

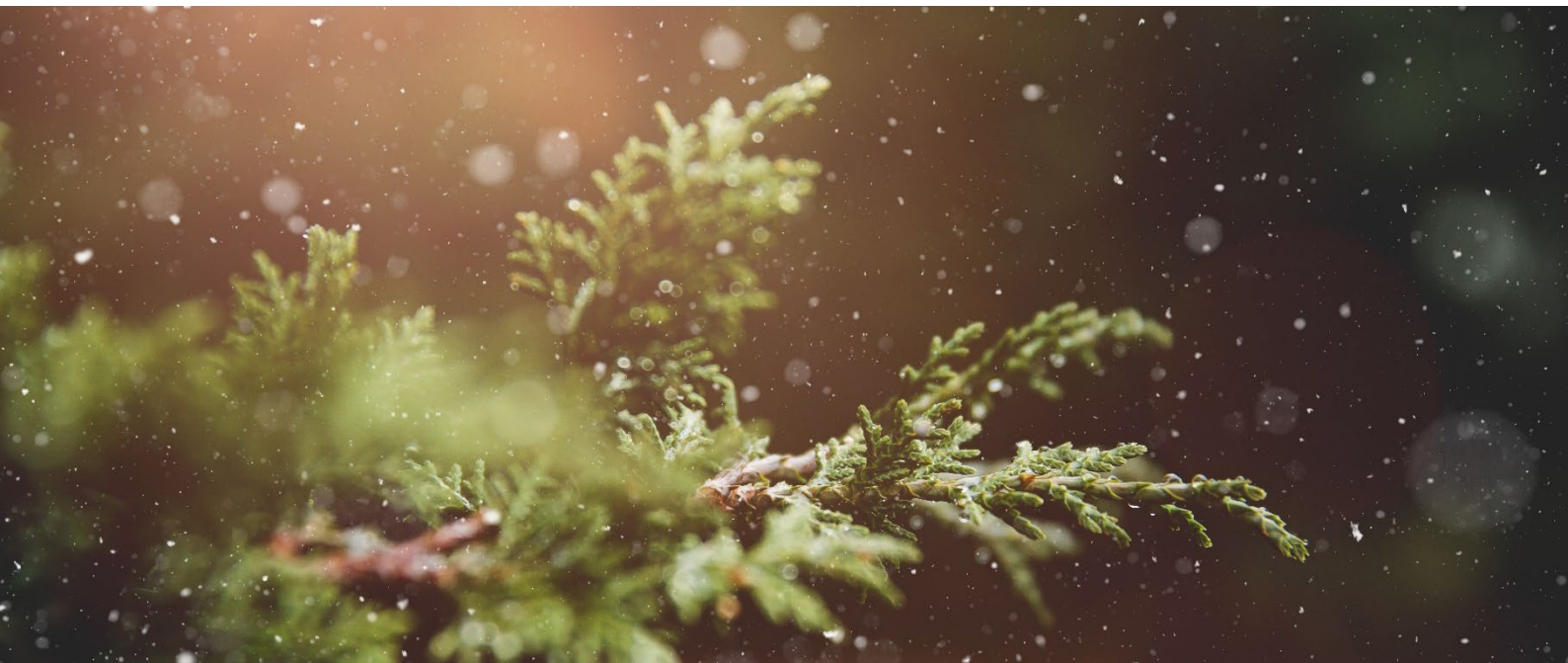
Technical reference manual

Biomixer 550 / Hemoscale AB-50

Valid for Biomixer 550 / Hemoscale AB-50

HW version 1.10

SW version 1.x



Manual version 1.04

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1 Important notes

1.1 Warranty

The manufacturer hereby warrants to the original purchaser that Biomixer is manufactured in a professional and quality manner and, when properly used, will be free from all defects in material and workmanship, for a period of 12 months after delivery from the manufacturer. The warranty includes equipment or components that prove to have faults during the warranty period.

 **It is important that the service personnel have been trained and approved by the manufacturer before opening the instrument or making any repair operation, if not, the warranty may be invalid.**

The manufacturer will without cost for the customer, repair or replace the faulty equipment. The warranty is not valid if the equipment has been repaired by anyone else than qualified personnel, approved by the manufacturer. The warranty is not valid for the battery since it is considered to be an expendable supply. The warranty is not valid if the equipment has been changed in any way that according to the manufacturer's opinion, affects the reliability or stability of the instrument. The warranty is not valid when the serial number has been changed, crossed-out or been removed, or if the fault has been caused by misuse or abnormal use. In these cases, the manufacturer or their representative will inform the customer about the decision, and if wished by the client, will repair the equipment for normal rate. An estimated price can be given on request. One important condition for this warranty to be effective is that the Biomixer is used in accordance with the instructions in this manual.

1.2 The technical reference manual

This technical reference manual is written for service personnel (technicians) responsible for service and maintenance of Biomixer 550 (abbreviated BM550) and Hemoscale AB-50, hereinafter called Biomixer unless otherwise noted.

The methods and routines are developed and tested to ensure a reliable, safe and efficient operation of the Biomixer. It is important that the service personnel have studied and fully understood the contents of this manual before using the Biomixer. This manual gives a detailed description about the Biomixer soft- and hardware, explaining how it works and how to run the built-in test program.



This blood mixer is a precision weighing instrument.
In order to maintain high accuracy BM550 should be handled with care and the scale must not be overloaded. Absolute maximum load is 1000g. I.e. the sum of weight for donated volume and tared weight should not exceed 1000g during donation.

The tray should never, under any circumstances, be used for lifting or moving the blood mixer.

Ljungberg & Kögel recommend exchange of complete parts as specified in Spare Parts List in chapter 17 instead of replacing discrete components.

1.3 Contact information

Biomixer is developed and manufactured by Abelko Innovation under contract from Ljungberg & Kögel. Abelko Innovation also manages logistics, service and technical support.

Address: Abelko Innovation
Industrivägen 17, 972 54 Luleå, Sweden
Telephone: +46 (0) 920-45 06 00
Email: info@abelko.se
www.abelko.se

Biomixer is marketed by Ljungberg & Kögel AB and spare parts are to be ordered by Ljungberg & Kögel.

Address: Ljungberg & Kögel AB
Box 1032, SE-251 10 Helsingborg, Sweden
Telephone: +46-(0)42-139860
Fax: +46 (0) 42-132181
Email: info@ljungberg-kogel.com
www.ljungberg-kogel.com

1.4 Severe incidents

Abelko Innovation wants all serious incidents that have occurred when using the Biomixer to be reported to us and the competent authority in the country where you as a user and/or patient are established. Please send your details of the incident to us directly at info@abelko.se.

1.5 Technical feedback

Abelko Innovation is committed to develop high-quality equipment and technical services to all our customers. We welcome any inputs on technical issues that are encountered so that they can be resolved quickly and in the most appropriate manner. Please submit your comments/feedbacks through your local distributors or alternatively email us directly at info@abelko.se




1.6 Descriptions of symbols



If labels or warning signs on the BM550/AB-50 are damaged, contact your local distributor.



The user of this product must carefully read the manual regarding important safety regulations and take the necessary precautions.

	<p>This device emits CDRH/IEC Class 2 laser light. Do not stare into beam.</p>
	<p>This product is a medical device.</p>
	<p>Unique Device Identification is a method for labeling and identifying medical equipment.</p>

1.7 Description of UDI-DI

This product has the UDI-DI **7350118260012** identification, used for labeling, with the GTIN format from GS1, see more details below.

<p>735011826</p>	<p>Company prefix.</p>
<p>001</p>	<p>Model reference.</p>
<p>2</p>	<p>A checksum of company prefix and model reference, which means that it is the same for all BM550s/AB-50s.</p>

This product's basic UDI-DI is **7350118260018B**, this is used for registration.

1.8 Description Production code

<p>Production code</p>	<p>Under the display, the label contains a Production code. This is used, together with the UDI, in service matters to identify the Biomixer.</p>
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1.9 Version

Version 1.00, 2021-06-18: First edition of this manual

Version 1.01, 2021-08-23: Second edition of this manual

Version 1.02, 2022-02-10: Third edition of this manual

Version 1.03, 2022-09-05: Fourth edition of this manual

2 Introduction

The basic function of the Biomixer is to keep the blood bag in motion during a donation so that blood and anticoagulants in the blood bag are mixed, in order to avoid coagulation. When the set weight has been achieved, the drainage is stopped by closing the blood tube with the built-in clamp.

The intended users of the product are professional operators trained for their professional role and not laymen.



2.1 System description

2.1.1 Intended use

The Biomixer is a fully automated blood mixer that is mainly used during blood donation. During blood donation a blood bag is used to collect the donated blood. To prevent the blood from coagulating; it has to be mixed with some anti-coagulant that is contained in the blood bag.

The Biomixer has a tray where the blood bags are placed prior to a collection. The tray makes a seesaw motion during the collection and hence mixing the blood with the anti-coagulant.

During the collection, the blood bag is weighed once per mixing cycle and when the preset volume has been reached, a tube clamp will automatically close the tube and hence preventing more blood from being collected. When a collection is ready, an informing sound will go off.

The collected blood is measured with a weighing sensor and converted to volume with the factor of 1/1.06 which is the specific gravity for blood.

2.1.2 Programmability

The Biomixer is a flexible blood mixer offering a complete system for blood collection and registration to meet the demands of today and in the future for total quality control and complete traceability. Its unique programming capability makes the blood centers free to choose their own strategy for collection monitoring and later change it according to new global or local regulations or after their own wishes.

2.1.3 Network connection

The Biomixer is prepared to be connected to a local area network (LAN) for transferring registration and collection data to a central host computer, so called On-line registration. This will minimize the risk of exchanging blood bags and offers new and improved possibilities to collect and store

information about the donation. The Biomixer can be delivered with different types of communication.

2.1.4 BmCom

In order to communicate with the Biomixer from a PC, use BmCom. BmCom is a Windows software for the Biomixer. It is used to configure the procedure of barcode scanning during blood donation; it performs firmware update, and is also acting as a server, collecting donation through USB memory or LAN-bus. Software can be downloaded from ljungberg-kogel.com.



Connected ITE-equipment must be evaluated according to IEC 60950-1.

2.1.5 Flexibility

The Biomixer is powered by a mains adaptor or a rechargeable battery with up to 20 hours capacity. It can be used in a conventional way, with or without barcode-reader, as stationary as well as mobile collection units.

2.1.6 Automatic tare

The Biomixer automatically deducts the weight of the blood bag and anticoagulant solution. All types of blood bags or set of blood bags with a tube diameter of 4.2 mm can be used.

The user can also choose to store the bag tare weight in the collection data. This is configured in the **Setup**-menu.

2.2 Features

2.2.1 Barcode-reader (internal/external)

For quick registration of donor, blood bags, operator etc. The sequence of barcodes is programmed from a PC (with software and barcodes can be scanned both prior to and after a collection. A barcode reader can be connected to the Biomixer connector **USB**. The Biomixer can also be equipped with an internal barcode reader located at the front of the display (this is an option for the Biomixer).



This device emits CDRH/IEC Class 2 laser light. Do not stare into beam.

2.2.2 Data storage for collection data

There is internal data storage for 100-1000 collections depending on the amount of registration data. Stored data (scanned barcode information and collected data) can directly or later be sent to a central PC or host computer. The memory is circular, i.e. when memory is filled the oldest data will be replaced. When old data that has not been sent to a computer or a USB memory, an optional warning can be viewed on the display. This warning is enabled in the **Setup**-menu.

Collection information can, instead of being sent on a network, be selected to be stored on a USB stick. The Biomixer supports USB sticks formatted with the FAT32 file system and with a maximum of 32GB. You can see which file system the USB memory has, for example, by right-clicking on the USB via a computer and clicking **Format...** The same USB stick can be used on several mixers, as long as the mixers are named individually.

2.2.3 Programmable registration function

With a simple setup-program on PC (BmCom), it is possible to freely decide how the registration function should be with a barcode reader, i.e. what kind of information to scan and in what order.



All the donation data that is being stored in the Biomixer's internal memory will be lost when the configuration is updated! If needed, take a back-up of the donation data before updating the configuration.

2.2.4 Adjustable alarms

Alarm levels for min/max flow rate and time, clock settings and other adjustments are easily set by setup menus from keyboard.

The user can choose between several signals that will go off when a collection is ready. This is handy if several mixers are used within the same area. The volume of the signal can also be changed.

2.2.5 Battery for mobile use

Fully charged, the internal battery gives about 16 hours of running time. It is recommended to keep the external charger (**Charger 2430**) connected during operation when possible. The internal battery can be replaced by authorized service personnel if needed.

2.2.6 Automatic calibration

Calibration is done automatically by using a calibration weight and by following instruction on the display.

If the mixer has not been calibrated for some days a feature called QC-lockout will prevent the start of a new collection. The number of days can be set in the **Setup**-menu.

A sound calibration interval is at least once per week or if the Biomixer is being moved between different type of environments with different type of temperatures. It is also recommended to calibrate the Biomixer after it has been transported.

2.2.7 Homogeneous mixing

The tray is moving in a well-tested seesaw motion to agitate and mix blood and anticoagulant in an efficient way.

2.2.8 Continues blood flow check

The Biomixer monitors the blood flow continuously during a collection. If the flow is below or exceeds the set alarm limits, an alarm will sound, and the blood flow value will start to blink.

2.2.9 Check of collection time

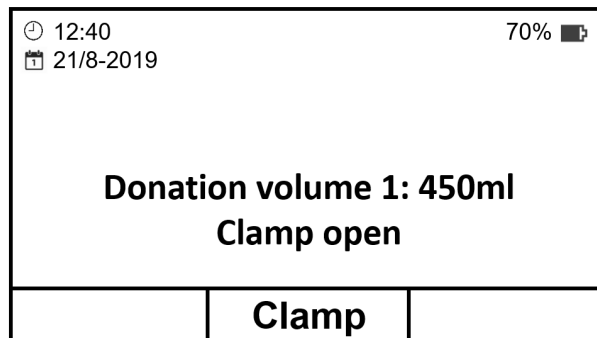
Collection time is monitored and if the set limit is passed, an alarm will sound and be displayed.

2.2.10 Automatic stop

When the predetermined volume of blood has been collected, the clamp closes automatically and a ready-signal sounds to inform of the completion of donation sequence.

2.3 Main program

The main program is the normal program that is run after power up. From here, the user has different options. See User manual for more details.



2.3.1 Clamp

Clamp is used to open or close the clamp. The clamp must be closed before a donation can be started.

The clamp which holds the tube in place can have three different status. When **open**, the tube can be placed in the clamp or removed from the clamp. When **closed**, the clamp prevents any flow through the tube. When **locked**, the clamp allows a flow through the tube during a donation but the tube cannot be removed.

All types of blood bags or set of blood bags with a tube diameter of 4.2 mm can be used.

2.3.2 Start

Start is used to start a donation and is visible when the clamp is being closed.

2.3.3 Scan

Scan is used to start a new collection, if the Biomixer is preconfigure for scanning barcodes. The procedure starts with asking the operator to scan barcodes according to a pre-programmed sequence. Then a collection is started with a press on **Clamp**, just as it would be if the operator has started a collection without barcodes. The Biomixer can be configured for scanning barcodes after a donation. When the donation is finished, the preprogrammed barcode questions will be showed on the display one by one.

3 Installation



The Biomixer is a precision weighing instrument for blood. The Biomixer must be handled with care and the scale should not be exposed to weights over 2000g. The tray should never, under any circumstances, be used for lifting or moving the blood mixer.



If BM550 has been cooled down to a temperature below +2°C, please wait at least 2 hours before using BM550/AB-50 to make possible damp evaporate.

3.1 Unpacking

Lift the Biomixer up from the box. Be careful not to lift the Biomixer using the tray since it may destroy the balance. Make sure that the blood mixer is intact and that all parts are well set. It should be possible to wriggle the tray sideways according to its intended mixing movements.

3.2 Placement

The Biomixer is best placed on a stable and flat surface and must not be moved while a donation is in progress. It should be placed beyond the patient's reach so that only the operator can access the device. Remember to position the unit so that it is easy to plug in/out the power cable.

In stationary conditions, it is recommended to use Biomixer with BIOLIFT 410 (separate manual). BIOLIFT 410 is a mobile table, with a moving shelf (up and down) designed to fit the Biomixer.

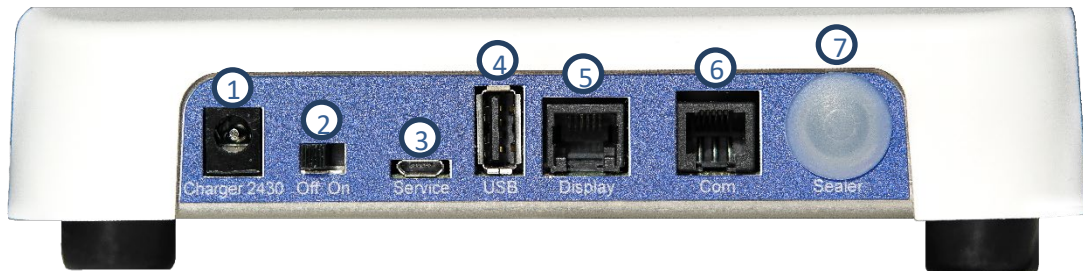
⚠ Use of this equipment adjacent to or stacked with other equipment should be avoided because it could result in improper operation. If such use is necessary, this equipment and the other equipment should be observed to verify that they are operating normally.


⚠ Always keep distance between the Biomixer and active high-frequency equipment.

⚠ Portable RF communications equipment (including peripherals such as antenna cables and external antennas) should be used no closer than 30 cm (12 inches) to any part of the Biomixer, including cables specified by the manufacturer. Otherwise, degradation of the performance of this equipment could result.

⚠ The emissions characteristics of this equipment make it suitable for use in industrial areas and hospitals (CISPR 11 class A). If it is used in a residential environment (for which CISPR 11 class B is normally required) this equipment might not offer adequate protection to radio-frequency communication services. The user might need to take mitigation measures, such as relocating or re-orienting the equipment.

3.3 Connecting



 Use of accessories, transducers and cables other than those specified or provided by the manufacturer of this equipment could result in increased electromagnetic emissions or decreased electromagnetic immunity of this equipment and result in improper operation.

3.3.1 Charger 2430 (1)

Inlet for battery charger. Check that the charger's AC supply voltage marking agrees with the local mains supply. Connect the charger to the inlet marked **Charger 2430** and connect it to the mains output. The charger is preferred to always be connected to keep the battery fully charged.



Only use battery charger of type **Charger 2430** (article number 9-55027-00).

3.3.2 Power switch (2)

Turn **On** and **Off** the Biomixer.

3.3.3 Service (3)

This connector is used to configure the mixer from a PC or download new software to the mixer.

3.3.4 USB (4)



Always use barcode readers recommended by Ljungberg & Kögel AB (article number 9-55033-00). Connection of other barcode readers may damage the reader as well as BM550/AB-50.

This connector is mainly used for connecting an external barcode reader. The connector is of USB type B. It can also be used for a USB-memory to store collection data.

3.3.5 Display (5)

Connector for the Biomixers display.

3.3.6 Expansion slot Com (6)

This connector is optional and can be either Ethernet, RS485 or USB (For use with XBee dongle). See more details in chapter 3.6 Communication.

Up to 31 mixers can be connected to a host computer for collection data storage. It is recommended to use Ethernet when monitoring several Biomixers.

3.3.7 Sealer (7)

This connector is optional and is used for an internal sealer.

3.3.8 Details inputs and outputs

Description of inputs and outputs for mixer unit:

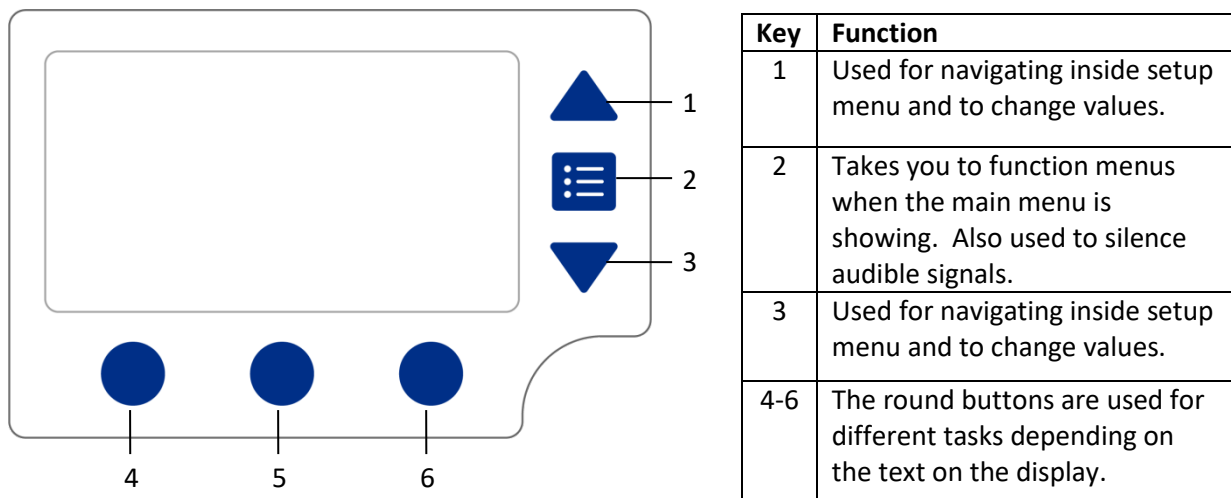
Name	Type	Description	Max voltage	Max current	Max cable length
Charger 2430 (1)	Input	24V DC-power	26.4V	2A	2 meters
Service (3)	Input	USB-micro for configuration and firmware update	5V	500mA	1,5 meters
USB (4)	Output	USB-A for barcode scanner or mass storage device	5V	500mA	1,5 meters
Display (5)	Input	Display connection, power + communication	13V	1.5A	1,5 meters
Com (6)	Input/output	Expansion port (RS485, Ethernet, USB (For XBee))	5V	500mA	Ethernet: 55 meters RS485: 700 meters USB: N/A
Sealer (7)	Output	Future use	-	-	-

Description of inputs and outputs for display unit:

Name	Type	Description	Max voltage	Max current	Max cable length
Mixer	Input/output	Display connection, power + communication	13V	1.5A	1,5 meters

3.4 Keyboard

The Biomixer has a set of keys for controlling its functions. The same key can be used for different tasks depending on the text on the display.



3.5 First time start-up

When starting up the Biomixer for the first time it will welcome you and ask if you want to exit storage mode. **Storage mode** is a mode where the Biomixers settings is optimized for storage (i.e., the battery will only load to maximum 70% which is the optimal battery level for long time storage).

1. Click **Yes**.


Now the Biomixer is in operating mode and the battery will be able to be charged 100%.

3.6 Communication

The Biomixer can be delivered with different types of communication. Communication must be configured both in Biomixer and in BmCom (See BmCom User Manual).


3.6.1 Communication configuration

The Biomixer needs to be configured according to which type expansion board for communication it is equipped with.


1. Enter special start-up by holding the menu-key  when turning the Biomixer on until the special menu is shown (approximately 25 seconds).
2. Click on **Service** and go down to **Setup expansion port**.
3. Click **Select**.
4. Select which **Expansion port** the Biomixer is equipped with from the following options:
 - None
 - Ethernet
 - RS-485
 - XBee

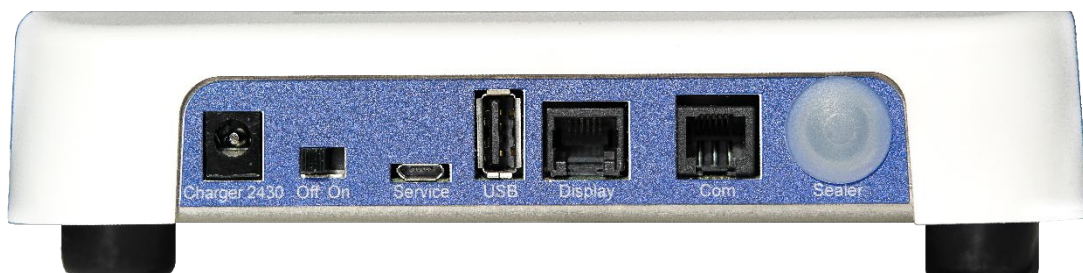
Note! When using Ethernet, make sure that the same port number is being used in the Biomixer and in BmCom (in BmCom: **IP-server port number** under **Preferences** and **Data collection**).

5. When done, click **Back** until the Biomixer main menu is visible.

Selected communication type and configuration can be viewed by entering the setup menu by clicking . Go to **Setup** and select **Information**.

3.6.2 Configuration how to send donation data

1. Click on the menu-key  and go to **Setup** and **Donation**.
2. Go to **Send data to** and select where the donation data should be sent.
 - **None** (default): Donation data is stored in the Biomixer's internal memory only.
 - **Exp. Port**: Donation data will be sent over the configured expansion port. (See chapter 3.6.3, 3.6.4 or 3.6.5 depending on which expansion board is used.)
 - **USB memory**: Donation data will be stored on a memory stick connected to the port marked **USB** (See chapter 3.6.6)



3.6.3 Ethernet

If it is equipped with an Ethernet expansion board, connect to the network using a network cable to the outlet marked **Com**.

Note! Always use the Biomixer on a switched network and a firewall protected net.

3.6.4 RS485

If equipped with a RS485 expansion board, connect to the network using a RJ12 6P6C cable to the outlet marked **Com**. To do this, you need a cable kit with an adapter.



Cable kit and adapter for communication with RS485 between Biomixer and PC.

3.6.5 USB (for connecting XBee dongle)

If equipped with USB expansion board for XBee communication, connect the USB dongle marked "XBee End Node Config ver. 1.20" to the USB outlet marked **Com**.

Note! The XBee USB dongle must be connected directly to the USB outlet marked **Com** on the Biomixer, no cable or other equipment shall be used for connecting it.

Note! USB memory and external barcode reader cannot be used in this USB port.



3.6.6 USB

It is also possible to collect the donation data on a USB memory that is connected to the outlet marked **USB**. The Biomixer supports USB sticks formatted with the FAT32 file system and with a maximum of 32GB. You can see which file system the USB memory has, for example, by right-clicking on the USB via a computer and clicking **Format....**

Note! XBee USB dongle cannot be used in this USB port.

Data from different individual mixers can be transferred to the same USB memory provided that the Biomixers have individual names. Names are set via the configuration file, see User Manual BmCom. Each mixer will create its own data file on the USB memory, which will be named as *mixer-name.bcd*. If a file with the same name already exists on the card, the new data will be appended to the end of this file.

This is the same outlet used for an external barcode reader. If you are going to use an external barcode reader and store donation data to a USB memory, you need to change the Biomixer's settings. Wrong settings may cause communication errors after each completed donation.

1. From the main menu, push the menu-key  and select **Setup** in the list.
2. Choose **Donation** and set **Send data to** to **USB memory**. Click **Save**.
3. Go to **Send data automatic** and set it to **No**. Click **Save**.
4. After the donation is completed (one or more), disconnect the external barcode reader from the USB port and replace it with the USB memory.
5. Push the menu key  and select **Send buffered donation data**. Now the Biomixer transfers the donation data from the Biomixer's memory to the USB memory.

3.6.7 BmCom

In order to communicate with the Biomixer from a PC, use BmCom. BmCom is a Windows software for the Biomixer. It is used to configure the procedure of barcode scanning during blood donation; it performs firmware update, and is also acting as a server, collecting donation through USB memory or LAN-bus. Download the latest version from ljungberg-kogel.com and find more information in user manual for BmCom.



Connected ITE-equipment must be evaluated according to IEC 60950-1.



All the donation data that is being stored in the Biomixer's internal memory will be lost when the configuration is updated! If needed, take a back-up of the donation data before updating the configuration.

3.6.8 Barcode reader (internal/external)

If external barcode reader is being used, connect the barcode reader to its connector on the Biomixer marked **USB**.

The Biomixer can also be equipped with an internal barcode reader located at the front of the display (this is an option for the Biomixer).

It is also possible to have both internal and external barcode reader operating in parallel. Always use external barcode readers recommended by the manufacturer (article number 9-55033-00). Connection of other barcode readers may damage the reader as well as the mixer.




This device emits CDRH/IEC Class 2 laser light. Do not stare into beam.

3.6.9 Power supply

Make sure that the line voltage is the same as the charger that comes with the Biomixer and also, that the right type of plug is available. Connect the charger in a free socket and to the blood mixer's charger inlet (marked **Charger 2430**, article number 9-55027-00).

Note! The internal battery is charged as soon as the Biomixer is turned on and the **Charger 2430** is connected. The battery status is indicated in the upper right corner on the main menu of the display.

4 Function menus

When pushing the menu-key  from the main menu, a selection of functions and settings are available.

4.1 Send buffered donation data

Here you can find the feature **Send all donation data**. This function will send all collection data that has been stored in the memory. Note that, only the data in the memory that has not already been sent, will be sent.

Note! If transmission fails, the stored data is preserved in memory and will be sent the next time a transfer is activated.

4.2 Weighing

The Biomixer operates like a scale when entering this menu, showing the weight placed on tray adjusted for the specific gravity of blood (1ml blood equals 1.06g).

4.3 Calibration control

It is recommended to, on a regular basis check the weighing accuracy of the scale. A sound calibration interval is at least once per week or if the Biomixer is being transported between different type of environments with different type of temperatures.

Select **Calibration control** in the list. The Biomixer enters a weighing state and show both weight in grams and calculated volume in ml (1ml blood weighs 1.06g). Put a reference weight (available by Ljungberg & Kögel) with 450ml (477g) on the tray. The Biomixer should now be showing 450ml +- 1% (445-455ml). If the calibration is outside these limits, please go to chapter 4.4.

4.4 Calibrate

If the deviation is too big during the calibration control (roughly +/- 5ml) the calibration can be changed. Remove the reference weight and go back to the main menu and select **Calibrate** from the list. Follow the instructions on the display. Always use a reference weight from Ljungberg & Kögel when calibrating.




The reference weight must be 450 ml i.e. 477g. (450mlx1.06g/ml). Reference weights can be ordered from Ljungberg & Kögel AB.

4.5 Setup

Here, settings of alarm limits and other parameters are done. See more details in chapter 5 Setup.

5 Setup

Settings of alarm limits and other parameter settings are done in the **Setup**-menu. From the main menu, push the menu-key  and select **Setup** in the list.

Note! This menu can be password protected, please refer to the User's manual for BmCom for more information on how to configure the password.

The setup-menu is divided into six submenus: **General**, **Donation**, **Donation alarms**, **Donation volumes**, **Advanced** and **Information**. Navigate by using the arrow-buttons to the right and enter a menu by pushing **Select** or the menu-key. The menu-key can always be used as a **Select**-button when you are operating in the setup-menu.

5.1 General

5.1.1 Language

Set the desired language by pushing **Select** and then use the arrow-buttons on the right. Confirm by pushing **Save**. There are two different language options available:

- English
- Swedish

Other languages can be added on request.

5.1.2 Time

BM550 has a real time clock for precise time registration. Set the minute, hour, year, month and day by using the arrow-buttons to the right and push **Next**. Confirm the settings by pushing **Save**.

5.1.3 Daylight saving time

The daylight saving hour can be set to either US or EUR, or be disabled. If selected, the clock will automatically be adjusted at dates for the daylight saving hour according to:

EUR: Increment hour the last Sunday of March, and decrement hour the last Sunday of October.

US: Increment hour the second Sunday of March, and decrement hour the first Sunday of November.

None: Daylight saving hours is disabled.

5.1.4 Date format

If set to **mm/dd**, the date format will be mm/dd yyyy. If set to **dd/mm** the date format is dd/mm yyyy.

5.1.5 Calibration interval

This setting will not allow a start of a new collection if the number of days since the last calibration check has exceeded. If this value is set to **0**, the feature is disabled.

5.1.6 Screen timeout

Number of minutes before the Biomixer goes into screen timeout when not being used (i.e. the backlight intensity will be set to 5%). If set to **0** the mixer will never activate the screen timeout. If the mixer is in screen timeout, simply press any button to leave screen timeout.

5.2 Donation

5.2.1 Donation menu unit

Units that can be used to indicate the donation is **ml**, **%** or **ml (g)**.

5.2.2 Change vol. during donation

If set to **Yes**, the SET volume can be changed during a donation by pressing **Pause**. Use the arrow-buttons on the right to change the volume.

5.2.3 Disinfection timer

When starting a donation and click **Clamp**, the Biomixer will countdown from the selected value and when it reaches zero, the donation might be started. If this value is set to **0**, the feature is disabled.

5.2.4 Store bag tare weight

If this setting is set to **Yes**, the tare weight of the blood bags will be stored in the collection data.

5.2.5 Send data to

Set to which unit you want the donation data to be send. Choose between the expansion port or USB memory depending on your working process and available unit. If **None** is selected, the system will continue to store the data internally until the internal memory is full. You can choose to activate an alarm for data overwriting (see section 5.2.7).

5.2.6 Send data automatic

If set to **Yes**, the data will be automatically sent when a collection is ready. If set to **No**, the data will still be stored in the internal memory for later transmission.

5.2.7 Data overwrite warning

If **Data overwrite warning** is set to **Yes**, the system will display a warning if the internal memory is full when donation begins. You can then choose whether you want to cancel the donation or

overwrite the oldest collection data that already exists in the internal memory. If it is set to **No**, the oldest collection data will be overwritten, when the internal memory is full, without a warning of data overwriting.

5.3 Donation alarms

5.3.1 Min volume flow alarm

The minimum volume for flow alarm is used in conjunction with the **Flow alarm – Low flow** and **Flow alarm – High flow**. Both alarms are disabled if the collected volume is less than parameter **Min volume flow alarm**. Thus, this is the donation volume the Biomixer needs to exceed before **Flow alarm – Low flow** and **Flow alarm – High flow** begin to be monitored. For example, if the value is set to zero, monitoring begins immediately when the donation starts.

5.3.2 Alarm limit flow LOW

If the flow rate in ml/min is less than the **Flow alarm – Low flow** limit an alarm will sound. If the alarm limit is set to zero, the monitoring of **Flow alarm – Low flow** is disabled during the entire donation.

5.3.3 Alarm limit flow HIGH

If the flow rate in ml/min is higher than the high flow alarm limit an alarm will sound. If the alarm limit is set to zero, the monitoring of **Flow alarm – High flow** will be disabled during the entire donation.

5.3.4 Alarm limit donation time

Time alarm will sound if the limit **Alarm limit donation time** is exceeded during a collection. If the alarm limit is set to zero, the donation time will not be monitored, and the alarm can therefore never be activated.

5.3.5 Abort donation on time alarm

If parameter is set to **Yes**, a collection is aborted if the **Time alarm** goes active.

5.4 Donation volumes

5.4.1 Number of donation volumes

Choose the number of set volumes that can be programmed. Up to nine volumes can be programmed.

5.4.2 Donation volume 1-9

Set the donation volumes that can be selected by using the arrow-buttons on the right before a donation.

5.5 Advanced

5.5.1 Mixing speed

Select the speed of the mixing motor controlling the tray. Select a value between 10-20 cycles/min. The default value of 15 has been proved to work well for most bag systems, however local regulations might demand other settings.

5.5.2 Backlight intensity

Here you can set the display's backlight intensity, a value between 1-100 %.

5.5.3 Sound signal Ok

Here you can choose which alarm signal you want to have for the Ok signal.

5.5.4 Sound signal Error

Here you can choose which alarm signal you want to have for the Error signal.

5.5.5 Sound level

The sound level of the speaker for the alarms is set with a value between 5-100 %.

5.5.6 Activate Barcode reader

If scanning is selected, a donation cannot be started without scanning barcodes. If no scanning is selected, a donation is started without scanning barcodes.

5.5.7 Upgrade configuration

Here you can configure and/or retrieve the barcode information, i.e. the scanning sequence and text to display for each question. Please refer to the User's manual for BmCom for more information.

5.5.8 Upgrade firmware

Here you can upgrade the firmware. Please refer to the User's manual for BmCom for more information.

5.6 Information

Under **Information** you find system information about firmware version, ethernet configuration and which expansion port the system is equipped with.


6 Donation alarms

Three donation alarms can be activated by the Biomixer.

Active alarms will be both audible and visual.

6.1 Flow alarm

Is activated if the blood flow during a donation goes over or under the limits that are preset for the alarm (see chapter 6.3 Donation alarms for more details on how to change the limits for the alarm). Both **Flow alarm – Low flow** and **Flow alarm – High flow** can be set in the range 0-500 ml/min.


The alarm is restored automatically when the flow goes back within the preset limits. The audio signal can be turned off by pushing the menu-key  to the right. Please note that if the flow goes back to normal values and then again goes outside of the preset limits the alarm is activated again.

There are two adjustable alarms for the flow. **Flow alarm – Low flow** is activated if the flow rate in ml/min is less than the low flow alarm limit. **Flow alarm – High flow** is activated if the flow rate in ml/min is higher than the high flow alarm limit. Parameter setting **Min volume flow alarm** is used together with the **Flow alarm – Low flow** and **Flow alarm – High flow**. **Flow alarm – Low flow** and **Flow alarm – High flow** are disabled as long as the total volume is below parameter setting **Min**


volume flow alarm. This is the donation volume the Biomixer must exceed before **Flow alarm – Low flow** and **Flow alarm – High flow** begin to be monitored.

6.2 Time alarm

Is activated if a donation takes longer than the preselected time limit. Valid limits for this alarm is 0-99 min. The user should adjust the time of blood collection depending on state regulation, norms etc.

The audio signal can be turned off by pushing the menu-key  to the right. If silenced, it will sound again when the time limit is reached once again.

7 Errors and events

Errors and events are shown with a text message on the display and a sound signal. The sound signal is silenced with a press on the menu-key .

7.1 Communication error

There was a communication error when sending data to the host PC. The data will however still be stored in the internal memory of the mixer. Once the connection is reestablished, the data can be sent.

If you get this error when using a USB memory, check the following:

- Valid USB memory is correctly inserted.
- USB memory is not full.
- USB memory is formatted to FAT32.

If you get this error when using Ethernet, check the following:

- Ethernet cable is correctly inserted.
- Ethernet settings for the Biomixer are correct (see section 3.6.1) and that the same port number is used in BmCom (**IP-server port number** under **Preferences** and **Data collection**).
- Check that path to **Save received data to directory** is correctly entered in BmCom (Under **Settings** and **Data collection**)

If you get this error when using RS485, check the following:

- RS485 cable is correctly inserted.
- Correct type of cable is used and that the RS485 network is set up as described in chapter 8.
- COM port configuration on the receiving PC is correct.
- Check that path to **Save received data to directory** is correctly entered in BmCom (Under **Settings** and **Data collection**)
- Too many Biomixers connected to the RS485 network may cause communication errors. Consider using Ethernet communication instead.

If you get this error when using XBee, check the following:

- Try resending the data using the function **Send buffered donation data**.

- Make sure the Biomixer is at least at 1 meter distance from the XBee dongle on the PC running BmCom
- XBee dongle marked “XBee End Node Config ver. 1.20” is inserted in the port marked Com on the mixer unit.
- Xbee dongle marked “XBee Coordinator” is inserted in the PC running BmCom.
- COM port configuration on the receiving PC is correct.
- Check that path to **Save received data to directory** is correctly entered in BmCom (Under **Settings** and **Data collection**)

If the communication error remains, contact service personnel.

7.2 Motor error

The motor controlling the mixing is either blocked or broken. Check that the tray can move freely and that no components regarding the tray and motor wheel is damaged.

7.3 Tare error

Automatic tare deduction is always done before collection. If this fails an error message is given with an error message and sound. Collection cannot proceed. Check that the tray is in its weighing position and moves freely. Also make sure that a tare calibration has been performed.

7.4 Calibration error

If a calibration has not been made a calibration error is active. If active, a calibration is needed.

7.5 Clock error

The clock error is active when there is an internal communication error in the Biomixer. If you get this error repeatedly, contact your local distributor.

7.6 Battery error – Mixer unit



An error has occurred in the Biomixer’s mixer battery. This means that the Biomixer will no longer be charged, and the battery will be drained if the power supply is not connected. The battery needs to be replaced, see chapter 12.6 Change battery for more information.

7.7 Battery low

Is activated if the battery level is lower than 20%. With a battery level below 20%, a new donation Can only be started if **Charger 2430** is connected.

7.8 Battery empty

Is activated if the battery level is less than 10 %.

Note! The battery level must be over 10% to be able to start a donation (even with the **Charger 2430** connected).

7.9 Over- or underweight

It may happen that the tray by accident is overloaded with too much weight. If this happens the display will show the text **>999**, which means the volume is more than 999ml.

It may also happen that the tray is loaded with too little weight; for example, if a set of blood bags are removed before the donation is finished. If this happens the display will show a negative volume down to **-99ml**.

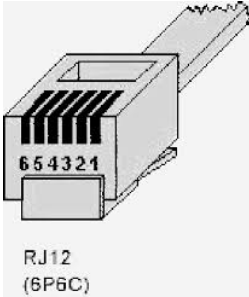
If **>999** or **-99ml** is showing on the display when the tray is empty it may be due to the exposure of a heavy weight and the calibration must be checked.

8 RS485 Communication description

8.1 RS485 - Connector pinout

Pinout of the BM550 optional RS485-connector (Com):

BM550 RJ12 6/6 (6P6C) Modular	
p1	
p2 (GND)	
p3 (RS485 A)	
p4 (RS485 B)	
p5 (GND)	
p6	

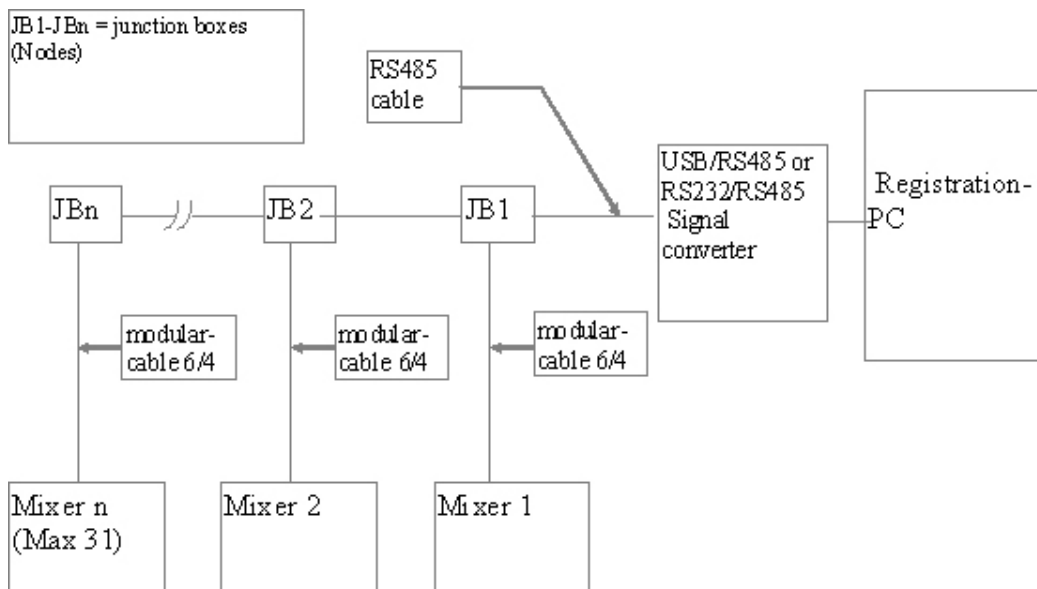


Since p1 and p6 is not connect a 6/4 (6P4C) cable is also compatible.

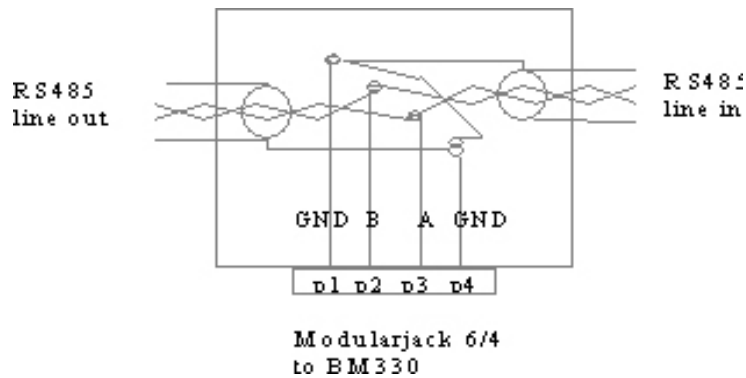
8.2 RS485 - Cable to registration PC

The PC is connected to the RS485-network via a USB/RS485 signal converter, type ADAM-4561 or other isolated converter complying with safety standards for medical equipment.

Junction boxes are mounted on the wall close to each mixer and connects to this box with a 4-pole straight cable with modular 6/4 in each end.



Connections in the junction box:



We recommend twisted pair cable with shield and return wire, e.g. type Alpha Wire 5471C. The return wire and the shield shall be connected to p1, p4 (GND) in every junction box.



Mixers of type BM550/AB-50 can be connected to the same network as the older BM330 and BM330-1 versions.



The signal converter shall have galvanic isolation between RS485 line and USB/RS232 line. It is the person who installs the LAN that is responsible for the installation and that connected external equipment (converter and PC) comply with relevant safety standard, EN60950, and that the whole system comply with EN 60601-1-1, "Safety requirements for medical electrical systems". If in doubt, contact qualified technician or Ljungberg & Kögel.

9 Communication description XBee

XBee is a wireless serial communication technology operating in the 2.4 GHz band that can be used to transfer donation data from Biomixer to BmCom. XBee is an option that must be ordered from Ljungberg & Kögel. There is also an upgrade kit so that Biomixers that have not been ordered with it can be equipped with an XBee-module later.

Required hardware:

- USB expansion board for BM550
- USB dongle marked "XBee End Node Config ver. 1.20" (connected to Com port on Biomixer)
- USB dongle marked "XBee Coordinator" (Connected to PC running BmCom)



Mixers of type BM550/AB-50 can be connected to the same network as the older BM330 and BM330-1 versions.

10 Hardware description

10.1 Display positions

The display can have two different positions, mounted on the side or mounted on the front.



The display is attached with three screws under the Biomixer. The display is connected to the Biomixer's connector marked **Display**. Make sure that the cable is attached under the Biomixer in such a way that the Biomixer stands firmly and rests on its black legs.

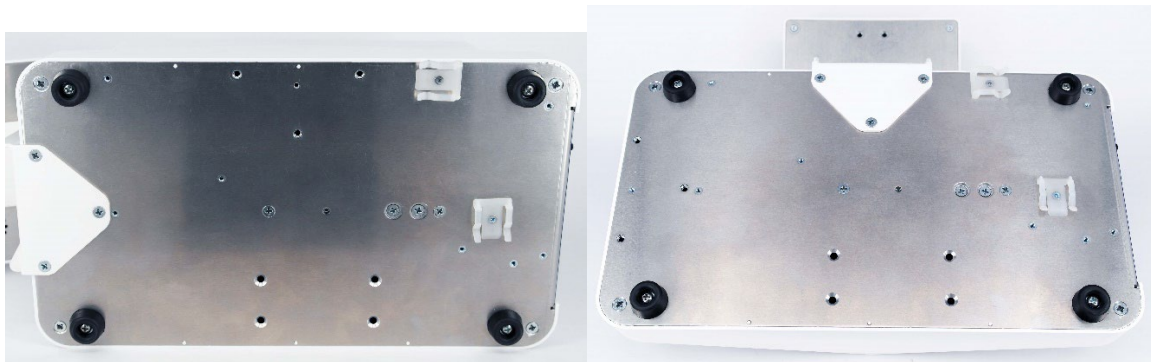


Figure 1: To the left, side position. To the right, front position.

10.2 Power supply and battery

The Biomixer is powered by an external power adaptor (**Charger 2430**) and an internal rechargeable battery. The internal battery is a 10.8V/2.6Ah Li-ion battery pack and is charged in the mixer when the power adaptor is present and the Biomixer is turned on.

10.3 BLDC-motor

A Brushless DC electric motor containing a built-in motor driver is used to drive the mixing tray. The five cables on the motor include Ground, Plus, Pulse, PWM and Direction. The microcontroller generates the PWM pulses that determine speed.

The motor is also equipped with a ToHome-switch that is used to stop the motor in the weighing position. This position is indicated by an Optical through-beam sensor which is affected by the lower part of the swing. If the sensor is not affected when it is supposed to be, i.e. when running the motor, an error is displayed.

10.4 Clamp

The clamp is operated by a servo motor which is controlled by a software subroutine. At power up, the clamp is reset by setting its position counter to **Closed** (despite its actual position) and then run it to **Open**.

See chapter 12.5 on how to calibrate the clamp.

10.5 Load cell

The load cell is used for the weighing function in the Biomixer. It uses a wire strain gauge for weight measurement. It is protected for both lifting and pressing overload.

11 Troubleshooting

If the Biomixer malfunctions, please refer to this chapter before contacting an authorized service technician.

11.1 Battery not charging

Problem

The adapter is connected, but the battery is not charging.

Solution

1. Make sure the Biomixer is turned on since the Biomixer only charges the battery when it is turned on.
2. An error has occurred in the Biomixer's mixer battery. The battery needs to be replaced, see chapter 12.6 Change battery for more information.

11.2 Battery discharge quickly

Problem

The battery used is fully charged but is discharged too quickly.

Solution

The battery is old and needs to be replaced.

11.3 Wrong donation volume

Problem

I have set the Biomixer to collect a certain volume, e.g. 500ml but the actual collected volumes differ.

Solution

1. Make sure that the Biomixer is correctly calibrated, see chapter 12.3.
2. If the time after a collection is completed has been longer than 2 minutes the Biomixer will automatically open the clamp, perform a mixing cycle and close the clamp. This is to prevent blood to coagulate in the tube. This will imply in a higher volume in the bag
3. Make sure that the clamp has correct settings, see chapter 12.5.


11.4 Lost password

Problem

I forgot the password for the setup menu.

Solution

1. You can read the password setting in BmCom, but first the Biomixer needs to be in a special menu.
 - a. Turn off the Biomixer.

- b. At power up, press menu- key  on the keyboard when turning the mixer on. Hold the key until the special menu is shown (approximately 25 seconds).
- c. Go to the menu **Upgrade configuration**.
- d. Connect the Biomixer's port marked **Service** to a PC.
- e. Open BmCom and make sure that the **Preferences** setting for **Configuration** is correct.
- f. Click on the menu **Do** in BmCom and select **Configure Biomixer**.
- g. Click **Read**. **\$03** indicates the password parameter.
- h. Click **Close** and close BmCom.

11.5 Clamp tube detection problems

Problem

The clamp does not detect tubes.

Solution

1. The clamp needs to be adjusted, see 12.5 for more information.
2. If the display has being moved to another mixer unit, a new setting needs to be done for the clamp. See 12.5 for more information.

11.6 Display problems

Problem

The mixer is running but nothing happens when I push a button.

Solution

1. Try restarting the Biomixer. Check if the buttons are working. If the problem remains, the keyboard needs to be replaced.

12 Service and maintenance



If this equipment is modified, appropriate inspection and testing must be conducted to ensure continued safe of use of the equipment.




A damaged battery must be handled as dangerous goods as there is a risk of leakage. If liquid comes in contact with skin or clothing, rinse immediately with plenty of clean water. Follow local regulations when recycling.



This device emits CDRH/IEC Class 2 laser light (if equipped with internal barcode reader). Do not stare into beam.

Abelko provide, on request, technical documents (circuit diagrams etcetera) to assist service personnel for parts that are designated to be repairable parts.

12.1 Special start-up procedures

At power up, the user can select to enter special procedures in the software. These procedures are entered by pressing menu- key  on the keyboard when turning the mixer on. Hold the key until the special menu is shown (approximately 25 seconds).

12.1.1 Service

Under **Service** there are test procedures for service tests and configurations of firmware. See more details below.

Menu	Function
Calibrate	Used for service tests.
Burn-in mode	Used for production tests (disconnects the charging on the internal battery).
Keyboard	Used for service tests.
Clamp adjust	Used mainly for production tests (adjustments of the clamp). See section 12.5 for more details.
Clamp	Used for service tests.
Motor	Used for service tests.
Barcode reader (int)	Used for service tests.
Barcode reader (ext)	Used for service tests.
Clock	Used for service tests (clock settings for the Biomixer).
Speaker	Used for service tests.
Mixer battery	Used for production tests (information for the mixer's battery).
Sealer battery	Used for production tests (information for the sealer's battery).

	Optional feature.
Expansion port	Information for the Biomixer's expansion port.
Setup expansion port	Configuration for the communication type. See section 3.6.1 for more details.
Default menu settings	Here, all the menu settings under Setup (for example sound level, donation alarms), can be default initialized. Donation data and configuration including barcode questions are not affected. When Default menu settings are set to Yes , the Biomixer will enter Storage mode , see section 12.11.1 for more details.

12.1.2 Upgrade configuration


Here you can upgrade the configuration for the Biomixer. This menu does not require password to enter which is useful if the Setup-menu is password protected and the password is lost.

12.1.3 Upgrade firmware

Here you can upgrade the firmware for the Biomixer. This menu does not require password to enter which is useful if the Setup-menu is password protected and the password is lost.

12.2 Running the test program

A built-in test program can be run to verify some of the functions implemented in the Biomixer. This test is available in the Service menu.

1. Turn off the Biomixer.
2. At power up, press menu- key  on the keyboard when turning the mixer on. Hold the key until the special menu is shown (approximately 25 seconds).
3. Click on **Service**.

12.2.1 Calibrate

Click on **Calibrate** to perform a calibration in order to set the weighing accuracy of the scale.

1. Follow the instructions on the display. Always use a reference weight from Ljungberg & Kögel when calibrating.

12.2.2 Keyboard

Click on **Keyboard**. This test makes sure that all the buttons on the Biomixer functions properly.

1. Start by pressing each key, one by one. Make sure that the display shows the right key function when pressing.

12.2.3 Clamp

This test will repeatedly close and open the clamp. The frequency is about 0.5 sec. A text is displayed indicating the position of the clamp and amount of clamp cycles.

1. Before entering the test, put a tube in the clamp.
2. Click on **Clamp**. The clamp will now repeatedly close and open.
3. Make sure that the clamp is closing the tube (see section 12.5 for more details on how to adjust the clamp).



Never leave the test in this mode for more than 10 minutes since the stepping motor will get overheated and may be damaged.

12.2.4 Motor

Click on **Motor**. One mixing cycle is done and then stopped in the weighing position for about 1 sec. This sequence is repeated until **Back** is pressed. A text is displayed indicating the number of cycles.

1. Check that the motor with the gearbox is running nice and smoothly.

12.2.5 Barcode reader (int) (optional)

Click on **Barcode reader (int)**. Here you can check that the internal barcode reader works (internal barcode reader is an option for BM550).

1. Check that the scanning works properly by scanning barcodes with the internal barcode reader at the front of the display.

12.2.6 Barcode reader (ext) (optional)

Click on **Barcode reader (ext)**. Here you can check that the external barcode reader works (external barcode reader is an option for BM550).

2. Connect the external barcode reader to the outlet marked **USB** on the Biomixer.
3. Check that the scanning works properly by scanning barcodes with the external barcode reader.

12.2.7 Clock

Click on **Clock**. In this test the internal clock is being tested in the Biomixer.

1. Check that the time and date are correct.
2. If not, set the correct time and date by pressing the arrow buttons to the right and using **Next**.
3. Click **Save**.

12.2.8 Speaker

Click on **Speaker**. This test will turn on the speaker by playing **Sound signal Ok** number **2** repeatedly.

1. Check that the sound signal is audible and clear.

12.2.9 Expansion port (optional)

Click on **Expansion port**. Here you can see which type of communication the Biomixer is set up for. If this is not the correct type of communication, see section 3.6.1 on how to change type.


The Counter is used for production tests.

In order to test the expansion port, connect the Biomixer to BmCom via PC and perform a donation. Check that the donation data is received in BmCom. If you want to keep the test data separated from authentic donation data, change the BmCom setting **Save received data to directory** to a temporary directory (see User's manual for BmCom). Remember to restore the settings after the test.


Now the test program is finished.

12.3 Check of calibration

It is recommended to, on a regular basis check the weighing accuracy of the scale. A sound calibration interval is at least once per week or if the Biomixer is being moved between different type of environments with different type of temperatures. It is also recommended to calibrate the Biomixer after it has been transported.

From the main menu, push the menu-key  and select **Calibration control** in the list. The Biomixer enters a weighing state and show both weight in grams and calculated volume in ml (1ml blood weighs 1.06g). Put a reference weight (available by Ljungberg & Kögel) with 450ml (477g) on the tray. The Biomixer should now be showing 450ml +/- 1% (445-455ml). If the calibration is outside these limits, please continue to next step.

12.4 Calibration

If the **Calibration control** shows **Error** (the deviation is too big), a new calibration must be performed before a new collection can be started. Remove the reference weight and go back to the main menu and select **Calibrate** from the list. From the main menu, push the menu-key  and select **Calibrate** in the list. Follow the instructions on the display. Always use a reference weight from Ljungberg & Kögel when calibrating.



If the Biomixer has been exposed to a big temperature difference, e.g. been moved from a cold environment to a warm, it must have some time to obtain a stable temperature.


12.5 Clamp settings

If the clamp has problems detecting tubes or leakage problems, it can be due to the settings of the clamp.

Since the setting is stored in the mixer unit, a new setting needs to be done if the display is being moved to another mixer unit.



Clamp settings should be handled with care. Always consult authorized personnel before modifying the clamp settings.

1. Turn off the Biomixer.
2. At power up, press menu- key  on the keyboard when turning the mixer on. Hold the key until the special menu is shown (approximately 25 seconds).
3. Click on **Service** and go to **Clamp adjust**.
4. Put a tube in the clamp.

5. The three different positions for the clamp (**Locked**, **Open** and **Closed**) can be adjusted by clicking **Clamp** on the Biomixer. For problems with detecting tubes or leakage, it is the **Closed** value that needs to be adjusted. The default setting for **Closed** is 2100.
6. Click **Select** and change the value with the arrow buttons to the right on the display unit. When changing values, it is recommended to step 10 units at a time.
7. Click **Save**.
8. Make sure that the clamp closes the tube tightly when **Closed**.

12.6 Change battery

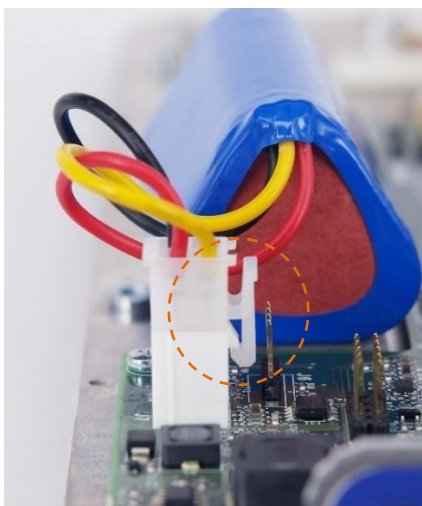


When handling the battery, please be aware of following warnings:

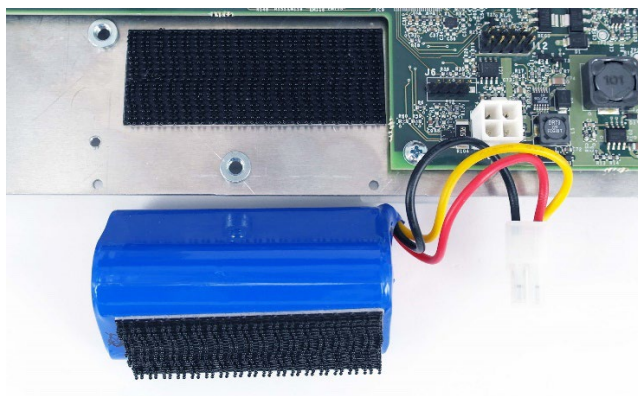
- **A damaged battery must be handled as dangerous goods as there is a risk of leakage. If liquid comes in contact with skin or clothing, rinse immediately with plenty of clean water.**
- **If liquid leaking from the battery gets into your eyes, do not rub your eyes. Wash them well with clean edible oil and go to see a doctor immediately.**
- **Do not disassemble or modify the battery or battery cells.**
- **Do not use a battery with serious scar or deformation.**
- **Do not store or transport batteries in your pockets or a bag together with metal objects such as necklaces, hairpins, coins, or screws.**
- **Always use the same type of battery (available by Ljungberg & Kögel) since fire or explosion may occur if wrong type of battery is being used.**
- **Do not expose the battery to heat or throw the battery into fire.**
- **Do not throw and wet the battery in liquid such as water gasoline or drink etc.**
- **Do not short circuit the (+) and (-) terminals with other metals.**
- **Do not place battery in a device with the (+) and (-) in the wrong way around.**
- **Do not pierce the battery with a sharp object such as a needle.**
- **Do not weld the battery directly.**

Batteries have life cycles. If the time that the cell powers equipment becomes much shorter than usual, the cell life is at an end. Replace the battery with a new one. Always use the same type of battery available by Ljungberg & Kögel.

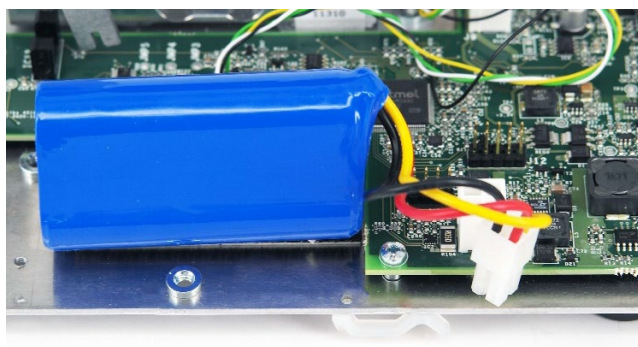
1. Start by dismounting the Biomixer, follow the guide in chapter 13.
2. Disconnect the battery connector with the white plastic hook.



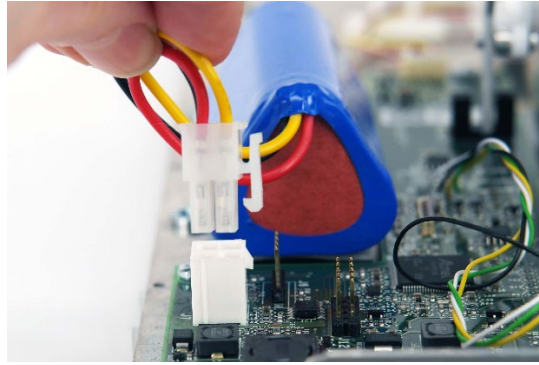
3. Remove the battery pack, it is fixed with Velcro.



4. Attach the new battery pack on the black Velcro.



5. Connect the battery connector with the white plastic hook.



6. Now the Biomixer has a new battery.



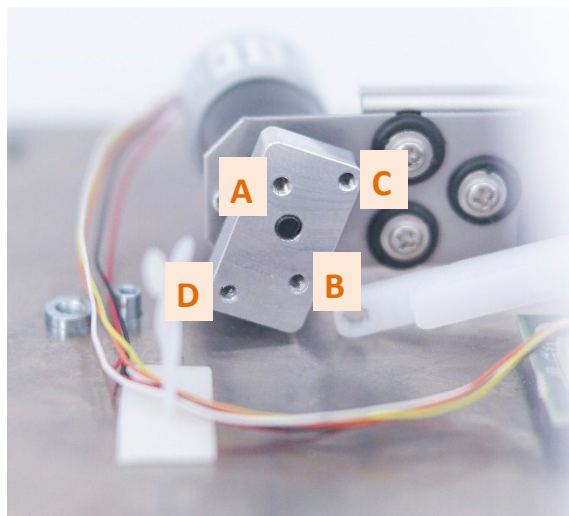
7. See section 12.12 on how to recycle the old battery.
8. Reverse the steps in chapter 13 to assemble the Biomixer. Turn on the Biomixer without the main supply connected to see that the Biomixer is working properly.

12.7 Change tray angle

The tray can be modified by changing its rocking angle. This can be useful for example if local restrictions require another setting than default (29°).

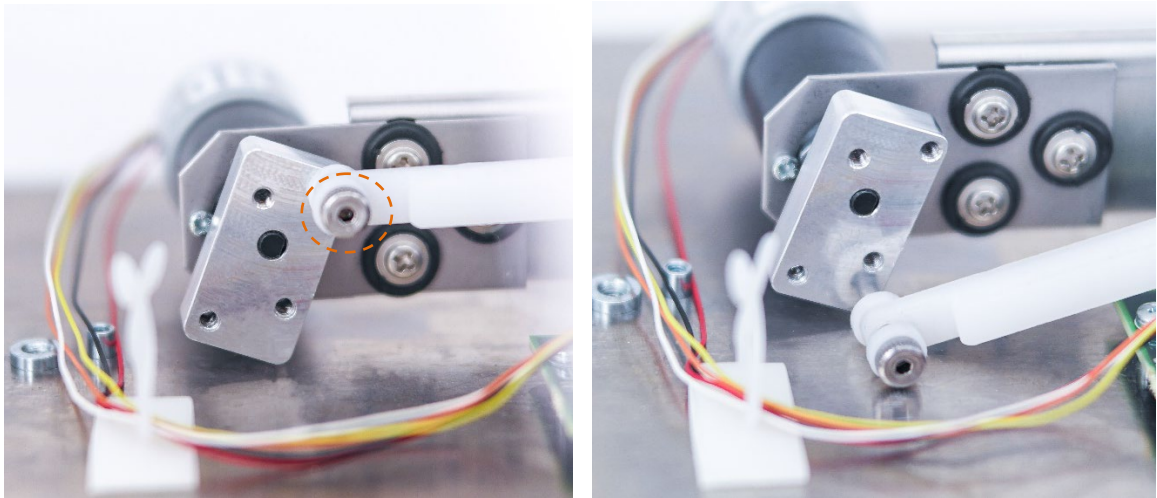
The axle of the tray can have four different positions:

- A: 21°
- B: 29°
- C: 35°
- D: 42°

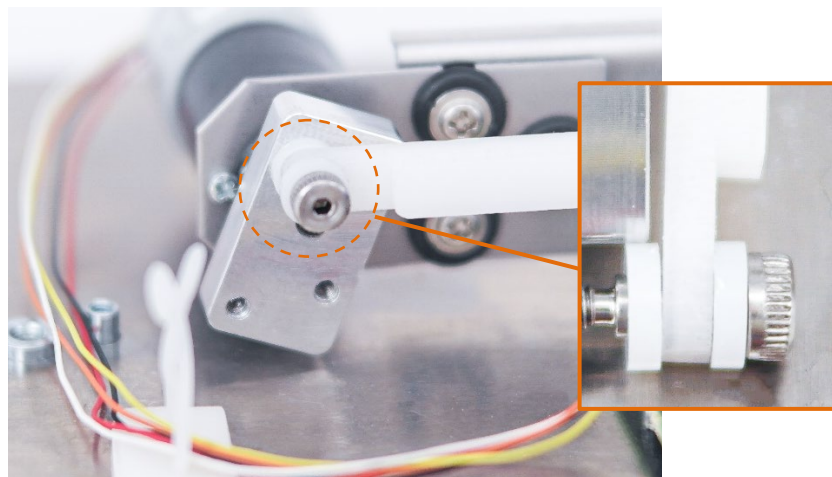


1. Start by dismantling the Biomixer, follow the guide in chapter 13.

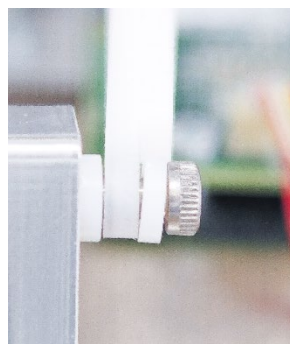
2. Detach the white plastic axle including the screw and spacers with a hex key.



3. Attach the axle to the desired position with the hex key. Make sure that the spacers are in the right position (one on each side of the axle).



4. Thread the screw until stop.



5. Now the tray has a new rocking angle.
6. Reverse the steps in chapter 13 to assemble the Biomixer. Turn on the Biomixer and try the new rocking angle in order to see that the Biomixer is working properly.

12.8 Battery charging

If the Biomixer is to be used mobile (without access to charger) the battery must be charged. The battery is fully charged when the display shows 100%. The Biomixer needs at least 20% battery without connected charger and 10% battery with connected charger to be able to safely make a donation. When capacity drops to 20% and the charger is not connected, and an alarm is activated. A started collection can however be completed.

If the Biomixer is to be used stationary the charger is recommended to always be connected to ensure that the battery is always fully charged.

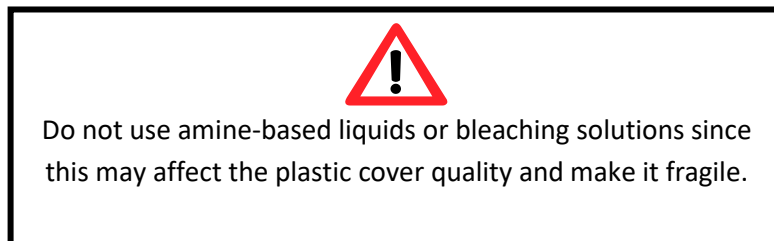
Note! The battery will only be charged when the Biomixer is turned on.

 **Do not charge/discharge the Biomixer in temperatures above 40°C.**

12.9 Cleaning


The Biomixer is cleaned by using a mild soap solution or another solution that is non acidic. Bleaching solutions and amine-based cleaners should not be used since this may harm the plastic, making it fragile and start to crack.

The tray should be fixed while cleaning it by holding it firmly but without using any force since this may affect the weighing accuracy. If needed, the tray can be removed by gently sliding it in the direction pointed out by the label on the tray.



12.10 Transport

Always turn the power off during transportation. The Biomixer should be transported in a transport case suitable for BM550. The transport case is available as an option and can be ordered by Ljungberg & Kögel.

 **Do not leave the Biomixer's battery close to fire or inside of a car where temperature may be above 60°C.**

12.11 Storage


Since the Biomixer contains lithium-ion batteries, it should be stored in a cool, dry place to prevent the battery cells from corroding (see chapter 0 Technical specifications for more details). Also, avoid storing the batteries fully charged for an extended period as they may permanently lose some of their capacity.

If the Biomixer is to be stored for an extended period, we recommend that the battery is charged up to 70% of its maximum capacity every six months. Use **Storage mode** to ease the charging procedure.

Storage mode is a mode where the Biomixers settings is optimized for storage (i.e., the battery will only load to maximum 70% which is the optimal battery level for long time storage).

12.11.1 Activate storage mode

Note! All the menu settings under **Setup** (for example sound level, donation alarms), will be default initialized.

1. Turn off the Biomixer.
2. At power up, press menu- key  on the keyboard when turning the mixer on. Hold the key until the special menu is shown (approximately 25 seconds).
3. Click on **Service** and go to **Default menu settings**.
4. Set **Yes** and click **Send**. Now the Biomixer will enter **Storage mode**.

Next time starting up, the Biomixer will ask if you want to exit storage mode.

12.12 Recycling

The Biomixer contains lithium-ion batteries. When recycling, the Biomixer should be labeled with "Lithium ion batteries for disposal" or "Lithium batteries for recycling". If they are damaged, make sure that they are labeled with "Damaged / defective lithium-ion batteries". The battery must not be modified and only replaced by authorized personnel.



A damaged battery must be handled as dangerous goods as there is a risk of leakage. If liquid comes in contact with skin or clothing, rinse immediately with plenty of clean water. Follow local regulations when recycling

12.13 Trouble shooting and technical training

When more advanced troubleshooting is needed, down to circuit level, we refer to the technical documentation with circuit scheme, component placing etc. which can be ordered from Ljungberg & Kögel AB.

Ljungberg & Kögel AB supports technical training for service personnel on request.

13 Dismounting the Biomixer



Be careful touching the charge regulator when the charger is connected since it can be hot.



A damaged battery must be handled as dangerous goods as there is a risk of leakage. If liquid comes in contact with skin or clothing, rinse immediately with plenty of clean water. Follow local regulations.



This device emits CDRH/IEC Class 2 laser light. Do not stare into beam.

1. Turn off the power of the Biomixer and disconnect **Charger 2430**.
2. Slide the tray off.



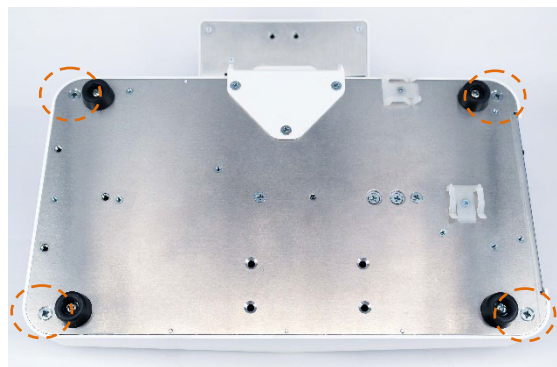
3. Unscrew the tray plate's four screws. Note the direction of the plate for when you are going to assemble it again.



4. Remove the safety lid.



5. To dismantle the cover, loosen the four screws under the Biomixer.



6. Lift the cover off.



14 Mount optional features

14.1 Communication modules

The Biomixer can be equipped with different types of communications. These are mounted in the outlet marked **Com**.



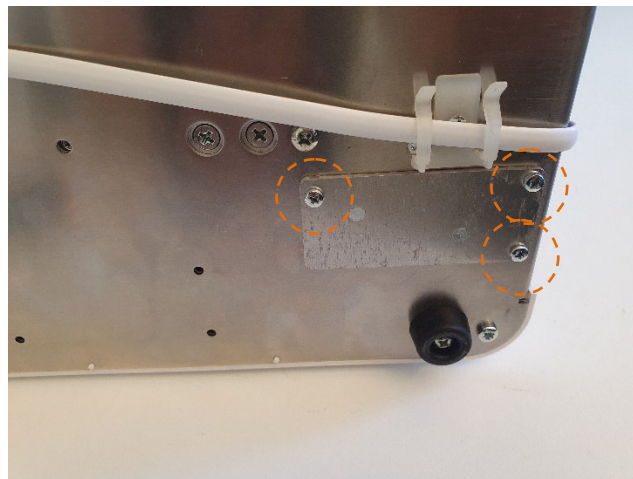
14.1.1 Mount an expansion module

The Ethernet module is named 4524 on the circuit board and has 8 contacts in its connector.

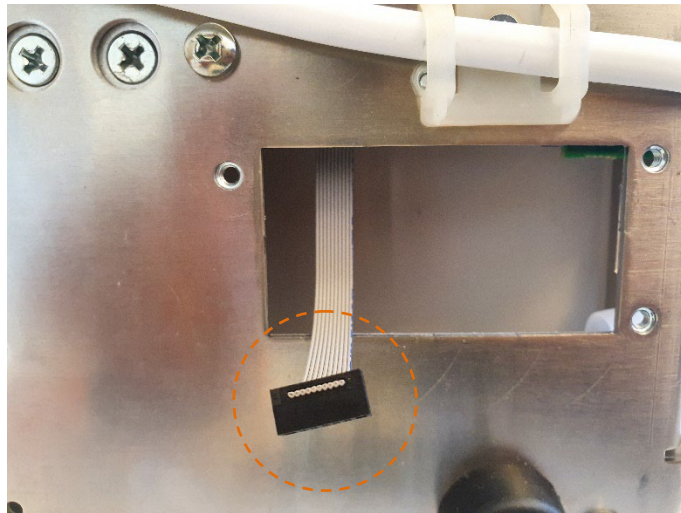
The RS485 module is named 4523 on the circuit board and has 6 contacts in its connector.

The USB (for XBee) communication module is named 4542 on the circuit board and has a USB connector.

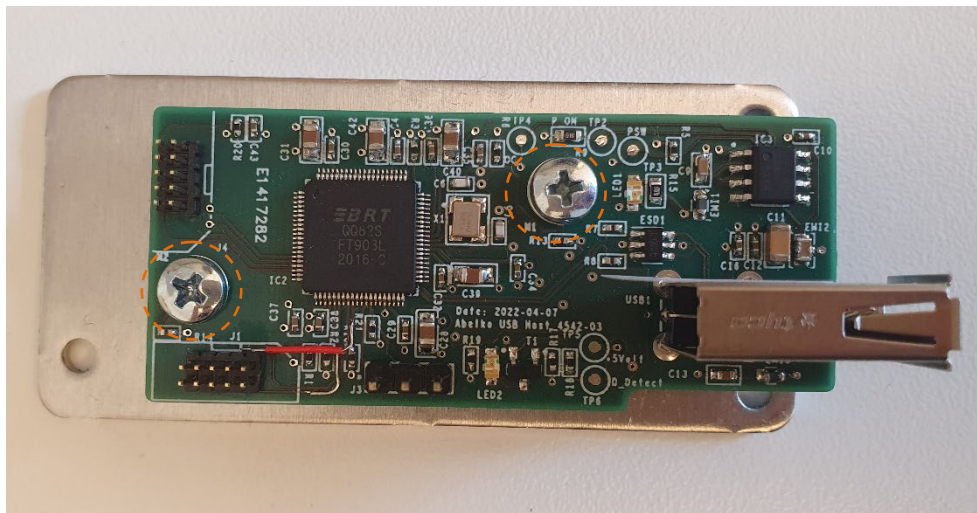
1. Remove the expansion module mounting plate with the 3 screws.



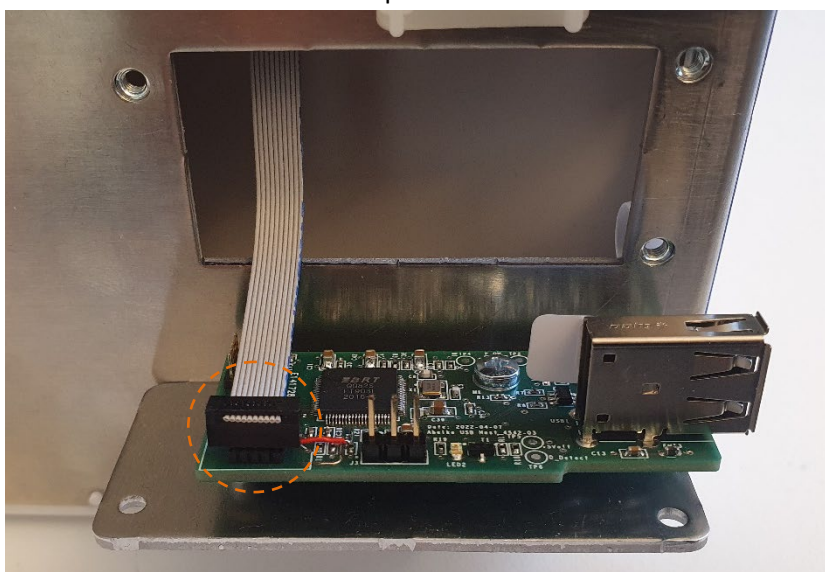
2. Inside the mounting plate you will find the flat cable that shall be attached to the expansion module.



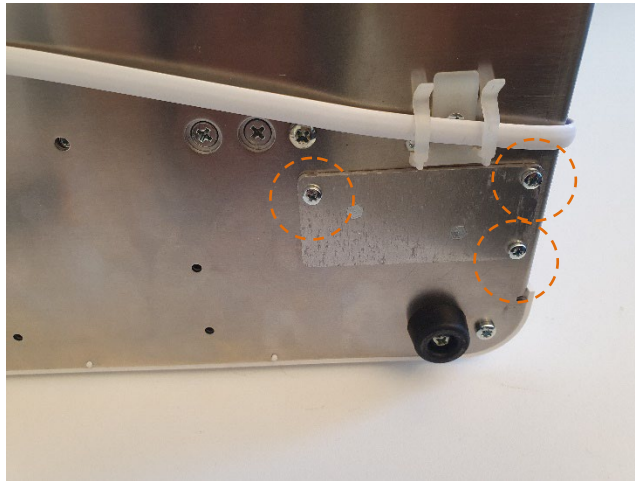
3. Attach the card to the mounting plate with the two screws.



4. Connect the cable to the expansion board as shown in the picture below.
Note! Some modules may have more than one connector. The cable shall always be attached to the connector marked in the picture below.



5. Reattach the mounting plate the the Biomixer using the 3 screws.



6. See chapter 3.6.1 on how to configure the software for the new communication type.

15 Biomixer Test protocol

This is a test protocol to be used with the BM550's test program in section 12.2. This can be used as a protocol for scheduled service.

Date	
Name	
Serial number	

Reference: BM550 test procedure				
§	Description	Read value	Checked	REMARKS
1	Mixer Bootloader version			
2	Mixer Firmware version			
3	Display Bootloader version			
4	Display Firmware version			
5	Check of basic functions			
6	Tray assembly			
7	Calibrate			
8	Keyboard			
9	Clamp			
10	Motor			
11	Barcode reader (int) (optional)			
12	Barcode reader (ext) (optional)			
13	Clock			
14	Speaker			
15	Expansion port (optional)			
16	Visual inspection of labels (including type plate)			

Approved by: _____

16 Technical specifications

16.1 Technical data BM550/AB-50

Parameter	Value	Note
CE	This product meets the requirements for CE marking.	
Power supply	AC Adapter Charger 2430 , also works as a battery charger and is a part of ME System. Voltage 100-240VAC \pm 10%, Output voltage 24V / 30W Internal battery, Li-Ion, 10.8V/2.6Ah up to 20h battery life during normal use. May only be replaced with the same article (9-55028-00).	
Mains isolation	Isolation from mains through appliance coupler C8 or mains plug.	
Overvoltage category	II for AC/DC adaptor	
Power consumption	Max 30VA	
Fuses (built in)	PTC (self-recovery for overload protection)	
Collected volume	(Collected blood) 0-999ml	
Accuracy	<1% of max weight \pm 1ml	
Tare range	0-600g	
Mixing cycle	Selectable between 10-20 cycles/min (based on continuous mixing cycles)	
Internal data storage for donations	More than 32.000 characters or a minimum of 80 collections	
External data storage for donations	USB mass storage device. USB Type A. FAT32 Filesystem	USB-memory not included
Tube clamp operation	Tube sensing	
Mixing tray operation	BLDC-motor	
Internal barcode reader	Laser class 2, certified for IEC 60825-1	Optional
PC connection	USB Micro-B for programming	
Network connection	RS485, 6/4 modular, Ethernet or XBee	Optional
Barcode reader connection	Internal (laser) or external USB Type A	Optional
Relative humidity incl. storage and transportation	10-95% not condensing	
Operating temperature	+10 - +40°C	
Storage and transportation temperature	-20 - +45°C	
Dimensions	Mixer unit: 320 (L) x 180 (W) x 150 (H) mm Display unit: 145 (L) x 110 (W) + 45 (H) mm	
Weight	2kg	
Mode of operation (according to IEC 60601-1)	Continuous operation	
Ingress protection	IP20	

(according to IEC 60529)		
Protection against electric shock (according to IEC 60601-1)	Class II	
Isolation (according to IEC 60601-1)	Input-output: 2 MOPP	
Applied parts (according to IEC 60601-1)	None	

Emissions test	Test level
RF emissions CISPR 11	Group 1, Class A 0.15-1GHz 30-230MHz 40dB μ V/m 230-1000MHz 47dB μ V/m.
Conducted emissions CISPR 11	Group 1, Class A Quasi/Average [dB μ V]: 0.15 – 0.50: 79/66 0.5 – 5: 73/60 5-30MHz: 73/60
Harmonic emissions IEC 61000-3-2	Class A
Voltage fluctuations/ flicker emissions IEC 61000-3-3	Class A

Immunity test	Test level
Electrostatic discharge (ESD) SS-EN 61000-4-2 v2 2009-05-25	\pm 8 kV contact \pm 15 kV air
Radiated RF-electromagnetic fields IEC 61000-4-3 V3.2 2010-04	3V/m 80MHz – 2.7GHz
Proximity fields from RF wireless communications equipment IEC 61000-4-3	380-390MHz 27V/m 430-470 28V/m 704-787 9V/m 800-960 28V/m 1700-1990 28V/m 2400-2570 28V/m 5100-5800 9V/m
Electrical fast transient/burst IEC 61000-4-4 V2.1 2011-03	\pm 2 kV for input/output Lines, A.C-port
Surge IEC 61000-4-5 V3.0 2014-01	\pm 2 kV line(s) to earth (for signal input/output, A.C-port)

Conducted RF-fields IEC 61000-4-6 V4.0 2013-10	3V 0.15-80MHz 6V in ISM-bands 80% AM at 1kHz
Voltage dips, short interruptions and voltage variations on power supply input lines SS-EN 61000-4-11 A1	Input AC-port <5 % UT (>95 % dip in UT) for 0,5 cycle 40 % UT (60 % dip in UT) for 5 cycles 70 % UT (30 % dip in UT) for 25 cycles <5 % UT (>95 % dip in UT) for 5 s
Power frequency (50/60 Hz) magnetic field IEC 61000-4-8 V1 2016-04-27	3 A/m
EN 61000-3- 2: 2014 Harmonic	Class A
EN 61000-3-3:2013 Voltage Fluctuations and Flicker	Class A

17 Spare parts list

17.1 BM550/AB-50

Name	Part number	Description
MIXERUNIT		
Mixer PCB	9-55006-00	Circuit board, mixer unit.
Modular cable 55cm 6/6-6/6	9-55004-00	Modular cable, mixer to display, 55 cm.
Motor DC 12V PWM	9-55008-00	Motor.
Display attachment plate	9-55012-00	Bracket for display unit incl screws.
Mixing tray BM550	9-55018-00	Tray incl label BM550.
Mixing tray AB-50	9-55018-01	Tray incl label AB-50.
Motor transmission	9-55009-00	Transmission parts for motor.
Motor mounting	9-55007-00	Motor mounting.
Load cell	9-55005-00	Load cell with holder.
Mixing tray attachment	9-55010-00	Details for attachment of tray incl safety lid.
Fixate	9-55011-00	Rubber feet, velcro straps, blind plugs for expansion ports.
Battery	9-55028-00	Battery with velcro fitting.
Mixer housing BM550	9-55003-00	Base plate and plastic cover with screws, for BM550.
Mixer housing AB-50	9-55003-01	Base plate and plastic cover with screws, for AB-50.
DISPLAY UNIT		
Display PCBs	9-55024-00	All (two) circuit boards for display unit.
Display LCD 240*128	9-55025-00	LCD display.
Display Speaker	9-55026-00	Speakers incl attachments.
Display housing BM550	9-55029-00	Labeled plastic cover with keyboard incl. back cover, for BM550.
Display housing AB-50	9-55029-01	Labeled plastic cover with keyboard incl. back cover, for AB-50.
Display Clamp	9-55013-00	Clamp mechanism incl servo motor.
MISC		
Charger2430 (Power supply 24 VDC 30W 100-240 V)	9-55027-00	AC adapter/battery charger.
Expansion Board: RS485	9-55000-50	Expansion board RS485 incl screws and cable.
Expansion Board: Ethernet	9-55000-55	Expansion board Ethernet incl screws and cable.
Expansion board: USB (for XBee)	9-55000-60	Expansion board USB (for XBee) incl screws and cable.