LJUNGBERG & KÖGEL AB

BIOMIXER BM330-1

BIOMIXER BM323-1

Technical reference manual

Valid for BioMixer BM330-1 version 6.xx

Valid for BioMixer BM323-1 version 7.xx

LJUNGBERG & KÖGEL AB

Table of contents

1 Important notes

1.1 Warranty

Please see user's manual for warranty information.

1.2 The technical reference manual

This technical reference manual is written for the person or persons responsible for service personnel (technicians) responsible for service and maintenance of Biomixers BM330-1 and BM323-1, hereinafter called Biomixer unless otherwise noted. Note also that not all features is available in BM323-1.

The methods and routines are developed and tested to ensure a reliable, safe and efficient operation of BIOMIXER. It is important that the user has studied and fully understood the contents of this manual before using 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 BM330-1 should be handled with care and the scale must not be overloaded. Absolute maximum load is 2000g.

Ljungberg & Kögel recommend exchange of complete parts as specified in "Spare Parts List" in chapter 15 instead of replacing discrete components.

Biomixer is developed and manufactured by Abelko Innovation under contract from Ljungberg & Kögel, Industrivägen 17, SE- 972 54 Luleå Sweden.
Tel +46-(0)920-220360. Fax +46-(0)920-220068. Email: info@abelko.se, www.abelko.se
Abelko Innovation also manages logistics, service and technical support.

Biomixer is marketed by Ljungberg & Kögel AB, Box 1032, SE-251 10 Helsingborg,
Tel+46-(0)42-139860, fax +46 (0) 42-132181, info@ljungberg-kogel.com , www.ljungberg-kogel.com
Spare parts are to be ordered by Ljungberg & Kögel.

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

1.3 Version

Version 1, 2012-11-13: First edition of this manual

Version 2, 2013-06-14: 10 hours operation time changed to 12 hours

Version 3, 2013-11-18: DoC moved to users manual

Version 4, 2014-02-05: Battery test added to test program

Version 5, 2014-09-04: BM323-1 introduced

Version 6, 2015-12-22: Spare part list updated

Version 7, 2016-08-24: 10 SET-volumes

Version 8, 2018-09-11: Changed tare range

2 Introduction

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 got 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 and a small lamp will start to glow.

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. The measuring accuracy is better than ±1%.

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 network can either be wired or wireless via XBee.

2.1.4 Flexibility

The Biomixer is powered by a mains adaptor or a rechargeable battery with about 12 hours capacity. It can be used in a conventional way, with or without barcode-reader, as stationary as well as mobile collection units.

4

2.1.5 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 can be used.

2.2 Features

2.2.1 Barcode-reader

For quick registration of donor, blood bags, operator etc. The sequence of barcodes is programmed from a PC and barcodes can be scanned both prior to and after a collection.

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 SD-card is overwritten, an optional warning can be viewed on the display. This warning is enabled in the SETUP.

Collection information can, instead of being sent on a network, be selected to be stored on a memory card (SD-card). The same SD-card can be used on several mixers, as long as the mixers are named individually.

2.2.3 Programmable registration function

The customer can, with a simple setup-program on PC, freely decide how the registration function should be, i.e. what kind of information to scan and in what order.

If the Configuration-memory is replaced with a new configuration, the entire collection data memory is disposed.

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

A replaceable, rechargeable battery of about 12 hour's operation. If both battery and external charger are removed the mixer will go into sleep mode and the real time clock will be run from an internal backup circuit. The backup circuit will be operable for about 72 hours, allowing the battery to be externally charged e.g. over the weekend.

The mixer will go into sleep mode when the mixer has not been used for some time (this time is configurable in the SETUP-menu). If any key is pressed when the mixer is inactive, the mixer will wake up and be ready for use.

2.2.6 Language

The text on the display can be selected in different languages. This applies to all texts for normal use however texts in the SETUP-menu are always in English.

2.2.7 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.

2.2.8 Quick choice of preset volumes

By pressing the SET-button the user can easy choose between three preset collection volumes.

2.2.9 Homogeneous mixing

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

2.2.10 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 an informative text will be shown on display.

2.2.11 Check of collection time

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

2.2.12 Automatic stop

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

2.2.13 Estimated Blood Volume

Estimated Blood Volume (EBV) is a feature that allows inputting the weight, height, and gender of the donor. With the help of this information the Biomixer is able to calculate the optimum volume of blood to collect based on formula designed by Nadler, Holmes or other scientists in the blood banking industry. For more information about how to set up the function, please refer to the manual for "BMCom". The donor information is inputted via the barcode reader from a pre-printed barcode chart.

2.3 Connections

2.3.1 CHARGER BM330-1 (1)

Inlet for battery charger that can also be used as main power supply if no battery is inserted.

⚠️ **Only use battery charger of the type BM330-1.**

2.3.2   RS 232 (2)

Serial connector (9-pole DSUB) mainly intended for barcode reader. This connector can also be used to configure the mixer from a PC.

2.3.3   RS 485 (3)

Connection for Local Area Network (LAN) where up to 31 mixers can be connected to a host computer for collection data storage. This connector is a 6/4-modular jack.

2.3.4   USB (4)

Connection to a computer used to configure or download new software to the mixer. Note that the mixer can also be configured via the RS232-connector. The connector is of USB type B.

2.3.5   Restart Button (5)

Because the mixer has no power switch, the restart button can be used for entering the test program. The restart button is activated via a small hole by a small pin, a paper clip, a small screwdriver or the tip of a pencil.

⚠️ **The restart button is activated by a gentle press. Never use more force than necessary; the display is reset when the reset button is pressed.**

2.3.6   SD-CARD (6)

SD-card slot (Secure digital card of SDHC-type) used to store collection data. Data is transferred to the SD-card once the SEND-button has been pressed.

2.4   Bottom plate hatch

2.4.1   LCD-contrast

Via this hatch it is possible to adjust the LCD-display contrast. The LCD-display contrast potentiometer is adjusted by use of a small screw driver.

⚠️ **Note that the potentiometer is located on the upper side of the circuit board. Never use a screw driver larger than 3mm as this might damage the circuit board.**

2.4.2   Xbee wireless communication module

An XBee wireless communication module can be applied via the bottom plate hatch. The antenna to the module is mounted via the hatch as well.

⚠️ **Make sure to locate the module in the correct direction. Note the markings on the circuit board.**

3   Installation

Make sure that no power is connected to BM330-1 before connecting any devices; such as a barcode reader or a network cable. Unplug the power adapter and remove the battery.
If BM330-1 has been cooled down to a temperature below +2°C, please wait at least 2 hours before using BM330-1 to make possible damp evaporate.

3.1   Barcode reader

If used, connect the barcode reader to the RS232 connector.

 Always use barcode readers recommended by Ljungberg & Kögel AB. Connection of other barcode readers may damage the reader as well as BM330-1.

3.2   Local Area Network (LAN)

If used, connect the RS485-cable to the input marked *RS485*. For further instructions, see chapter **Fel! Hittar inte referenskälla.**.

3.3   Battery charger (mains adapter)

Check that the chargers AC supply voltage marking agrees with the local mains supply. Connect the charger to the inlet marked *CHARGER BM330-1* and connect it to the mains output. The charger is preferred to always be connected to keep the battery fully charged.

 Only chargers marked with Ljungberg & Kögel AB type BM330-1 may be used.

3.4   Battery charging

If the Biomixer is to be used mobile (without access to mains supply) the battery must be charged. Connect the charger and charge the batteries for at least 6 hours if battery is emptied to `LOW`-state. The battery is fully charged when the display shows `HI`. The capacity is shown on the display and when it drops to `LOW`-state it should be recharged. When capacity drops to `LOW`-state, start of collection is prohibited and an alarm is activated (see chapter 5). A started collection can however be completed.

 If the charger is removed before the battery status shown on the display is `HI`, the battery is not fully charged. This might imply that the status of the battery is shown as `HI` but might drop to `MED` and `LOW` faster than it would if the battery was fully charged.

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

3.5 Power up

When power is applied to the Biomixer, it will show a startup screen on the display.

```
   --- H01 S6.07 ---
MIXER-ID
```

The first row displays hardware and software revision. This information is hande for eventual support matters.

The second row displays the mixer name (if it has been configured to have one).

3.6 Start-up

If the Biomixer is in sleep mode: push any button to wake it up. If the Biomixer has been in sleep mode for more than 6 hours; the Biomixer functions are automatically checked and possible errors are indicated on display and with an intermittent sound-signal. The main menu is shown.

On the upper row date and time are shown together with the remaining battery capacity. The lower row shows the set collection volume and the tube clamp position.

```
22/3 14:51 BATT=HI
SET=450, CLAMP OPEN
```

4   How to use the Biomixer

4.1   General start-up procedures

At power up, the Biomixer will do some internal tests. During power-up the following steps are performed:

- Microcontroller is initialized and started up

- The text `INITIALIZING...` is displayed

- Jump to special procedures if requested by the operator

- The version number and identity of the mixer is displayed

- The clamp is initialised as well as the AC-motor for the mixing tray

- The mixer is now ready for command via the keyboard

4.2   Special start-up procedures

At power up, the user can select to enter special procedures in the software. These procedures are entered by pressing one or two keys on the keyboard simultaneously as the mixer is powered up.

4.2.1   Boot loader

The internal software of the Biomixer can be updated via the USB-port and is managed by "BMCom" from a PC-program. To be able to download new software, the Biomixer has to be set in boot loader mode.The boot loader is entered by pressing and holding the `SETUP` and `RESET` keys during power up.

When the mixer has entered the boot loader mode the display will show:

```
READY FOR SOFTWARE
UPDATE FROM PC
```

Startup sequence

> **Bootloader**
> BM330-1: `SETUP` and `RESET` during power up
> BM323-1: `PAUSE` during power up

> **Test program**
> BM330-1: `SETUP` during power up
> BM323-1: `START` during power up

> **Setup menu**
> BM330-1: `SETUP` after power up
> BM323-1: `SET` during power up

> **Erase memory**
> BM330-1
> `NEW` + `SETUP` during power up will erase configuration and all collection data
> `NEW` + `RESET` during power up will erase all collection data
> BM323-1
> '+' and '−' during power up will erase configuration

The mixer is now ready for software download.

If the memory containing the Biomixer software gets corrupt, i.e. a checksum error, the mixer will automatically enter the boot loader. The display will show:

```
SOFTWARE ERROR!
UPDATE FROM PC
```

4.2.2 Test program
Press SETUP during power up to enter the test program. See chapter 9 for more information on how to use the test program and what is included.

4.2.3 Erase memory
The user can choose to erase the internal and or the external EEPROM memories. This is handy if a faulty configuration has been downloaded or if a checksum error occurs.

Press NEW + SETUP (PAUSE for BM323-1) during power up to erase setup, configuration and collection data memories. The display will show:

```
ERASE SETUP+DATA?
YES:RESET           NO:SET
```

A press on RESET will erase all data memory and setup memory.

⚠️ **All setup data e.g. flow alarm, time alarm, etc. will be set to default values. All configuration data will be lost and has to be reprogrammed and a new calibration must be done.**

Press NEW + RESET during power up to reset the collection data memory. The display will show:

```
ERASE DATA?
YES: RESET          NO:SET
```

A press on RESET will erase all data memory.

⚠️ **All collected data that has not yet been sent to a PC will be lost.**

4.3 Main program
The main program is the normal program that is run after power up. From here, the user has different options.

4.3.1 NEW

NEW is used to start a new collection including 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 START, just as it would be if the operator has started a collection without barcodes.

When the collection is finished, the mixer will ask for optional barcodes. The procedure is finished by sending the collection data to a PC or a SD-card.

Note, if the NEW key is not working it has been disabled by the setting BARCODE READER in the setup.

4.3.2 START

START is used to start a collection without scanning any barcodes.

4.3.3 SETUP

SETUP is used for entering the setup-menu to make settings such as setting the clock, alarm levels etc. More information about the setup menu can be found in chapter 5.

4.3.4 SET

SET is used to choose between the preset target volumes.

4.3.5 SEND

A press on SEND in the main menu will transfer all not already sent collections to a PC.

4.3.6 PAUSE AL. OFF

PAUSE AL.OFF is used to check calibration of the mixer. Hold the button for 3 seconds and the mixer will enter a constant weighing mode and simply display the weight of the tray in ml and in grams. If the calibration check feature is enabled, it will also allow the user to store the current date as calibration date.

If this key is pressed for more than 3 seconds, the calibration menu will be entered.

Main program

> **NEW**
> Start a new barcode collection
>> Scan barcodes
>>
>> Collect blood
>>
>> Collection ready
>>
>> Scan barcodes
>>
>> Send collection data

> **START**
> Start a new barcode collection
>> Collect blood
>>
>> Collection ready
>>
>> Send collection data

> **SETUP**
> View and change setup parameters

> **SET**
> Toggle between 2 preset volumes

> **SEND**
> Send collection data to PC or SD-card

> **PAUSE AL. OFF**
> Continuous measuring without registration
> Calibrate if QC-lockout is enabled

4.3.7 CLAMP

CLAMP is used to open or close the clamp.

4.3.8 RESET

A press on RESET (PAUSE + SET on BM323-1) will set the mixer in parking position, i.e. run the AC-motor for a few milliseconds. This will relieve the tray and hence protect the electronic load cell. The parking position is recommended to be used when the mixer is used mobile or when transported for any reason.

Main program

CLAMP
Open or close tube clamp

BM330-1: RESET

BM323-1: SET + PAUSE
Park the tray

4.3.9 Cleaning

The Biomixer tray, keyboard and cover can be cleaned with a soft cloth and a mild detergent. The tray should be kept steady during cleaning and no force can be used in order to keep the weighing accuracy.

⚠️

Do not use liquids with bleach since this may affect the plastic cover quality and make it fragile.

5 Setup

Settings of alarm limits and other functions are done in the `SETUP`-menu. This menu is always in English, no matter of choice of language for the collection menus.

5.1 BM330-1

In BM330-1, the `SETUP`-menu is divided into four submenus: General, Alarms, Com and Advanced. Enter the setup by pressing the `SETUP`-key and scroll between the different submenus with the +– and –-keys. Select submenu with the `SETUP`-key.

```
SETUP:1 GENERAL
CHANGE WITH +/-
```

Scrolling through the options in the submenus is done with the `SETUP`-key. Settable values or functions are shown blinking and increasing/decreasing is done with the +- and –-keys. Scrolling between different input fields in the same menu is done with the `SET` key. The `SETUP` can be stopped with a press on `RESET` at any moment. The lower row gives a guide for what keys to press.

Note, changed values and functions are saved in memory when the next menu is selected with `SETUP` or when `SETUP`-function is interrupted with the `RESET`-key.

5.2 BM323-1

Scroll through the options with the SET-key. Change values with the + and - keys. Exit the SETUP-menu by stepping to the last option and press -.

Note that not all options described below are available in BM323-1.

5.3 Password

The password is configured via the configuration program on a PC. The password is a sequence of keys on the keyboard in any sequence. All keys can be used for the password and an example of a password could be: `NEW`, `SEND`, `START`, `NEW`. If no password is given, the password is disabled. For more information about how to set the password, see the manual for "BMCom".

```
LOGIN?
***
```

5.4 General

5.4.1 Language

Set the desired language. There are three different language options available:

- English, Spanish, Swedish, Norwegian, Danish, Estonian, Portuguese
- English, Russian.
- English, Chinese

Other languages can be added on request.

```
LANGUAGE:ENGLISH
CHANGE WITH +/-
```

⚠️ **The language setting is only valid for the collection menus, not the setup menus.**

5.4.2 Clock setting

BM330-1 has a real time clock for precise time registration. Set the minute, hour, year, month and day. Confirm the settings with a press on SET.

```
22/3 2012 16:30
CHANGE WITH +/-/SET
```

5.4.3 Daylight saving hour

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.

```
DAYLIGHT HRS:EUR
CHANGE WITH +/-
```

5.4.4 US date format

If set to YES, this will change the date format to mm/dd yyyyy. If set to NO the date format is dd/mm yyyy.

```
US DATE FORMAT:NO
CHANGE WITH +/-
```

5.4.5 Number of set volumes

Chose the number of set volumes that can be programmed. Up to 10 volumes can be programmed.

```
NUM SET VOLUMES: 3
CHANGE WITH +/-
```

5.4.6 Set volume 1-10

Set the volumes that can be selected by pressing SET in the main menu.

```
SET VOL1:450 ml
CHANGE WITH +/-
```

5.5 Alarms

5.5.1 Setting of min volume for Flow Alarm

The minimum volume for flow alarm is used in conjunction with the low and high flow alarm. Low and high flow alarm are disabled if the collected volume is less than this minimum volume.

```
MIN VOL FL AL: 50
CHANGE WITH +/-
```

5.5.2 Alarm limit low flow

If the flow rate in ml/min is less than the low flow alarm limit an alarm will sound.

```
LOW FLOW: 20 ml/min
CHANGE WITH +/-
```

5.5.3 Alarm limit high flow

If the flow rate in ml/min is higher than the high flow alarm limit an alarm will sound.

```
HIGH FLOW: 350 ml/min
CHANGE WITH +/-
```

5.5.4 Alarm limit collection time

If a collection exceeds the time alarm limit an alarm will sound.

```
TIME ALARM: 12 min
CHANGE WITH +/-
```

5.5.5 Time alarm abort

If this is set to YES a collection is aborted if the time alarm goes active.

```
TIME ALARM ABORT:NO
CHANGE WITH +/-
```

5.5.6 Sound level of collection ready alarm

The sound level of the speaker for the alarms is set with a value between 0-100. The speaker is activated when +or − are pressed and sounds until the menu is left. Setting a value less than about 20 can cause the speaker to cease.

```
SOUND LEVEL:40
CHANGE WITH +/-
```

5.5.7 Alarm signal

The alarm for completed collection can be selected to be a simple melody. This is handy if several mixers are used near each other. Each melody can be selected by pressing + or −.

```
ALARM SIGNAL:11
CHANGE WITH +/-
```

5.6 Communication

5.6.1 Communication speed (Baudrate)

This setting is valid for all communication, i.e. the barcode reader RS232, local area network and wireless network (RS485, Xbee) and USB.

```
BAUDRATE:9600 baud
CHANGE WITH +/-
```

5.6.2 Configuration data port (Setup port)

Selects the communication port that will be used when configuring the barcodes scanning sequence of BM330-1.

```
SETUP PORT:USB
CHANGE WITH +/-
```

5.6.3 Collection data port (Donation port)

Selects the communication media that will be used to transmit collection data. This can either be any of the networks or the SD-card.

```
DONATION PORT:RS485
CHANGE WITH +/-
```

5.6.4 Send option

If set to `ON COMMAND`, a message will be displayed after each collection asking the operator to press `SEND` to send the information to a PC.

If set to `AUTOMATIC`, the data will be automatically sent when a collection is ready.

If set to `NEVER`, data will never be sent but still be stored in memory for later transmission.

If the data cannot be sent for any reason, an error message will appear and warn the user.

```
SEND:ON COMMAND
CHANGE WITH +/-
```

5.6.5 Barcode reader connected

`YES` or `NO` reflecting if a barcode reader is connected or not. A connected barcode reader will enable the `NEW`-button and hence the possibility to collect barcode information prior and/or after a collection.

```
BARCODE READER:YES
CHANGE WITH +/-
```

5.6.6 Enable /disable block function for Start (Obligation scan)

This feature will enable or disable the `START`-button. If `YES` is selected, the `START` button is disabled and hence forcing the operator to scan barcodes via the `NEW`-button.

```
OBLIGATION SCAN: NO
CHANGE WITH +/-
```

5.7 Advanced

5.7.1 Calibration

Make sure the tray is empty and moves freely. Start the calibration by pressing `START`, after which zero balancing and tare is done. The display shows:

```
CALIBRATION VOLUME
PRESS START
```

Put the reference weight for 450 ml on the tray, (make sure that the reference weight is placed in the center of the tray), and press `SET`.

```
PUT 450 ML ON TRAY
PRESS SET WHEN READY
```

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

From hardware version 1 and forward the calibration procedure has slightly changed due to hardware changes.

Hardware version 0

The calibration is now performed automatically and the result is shown on the display.

```
TARE=102 VOL=441>450
OK PRESS SETUP
```

The value `TARE` is the measured tare (dead weight) and should be between 50 and 150.

`VOL` is the read volume and should be close to the reference weight 450 ml. The calibration is done when `SETUP` is pressed. If the divergence is to big (more than ±20%) an error message is shown:

```
TARE=102 VOL=349>450
ERR ADJUST GAIN
```

If this happens, adjustment of the electronics is needed (see chapter 8.4 for more details).

Hardware version 1

I hardware version 1 the calibration process has been simplified. There is no need for any adjustments of the hardware, and it is only in very rare cases that the automatic routines cannot perform a calibration.

After the calibration weight has been applied on the tray, the mixer will automatically calibrate and show:

```
CALIBRATION OK
PRESS SETUP
```

5.7.2   Days since last calibration check
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. A calibration check is done by pressing PAUSE in the main menu or according to 5.7.1 above.

```
CALIBRATION DAYS: 7
CHANGE WITH +/-
```

5.7.3   Second stick
If this function is enabled (set to other value than 0) the selected value will be subtracted from the preset volume. If for example the SET-volume is 450ml and SECOND STICK value is set to 30, BM330-1 will only collect 450-30=420ml. To use this function, press and hold the NEW-key for more than 3 seconds at the start of a collection.

```
SECOND STICK:30
CHANGE WITH +/-
```

5.7.4   Store tare weight
If this setting is set to YES, the tare weight of the blood bags will be stored in the collection data. To be able to store the tare weight of the blood bags, a new menu is enabled at start of each collection which will require an extra press on START. If this function is enabled, the tare weight will be displayed at the end of the collection, otherwise the mean flow will be displayed.

```
STORE TARE:YES
CHANGE WITH +/-
```

5.7.5   Time to sleep
Number of minutes before the Biomixer goes into sleep mode. If set to 0 the mixer will never go into sleep mode. It is recommended to enable the sleep function if no charger is connected to save power. If the mixer is in sleep mode, simply press any button to wake it up.

```
TIME TO SLEEP:1
CHANGE WITH +/-
```

5.7.6   Old collection data replace

If this feature is enabled, a warning will be displayed if collection data that has not been sent will be overwritten by the next collection.

```
OVERWRITE WARN:NO
CHANGE WITH +/-
```

5.7.7   Send all donations

This feature will send all collection data that has been stored in the memory. This is handy if the information is lost, i.e. collection has been sent to a SD-card and the SD-card is lost. Note that ALL data in the memory will be sent, even data that has already been sent.

```
SEND ALL DONATIONS
PRESS START
```

5.7.8   Program mode

The program mode is used to configure the barcode information, i.e. the scanning sequence and text to display for each question.

Activate the program mode with a press on START. The display will show:

```
PROGRAM MODE
SEND SETUP FROM PC
```

BM330-1 is now ready for programming of the scanning sequence from the programming PC. For more information see the manual for "BMCom".

By pressing SEND at this moment the stored scanning configuration in BM330-1 is sent to the PC.
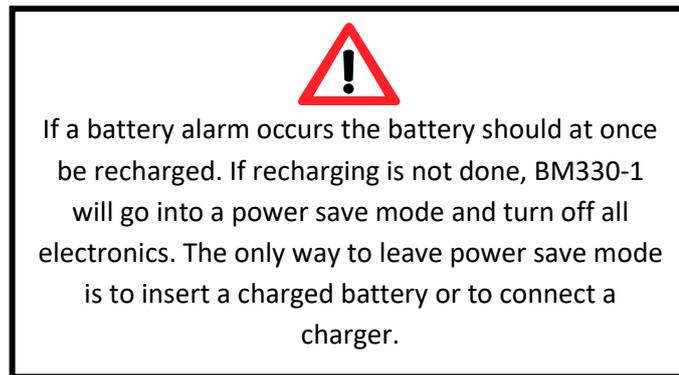
6 Alarm and error messages

Low and high flow alarm and alarm for exceeding max collection time is announced with a blinking corresponding text in the collection menu and a sound signal. Other error messages are shown with a blinking text on the lower row with an intermittent sound signal, two short signals with a pause. The sound signal is silenced with a press on `PAUSE AL.OFF`.

6.1 Alarm and error messages before and during collection

6.1.1 Battery alarm

The battery can have three different statuses: `HI`, `MED` and `LOW`. During `HI` and `MED` a new collection can be started, but not during `LOW`. If a collection has started it can be completed but no further collections can be started without battery recharging. Charge of battery can be done at the same time as an ongoing collection.

If the battery is `LOW`, a warning is given with a sound signal and a blinking text: `BATTERY LOW`.

> ⚠️
>
> If a battery alarm occurs the battery should at once be recharged. If recharging is not done, BM330-1 will go into a power save mode and turn off all electronics. The only way to leave power save mode is to insert a charged battery or to connect a charger.

⚠️ **If the battery has been deeply discharged the mixer will go into a sleep mode. To wake it up, remove the battery and connect a power adaptor.**

6.1.2 Tare error

Automatic tare deduction is always done before collection. If this fails an error message is given with blinking text 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 as described in chapter 5.7.1.

6.1.3 Calibration error

If a calibration has not been made a calibration error is active. If active, a calibration is needed as described in the chapter 5.7.1.

6.1.4 Motor error

If the mixing motor does not start or not find the home-position (weighing position) there is an error message and collection is stopped. Check that the tray can move freely and that no components regarding the tray and motor wheel is damaged.

6.1.5 Flow alarm

If the blood flow is below or exceeds the set limits an alarm is given with `FLOW` blinking in the collection main menu and an intermittent signal sounds. Flow alarm will be stored in collection data memory. A flow alarm will not occur if the collected volume is less than the limit set in the `SETUP`. This can be handy because blood flow disturbance is liable to occur at the start of a collection.

6.1.6 Time alarm

If collection time exceeds set time limit, an alarm is activated with `TIME` blinking on the collection main menu and an intermittent signal sounds. Time alarm is stored in collection data memory.

6.1.7 Volume=EEE

Indicates overweight, measuring range is exceeded. Check if something is weighing down the tray.

6.1.8 Volume= - - -

Indicates underweight; measuring range is below limit. The tray has become lighter since tare deduction (for any reason) or is touching something when it is in the weighing position.

6.2 General error messages

6.2.1 Setup error

When the Biomixer is powered on all settings and functions are checked. If the setup has been changed i.e. checksum is not the expected, `SETUP ERROR` is displayed and a new setup has to be done, see chapter 5.

6.2.2 Data error

Stored data from collections are checked at power on. This data are stored in a nonvolatile memory and if data for some reason has been lost or damaged, `DATA ERROR` is displayed. Try to transfer the stored data as soon as possible and perform a memory reset according to chapter 4.2.3.

6.2.3 Input error

If e.g. the clock is set to an unreasonable value, for instance 31 February, an `INPUT ERROR` is indicated.

7 Communication

7.1 RS232

For using a wired connection to a PC a null modem-cable should be used via the connector marked RS232.

To BM330-1 9-pole D-sub female	Signal- direction	To PC 9-pole D-sub female	To PC 25-pole D-sub female
(1)			
2 (RX)	←	3 (TX)	2 (TX)
3 (TX)	→	2 (RX)	3 (RX)
(4)			
5 (GND)	↔	5 (GND)	7 (GND)
(6)			
7 (RTS)	→	8 (CTS)	5 (CTS)
8 (CTS)	←	7 (RTS)	4 (RTS)
9 (+5V)	→		

⚠ The same 9-pole DSUB connector is used for the barcode-reader. Pin 9 in the 9-pole connector is the power supply (+5V) for the barcode-reader. It is very important that the used barcode reader has a compatible connection, otherwise the mixer or the barcode reader may be damaged. The barcode reader current consumption must be max 60mA in average or else the battery operation time will be reduced.

7.2 Transmission via LAN

During all collections, data is recorded and stored in an internal memory. The memory is of circular type which means that the oldest data will be overwritten if the memory is full.

All stored collection information can be transferred from BM330-1 to the selected data storage device. A data storage device is either a PC connected via the LAN (Local Area Network) (wired or wireless) or a SD-card.

Data is either sent automatically if selected in the SETUP-menu, or by pressing SEND after a completed collection.

SEND can also be pressed in the main menu which will transfer all collection data that has not already been sent.

During a data transfer, the display shows:

```
DATA TRANSMIT ACTIVE
```

Each individual collection is sent in a separate data batch and the transfer is acknowledged by the selected media. When all collection data has been sent the display shows:

```
DATA TRANSMIT READY
```

When a data batch is sent to a PC, BM330-1 expects an acknowledgement from the PC. If no acknowledgement arrives in spite of 3 repetitions an error signal sounds and an error message is shown:

```
DATA TRANSMIT ERROR
```

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

If the data is lost, e.g. an SD-card used for storage is broken or lost; the already sent data can be resent again. See chapter 5.7.7 for more information.

Up to 31 mixers can be connected to the LAN (RS485). When SEND is activated from several mixers at the same time the transfer will be queued to avoid collision. If transmit is in progress from one mixer the other waits until the line is free. The display shows:

```
LINE BUZY WAIT
```

7.3   LAN-cable to registration PC

The PC is connected to the LAN via a USB/RS485 signal converter, type ADAM-4561 or other isolated converter complying with safety standards for medical equipment. The converter must be strapped for TX controlling the data flow from PC.

Junction boxes are mounted on the wall close to each mixer and BM330-1 connects to this box with a 4-pole straight cable with modular 6/4 in each end.
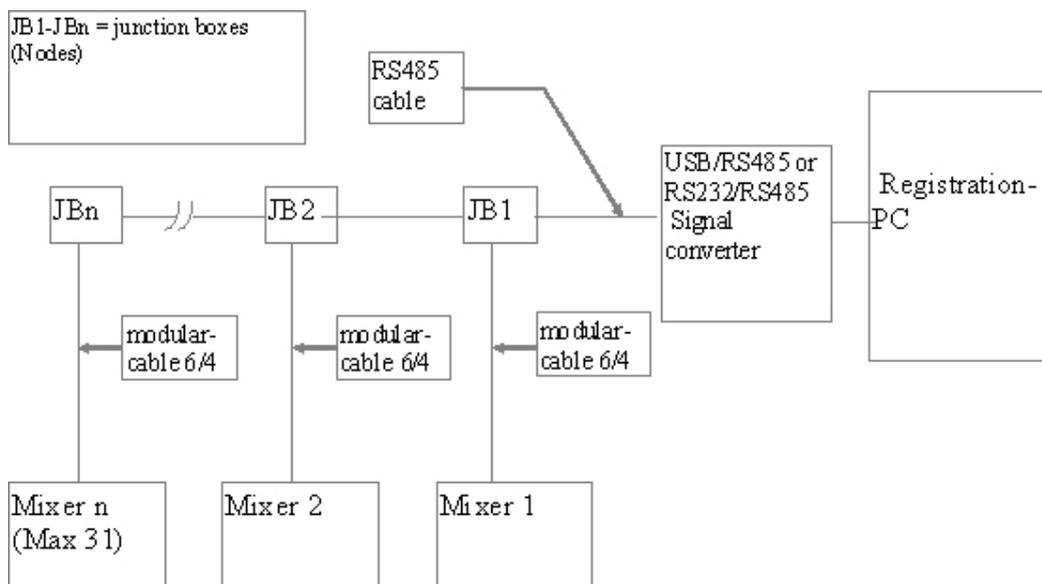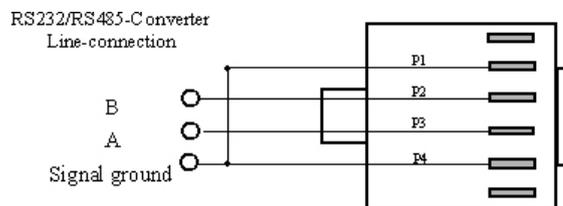
Connections in the junction box:
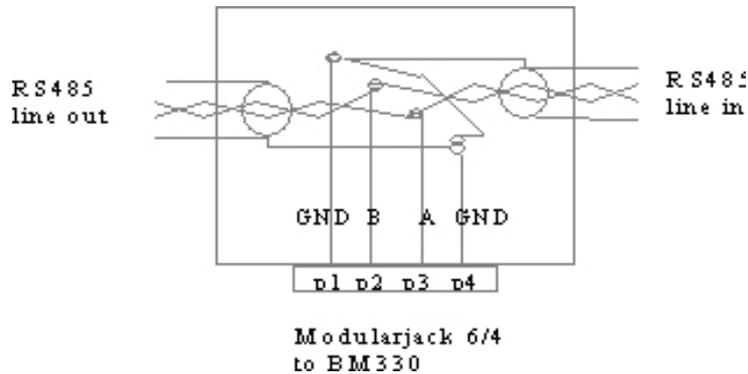
The cable for a direct connection of a BM330-1 to a 485 converter is shown below. The modular contact is seen from contact side.

BM330-1 4-pole Modular contact
p1 (GND)
p2 (A)
p3 (B)
p4 (GND)

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 BM330-1 can be connected to the same network as the older BM330 version.**

> ⚠️ **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.**

7.4 Wireless transmission

Data can be transferred by use of an XBee-module. The transmission works the same way as described above for LAN.

7.5 SD-card

The SD-card is a standard card. Data from different individual mixers can be transferred to the same SD-card if several BM330-1 mixers have individual names. Names are set via the configuration file, see "Manual BMCom". Each mixer will create its own data file on the SD-card, which will be named as "mixer-name".bcd. If a file already exists on the card, the new data will be appended to the end of this file.

8   Hardware description

8.1   Power supply

The Biomixer is powered by and external power adaptor and/or a replaceable rechargeable battery. The battery is a 12V, 4000mAh NiMH-chemistry and is charged in the mixer when both battery and power adaptor is present.

8.2   AC-motor

A synchronous motor is used to drive the mixing tray. The AC-waveform is generating by the microcontroller in collaboration with a transformer. The microcontroller generates 50Hz square wave pulses that are converted to a sinus-like waveform by a transformer. The third phase to the AC-motor is generated by a bipolar capacitor.

⚠ **Never replace the bipolar capacitor to a non-bipolar capacitor as this will cause the capacitor to explode.**

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 a reed sensor affected by a small magnet glued on the driving wheel. If the sensor is not affected when it is supposed to be, i.e. when running the motor, an error is displayed.

8.3   Clamp

The clamp is operated by a stepping 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". If the clamp was already open this operation will have no effect, but this make sure for the software that the position is indicated correctly.

For the clamp to close properly the distance from the top to the base must be 55.0-55.5 mm in closed position, i.e. max out, se figure below.

Adjust to 55mm

8.4 Load cell

The load cell is protected by stop screws for both lifting and pressing overloading. The upper stop screw shall be adjusted to 0.1mm distance and the lower stop screw shall be adjusted to 0.2 mm. Use a thickness gauge for measuring. Adjustments can be done with the load cell loosened or with the PC-board loosened. The lower stop screw is accessible from a hole in the chassis bottom plate. See figure below.
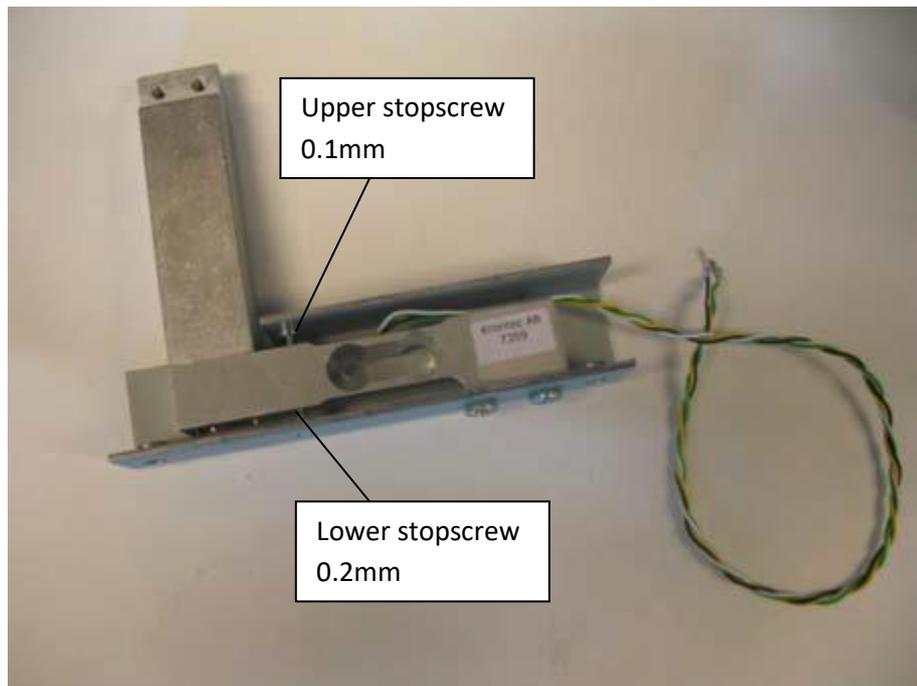
8.4.1 Calibration

There are two different hardware versions in the Biomixer, 0 and 1. 0 is the first generation and 1 is the second generation which is a bit simplified. To find out which version a mixer is, please refer to chapter 3.5.

Hardware version 0

The load cell used in the Biomixer is a full bridge strain gauge cell that will generate a signal of about 1.5 mV/kg. The origin offset (built in offset from load cell production) is automatically adjusted with a digital potentiometer to a level from A/D-converter corresponding to about 100 ml. This is done by two digital potentiometers: one for rough calibration and one for fine tune.

The rough potentiometer is adjusted from the Test Program. When adjusting the rough potentiometer the fine tune potentiometer is in its middle (neutral) position. When the Biomixer performs a normal tare process, it adjusts the fine tune potentiometer back to about 100ml. (This is done with the empty blood bag on the tray). This value is then referred to as the zero-value and deducted from the continuous readings when the blood is collected.

The reason for this electrically adjustment of the load cell is to give a very dynamic adjustment range insensible of tare weight or if the load cell has been deformed by rough treatment during transportation or likewise.

The amplifier consists of two operational amplifiers connected in a way so that the signal is converted to a reasonable value to the A/D-converter. The gain of the amplifier is adjusted by a third digital potentiometer controlled by the Test Program. The gain of the amplifier calibrates the load cell so that 450ml (477g) actually is read as 450ml by the software.

Hardware version 1

In hardware version 1 the digital potentiometer has been eliminated and the signal from the strain gauge is via an operational amplifier directly feed to an A/D-converter. This means that there is no need to adjust any potentiometers in the calibration process.

8.4.2   Automatic tare

Prior to each collection an automatic tare sequence is performed.

Hardware version 0

An automatic tare is done by adjusting the fine tune potentiometer for tare until the relative volume (with an empty blood bag on tray) reads 0 ml. The absolute volume is about 100 ml if adjusted and calibrated correctly. This means the relative volume can show negative values down to –99 ml.

If the relative value of 0 ml for some reason cannot be reached a tare error is displayed.

Hardware version 1

An automatic tare is done by simply take a measurement sample of the current volume and remember this value. If the value is out of range for the A/D-converter a calibration error is displayed.

9 Running the test program

A built in test program can be run to verify some of the functions implemented in the Biomixer. In BM330-1 the test program is started if the SETUP-key is pressed during power up. In BM323-1, the test program is started by pressing the START-key during power up.

```
TEST PROGRAM...
```

When the test program has started (takes about 3-4 seconds) the display shows:

```
TEST AUTOMATIC
```

With the +- and −-keys the operator can choose automatic or manual test.

```
TEST MANUAL
```

Confirm with a press on SETUP (SET on BM323-1). A press on RESET will end the test program and the ordinary program is started and the main menu is shown.

If automatic test is selected the test sequence will immediately start with test 1 (DISPLAY TEST) and continue with the next test after a new press on SETUP (SET on BM323-1). When all tests are done you will be back to the start menu as above.

If manual test is selected a test has to be selected with the keys + and − .

```
TEST MANUAL
1 DISPLAY TEST
```

A test is started with a press on SETUP (SET on BM323-1). All available tests are listed below. A test is ended with a press on SETUP (SET on BM323-1) and a new manual test number can be selected with the keys + and − or continue with the next test by pressing SETUP (SET on BM323-1). Manual test is ended with a press on RESET and the ordinary main menu is shown.

Note! Depending on the hardware version of the Biomixer the sequence number of the tests can vary.

9.1 Display test.

All segments of row 1 are turned on for 0.5 sec and then all segments on row 2 are turned on alternately.

```
########################
```

The test is done to verify that display and connections are ok. If necessary the contrast can be adjusted, see chapter 12.2 for details. The test is ended with a press on SETUP.

9.2 Keyboard test.

Keyboard is checked by pressing each key and the display shows the key function.

```
2 KEYBOARD TEST
SETUP
```

BM330-1: The test is ended by pressing `NEW` and `SETUP` simultaneously.

BM330-1: The test is ended by pressing `SET` and `CLAMP` simultaneously.

9.3 Calibration

Depending on hardware version the calibration process differs. To find out the hardware version, please refer to chapter 3.5.

⚠ **Always use reference weights from Ljungberg & Kögel for best accuracy.**

9.3.1 Hardware version 0

The calibration process is divided into two steps: Offset and Gain.

Offset

This is a check of the load cell origin offset adjustment and will also adjust the digital rough tare potentiometer if necessary. The test is started with a press on `START`.

```
3 CALIBRATION OFFSET
PRESS START
```

First, the mixer will run the AC-motor to make sure that the tray is in the weighing position. The operator is then asked to make sure that the tray is empty.

```
ENSURE TRAY IS EMPTY
PRESS SET WHEN READY
```

Remove all items placed on the tray, such as blood bags or the calibration weight and press `SET`.

The digital fine tune tare potentiometer is programmed in its middle position. The digital rough tare potentiometer is now automatically adjusted so that the A/D-converter reads a value of about 100ml.

```
TARING...
```

An error message will be displayed if the adjustment goes wrong. In this case the load cell is probably damaged.

⚠

This origin offset adjustment is normally only needed to be done when the load cell has been replaced or if it has got a hard mechanical hit making it change the value radical.

Gain

Gain calibration is performed to calibrate the load cell so that the mixer understands what load on the tray that corresponds to 450ml blood.

```
4 CALIBRATION GAIN
PRESS START
```

The test is started with a press on `START` and the mixer will do an automatic tare. The user is now asked to place the calibration weight on the tray.

```
PUT 450 ml ON TRAY
PRESS SET WHEN READY
```

After a press on `SET`, the mixer will now adjust the digital potentiometer until the reading on the A/D-converter is about 450ml.

 This is a rough calibration of the gain value; this calibration will only adjust the hardware so that the signal produced by the electronic load cell is within the limits of the A/D-converter and the microcontroller. Always finish with a calibration via the `SETUP`-menu. See chapter 5.7.1 for more information about calibration.

An error message will be displayed if something goes wrong in the adjustment process. If so, there is probably something wrong with the electronic load cell.

9.3.2 Hardware version 1

The calibration process is very simple.

```
3 CALIBRATION
PRESS START
```

Just start the test by pressing `START`, wait for the mixer to tare and put the reference weight on the tray.

```
PUT 450 ml ON TRAY
PRESS SET WHEN READY
```

When ready, the mixer will show the A/D-converter value for offset and a relative value for the gain. The values shown are only of interest during production and in some rare service matters.

9.4 Clamp test

This test will repeatedly close and open the clamp. The frequency is about s 0.5 sec. Make sure that the clamp is actually closed. A text is displayed indicating the status of the clamp.

```
4 CLAMP TEST
CLAMP OPEN
```

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

Test is ended with a press on SETUP and the clamp will be left open.

9.5 Motor test (and "ToHome"-position sensor test)

One mixing cycle is done and then stopped in the weighing position for about 1 sec. This sequence is repeated until the SETUP-key is pressed.

```
5 MOTOR TEST
```

Check that the motor with the gearbox is running nice and smoothly. Test is ended with a press on SETUP.

9.6 Alarm level

This test will turn on the speaker if the alarm level is adjusted at least one step up or down. The keys + and − is used to change the alarm level.

```
6 ALARM TEST
```

> ⚠️ **Setting a level lower than 20 may cause the speaker to stop beeping. The default level of 50 is suitable for most installations.**

This test will also blink the red LED at a period of about 1sec. The test is ended by a press on SETUP.

9.7 Clock

In this test the internal clock is being tested. The time and date can be set by pressing +, − and SET. The test is ended by a press on SETUP.

```
7 CLOCK
26/11 2010 16:30:13
```

9.8 LED

This test will turn on and off the green/red LED .

```
8 LED
ON/OFF (1HZ)
```

9.9 Battery

This step will display the current battery voltage. If the battery voltage is not correct it can be adjusted with the + and --keys.

The battery voltage is either measured on the contact probes when the cover is open, or it can be measured before the battery is inserted into the mixer.

⚠️ **If the battery voltage is measured outside the mixer, the adaptor needs to be disconnected. The charger will increase the battery voltage during charge.**

```
9 BATTERY
12.2V
```

9.10 Port test RS232

This test will send the text BM330-1 once per second on the RS232-port. Connect the RS232-port to a PC and check received data on a terminal.

```
10 PORT TEST RS232
SENDING...
```

⚠️ **Odd parity is used on the RS232-port.**

9.11 Port test USB

This test will send the text BM330-1 once per second on the USB-port. Connect the USB-port to a PC and check received data on a terminal.

```
11 PORT TEST USB
SENDING...
```

⚠️ **Odd parity is used on the USB-port.**

9.12 Port test RS485

```
12 PORT TEST RS485
SENDING...
```

This test will send the text BM330-1 once per second on the RS485-port. Connect the RS485-port to a PC and check received data on a terminal.

⚠️

Even parity is used on the RS485-port.

9.13 Port test XBEE

```
13 PORT TEST XBEE
SENDING...
```

This test will send the text `BM330-1` once per second over the XBEE-link. Open a terminal in PC and choose the serial port created by the PC-dongle. Check the received data.

Even parity is used on the XBEE-port.

10 Troubleshooting

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

Problem

I push a button on the keyboard but the Biomixer does not start (wake up)

Solution

1. Make sure that power is connected, check both power adapter and/or battery

2. If battery is inserted; make sure that the battery is not discharged

3. If power is connected; disconnect both battery and power adapter for a few seconds and connect any of them again

Problem

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

Solution

1. Check if any of the buttons is working; if so the keyboard is damaged and has to be replaced

2. If none of the keys is working; disconnect both battery and power adaptor, wait a few seconds an connect any of them again

Problem

The display is illuminated but no text is displayed or the characters are weak or fuzzy

Solution

1. Adjust the contrast to the display. The contrast adjustment potentiometer is located under the bottom plate hatch. Open the metal hatch and use a small screwdriver to adjust the LCD-contrast

Problem

I have started a collection but the tray is not moving

Solution

1. Make sure that nothing is blocking the mixer motor, e.g. a tube from the bag set or similar

2. Make sure that no other objects than the blood bags are placed on the tray since this might overweight the tray

3. Remove all objects from the tray and press the `PAUSE`–key in the main menu to enter the constant weighing mode. Check for motor error event on the display. if present; the motor is probably damaged and needs to be replaced

Problem
The volume displayed is EEE

Solution

1. The weight on the tray is too high, make sure that noting other than the blood bags are placed on the tray

2. Check calibration, see chapter 5.7.1 and chapter 8.4

Problem
I have started a collection but the volume is not changing

Solution

1. Check the flow from the donor

2. Check if something is blocking the tray and/or the electronic load cell (The silver pillar under the tray)

3. Remove all objects from the tray and press the `PAUSE`-key in the main menu to enter the constant weighing mode. Make sure that the volume 0 is read when no objects are placed on the tray. Put a calibration weight on the tray and make sure that the volume is 450ml ± 1%; if not the mixer has to be recalibrated

Problem
When I use a SD-card for data storage I get a SD-card error

Solution

1. Only SDHC-cards can be used to store data in BM330-1.

2. Make sure that a valid SD-card is correctly inserted

3. Make sure that the SD-card is not full

4. Check that the "write protect" slide is in its correct position

5. Make sure that the SD-card is formatted to FAT32

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

Solution

1. Please refer to the do and don´t chart that is shipped with each Biomixer. If the chart is missing, it can be ordered from Ljungberg & Kögel

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. Check if the `SECOND STICK`-function has been enabled, this function will lower the volume

4. Make sure that the clamp is correctly calibrated. See chapter 8.3.

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

Solution

1. The battery is old and needs to be replaced

2. The battery charger has been removed before the battery has been fully charged

11 Service and maintenance

11.1 Calibration (check of weighing accuracy)

The weighing accuracy should be checked regularly, e.g. once per month, with a reference weight corresponding to 450 ml (477g). We recommend usage of reference weights from Ljungberg & Kögel AB.

- Start-up the Biomixer and press `PAUSE ALARM OFF`. Wait for about 5 min and let the Biomixer warm up. It takes some minutes for the measuring circuits to stabilize for highest accuracy.

- Press `RESET` and then `PAUSE ALARM OFF` again. A normal tare (zero balancing) is done and after this the Biomixer is in a continuous weighing mode. Check that the `VOL` value reads 0 ± 1 ml.

- Put the reference weight 450 ml on the tray and read the result. Note! The reference weight must be placed in the center of the tray.

- If the divergence is too large, e.g. +-5ml, an adjustment must be done.

- End calibration with a press on `RESET`.

⚠️ **In this "continuous weighing mode" the Biomixer operates like a scale, showing the weight placed on tray adjusted for the specific gravity of blood (1ml blood equals 1.06g).**

⚠️ **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.**

⚠️ **Worn out batteries must be left to a recycling station according to local regulations.**

11.2 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, parts list, troubleshooting guide etc. which can be ordered from Ljungberg & Kögel AB.

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

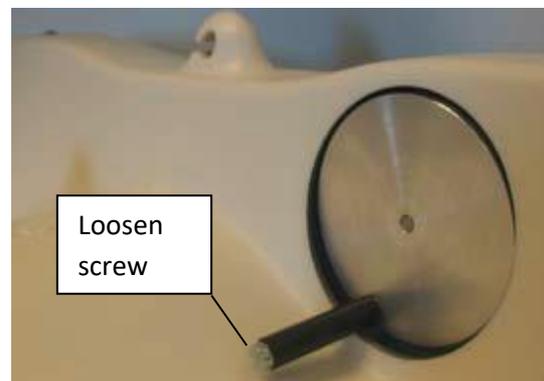# 12 Dismounting the Biomixer

12.1 Lift the cover off

1: Unscrew the tray and lift it off.

Loosen 2 screws

2: Unscrew the roller.

Loosen screw

3: To dismantle the cover, loosen the four screws holding the cover and lift the cover off.

Loosen 4 screw
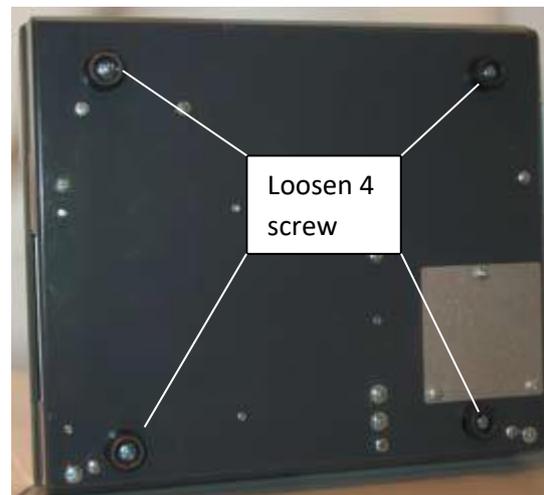
12.2 Adjust the LCD-contrast

1: Unscrew the bottom plate hatch.

2: Adjust the potentiometer using a small screwdriver.

12.3 Mount an XBee-module

1: Remove the battery and the power adaptor.

2: Dismount the bottom plate hatch as described above.

3: Mount the XBee-module through the PCB. Note that the sockets to the module are located on the upper side of the PCB and not visible through the bottom plate hatch.

4: Mount the Antenna and connect it to the XBee-module.
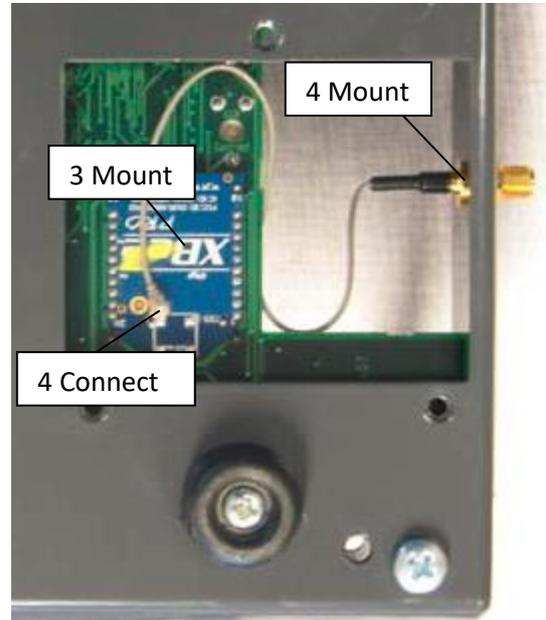
13 Biomixer Test protocol

This is the test protocol used for the final test in factory. Appropriate paragraphs can be used as a protocol for scheduled service.

This chapter is referring to the BM330-1 and BM323-1 test procedures.

Date	
Name	
Serial number	

Reference: BM 330-1 test procedure			
§	Description	Read value	REMARKS
1	Factory software version		
2	Check of basic functions		
3	Cover, tray assembly		
4,5	Overload and seesaw motion		
6	Calibration, tare before burn-in		
6.1	Display		
6.2	Keyboard		
6.3	Offset		
6.4	Gain		
6.5	Clamp		
6.6	Motor		
6.7	Alarm		
6.8	Clock		
6.9	RS-232		
6.10	USB		
6.11	RS-485		
6.12	XBEE		
7	Burn-in		
8	Tare drift after burn-in (ml)		
10	Calibration after burn-in		
12,13	On line registration		
14	Custom install		
15	Check calibration (ml)		
16	Final inspection		
17	Type plate		

Approved by:_____

14 Technical specifications

14.1 Technical data

Power supply	Mains adaptor, 100-240VAC, BM330-1, 24V/30W (also operates as a battery charger) Internal battery, NiMH, 12V/4Ah for approximately 12 hours operation between charges
Power consumption	Max 10VA
Fuses (built in)	PTC (self-recovery for overload protection)
Collected volume	(Collected blood) 0-999ml
Accuracy	<1% of max weight ± 1ml
Tare range	0-600g (0-800g on request)
Mixing cycle	16 cycles/min
Internal data storage for donations (not SD-card)	32.000 characters or a minimum of 80 collections
Tube clamp operation	Linear stepper motor
Mixing tray operation	AC-driven synchronous motor
PC connection	RS232 for programming, 9-pole Dsub male or USB type B-connector (serial link)
Network connection	RS485 (multidrop), 6/4 modular
Wireless connection	XBee
Barcode reader connection	R232, 9-pole Dsub male (+5V on pin 9)
Relative humidity incl. storage and transportation	10-95% not condensing
Operating temperature	+10 - +40°C.
Storage and transportation temperature	-40 - +70°C.
Dimensions	290 (L) x 253 (W) x 185 (H) mm.
Weight	3.7kg (4.4kg incl. battery)
Protective classification	Class II, type B

15 Spare parts list
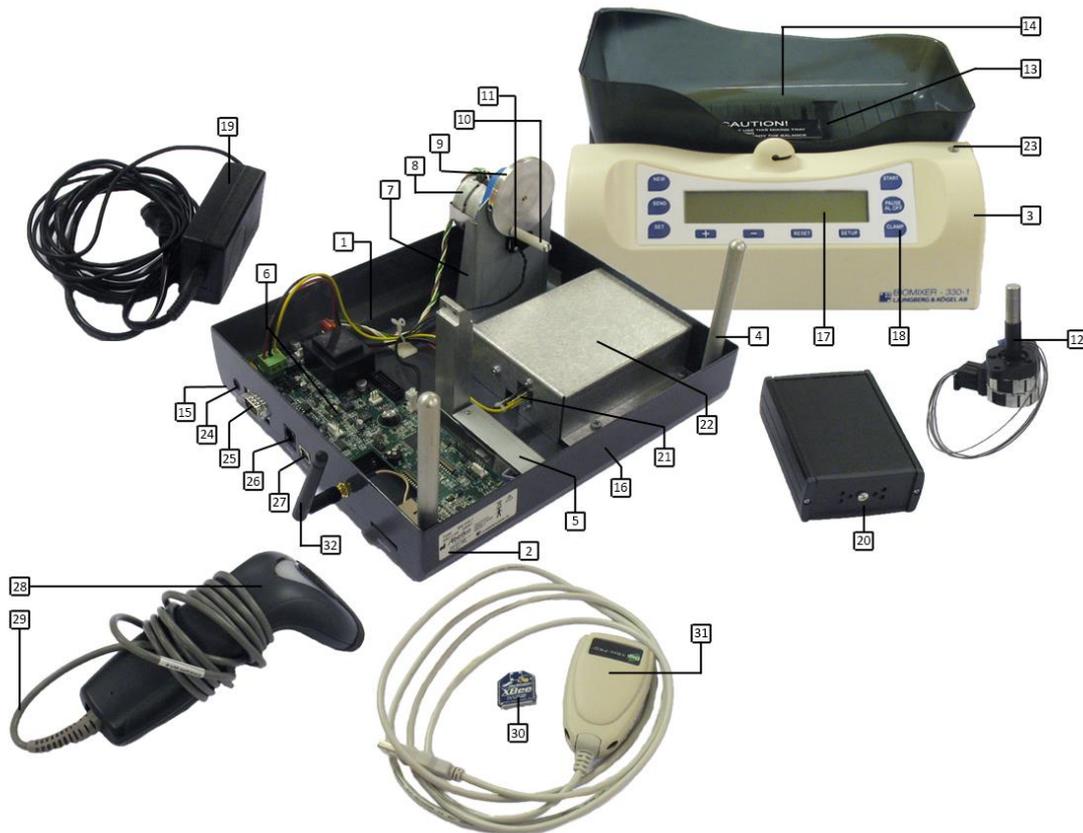
Number	Description	Part number
1	Chassis, bottom plate	33101-00
2	Bottom plate hatch	33101-01
3	Cover	33102-00
4	Pillars, 2 pcs	33003-00
5	Load cell complete with stop screws	33105-00
6	Circuit board complete BM330-1	33106-00
	Circuit board complete BM323-1	32306-01
7	Motor plate	33107-00
8	Motor 24VAC/50-60 Hz	33008-00
9	Driver wheel complete with magnet	33009-00
10	Roller with screw and housing	33010-00
11	Position sensor, complete	33011-00
12	Step motor complete with piston (clamp)	33012-00
13	Bearing rod	33015-00
14	Scale (mixing tray)	33018-00
15	Rubber foot, 4 pcs.	33022-00
16	Plastic cover	33024-00
17	Display	33125-00
18	Keyboard BM330-1	33026-00
	Keyboard BM323-1	32326-01

Number	Description	Part number
19	Battery charger BM330-1	33127-00
20	Battery complete	33128-00
21	Battery connector including cables	33133-00
22	Battery slot	33134-00
23	LED (including cable and lens)	33135-00
24	Charger inlet	33136-00
25	9-pole D connector	33031-00
26	Modular 6/6 connector	33032-00
27	USB connector	33137-00
28	Barcode reader	33033-00
29	Cable barcode reader	33033-10
30	XBee-module	33147-00
31	XBee-PC-side module (dongle)	33148-00
32	Antenna	33151-00
--	XBee-upgrade kit, including module and antenna (not in picture)	33149-00