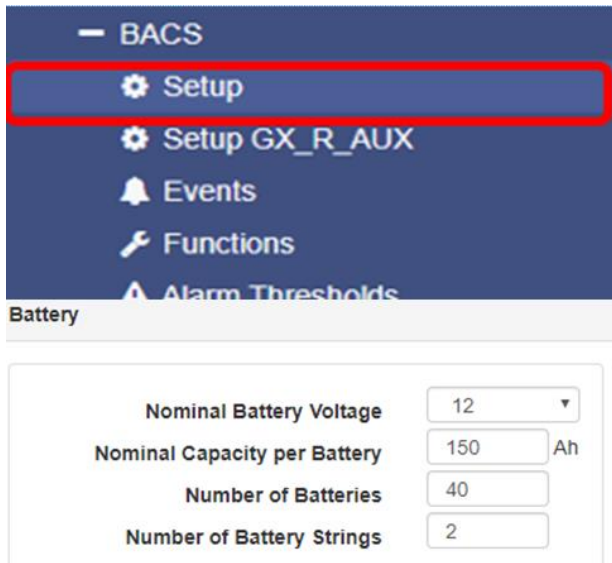
Battery information

1. In the main menu under "Devices/Systems" select the submenu "BACS" and open the "Setup".
2. Enter the battery information.

Configuration example:

40 batteries were installed in 2 strings

Enter 40 for number of batteries on and for number of battery strings 2.



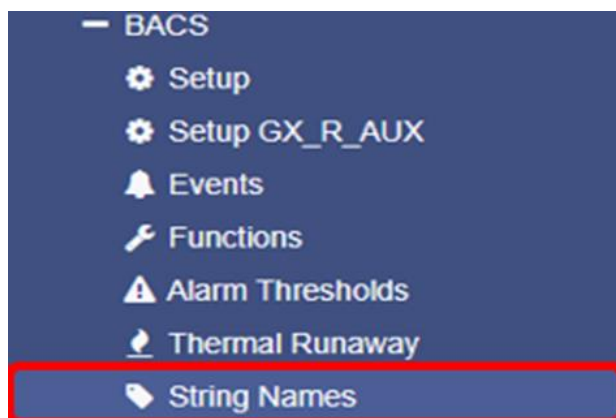
List modules per string: Status display and log file

If the checkbox "Execute modules per line" is selected, the module numbers in line 1 and line 2 from 1-20 are displayed in the BACS monitor. In addition, the batteries per string are logged in the BACS log file with a prefix:

4S2 = module 4 in line 2

This facilitates the physical identification of a battery numbered according to the same scheme in the system.

Please contact your UPS manufacturer for more information about your UPS system if you are not sure how many strings to enter.



A screenshot of the configuration form for 'String Names'. It shows input fields for 'String 8', 'String 9', and 'String 10'. Below the fields is a checkbox labeled 'List Module Numbers Stringwise' which is currently unchecked.

String String 1						String String 2			
No.	Volt [V]	Temp. [°C]	Ri [mΩ]	Equalize	Status	mp. C]	Ri [mΩ]	Equalize	Status
1	13.63	26.3	2.84	..lll	●				
2	13.74	26.5	2.79	..lll	●				
3	13.49	27.5	2.85	..lll	●	..3	2.84	..lll	●
4	13.68	26.5	2.94	..lll	●	..5	2.79	..lll	●

The BACS programmer

The BACS Programmer Tool can also be found in the BACS WEBMANAGER.

1. Under "Devices/Systems", open the "BACS" submenu.
2. Select the menu item "Programmer" there.
3. Check "Enable Page Input Capability".

With this function you enable the following functions for BACS configuration:

Audible Confirmation:

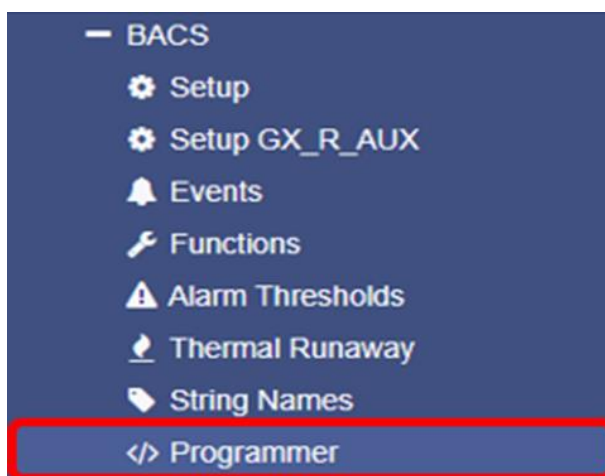
A beep from the BACS WEBMANAGER/BACS Bus Converter confirms successful module addressing

Automatic/Manual mode:

Address your BACS modules.

BACS Address Search Tool:

Find a BACS module with a specific address.



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.



Addressing the BACS modules in automatic mode

The automatic mode allows the modules to be addressed automatically. After each successful addressing, one address is automatically incremented in order to prevent double address assignment. If you want the web manager to emit an acoustic signal for each registered module, tick "Audible Confirmation". Under "Start" you define the first address to be used. Under "End" you define the last address that is assigned.

Addressing example 1:

The start address is 1 and the end address is 35:

The BACS programmer will address exactly 35 modules starting with number 1.

Addressing example 2:

The start address is 76 and the end address is 89:

The BACS programmer will address exactly 14 modules, assigning 76 to the first module and 89 to the last module.

With "Start" you begin the addressing process

Range

Help

Reset

Start 1

End 124

Start Stop

Reset

Start 1

End 35

Start Stop

Reset

Start 76

End 89

Start Stop

Reset

Start 1

End 35

Start Stop

Addressing of the BACS modules

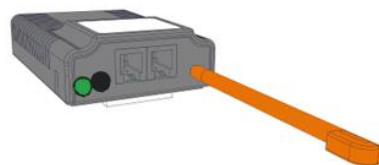
By pressing "Start" in the programmer, the blinking frequency of the BACS module LED increases as confirmation that the addressing is ready.

Briefly press the button on the BACS module with the BACS PEN. Successful addressing is confirmed by incrementing the address on the website, green module LED and an acoustic signal. Repeat the process until all modules are green.

Please note:

In automatic addressing mode, all LEDs should be flashing red quickly. If this is not the case, there is an error. In this case, tick "Set all addresses to 0" in the programmer.

You can also press and hold the button on the relevant BACS module for about 10 seconds to reset the module to the delivery status. Then repeat the addressing process. (This function is no longer available from module firmware C20 HW 3.x, FW 3.4.1 and C30 & C40 HW 3.x from FW 3.4.2)



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 complete under the following conditions:

All entered module addresses were assigned successfully

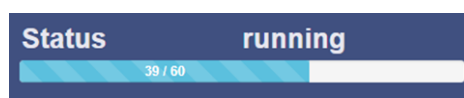
In this case, the BACS WEBMANAGER terminates the addressing process and reports successful addressing.

The last module has been addressed

If you have specified more modules than will be installed, you can end the process manually by clicking on "Stop" in the BACS programmer.

Please note:

In both cases, the status indicators of the modules must be static green or flashing.



Addressing the BACS modules in manual mode

The manual mode allows you to specifically set and change a BACS module address. It is also useful if you want to track down a specific BACS module in an installation.

Please make sure that only one module is connected to your manager.

Program a module

Make sure only one module is connected to the manager. Enter the current module ID under "Old" and the desired ID under "New". With "Set" the module will accept the new address immediately.

Single

Connect only one Module to the bus to avoid undetermined behaviour of the system.

Request module address

Connect a module to the BACS Webmanager and press "Search" under Address. The current address of the module is displayed.

Address

Retrieve the currently set address of the only attached module. This does not work if more than one module are connected.

Finding current address of the only attached module ...

track module

Enter a "Module ID" and press "Show" - The module will flash red/green accordingly until you press the trigger on the module and confirm the request.

Module

Find all modules with the address to search. You will recognize them at the LED blinking red/green slowly.

Exit BACS programming

Slide the "slider switch back to OFF"—The BACS programmer will exit and the system will reinitialize regular BACS functions.

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

Disabling BACS Setup ...

Configuration tip for larger systems:

With larger systems, it may happen that you cannot address all the modules together, but want to connect them together later. You can first address partial areas here in automatic mode (e.g. first address module addresses 32-64 and later modules 1 - 31) If there is an addressing error here, the WEBMANAGER will display an error message and you can correct the affected modules individually in manual mode.

First BACS start after configuration

The BACS Monitor shows the system status according to your configuration.

The colors have the following meaning:

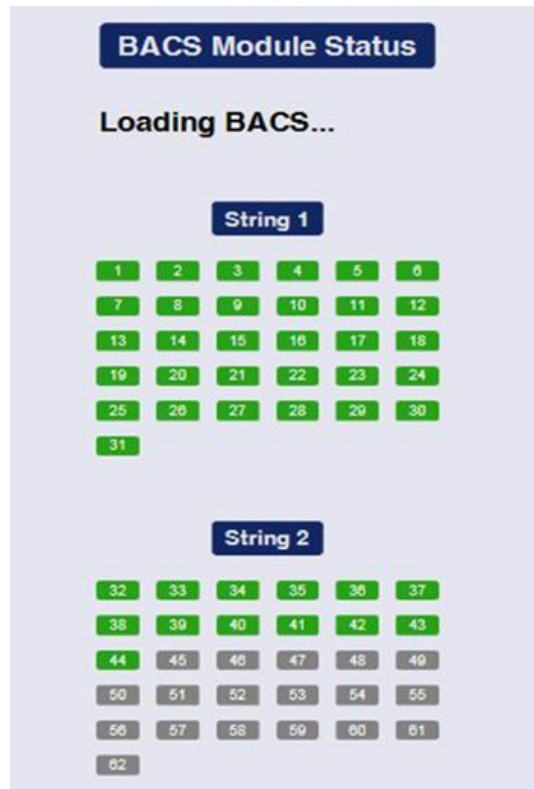
- BACS module initialized and ready for operation
- BACS module not available
- BACS module not queried or initialized

After successful initialization, the BACS status page is displayed with the battery readings and status.

After about 15 minutes, the first impedance measurement is carried out.

Wait until the first RI measurement has been performed before starting the following chapter in the official BACS user manual:

BACS modules & alarm threshold setting



String String 1						String String 2					
No.	Volt [V]	Temp. [°C]	Ri [mΩ]	Equalize	Status	No.	Volt [V]	Temp. [°C]	Ri [mΩ]	Equalize	Status
1	13.62	26.3	2.82		●	21	13.50	29.0	2.75		●
2	13.77	26.3	2.77		●	22	13.51	28.6	2.94		●
3	13.49	27.5	2.85		●	23	13.46	28.0	2.75		●
4	13.67	26.8	2.92		●	24	13.63	28.0	2.85		●
5	13.62	26.5	2.98		●	25	13.83	25.5	2.58		●

Module info		Battery info		Miscellaneous	
Module type	C20	Manufacturer	Oerlikon CP 80	Voltage Low/High	9.9 V/14.7 V
Hardware Version	03.02	Type	12 year battery	Temperature Low/High	5°C/35°C
Software Version	03.02.00	Capacity(C10)	150 Ah	Resistance Min/Max	1.1 mΩ/3.6 mΩ
Number of Blocks	40	Installation Date	01.01.2008	Equalizing Range Min/Max	12.495 V/14.7 V
Number of Strings	2	Phone Number		Firmware Version	CS141-SNMP V1.52.3 170306
Contact Person		Location	Testlab 2	Discharge Counter	0

BACS status page with 2 strings with 40 modules

Step 8: thoroughly check all BACS modules and fuses

The difference to a standard BACS system is that the fuses (5) are not in the cable as fuses. If a fuse has tripped when connecting to the batteries (e.g. by touching the live battery poles several times), it can be easily replaced on the main circuit board.

Step 9: Seal the BACS ATEX enclosures

In the last step, seal the ATEX protective housing. To do this, carefully screw the screw cap with viewing window (7) into the base. Make sure that the sealing ring of the screw cap is not damaged, otherwise it may no longer be used in your system.:



Step 9: Remove all attachments

Clean the plant area and remove all tools and leftovers before releasing the zone area for regular operation.

Maintenance work

Important:

During each work step, the housing, seals and cables must be checked for any damage and replaced if necessary. When screwing, pay attention to the torque values specified by the manufacturer in order to avoid damage to the seal or thread.

Replacing a fuse (Fuse Blown)

The ATEX version of the BACS measuring cable differs from the regular BACS version in that the safety fuse is no longer installed in the cable but on the carrier board in the housing.

This means that the cable does not have to be replaced, it is sufficient to replace the affected fuse directly.

Method:

Step 1

Plan the maintenance window taking into account the national and international safety guidelines and regulations for the ATEX zones 1/21 and 2/22. Make sure that no explosive atmosphere is present or can form within the maintenance period.

Step 2

Shut down the BACS system as much as possible:

De-energize the BACS web manager and secure it against being switched on accidentally. Then completely disconnect the affected batteries from the BACS ATEX module.

Step 3

Now loosen the locking screw on the BACS ATEX housing and carefully unscrew the cover with the viewing window.

Be careful not to damage the sealing rings or the viewing window!

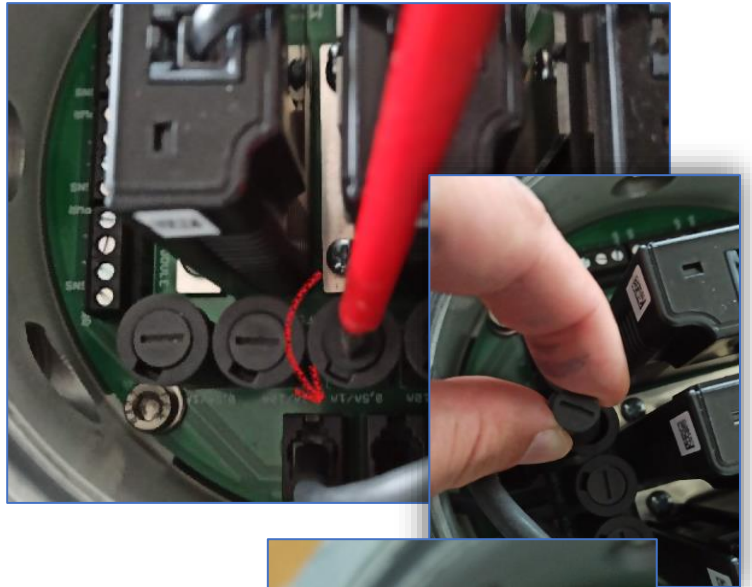
Damage means that you are no longer allowed to operate the housing within an ATEX protection zone.



Step 4

Insert a suitable screwdriver into the affected fuse holder and turn counterclockwise until it locks.

The bracket can then be easily removed from the base.

**Step 5**

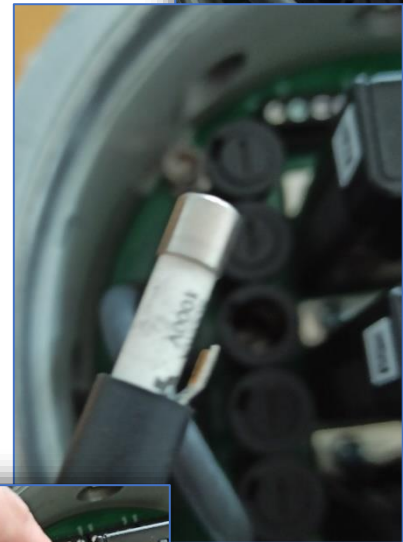
Replace the fuse:

The fuse can be removed from the holder, measured and replaced if necessary without additional tools.

Only use GENEREX certified spare parts to ensure operational safety under ATEX conditions.

Important:

The use of a fuse that is not certified by GENEREX will result in the loss of the GENEREX guarantee and warranty. Furthermore, unlicensed equipment can invalidate the operating permit within an ATEX zone.

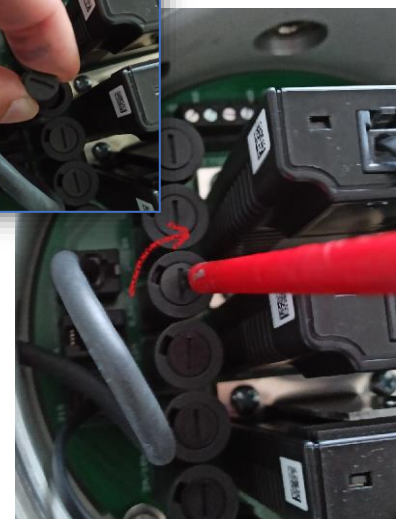
**Step 6**

Place the fuse holder back into the socket and lock the holder by turning it slightly clockwise. Be careful not to damage the socket by excessive turning.

**Step 7**

Now close the case again, making sure that

- the screw connections are free from contamination.
- The seals are undamaged
- The locking screw has been tightened again



Step 8

Reconnect the batteries taking into account national and international ATEX directives for potentially explosive atmospheres. The correct connection of batteries is described in this manual.

Step 9

Start up the BACS system and test whether the maintenance work has brought the desired success.

Step 10

Remove all tools and clean the work area from contamination according to the specifications of the ATEX guidelines.

Replacement of a BACS module (module defective)

With the ATEX version, the BACS modules are not installed directly on the batteries, but are located in a specially encapsulated ATEX housing. If a module needs to be replaced, this can be done by opening the housing.

Tip:

The following procedure generally only works with the replacement of a BACS module! If you want to exchange several modules, this must be done one after the other or the modules must be pre-addressed at an external location using the BACS programmer software and a BACS bus converter so that this does not have to be done on site.

The pre-addressing with the BACS programmer can be found in the appendix of this manual.

Step 1

Plan the maintenance window taking into account the national and international safety guidelines and regulations for ATEX zones 1/21 and 2/22. Make sure that no explosive atmosphere is present or can form within the maintenance period.

Step 2

Shut down the BACS system as much as possible:

De-energize the BACS web manager and secure it against being switched on accidentally. Then completely disconnect the affected batteries from the BACS ATEX module.

Step 3

Now loosen the locking screw on the BACS ATEX housing and carefully unscrew the cover with the viewing window.

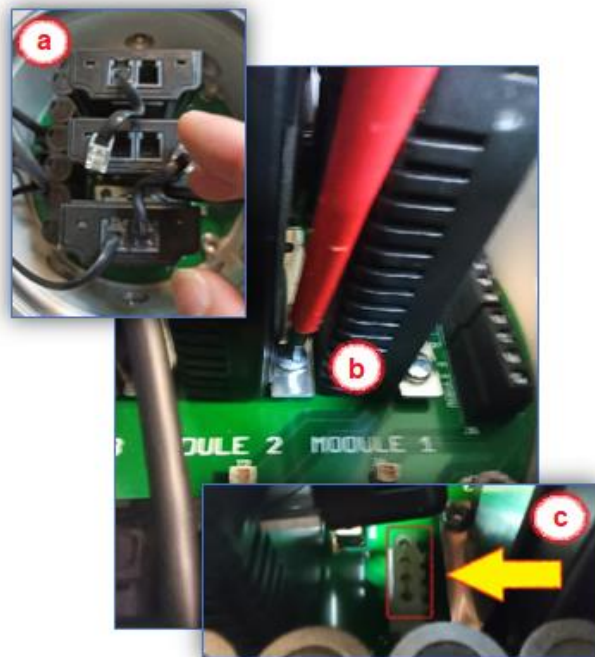
Be careful not to damage the sealing rings or the viewing window!

Damage means that you are no longer allowed to operate the housing within an ATEX protection zone.



Step 4

- a. Remove the BACS bus cable from the one to be exchanged BACS module. Be sure to, that the detents of RJ12 connector not damaged become.
- b. On the socket on the motherboard There are two socket screws used to hold and fix the BACS module in position: Carefully remove the screws, being careful not to damage the circuit board.
- c. Gently pull the module out of its socket. Make sure that the connection is not overstretched in order to avoid a loose connection later.



Step 5

Replace the guide rail on the BACS module. This will be used later to fix the new BACS module on the main board. Make sure the screw is finger tight.



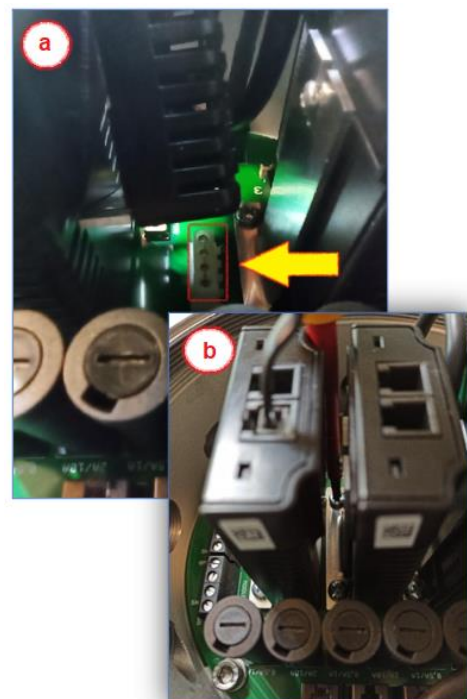
Step 6

- a. Place the new module on the motherboard socket and gently push firmly.

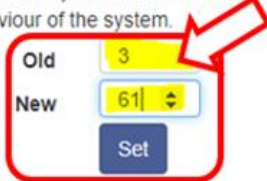


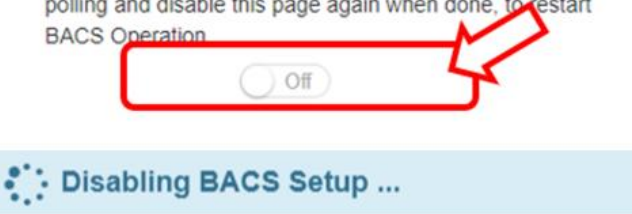
Make sure that

- The module is firmly seated in the socket
- The plinth not through excessive
- Power expenditure is damaged.

- b. Then hand-tighten the additional holder back onto the circuit board.



- c. (Optional) The BACS module has the factory ID 0 - it must be programmed in the web manager. To do this, start the BACS web manager and open the BACS programmer.

Addressing the BACS modules in manual mode	
<p>The manual mode allows you to specifically set and change a BACS module address. It is also useful if you want to track down a specific BACS module in an installation. Please make sure that only one module is connected to your manager.</p>	
<p>Program a module Make sure only one module is connected to the manager. Enter the current module ID under "Old" and the desired ID under "New". With "Set" the module will accept the new address immediately.</p>	<p>Single</p> <p>Connect only one Module to the bus to avoid undetermined behaviour of the system.</p> 
<p>Request module address Connect a module to the BACS Webmanager and press "Search" under Address. The current address of the module is displayed.</p>	<p>Address</p> <p>Retrieve the currently set address of the only attached module. This does not work, if more than one module are connected.</p> 
<p>Track module Enter a "Module ID" and press "Show" - The module will flash red/green accordingly until you press the trigger on the module and confirm the request.</p>	<p>Module</p> <p>Find all modules with the address to search. You will recognize them at the LED blinking red/green slowly.</p> 
<p>Exit BACS programming Slide the "slider switch back to OFF"—The BACS programmer will exit and the system will reinitialize regular BACS functions.</p>	<p>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.</p> 

Step 7

Now close the case again, making sure that

- the screw connections are free from contamination.
- The seals are not damaged
- The locking screw has been tightened again

Step 8

Reconnect the batteries taking into account national and international ATEX directives for potentially explosive atmospheres. The correct connection of batteries is described in this manual.

Step 9

Remove all tools and clean the work area from contamination according to the specifications of the ATEX guidelines.

Step 10

The following step consists of two sub-steps that build on each other.

10 a. Initialization of the exchanged BACS module

Boot up the BACS system. As soon as the BACS web manager is available, log in.

10 b. If the replaced module is still set to factory settings (ID 0):

Tip:

If your exchanged BACS modules have already been assigned an ID, you can skip step 10 b:
Continue reading at step 10 c.

After logging in, a unique ID must be assigned to the BACS module. To do this, open the BACS programmer in the BACS configuration menu:

10 c. Functional check and release of the system

Test whether the maintenance work has brought the desired success. The BACS web manager should be able to access all modules and the BACS screen should work correctly as desired.

The module exchange is now complete and BACS can resume normal operation.

Connection / replacement of a BACS measuring cable

Under rare conditions it can happen that a BACS measuring cable has to be exchanged - especially the red cable with the integrated temperature sensor is affected by this. The housing seal plays a special role in this step, as it has to be opened to exchange a BACS measuring cable.

Be sure to check the seal for potential damage before closing it and replace it if in doubt!

Step 1

Plan the maintenance window taking into account the national and international safety guidelines and regulations for the ATEX zones 1/21 and 2/22. Make sure that no explosive atmosphere is present or can form within the maintenance period.

Step 2

Shut down the BACS system as much as possible:

De-energize the BACS web manager and secure it against being switched on accidentally. Then completely disconnect the affected batteries from the BACS ATEX module.

Step 3

Now loosen the locking screw on the BACS ATEX housing and carefully unscrew the cover with the viewing window.

Be careful not to damage the sealing rings or the viewing window!

Damage means that you are no longer allowed to operate the housing within an ATEX protection zone.

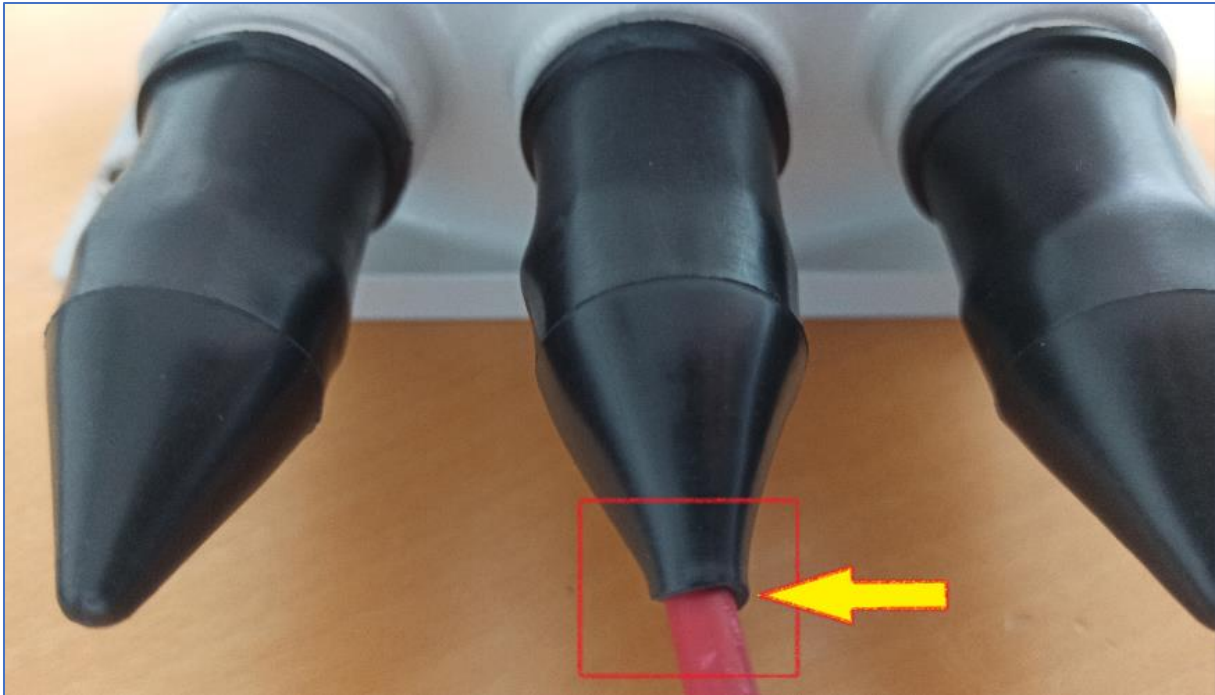


Step 4:

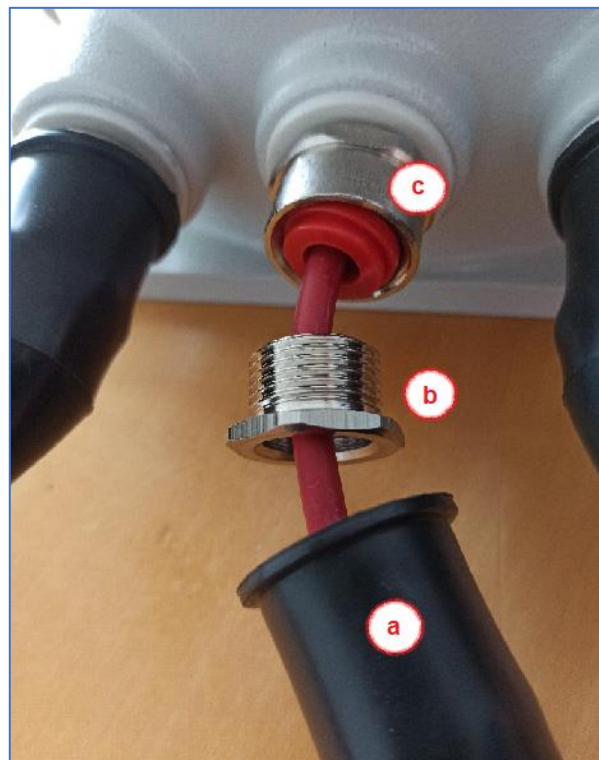
The protective cap

The rubber protective hood is mandatory and must be placed over the screwed elements at the end. If necessary, you can open the tip of the protective cap, but be careful not to make the opening too large.

Ideally, it then sits tightly around the BACS measuring cable:



Carefully pull off the protective cap (a) and loosen the locking nut (b). This relaxes the seal (c) and releases the BACS measuring cable. You can pull it out carefully.

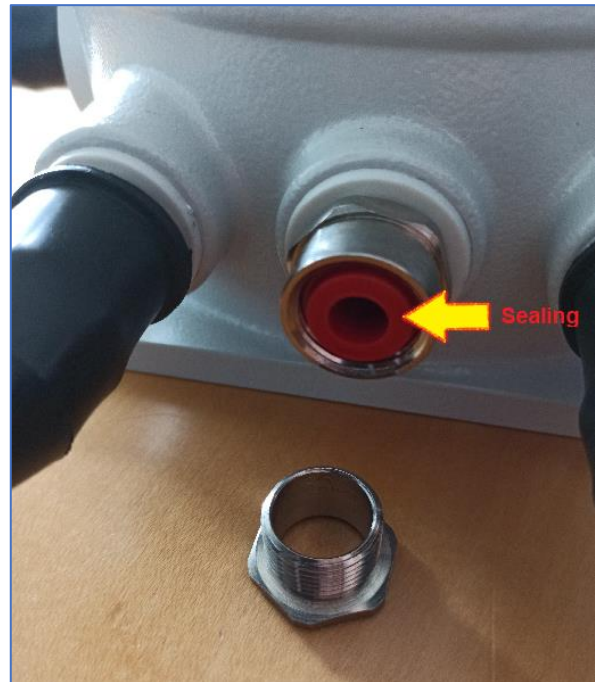


Step 5

Remove the BACS measurement cable and check the seal for damage:

Be careful not to damage the seal during the process.

If the seal is damaged, be sure to replace it.



Step 6

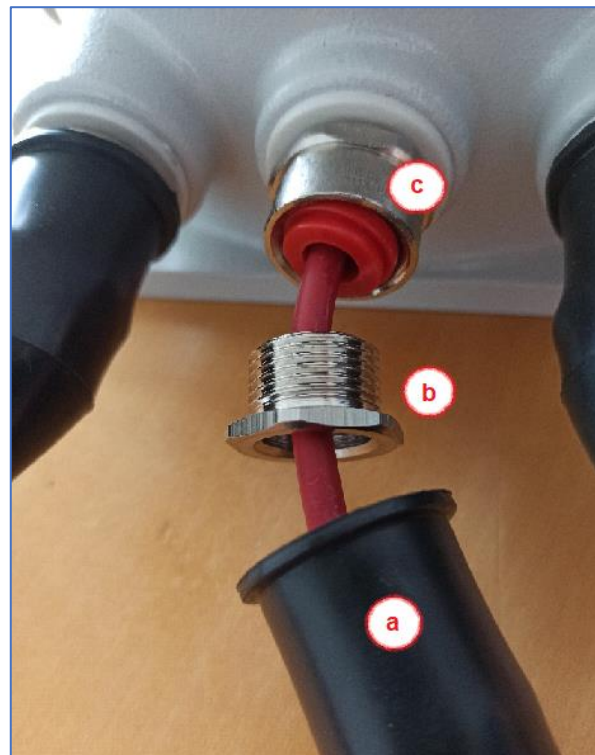
Now pull the new cable with the open end through the tip of the protective cap (a), and then through the locking nut (b).

Then guide the cable through the seal into the interior of the ATEX BACS housing.

1. Pay attention to the alignment of the sealing ring (c)! This fits seamlessly into the locking nut!

Once you have inserted the cable, tighten the locking nut slightly so that the cable can still move freely but the nut can no longer slip off.

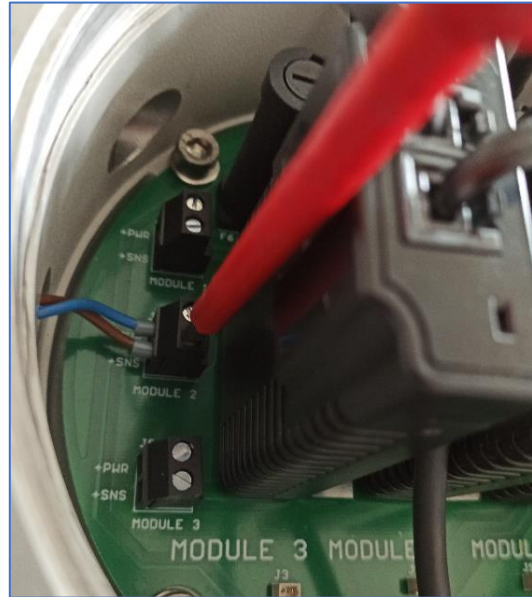
2. Make sure the red wire is pulled all the way through the gasket to ensure sealing of the exit later.



Step 7

Place the open cable ends in the screw clamps provided and carefully tighten the base screws.

Make sure the cable ends are firmly inserted without over-tightening the screws on the sockets.

**Step 8**

- a. Using a suitable tool, tighten the locking nut. The nut will automatically tighten the inner seal when tightened, completely sealing the cable for use in ATEX Zones 1 and 2 or 21/22 areas.
- b. Then slide the protective hood over the locking nut and the screw base.

The BACS measurement cable should now be sealed and firmly enclosed in the rubber protection.

Step 9

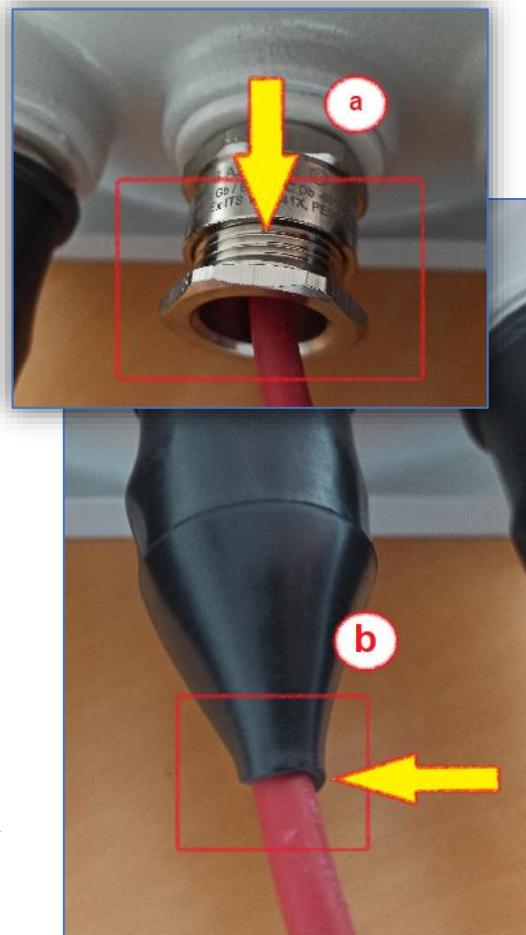
Reconnect the batteries taking into account national and international ATEX directives for potentially explosive atmospheres. The correct connection of batteries is described in this manual.

Step 10

Start up the BACS system and test whether the maintenance work has brought the desired success.

Step 11

Remove all tools and clean the work area from contamination according to the specifications of the ATEX guidelines.



The blind plug

Blind plugs seal the housing in the event of sparks inside. If you do not use an outlet on the housing, you must set a blind plug to seal the housing in accordance with ATEX. If you do not have to remove any cables, the housing cannot be opened in this case, as the screw connection can be accessed directly from the outside - otherwise please note the detailed maintenance instructions for BACS modules, fuses and cables in this manual:

Procedure

Step 1:

Remove the protective rubber cap from the connector. Then first loosen the locking nut (a) to relax and relieve the inner seal and gromit.

You can then turn the screw base of the seal (b) counterclockwise with a suitable tool and then remove it completely.



Step 2:

Screw the blind plug onto the housing and tighten it with a suitable tool. Be careful not to damage the sealing ring.

Finally, put the rubber protection back on the blind plug.



Appendix: List of BACS events – Severity:

The color code represents the severity of the according event:

Informational	Warning	Alarm	System Alarm
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EVENT name	Event description	Explanation	Recommended reaction
BACS started	Battery monitoring started	BACS System has started and is now managing batteries	For your information.
BACS discharging phase	Battery discharging	BACS System noted that a discharge has started	Check Charger output status and Battery Breaker
BACS charging phase	Battery charging	BACS system is back to normal from a previous discharge.	For your information. Watch if batteries charge correctly.
BACS system alarm	Module communication is lost and the system is in alarm mode! React immediately!	BACS system is not functional at this status and needs attention	Intervention required: Check communication cable and addressing
BACS system alarm off	Module communication restored	BACS system communication problems cleared	For your information
BACS voltage high alarm	BACS voltage high alarm	BACS System detected one or more batteries with voltage out of the configured alarm threshold.	Check battery health and charger
BACS Voltage High Alarm off	BACS voltage high alarm reset	BACS System High Alarm cleared	For your information.
BACS voltage low alarm	BACS voltage low alarm	BACS System detected one or more batteries with voltage out of the configured alarm threshold	Check battery health and charger
BACS Voltage Low Alarm off	BACS voltage low alarm reset	BACS System Low Alarm cleared	For your information
BACS temperature high alarm	BACS temperature high alarm	BACS System detected one or more batteries with temperature out of the configured alarm threshold	Intervention required: Check charger and environmental conditions and watch if temperature increases or comes back to normal. Check if balancing is active and if ampere rating of battery is correctly configured. If both are correct, check battery health to avoid a thermal runaway.
BACS temperature high alarm off	BACS Temperature High Alarm reset	BACS System High Alarm cleared - No action	For your information.
BACS temperature low alarm	BACS temperature low alarm	Temperature of one or more modules are beyond the configured alarm threshold.	Check environmental conditions
BACS temperature low alarm off	BACS temperature low alarm reset	BACS System Low Alarm cleared - No action	For your information.
BACS resistor high alarm	BACS resistor high alarm	Resistance/Impedance of one or more modules are beyond the configured alarm threshold.	Check battery health and voltage level
BACS resistor high alarm off	BACS Resistor High Alarm reset	BACS System High Alarm cleared.	For your information.
BACS resistor low alarm	BACS resistor low alarm	Resistance/Impedance of one or more modules are beyond the configured alarm threshold	Check battery health and voltage level
BACS resistor low alarm off	BACS Resistor Low Alarm reset	BACS System Low Alarm cleared - No action	For your information.
BACS Voltage Diff High Warning	Voltage difference between single batteries/cells to high	Battery Voltage difference within one or more battery strings are beyond the configured threshold.	check battery health
BACS Voltage Diff High Warning off	Voltage difference between single batteries/cells reset	Battery Voltage difference within one or more battery strings are back to normal	For your information

BACS Battery Breaker open alarm	Battery breaker/fuse open, no battery protection active!	Battery breaker or battery fuse has been opened.	Intervention required: Check battery breaker/fuse status immediately in order to prevent loss of load in case of a power outage.
BACS Battery Breaker open alarm off	Battery breaker/fuse closed	Battery breaker/fuse is normal again, batteries should pick up charge again - no action	For your information, it is recommended to check the battery breakers and fuses
BACS Equalizing Error Alarm	Equalization error	BACS equalization failure automatically stops all balancing functions	Reboot/Coldboot the system and wait for clearance. If the problem cannot be solved by the BACS itself after some hours, call BACS support.
BACS Equalizing Error Alarm off	Equalization error reset	BACS equalization failure cleared	For your information.
BACS Voltage High Warning	BACS Voltage High Warning	BACS System detected one or more batteries with voltage out of configured warning threshold	1. Check if voltage increases or comes back to normal. 2. Check if balancing is active and ampere rating of battery is correctly configured. If both are correct, check battery health
BACS Voltage High Warning off	BACS Voltage High Warning reset	BACS System High Warning cleared.	For your information.
BACS Voltage Low Warning	BACS Voltage Low Warning	BACS System detected one or more batteries with voltage out of configured warning threshold.	1. Check if voltage decreases or comes back to normal. 2. Check if balancing is active and ampere rating of battery is correctly configured. If both are correct, check battery health
BACS Voltage Low Warning off	BACS Voltage Low Warning reset	BACS System Low Warning cleared.	For your information.
BACS Temperature High Warning	BACS Temperature High Warning	BACS System detected one or more batteries with temperature out of configured warning threshold.	Check charger and environmental conditions and watch if temperature increases or comes back to normal. Check if balancing is active and ampere rating of battery is correctly configured.
BACS Temperature High Warning off	BACS Temperature High Warning reset	BACS System High Warning cleared.	For your information.
BACS Temperature Low Warning	BACS Temperature Low Warning	BACS System detected one or more batteries with temperature out of configured warning threshold.	1. Check if temperature decreases or comes back to normal. 2. Check charger and battery breaker and environmental conditions.
BACS Temperature Low Warning off	BACS Temperature Low Warning reset	BACS System Low Warning cleared.	For your information.
BACS Resistor High Warning	BACS Resistor High Warning	BACS system detected one or more batteries with impedance out of configured warning threshold	Check if voltage and temperature is correct. If problem persists, call battery service to check battery health
BACS Resistor High Warning off	BACS Resistor High Warning reset	BACS System High Warning cleared	For your information.
BACS Resistor Low Warning	BACS Resistor Low Warning	BACS system detected one or more batteries with impedance out of configured warning threshold.	Check if voltage and temperature is correct. If problem persists, call battery service to check battery health
BACS Resistor Low Warning off	BACS Resistor Low Warning reset	BACS System Low Warning cleared.	For your information.
BACS General Alert	General failure/alarm, check BACS website for alarm details	BACS System detected an alarm, which always triggers the general alarm.	Check BACS web interface and log file for alarm detail and take a look to the recommended action for it.
BACS general alarm off	General failure/alarm reset	BACS system general alarm cleared.	For your information.
BACS thermal runaway alarm	Thermal Runaway conditions TRUE	Thermal runaway risk at this string.	Intervention required: Check temperature and voltage and battery health. If battery breaker has been opened, check battery health before closing the breaker
BACS Module Fuse Blown	No measuring data available by defect.	One or more batteries cannot be managed or monitored by BACS, but are still connected to the charger.	Intervention required: For some reason, the BACS measuring cable fuse was triggered. Check both, wiring and batteries for damages, and replace the measuring cable.
BACS thermal runaway alarm off	Thermal Runaway conditions FALSE - Normal	Thermal runaway alarm cleared	For your information: Evaluate data to find the reason why a terminal runaway alarm happened.

BACS Discharge Counter Alarm	Discharge counter beyond configured threshold	Configured number of discharges reached.	Check battery health and decide if more cycles can be accepted
BACS discharge counter alarm off	Discharge counter reset	Discharge Counter has been reset to 0	For your information.
BACS GX_R_AUX 1 Input 1 Alarm Off	GX_R_AUX DigitalInput 1 LOW	Connected dry contact closed/opened, action depends upon connected application.	Action depends on connected application.
BACS GX_R_AUX 1 input 1 alarm	GX_R_AUX DigitalInput 1 HIGH	Connected dry contact closed/opened,	action depends upon connected application.
BACS Baseline Impedance Alarm	BACS Baseline Resistor High Alarm	Resistance/Impedance of one or more modules are out of the percentual baseline alarm threshold.	Check battery health and voltage level
BACS Baseline Impedance Alarm Off	BACS Baseline Resistor High Alarm reset	Alarm / warning cleared.	For your information.
BACS Baseline Impedance Warning	BACS Baseline Resistor High Warning	Resistance/Impedance of one or more modules are out of the percentual baseline warning threshold.	check battery health and voltage level
BACS Baseline Impedance Warning Off	BACS Baseline Resistor High Warning reset	alarm/warning cleared.	For your information.
BACS string voltage high alarm	String voltage too high	String voltage out of configured threshold.	Check charger and battery health
BACS String Voltage High Alarm Off	String voltage alarm reset	alarm/warning cleared.	For your information.
BACS string voltage low alarm	String voltage too low	String voltage out of configured threshold.	Check charger and battery health
BACS String Voltage Low Alarm Off	String voltage alarm reset	alarm/warning cleared	For your information.
BACS String Voltage High Warning	String voltage high	String voltage out of configured threshold.	Check charger and battery health
BACS String Voltage High Warning Off	String voltage warning reset	alarm/warning cleared	For your information.
BACS String Voltage Low Warning	String voltage low	String voltage out of configured threshold.	Check charger and battery health
BACS String Voltage Low Warning Off	String voltage warning reset	alarm/warning cleared.	For your information.
BACS String Current High Alarm	Positive (Charging) String current too high	String current out of configured alarm threshold. Check charger and battery health	Check charger and battery health
BACS String Current High Alarm Off	String current alarm reset	alarm/warning cleared	For your information.
BACS String Current Low Alarm	Negative (Discharging) String current too high	String current out of configured alarm threshold.	Check charger and battery health
BACS String Current Low Alarm Off	String current alarm reset	alarm/warning cleared	For your information.
BACS String Current High Warning	Positive (Charging) String current high	String current out of configured warning threshold.	Check charger and battery health
BACS String Current High Warning Off	String current warning reset	alarm/warning cleared - no action	For your information.
BACS String Current Low Warning	Negative (Discharging) String current high	String current out of configured warning threshold.	Check charger and battery health
BACS String Current Low Warning Off	String current warning reset	alarm/warning cleared.	For your information
BACS module revision alarm	Wrong/Incompatible module revision in BACS bus found	Installation of different BACS module revisions or missing module revision information may trigger this alarm.	This is an installation error, different hardware revision modules has been used. Contact BACS support.

BACS Module Revision Alarm Off	Module revision alarm reset	alarm/warning cleared	For your information.
BACS equalizing deactivated by system	Balancing/Equalization does not take effect for up to 4 days.	If the balancing/equalization does not show any effect on one or more modules/batteries, it will be turned off after some time and this warning is triggered	Check battery health
BACS Equalizing deactivated by System Off	Balancing/Equalization restarted - warning reset	alarm/warning cleared	For your information.
BACS String Current Deviation Discharge Alarm	Discharge current difference between strings too high	BACS has noticed there is a problem when string current measurements deviates compared to other strings during a discharge cycle.	Check charger and battery string health
BACS String Current Deviation Discharge Alarm Off	Discharge Current difference between strings Alarm reset	alarm/warning cleared	For your information.
BACS String Current Deviation Charge Alarm	Charge current difference between strings too high	BACS has noticed there is a problem when string current measurements deviates compared to other strings during a charge cycle after discharging.	Check charger and battery string health
BACS String Current Deviation Charge Alarm Off	Charge current difference between strings too high reset	alarm/warning cleared	For your information.
BACS String Current Deviation Discharge Warning	Discharge current difference between strings high	BACS has noticed an unusual high current difference within the battery strings during a discharge cycle.	Check charger and battery string health
BACS String Current Deviation Discharge Warning Off	Discharge current difference between strings high reset	alarm/warning cleared	For your information.
BACS String Current Deviation Charge Warning	Charge current difference between strings high	BACS has noticed an unusual high current difference within the battery strings during a charge cycle.	Check charger and battery string health
BACS String Current Deviation Charge Warning Off	Charge current difference between strings high reset	alarm/warning cleared - no action	For your information.