

UM-AJV-01-276
Abacus Junior Vet User's Manual

REVISION-HISTORY

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Abacus Junior Vet


Hematology Analyzer




User's Manual

2.76 release



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1 INTRODUCTION

1.1 Intended Use

Abacus Junior Vet hematology analyzer is a fully automated cell counter designed for *in vitro* diagnostic use.

The instrument was developed for use in hospitals and small to medium sized labs.

1.2 The Instrument

Abacus Junior Vet is a fully automated, bench top hematology cell counter.

It implements the so-called Coulter-method for counting cells passing through a small aperture, and measures the hemoglobin content of red blood cells.

The analyzer features a graphical LCD display module, and a foil keypad of 24 keys including 6 software buttons (with icons), 6 function keys (above LCD) and has a START button.

The instrument allows sending results to an external printer (parallel port), or can have an optional built-in printer module.

Its internal memory is capable of storing 1000 records with full histograms, and individual patient data. QC measurements can also be performed, and stored. The software operating the instrument is easy to upgrade using a standard 3.5" floppy diskette or CD-ROM (optional). The instrument allows connecting to a host computer for uploading records stored in the memory through RS-232 serial port, and also enables archiving and restoring records to and from floppy diskettes.

NOTE: If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired. Misuse of equipment or use other than its intended purpose will invalidate conditions of warranty. The accuracy and precision may also be impaired.

1.2.1 Patient Testing

The analyzer can process 30 blood samples per hour. Samples can have individual sample data, and additional parameters. Full histograms of the blood cells are also stored along with the above data.

Results can be printed on the optional internal or external printer. The user can customize the printout format.

Abacus Junior Vet determines 18 hematology parameters including three-part WBC differential. The instrument requires 25 µl of the whole blood sample:

WBC	total white blood cell count
LYM	lymphocytes count
MID	medium size cells* count
GRA	granulocytes count
LY%	lymphocyte percentage
MI%	medium size cells* percentage
GR%	granulocytes percentage
RBC	red blood cell count
HGB	hemoglobin
HCT	hematocrit
MCV	mean corpuscular volume
MCH	mean corpuscular hemoglobin
MCHC	mean corpuscular hemoglobin concentration
RDWc	red cell distribution width
PLT	platelet count
PCT	platelet percentage
MPV	mean platelet volume
PDWc	platelet distribution width

* = medium size cell population includes monocytes and a part of eosinophiles

1.2.2 Reagents

Only reagents supplied by **DIATRON** should be used with the analyzer, otherwise accuracy cannot be guaranteed.

Diluent: Isotonic saline solution used to dilute whole blood specimens and to rinse the fluidic system between measuring procedures.

Lysing reagent: Used to create hemolysate for 3-part WBC differential and for total WBC and HGB.

Cleaner: Used to perform cleaning process of the fluidics.

Rinse: Used in cleaning process of the fluidics.

1.2.3 Technical Operation

As **Abacus Junior Vet** is a fully automated instrument, operating it requires minimal training or technical support. Operator interaction is reduced to the following:

- Perform a *Blank Measurement* in case the instrument is used for a long time
- Enter sample and/or patient data
- Apply the sample for analysis
- Print results either one-by-one, or by selecting records from the database
- Perform simple weekly maintenance, as described later in this description.

1.2.4 Calibration and Quality Control

Abacus Junior Vet arrives at your laboratory factory-calibrated and ready to use. However, calibration needs updating whenever you find that the results have slightly changed, or a different or new control material is used. On each control material you receive to be used with the instrument, you will find a control sheet listing the parameters the instrument should match. Perform these calibrations as explained in a later chapter.

Quality Control is used for checking for proper calibration and performance of the analyzer. Running these samples should happen on a regular basis, as also explained in a later chapter.

1.3 Instrument features

Figures 1 and 2 show a front and a back view of **Abacus Junior Vet** hematology analyzer.



Figure 1. Front view

1. Floppy disk drive
2. OK key
3. Numerical keypad
4. Function keys
5. Graphic liquid crystal display
6. HELP key
7. Measure function key
8. Built-in printer
9. Database function key
10. Utilities menu key
11. Printing function key
12. Exit menu key
13. Cursor control keys
14. Status indicator
15. START key
16. Sample rotor (with interchangeable adapters)



Figure 2. Rear view

1. Reagent tubing connections
2. On/Off switch
3. External power supply inlet 12VDC
4. PS2 external keyboard port
5. USB port (not available yet)
6. Serial (RS 232) port #1
7. Parallel printer port

Figure 3 shows an open built-in printer using roll paper inside.

To open the lid, press the black button. Just put in the thermal printer paper and close the lid so that the end of the paper should be clipped between the black paper guide and the printer mechanics.

You can select to use this printer in the “**Printer Settings**” menu (see chapter 7.5.1).

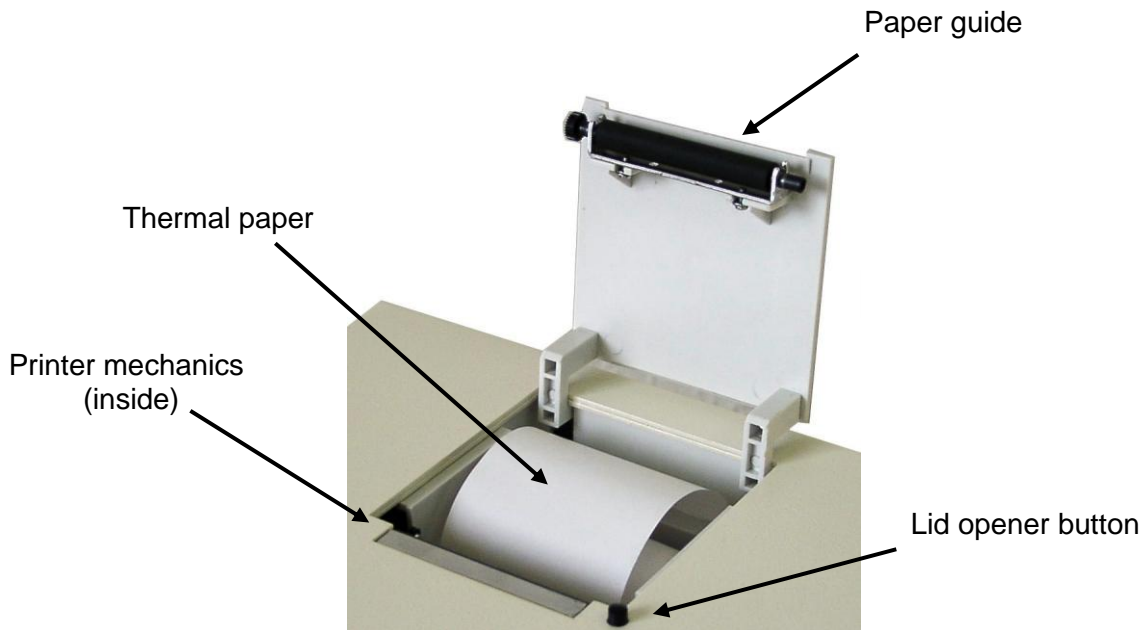


Figure 3. Built-in printer

The analyzer works with an external power supply. The next figure shows the power supply unit generating 12VDC. The power supply module has a so-called auto range input, allowing operation on 230V or 115V power system. The power supply complies CE and UL safety certifications.



The input socket is a standard power cable connection, the output is a special, lockable socket as shown in the picture.

Only the provided power supply shall be used with the instrument. (“Protek Electronics Corp.” Model ID: PUP80-12-N8, or “GLOBTEK INC”, Model ID: GT-81081-6012-T3”)

Figure 4. External power supply unit

1.4 Parts of the Analyzer

Abacus Junior Vet hematology analyzer is composed of three main units:

Fluidic System: Performs sampling, diluting, mixing, and lysing functions. Generates the regulated vacuum used for moving cells through the aperture during the counting process.

Data Processing

System: Counts, measures and calculates blood parameters, generates and stores numerical results and histograms.

Control Panel: Features an LCD display, a 29-button keypad, and parallel (external printer) and serial (computer) interfaces.

1.4.1 Function of the Fluidics

For the Schematics of the fluidics system, see Section 9.

Sample aspiration and dilution:

Sample procedure	
a.	25 μ l (50 μ l in predilution mode) of anti-coagulated (EDTA) whole blood sample is aspirated through the sampling needle, mixed with 4 ml of diluent and stored in the chamber (primary dilution)
b.	25 μ l of the primary dilution is aspirated into and stored in the needle during WBC measurement and the hemoglobin analysis
c.	Lysing reagent is added to the primary dilution held in the chamber for WBC differential analysis. This amount of lysing reagent is species dependent and may be changed by the operator within "Limits" menu.
e.	After WBC counting and a washing process, 5 ml of diluent is added to the second dilution (using the 25 μ l of primary dilution stored in the needle)
f.	This portion is analyzed for RBC count, PLT count and their parameters

Table 1.

Dilution rates used within *Abacus Junior Vet*:

- Primary dilution 1:160
- RBC dilution 1:32 000
- WBC dilution 1:196 (dependent on lyse amount)

Measurement times:

- WBC count 8 seconds
- HGB measurement 3 seconds
- RBC/PLT count 8 seconds

1.4.2 Control Panels

START button

Pressing and releasing the START button triggers an analysis cycle.

Status indicator

A three-color LED is located near the START button. Its actual color indicates the status of the analyzer.

LED color	Analyzer status
● Green	The analyzer is ready to work. Analysis can be initiated.
● Red blinking	Blood sample can be removed when the LED blinks red 3 times and the instrument beeps 3 times.
● Red	The analyzer is currently performing an analysis. No new measurement can be started.
● Yellow	The analyzer is performing a maintenance process or is in stand-by state.
● Yellow blinking	The the instrument is in stand-by and display light is off.

1.4.3 Display

The display is a 240 x 128 dots, high contrast, CCFL backlit graphic LCD (Liquid Crystal Display) module.







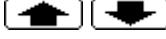

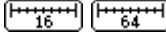







1.4.4 Keyboard

The foil keypad is composed of the following (shown in Figure 1):







- **Numeric keys** for entering numerical data, and selecting menu items
- **Function keys** having specific functions. These functions are menu-dependent and are indicated by icons appearing above the keys
- **Hardware function keys (short-cut keys)** for easier navigation between menus
- **Cursor control keys** ↑ and ↓ for moving between database items, ← and →, for moving between parameter columns or menu levels
- **START key** for initiating an analysis cycle
- **OK key** for confirming data
- **Del key** for deleting characters
- **Help key** for HELP function

Function keys

Below you can find all the possible icons and functions assigned to the so-called soft-keys (function keys)

Function key	Action triggered
	Exit from actual menu or action
	Leave data-entry menu without saving any changes made to it (Cancel)
	Confirm the results or changes made (OK)
	Display histograms of the highlighted patient ID or QC Lot No.
	Redo action (e.g. Blank measurement)
	Enter/modify sample/patient data
	Select between result pages
	PAGE-UP / PAGE-DOWN key in a multi-page menu
	Change scaling of Levey-Jennings chart (16 or 64 days)
	Patient type selection
	Confirm error
	Go to local menu (database, measurement)
	Limits
	Stop the running process
	Show data in table format
	Load QC reference values from storage media

Below you can find all the possible icons and functions assigned to the so-called hardware function buttons

Function key	Action triggered
	Information
	Measuring process at once
	Database
	Utilities menu
	Printing function
	Exit menu

1.5 Control Material

Abacus Junior Vet enables continuous monitoring of six different Control Materials (control blood). These should be matched to the types of samples usually run on the instrument. Specification (assay values and allowed tolerances along with expiry date) regarding these materials is always enclosed with the approved control material.

1.6 Accessories

Below is a list of accessories shipped with your **Abacus Junior Vet** instrument. This list can also be referred as the “**DIATRON Abacus Junior Vet - pack**”

Abacus Junior Vet Hematology Analyzer

Abacus Junior Vet User's Manual (this booklet)

Abacus Junior Vet Reagent Tubes (marked with colored connector caps)

Diluent tube (green)

Lyse tube (yellow)

Clean tube (blue)

Waste tube (red)

Abacus Junior Vet Cleaning Tube Kit.

Abacus Junior Vet Caps for reagent containers (marked matching reagent tube colors).

Abacus Junior Vet Waste Container (20 L).

Abacus Junior Vet External power supply and Power cable.

Abacus Junior Vet Tube adapters.

Abacus Junior Vet Thermal roll-paper.

1.7 Specifications

<i>Sample volume:</i>	25 µl whole blood (50 µl in Prediluted mode)			
<i>Aperture diameter:</i>	80 µm (in one universal measuring chamber)			
<i>Throughput:</i>	approximately 30 tests/hour			
<i>Characteristics:</i>	Accuracy max deviance from expected	Reproducibility (CV)	Carry over between samples	Test range
WBC	3%	< 3%	< 1%	4.0 – 20.0 10 ⁹ /l
RBC	3%	< 3%	< 1 %	4.00 – 15.00 10 ¹² /l
HCT	3%	< 3%	< 1 %	25.0 – 50.0 %
MCV	2%	< 1%	N/A	50 – 90 fl
HGB	2%	< 2%	< 1 %	9 – 16 g/dl
PLT	4%	< 4%	< 3 %	200 – 900 10 ⁹ /l
<i>Sampling method:</i>	Open tube system with automatic sample rotor and different tube adapters			
<i>Sample types:</i>	Dog, Cat, Horse, Mouse, Rat, Rabbit, Cattle, Monkey, Goat, Sheep, Ferret			
<i>Fault statistics:</i>	RBC/WBC clogging < 1% of analyses (normal use)			
<i>Cleaning procedure:</i>	High-voltage burst of aperture, high-pressure back-flush, chemical cleaning of aperture using Cleaner			
<i>Quality control:</i>	6 levels, including: mean, ± range, SD and CV for all measured and calculated parameters, 16- and 64-day Levey-Jennings charts, separate QC database			
<i>Calibration:</i>	Automatic based on 1 or 3 measurements, or manual calibration of WBC, HGB, RBC, PLT, MCV, RDW, MPV (separate factors for prediluted mode), monitoring of calibration factors by calibration events			
<i>Multi-user feature:</i>	3-level multi-user operation with selective privilege levels, user identification with ID and password			
<i>User interface:</i>	Easy-to-use, menu driven user interface with 6 software buttons (with icons), 6 hardware function buttons (above LCD), cursor and numeric keys			
<i>Languages available:</i>	English, Persian, French, German, Greek, Hungarian, Indonesian, Italian, Polish, Portuguese, Romanian, Russian, Spanish, Turkish, Vietnamese			
<i>Data storing capacity:</i>	1000 results, including histograms			
<i>Host computer interface:</i>	Serial (RS-232) computer link			
<i>Data back-up Interface:</i>	3.5" floppy disk			
<i>Software upgrade:</i>	3.5" floppy disk or slim CD-ROM (optional)			
<i>Printer interface:</i>	Centronics (parallel) or USB (optional)			
<i>Optional built-in printer:</i>	"Easy Paper Operation" built-in printer module			
<i>Display:</i>	240x128 dots high-contrast, backlit, graphics LCD			
<i>Keypad:</i>	29 foil keys + START button			
<i>External keyboard:</i>	Standard PS/2 compatible keyboard			
<i>Power supply:</i>	Auto-range, external 12VDC, 8A power module			
<i>Power supply (input):</i>	100-120V/200-240V, 50-60Hz, 10W stand by, 80W max.			
<i>Operating temperature:</i>	15-35°C			
<i>Dimension (WxDxH):</i>	320 x 260 x 365 mm			
<i>Net weight:</i>	12 kg			

2 INSTALLATION

2.1 General information

This chapter provides instructions for the installation of the **Abacus Junior Vet** hematology analyzer. The procedures described below must be followed correctly to ensure proper operation and service. Please carefully read and follow all instructions in this *User's Manual* before attempting to operate **Abacus Junior Vet**.

Abacus Junior Vet hematology analyzer is a precision instrument, and must be handled accordingly. Dropping or other improper handling of the instrument will disturb calibrated mechanic and electronic components and/or cause other damage. ***Always handle the instrument with care.***

2.2 Environmental factors

Operate **Abacus Junior Vet** within the ambient temperature range of 15-30°C and relative humidity of 65% ± 20%. The optimum operating temperature is 25°C.

Avoid using the instrument in areas of extreme high or low temperatures or where it is exposed to direct sunlight. If it is kept at a temperature less than 10°C, the instrument should be allowed to sit for an hour at the correct room temperature before use.

Reagents should be stored at a temperature range of 15-30°C.

The instrument should be placed in a well-ventilated location. The instrument should not be placed near potentially interfering devices capable of emitting radio frequencies (e.g. radio or television receiver, radars, centrifuge, X-ray devices, fans, etc.).

Operation at an altitude over 3000 meters (9000 ft) is not recommended.

Instrument is designed to be safe for transient voltages to INSTALLATION CATEGORY II and POLLUTION DEGREE 2.

Environmental and electrical requirements have been provided to insure the accuracy and precision of the instrument and maintain a high level of operational safety for lab personnel.

2.2.1 Electrical requirements

Abacus Junior Vet comes with a power cord appropriate for your power system. Proper use of the appropriate power cord assures adequate grounding of the system.

WARNING: Failure to properly ground the **Abacus Junior Vet** bypasses important safety features and may result in an electrical hazard.

2.2.2 Space requirements

It is important to install the instrument in a suitable location. A poor location can adversely affect its performance. Consider the following space requirements:

- Select a location near a power source and close to a suitable drain.
- Place the unit on a clean and level surface.
- Leave at least 0.5 m space on both sides, and above the instrument to access pneumatics and (optional) built in printer. A minimum of 0.2 m must be maintained between the rear panel and the wall to allow for heat dissipation and tube clearance.
- Install the reagents in a suitable place that will make your work easy. The best place is on the ground, below the supporting desk the instrument is placed on. The pneumatics system is capable of aspirating reagents from containers being 1.0 m below the reagent inputs. Make sure the reagent tubes are not bent, broken, twisted or blocked in between the desk the instrument is on and the wall behind. Such circumstances can result in instrument operation failure.
- DO NOT PLACE the reagents above the instrument, as there can be a risk of falling and spilling.

WARNING: Install the unit on a table or workbench. If the unit is installed without a supporting desktop under the unit, there is a possibility that the Abacus Junior Vet could accidentally fall.

2.2.3 Peripherals

External peripherals should only be connected when both the instrument and the peripheral device are powered off. Possible peripherals are:

- external printer
 - o the printer must be recommended by authorized technician
 - o the printer must be approved and listed
 - o the printer must have a CE mark
- external keyboard
 - o the external keyboard must be approved
 - o the external keyboard must have a PS2 connector, or suitable adapter
- link to host computer via serial port
 - o serial link cable must be approved by technician

2.2.4 Reagents and waste handling

Reagents should be handled according national or international regulations.

Waste generated by the unit is biohazard material. Handling and disposal must happen according to regulations covering reagent system.

2.2.5 Maintenance

The user should check the following components weekly:

- bottom of washing head for salt build up – should be wiped off with a damp cloth
- tubing system – by opening the side and back doors and look for any liquid leakage. If any leakage is observed, authorized technician should be contacted.

Caution:

The following parts must NOT be opened or serviced by the user:

- electrical supply
- electronic boards

2.2.6 Cleaning

The instrument and its power supply should be cleaned on the outside only, using a damp cloth with a soft detergent. DO NOT let liquids get inside the units.

2.2.7 General points

The manufacturer under the following conditions guarantees work safety reliability and general characteristics only:

- services and repairs are provided by an authorized technician
- the electrical supply of the laboratory follows the national or international regulations
- the system is operated under the following instructions

2.3 Unpacking and installation

1. Carefully remove the **Abacus Junior Vet** hematology analyzer from the shipping carton. Inspect the instrument for any visible signs of damage incurred during shipping. If you find any damage, immediately file a claim with the carrier or your distributor. Check the accessories received against the packing list. Contact Service if anything is missing.
2. **CAUTION!** Prior to initial operation, allow the instrument to reach room temperature (approx. 2 hours). Rapid temperature changes in an operational unit can lead to water condensation, damaging electronic parts.
3. Place the instrument on a firm work surface in the designated work area, near an appropriate AC electrical outlet. The connection **MUST** be grounded.

NOTE

Before making connections: Be certain, that all power is in an “OFF” setting before connections (printer, external keyboard) are made. Carefully read all literature accompanying the instrument and its accessories. Pay particular attention to the operating procedures for the external printer.

4. Keyboard and external printer

Attach the keyboard cable to the round “KEYBOARD” port on the back of the instrument. Attach both ends of the printer cable to the appropriate ports on the printer and **Abacus Junior Vet**. Attach the AC adapter to the printer (if required) and plug it into an AC outlet.

5. Host Computer

The instrument has a built-in serial port that allows connection to a host computer. Results, including histograms, may be exported. Serial I/O settings can be found in Settings. For installation instructions, please contact Service.

6. Power supply

Connect the power supply to the instrument. Attach power cord outlet to the external power supply of **Abacus Junior Vet** and plug the other end into a properly grounded AC outlet.

Please do not switch on the instrument before connecting the external power supply to the instrument and to the AC outlet, as well as before connecting an external printer or a keyboard to the instrument.

7. Reagent Containers

Place the reagent containers near the instrument, to an accessible location. Do not place the containers to a higher position than that of **Abacus Junior Vet**, because would a tube come off its connector, the fluids spoil out. Use the supplied connecting tubes and special bottle caps. Be sure that the color on each tube, cap and connector in the back of the instrument match. You can for example, place the reagent containers below the desk **Abacus Junior Vet** is installed on, as the instrument has sufficient power to draw the liquids from a lower location.

All containers should be left open (do not block the small air vent hole on the special container caps) in order to provide free airflow. (For connections, see Figure 5.)

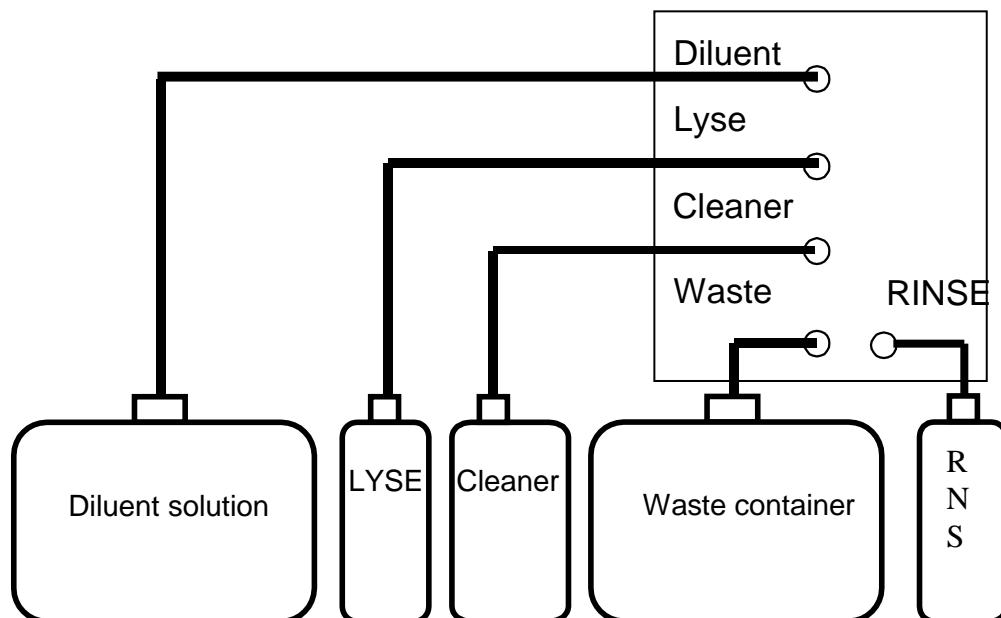
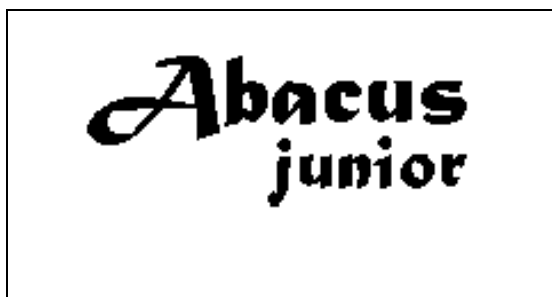


Figure 5. Reagent connections

2.3.1 Turning the Instrument ON

- In case you use an external printer (for information, read manual shipped with the printer) connect it and turn it on.
- Turn on the instrument by flipping the power switch (above the external power inlet) to **I** position.



During start-up, the following screen is displayed. The software version number appears few seconds later, when the software starts.

SmplID	Date	PatID
<input type="checkbox"/> Blank	15.05.2003 02:44P	
<input type="checkbox"/> Blank	16.05.2003 08:37A	
<input type="checkbox"/> Blank	26.05.2003 12:30P	
<input type="checkbox"/> Blank	05.06.2003 10:56A	
<input type="checkbox"/> Blank	10.06.2003 03:29P	
<input type="checkbox"/> Blank	10.06.2003 03:53P	

⏪ ⏩ ⏴ ⏵ (#9999)

An important feature of the instrument is that when the software version is completed, the DATABASE will be displayed without any pneumatic initialization (default setting). Pneumatic movement will be initiated only when necessary for the relating process.

The default setting can be changed at Service Menu level, in this case the instrument will start with pneumatic initialization giving the possibility to perform a measuring process immediately. Please call the Service Personnel in case you want to change the setting.

CAUTION! Wait 5 minutes before initiating any measuring process to allow the instrument to reach the optimal working temperature.


In some cases, a priming cycle is necessary prior to sample introduction. The instrument will perform the cycle automatically if the fluid sensors are on and additional liquid in the tubing system is required. A priming cycle should be run:

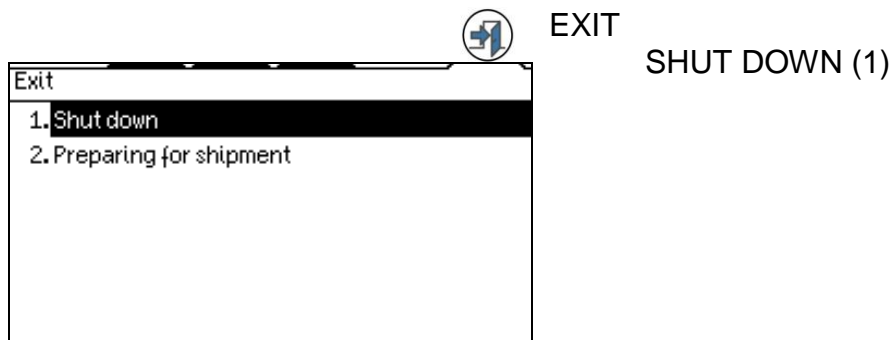
- at installation
- in case of extended time out of use
- after replacement of any component related to the Fluidic System

2.3.2 Turning the Instrument OFF

The instrument should never be switched off by simply pressing the power button on the rear panel. Doing so may result in erroneous operation during later use. It can be so, because the instrument uses different kinds of solutions, one of which is the so-called diluent. This liquid is an isotonic saline solution containing salt. Would it not be washed out of special units of the instrument, or would chambers not be filled with this solution may lead to dust condensation, or salt build up.

Therefore always follow the instructions below when switching the instrument off.

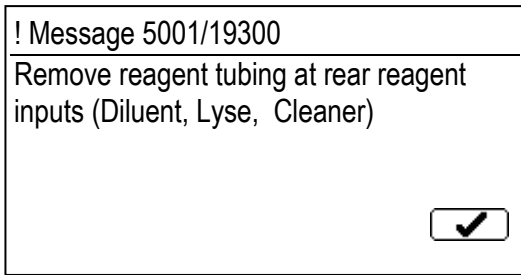
Select EXIT key . The following screen is displayed.



The software will prompt you for confirmation. Press 1, and the analyzer will perform a priming cycle, filling the chamber to avoid dust and salt build-up. The screen will prompt the user again to power off accompanied by a continuous beep.

2.3.3 Preparing for shipment

The second item in the shut down menu should be used when the instrument is to be shipped or left unused for a longer time. The instrument will ask you to utilize the cleaning tube kit and 100ml of distilled water. Follow the instructions appearing on the display.

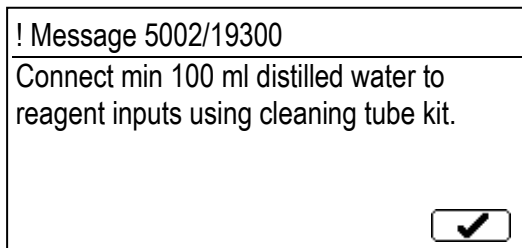


EXIT

PREPARING FOR SHIPMENT (2)

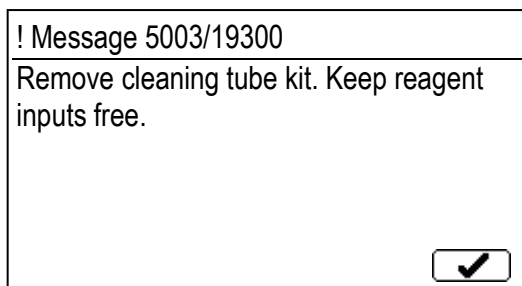
Here, the user is instructed to remove tubing connectors, so they could be drained.

Leave the waste connector attached.



Next, you should connect the cleaning tube kit to the reagent inputs, submerging the free end in a bottle containing at least 100 ml of distilled water.

The analyzer will flush any remaining reagents from the system into the waste container.



As a next step, the analyzer asks you to remove the cleaning tube kit.

When finished, the analyzer prompts you to power off the system. Remove the waste connector after shutting down.

2.3.4 Emergency handling

In case of emergency situation - like catching fire the instrument (short-circuit, etc.) - cut off the current immediately and use the fire-extinguisher.

3 MENU SYSTEM

3.1 General Information

This chapter contains information about the structure and usage of the software implemented menu structure.

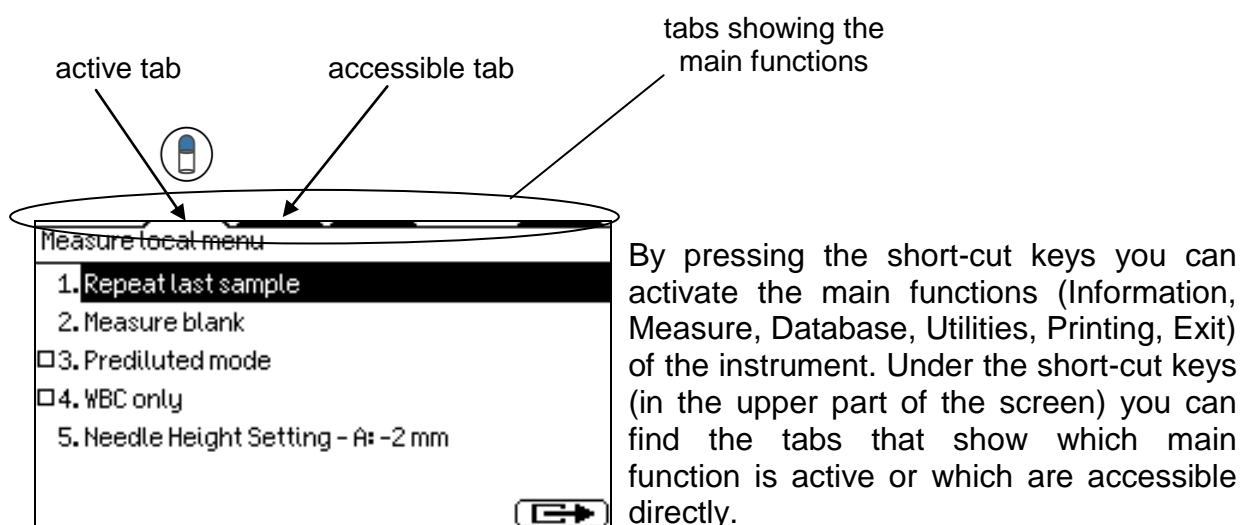
This integrated software controls instrument operations including calculation and evaluation of measured data, displaying results and information screens storage and recalling of data.

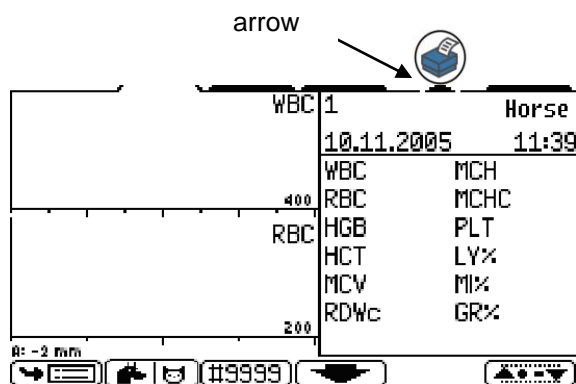
3.1.1 Navigating in the Menu System

The instrument uses a menu system to initiate actions and allow settings modifications.




There are four possible ways to navigate between menus and menu items:

- a. The most important issue is that above the LCD screen there are 5 function keys you can navigate with them between main functions of the instrument (Information, Measure, Database, Utilities, Printing, Exit). These keys are short cut keys, so by pressing any of them you can enter directly the main functions, wherever in other submenu you are. Connecting a keyboard to the instrument you can use Function keys F8 to F12 on the keyboard as well (you will find the corresponding key in Menu Structure).





The arrow under the Printing short cut-key indicates Printing function is enabled.

- b. You can select the desired item with the \uparrow and \downarrow keys and press the **OK** key to enter or activate the highlighted item. Within a submenu, you can press the  function key to return to the previous menu level. This method is suggested while learning instrument operation.
- c. Pressing the numeric key corresponding to the desired menu item allows selection and validation of an item without the need to additionally press the **OK** key. Pressing the **0** (zero) key has the same effect as the  function key. This method is more efficient after the user knows the menu structure.
- d. You can also move between the different menu levels using the \leftarrow and \rightarrow keys. These have the same effect as **OK** and , respectively.

If selection of a menu item would open up a submenu, then that item is indicated with a \blacktriangleright symbol at the end of the menu line.

Some results can be displayed in table format. The following keys may be used for browsing the database:

- 3 \uparrow page up
- 9 \downarrow page down
- 1 \uparrow jump to top of list
- 7 \downarrow jump to bottom of list

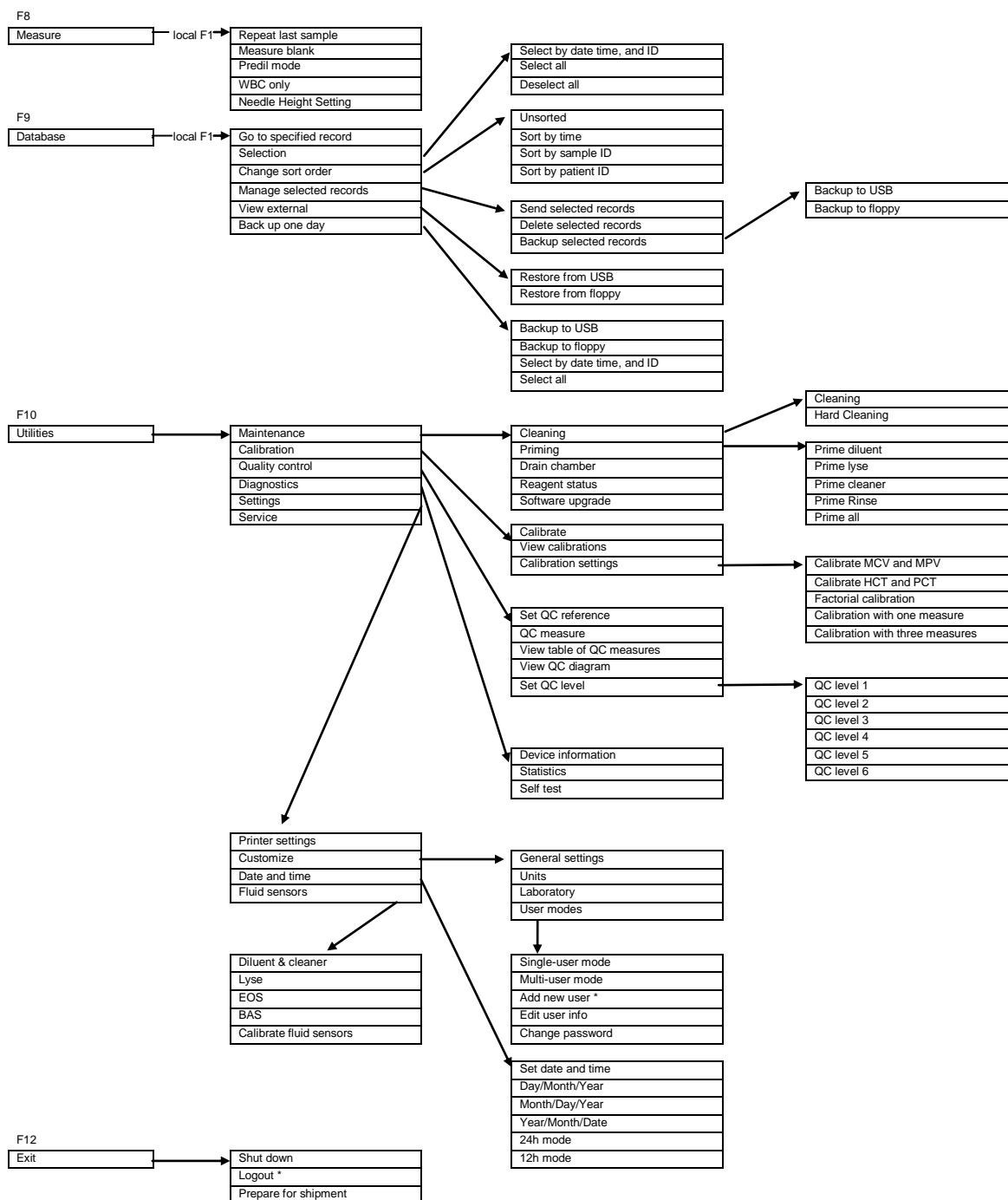
Several menus have items with boxes in front of the text. These indicate two-state options. The *selected* state is indicated with a filled box, the *deselected* state is indicated with an empty box. Selecting the item toggles its state.

Other items have circles in front of the text. These are called “radio-buttons”.

They are divided into groups separated by horizontal lines.

The function of these groups is that only one item of the group can be selected, and this is indicated with a filled circle in front of the selected item. Selecting an item of the group will move the filled circle in front of this item, emptying the circle of the old selected item.

3.1.2 Menu Structure



* if multi-user mode is enabled
 ** if serial communication is enabled

4 OPERATING PRINCIPLES

4.1 Impedance Method

The impedance method (a.k.a. Coulter method) counts and sizes cells by detecting and measuring changes in electrical impedance when a particle in a conductive liquid passes through a small aperture.

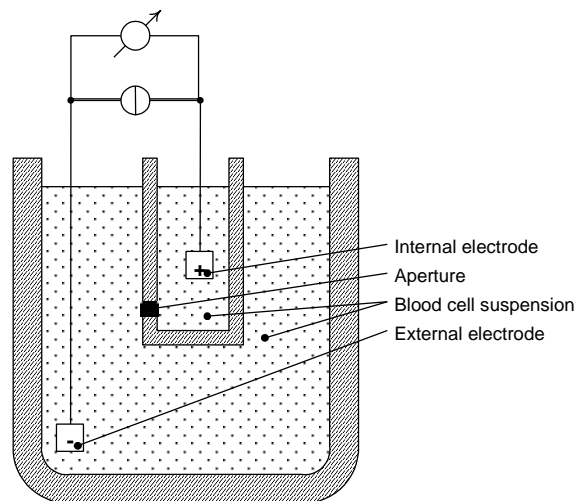


Figure 7. Impedance method

Each cell passing through the aperture – where a constant DC current flows between the external and internal electrodes – causes some change in the impedance of the conductive blood cell suspension.

These changes are recorded as increases in the voltage between the electrodes.

The number of pulses is proportional to the number of particles. The intensity of each pulse is proportional to the volume of that particle. The volume distribution diagrams of the particles are WBC, RBC, and PLT histograms.

Pulses are counted only in channels (in terms of femtoliter, fl), which are between the lower and upper discriminators.

4.2 Principle of HGB Measurement

The lysed 1:196 sample dilution can be measured by a cyanmethemoglobin method. The reagent lyses the red blood cells, which release hemoglobin.

Hemoglobin iron is converted from the ferrous (Fe^{2+}) to the ferric (Fe^{3+}) state to form methemoglobin, which combines with potassium cyanide (KCN) to produce the stable cyanmethemoglobin, or hemoglobincyanide. Subsequently, the HGB concentration is measured photometrically.

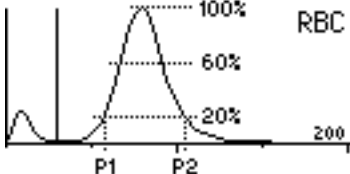
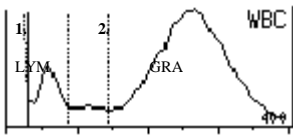
Note: The above-mentioned measuring method is used to determine the HGB concentration. The HGB concentration can be measured using cyan-free lysing reagents as well. In this case the effect is the same but the used lyse is environmental-friendly reagent.

4.3 Parameters

Abacus Junior Vet measures and calculates 18 different parameters, listed below.

For each parameter you can find the name, the abbreviation and the measurement unit in the first column.

You can find a short description for each parameter in the second column.

White Blood Cells – WBC (cells/l, cells/ μ l)	Number of leukocytes $WBC = WBC_{cal} \times (\text{cells/l, cells}/\mu\text{l})$
Red Blood Cells – RBC (cells/l, cells/ μ l)	Number of erythrocytes $RBC = RBC_{cal} \times (\text{cells/l, cells}/\mu\text{l})$
Hemoglobin concentration - HGB (g/dl, g/l, mmol/l)	Measured photometrically at 540 nm; in each cycle blank measurement is performed on diluent $HGB = HGB_{cal} \times (HGB_{measured} - HGB_{blank})$
Mean Corpuscular Volume - MCV (fl)	Average volume of individual erythrocytes derived from the RBC histogram.
Hematocrit – HCT (percentage, absolute)	Calculated from the RBC and MCV values. $HCT_{percentage} = RBC \times MCV \times 100$ $HCT_{absolute} = RBC \times MCV$
Mean Corpuscular Hemoglobin – MCH (pg, fmol)	Average hemoglobin content of erythrocytes, calculated from RBC and HGB values. $MCH = HGB / RBC$
Mean Corpuscular Hemoglobin Concentration – MCHC (g/dl, g/l, mmol/l)	Calculated from the HGB and HCT values. $MCHC = HGB / HCT_{absolute}$ Unit of measurement is displayed according to the one chosen for HGB result (g/dl, g/l or mmol/l)
Red Cell Distribution Width – RDW-SD (fl) Platelet Distribution Width – PDW-SD (fl) Red cell Distribution Width – RDW-CV (absolute) Platelet Distribution Width – PDW-CV (absolute)	The distribution width of the erythrocyte or platelet population derived from the histogram at 20% of peak  $xDW-SD = RDW_{cal} \times (P2 - P1)$ (fl), $xDW-CV = RDW_{cal} \times 0.56 \times (P2 - P1) / (P2 + P1)$ by the factor of 0.56 CV is corrected to the 60% cut
Platelet – PLT (cells/l, cells/ μ l)	Number of thrombocytes (platelets) $PLT = PLT_{cal} \times (\text{cells/l, cells}/\mu\text{l})$
Mean Platelet Volume – MPV (fl)	Average volume of individual platelets derived from the PLT histogram
Thrombocrit – PCT (percentage, absolute)	Calculated from the PLT and MPV values $PCT_{percentage} = PLT \times MPV \times 100$ $PCT_{absolute} = PLT \times MPV$
White blood cell differential: LYM, LY% : lymphocytes MID, MID% : monocytes and some eosinophils GRA, GR% : neutrophil, eosinophil and basophil granulocytes	Absolute values counted in the channels determined by the three WBC discriminators:  Percentages calculated from the absolute WBC value.

4.4 Absolute and Linearity Ranges of Measured Parameters

Within the linearity range, the instrument is guaranteed to provide the specified accuracy.

Beyond this linearity range, the instrument is able to display results, but may not guarantee accuracy characteristics.

If the value is over the maximum range of guaranteed linearity, the instrument cannot measure it and the result will be marked with an E (Error) flag.

To measure a sample, whose parameters exceed the maximum value indicated in the table below, predilution is recommended. See section 5.3.1.3 of this manual.

The linearity ranges of primary parameters in normal measuring mode:

Parameter	Linearity Ranges	Maximum	Unit
WBC	0...100	150	10 ⁹ cells/liter
RBC	0...15	20	10 ¹² cells/liter
PLT	0...700	1000	10 ⁹ cells/liter
HGB	0...250	400	g/l
HCT	0...100	-	%
MCV	30...150	-	fl
MPV	3...30	-	fl

Table 2. Linearity ranges of parameters

The linearity ranges for 1:5 predilution mode:

Parameter	Linearity Ranges	Maximum	Unit
WBC	2...200	300	10 ⁹ cells/liter
RBC	1...30	40	10 ¹² cells/liter
PLT	100...2000	3000	10 ⁹ cells/liter

Table 3. Linearity ranges of Pre-dilution mode

5 ROUTINE UTILIZATION and MEASURE

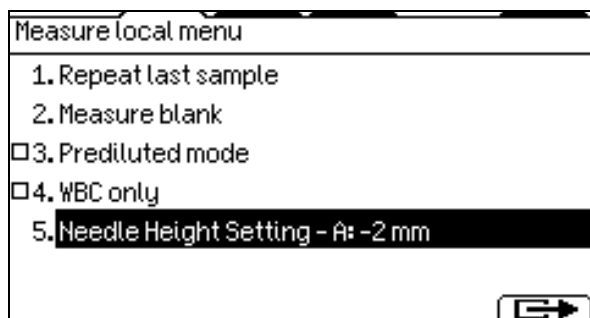
5.1 Sample handling

Since some time will usually elapse between collection of samples and counting, it is necessary to preserve the sample with an anti-coagulant to prevent large groups of cells forming into clots or lumps of cell matter that will clog the cell counter. Choice of anti-coagulant is very important, as some anticoagulants will affect the shape and size of blood cells. In general **EDTA**, preferably sodium or potassium based, is the only anti-coagulant recommended for use with electronic blood counters.

Care must be taken when using homemade containers pre-dosed with EDTA. If the container is not filled completely with blood, the ratio of EDTA to blood may reach a level, which results in osmotic transfer from the RBCs, shrinking them. **The ratio of EDTA to blood should not exceed 3 mg/ml.** Generally, we suggest using manufactured sample tubes containing the necessary amount of EDTA and when you take blood please take into account the specifications attached to them.

Important! Sample tubes must be filled at least 7-8 mm height with blood otherwise correct sampling is not guaranteed!

There is another possibility that can help the user in correct sampling by using the needle setting function. This is available in Measurement Local menu:



This function controls the sampling height of the needle inside the sample tube. So, if you have a sample tube with a higher/lower bottom you can control the sampling height adjusting this option.

In the left bottom of the screen will be displayed how many millimeters the needle was set compared to the original position.

Attention! If you hurt yourself during analysis biohazard substances can cause infection! Use always rubber gloves!

To initiate analysis:

1. *Invert the closed sample tube 11 times to achieve a homogenous sample.*

Do not shake the sample, because micro-bubbles can form inside causing erroneous sampling!

You have the possibility to use 3 different interchangeable adapters for different tube types. Tube types are shown in the next figures.

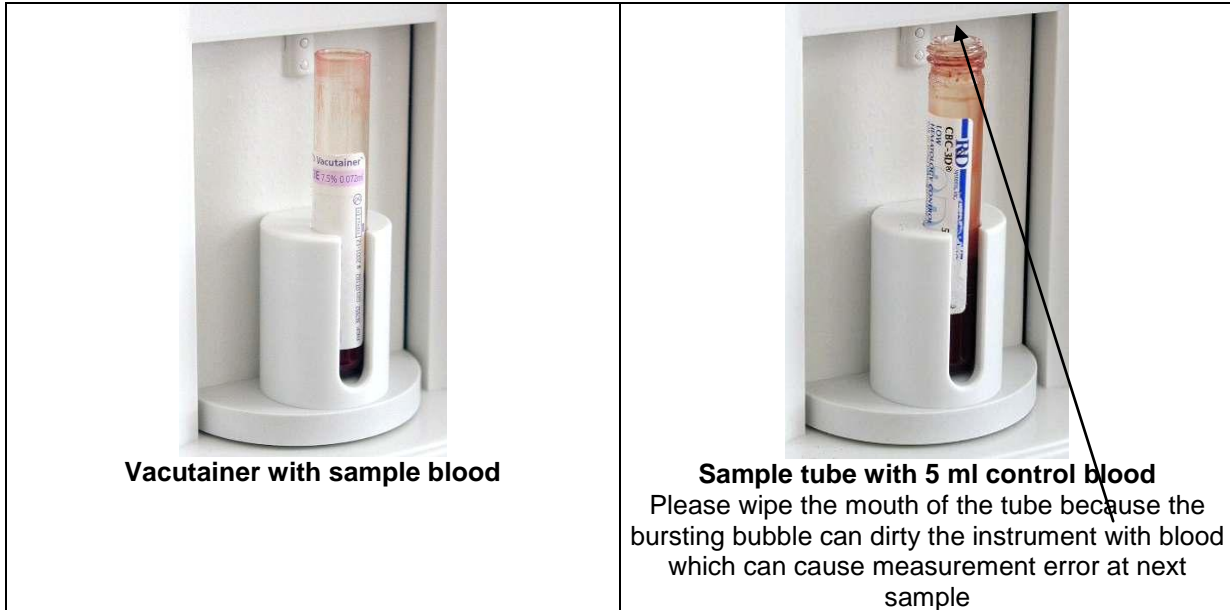


Figure 8. Tubes used in big adapter

Below you can see 3 types of tubes (microtainers) used in micro adapters. These are only examples given by us, you can try to use other type of microtainers as well.

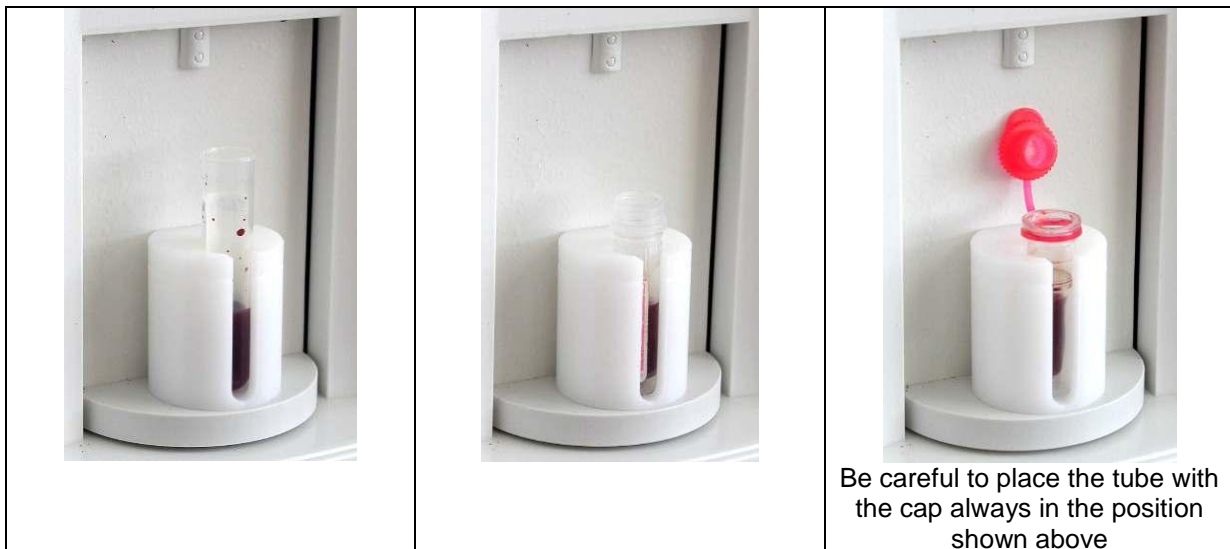


Figure 9. Tubes used in micro adapter

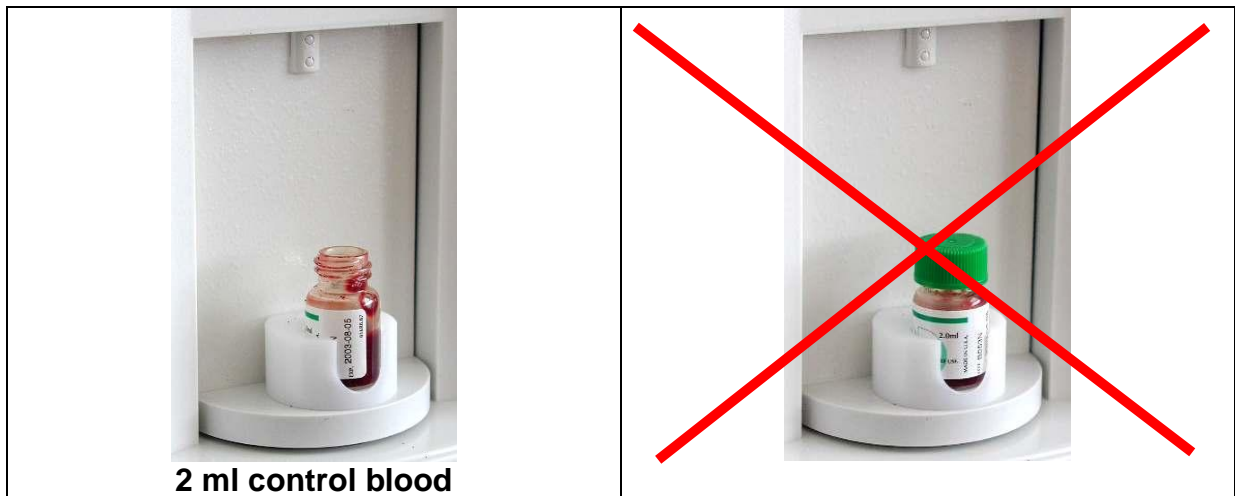


Figure 10. Tube used in small adapter

2. Remove the cap!! It is very important because the tip will not pierce the cap!

3. Position the sample tube in the sample rotor.
4. Push START key.




The sample rotor will turn into inside of the instrument and the needle draws 25 μ l of sample from the tube. The aspirating needle is retracted, while its outer surface is automatically rinsed with diluent. This insures a low carry-over between samples. After a few seconds the rotor turns out and the needle remains inside the instrument. Now you can take out the sample tube from the adapter of the sample rotor.

5.2 Sample analysis

5.2.1 Sample preparation

Use K₃-EDTA anti-coagulated fresh whole blood as sample. **Prior** to sampling, mix the sample gently by **inverting it 11 times**. **Do not shake** as this could damage the blood cells.

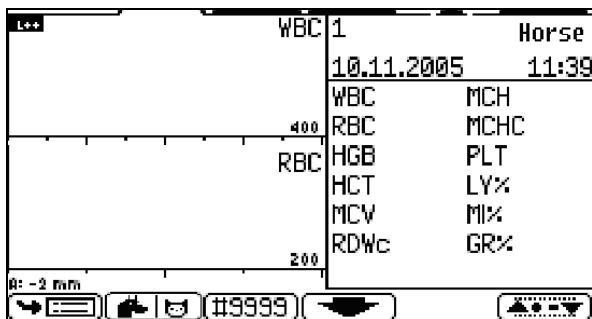
5.2.2 Modifying lyse quantity

The default lyse quantity can be adjusted by pressing MEASURE//Human, Male, Female, etc./ (LIMITS) for each species. An additional option to modify the lyse quantity by ± 0.1 ml or ± 0.2 ml is available during analysis.

Press \uparrow to **increase** the lyse quantity (**+0.1/0.2 ml**) if the separation between lysed RBCs and WBC populations is poorly differentiated, resulting in increased WBC and LYM counts.

Press \downarrow to **decrease** the lyse amount (**-0.1/0.2 ml**) if the WBC histogram seems to be shrunk to the left, i.e. the different WBC populations are overlapped. This can inhibit proper separation of WBC populations.

If this function is selected, the **L+/L-**(for 0.1 ml) or **L++/L--**(for 0.2 ml) signs can be seen in the top-left corner during analysis (see the screen below).



The two important parameters influencing lysing are lysing time and lyse quantity. You cannot change the lysing time, as it is adjusted to the lysing reagent supplied by Diatron.

Above you could read that the lyse quantity can be adjusted either at patient limits, or right before measurement.

5.2.3 Sample information

The software allows the user to enter information for each sample that has been, or will be, measured. If an external PC keyboard (standard USA layout) is used, it must be connected to the instrument **before** turning the instrument on.

Two options exist for sample information entry:

- immediately before analysis
- in the Database menu

To enter sample information prior to sample analysis, press the function key. The following screen appears:

Sample information	
Sample ID: 1	Date: 10.11.2005 11:39
Doctor:	
Patient type:	Horse
Patient ID:	
Name:	
Birth: 00.00.0000	Sex: -
<input type="button" value="X"/> <input type="button" value="✓"/>	

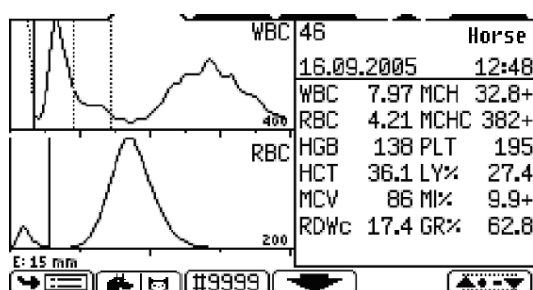
Sample ID and patient data can be specified (name, sex, date of birth). Also, the name of the doctor having ordered the laboratory analysis can be given.

The patient name will appear in the header of the printed result sheet.

Type in the name, using up to 32 alphanumeric characters, ("A-Z", "0-9", space, comma, dot and parentheses). Use arrow keys to move between characters and the backspace for deletions. Press **Enter** to accept data, cancel with **Esc** or , confirm with .

5.2.4 Results

At the end of an analysis, the following screen is displayed, including all measured and calculated parameters as well as the WBC, RBC and PLT histograms.



Results and histograms will be stored automatically in the memory, without any operator confirmation.

If reference ranges are set (not 0.0), parameters will be verified and marked by:

- + if the value is over,
- if the value is under the range specified.

- If analysis errors occur or the blank measurement is too high, the **E error flag** will appear at the erroneous parameter and no results will be displayed for it, instead --- will appear.
- If there are warnings, a * **flag** will appear preceding the result.

In the last line of the first result screen, **warning flags** can be displayed.

In the followings we summarize the **warning flags** and give an explanation of their possible cause and a few hints to overcome the problem:

Uppercase letters refer to WBC or HGB problems:

Flag	Meaning	Recommended user action
E	No WBC 3-part differential	Possible lyse problem. May occur in pathological lymphocytosis.
H	HGB blank is high, or no HGB blank	Repeat the blank measurement. If HGB blank is not stable there are probably bubbles in the WBC chamber: Run a cleaning and try blank again. Close the side door if open during measurement.
B	WBC blank is high, or no WBC blank	Repeat the blank measurement, or run prime lyse and try blank again. Possible lyse contamination, or noise problem.
C, Q	WBC clogging	Aperture clogging. Perform cleaning and repeat the measurement. If it is a general problem, please contact your Service Personnel. Low temperature reagents can cause it as well (mainly diluent), in this case you will have to wait until they reach room temperature.

Table 4. Summary of warning flags related to WBC/HGB

Warning flags in lowercase refer to RBC or PLT problems:

Flag	Meaning	Recommended user action
p	PLT blank is high, or no PLT blank	Run cleaning and repeat the blank measurement. Diluent or system cleanliness problem. If it is stable high, replace the diluent by opening a new tank.
b	RBC blank is high, or no RBC blank	Same action as in case of warning flag p .
c	RBC/PLT clogging	The same action as in case of the C warning flag.

Table 5. Summary of warning flags related to RBC/PLT

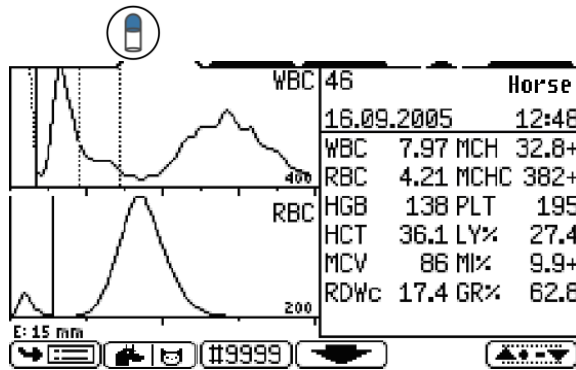
Warning flags can be grouped according to measurement conditions and according to the problems relating to the blood sample.

Measurement conditions: when the flags are related to clogging (**c, C**), probably hemolysing problems (**E, b, B, p**) and pressure problems (Fatal pressure error). In this case we suggest repeating the measurement.

The asterisk flag (*) near a parameter shows some doubt suspected during the evaluation of that parameter. The reasons can be: a high PLT blank (PLT value will be marked), a case of indefinite discriminator setting (default location is used for some reasons, related parameters will be marked), etc.

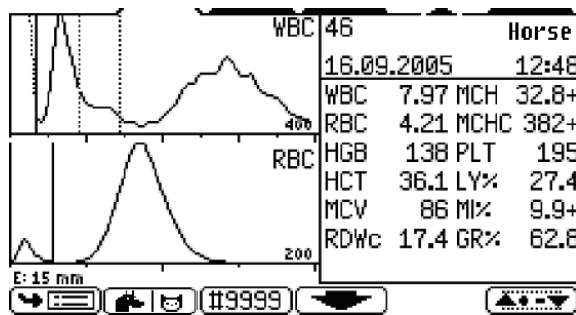
Another flagging method is evaluation against the normal ranges. If some of the parameters is out of range it gets a (-) flag if under the range, or gets (+) if over the range. You can customize ranges for all kind of patients by setting the corresponding lower and upper ranges. If you set 0 for a range limit, it will be not verified.

5.3 Measure

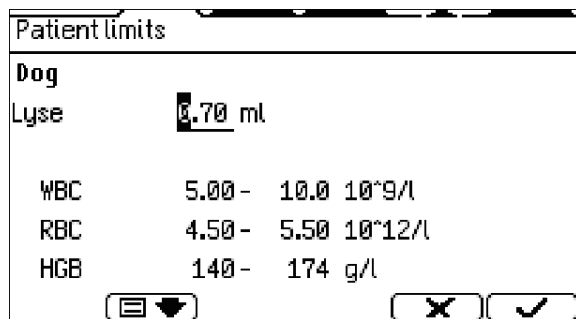


Pressing the MEASURE short-cut key the measurement screen is displayed. The default measurement screen is set to Human species. From here you can reach the Profile screen by pressing the button.

The Profile icon allows you to choose between different species. By pressing the icon, the available species will be toggled.



Once you have set the required species, press the key and you can enter the Patient limits setting dialog.



This function allows the user to specify the patient limits, or reference ranges, used in your laboratory. Lower and upper limits for each parameter are displayed and can be modified using the numerical keypad. Confirm data by pressing the OK key. Pressing and function keys accesses additional pages. **If 0.0 - 0.0 is specified for lower and upper limits, that parameter will not be verified.**

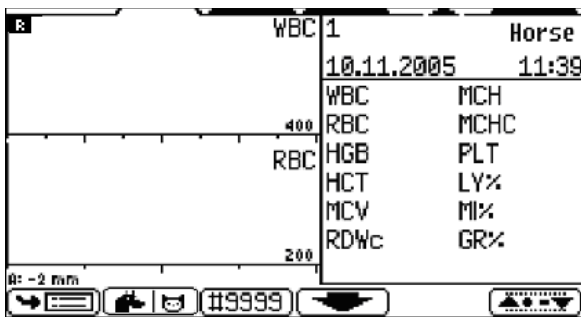
On the first screen of the limit settings, the software allows you to **change the amount of lyse added**. The instrument permits a range of 0.3 ml to 1.2 ml. Optimal quantities are strongly influenced by the chemical composition and behavior of the lysing reagent. The quantity of the lyse reagent can also be modified before each analysis by $\pm 0.1/0.2$ ml without having to change the value in this sub-menu.

5.3.1 Measure local menu



From the Measure local menu you can access 4 sub-menus.

5.3.1.1 Repeat last measurement



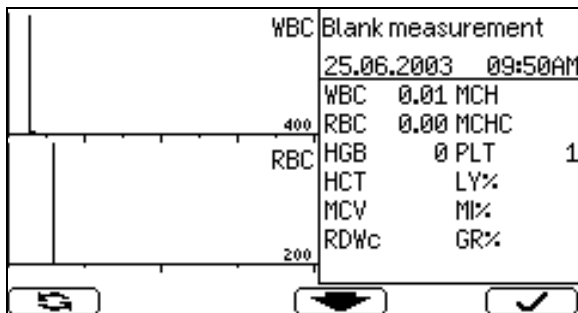
Choosing item 1 from the Measure local menu the last measurement can be repeated and an **R** sign will be displayed on the upper left corner of the screen.

5.3.1.2 Blank measurement


Blank measurement is used for checking the cleanliness of the system and the reagents.

Blank measurement must be performed:

- Once daily, before sample analysis (this is done automatically before the first analysis in the MEASURE).
- After any reagent change (activated manually from the MEASURE/ MEASURE BLANK menu).
- After the replacement of any hardware component that is closely related to the measuring process (aspiration, dilution, counting, rinsing).



The user must accept blank values by pressing .

To repeat the blank measurement, press .

If any of the tested parameters has a high blank value, the message "Unsuccessful blank measure" appears at the top of the screen.

There are 3 regions for blank value handling:

1. *Optimal* - all results are within acceptable ranges.
2. *Blank is high* - * flag is displayed at relevant results.
3. *Blank exceeds acceptability* - no results displayed.

Parameter	1. No flag at parameter	2. * flag at result	3. E (error) flag at result
HGB	0-10 g/l	10 - 25 g/l	> 25 g/l
WBC	0 - 0.5 x10 ³ cells/μl	0.5 - 1.0 x10 ³ cells/μl	> 1.0 x10 ³ cells/μl
PLT	0 - 25 x10 ³ cells/μl	25 - 50 x10 ³ cells/μl	> 50 x10 ³ cells/μl
RBC	0 - 0.05 x10 ⁶ cells/μl	0.05 - 0.5 x10 ⁶ cells/μl	> 0.5 x10 ⁶ cells/μl

Table 6. Blank measurement ranges

Accepted blank values are essential for proper calibration and quality control measurement. For this reason, no calibration or QC measurement can be performed without accepted blank values.

Quality control measurement and calibration can be performed **only** if all blank values are in the first region (receiving no flags or errors).

5.3.1.3 Prediluted mode

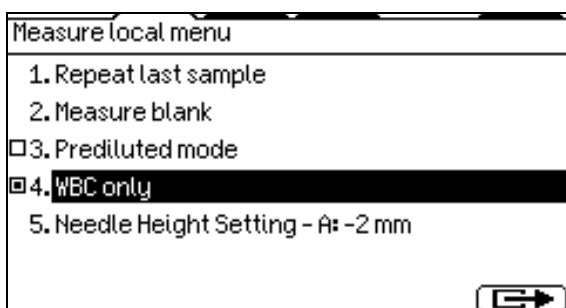
The software has a special Prediluted mode, useful in the following situations:

- Sample values exceed linearity (see section 4.4)
- Small sample volumes
- Capillary blood samples

In the Prediluted mode, the operator must prepare an external 1:5 predilution, as in the following example:

Predilution: **1 UNIT OF SAMPLE + 5 UNITS OF DILUENT**

Example: if 20μl capillary tubes are used for blood collection, add 100μl of pure diluent to create a proper predilution.



The Prediluted mode must be selected in the MEASURE local menu.

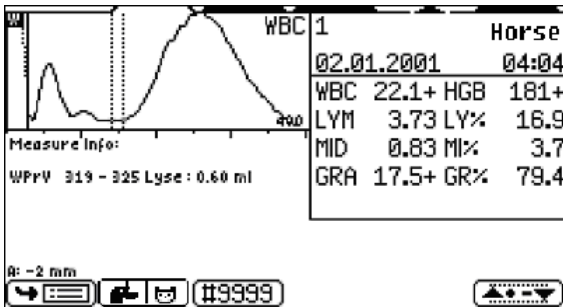
1:5 sign will appear on the WBC histogram of the result screen.

The results are corrected with the predilution factor (1:5) automatically.

NOTE: The Prediluted mode has its own calibration factors. To calibrate the instrument for this mode, see the Calibration settings section of this manual.

To **disable** the Prediluted mode, re-enter Measure local menu and deselect its box.

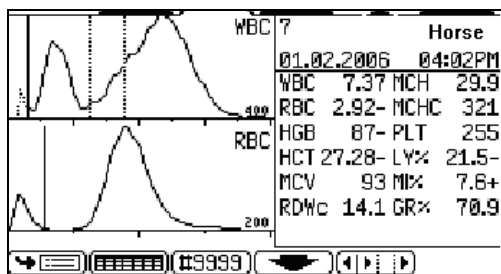
5.3.1.4 WBC only



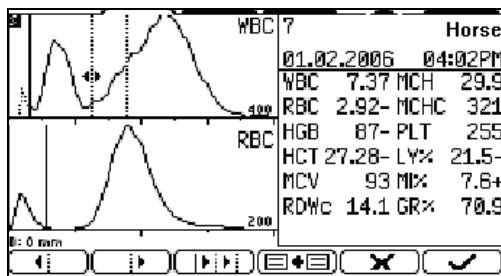
Selecting item 4 in Measure local menu the instrument will measure and display WBC parameters only.

5.3.1.5 Marker moving – validating a sample

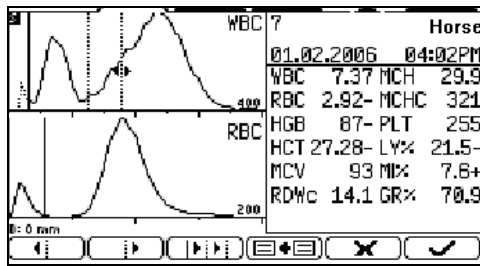
This feature allows validation of sample analysis. After the sample has been run, an icon appears at icon location 5, allowing fine-tuning of markers found on the histogram of the analytical curve. Software tries to find the ideal positions for the population-markers, and fits mathematical curves to best fit the result curve. Would these markers be placed at locations, which the user finds unsuitable, then these markers can be re-positioned on a user interface provided.



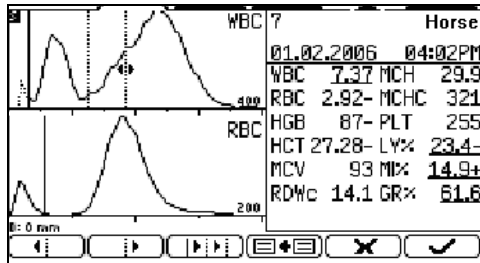
After a result is displayed, you will find a marker-moving icon (at position 5), which enters you into marker moving screen:



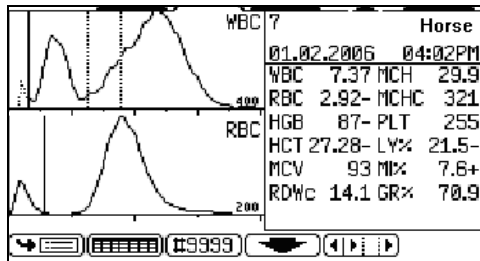
Further icons are displayed which allow moving the markers separately.



Another icon allows changing between markers, and you can also reset the markers to original (calculated) or to previous states (x). You can accept the modifications with the (check).




If any marker was moved, the respective parameters become underlined. This is valid for printed results as well, so "user-calibrated / modified" records can be identified.





You can revert to the original state as well, using the F4 button:

6 DATABASE

Patient results are stored in the memory in chronological order, and can be retrieved at any time. Memorizing capacity is 1,000 measurements, including the complete parameter list, histograms, flags, sample data, and date/time of measurements.





SmpID	Date	PatID
<input type="checkbox"/> Blank	15.05.2003 02:44P	
<input type="checkbox"/> Blank	16.05.2003 08:37A	
<input type="checkbox"/> Blank	26.05.2003 12:30P	
<input type="checkbox"/> Blank	05.06.2003 10:56A	
<input type="checkbox"/> Blank	10.06.2003 03:29P	
<input type="checkbox"/> Blank	10.06.2003 03:53P	




  (#9999)


DATABASE

Pressing the ← or → key accesses the remaining, non-visible parameter results. The ↑ or ↓ key scrolls between the results individually. The 3 and 9 keys are equivalent to PageUp and PageDown scrolling keys. Select patient results by pressing the OK key. The box will be filled.


From the database table screen, WBC, RBC and PLT histograms can be displayed by pressing . By pressing the  key, the second panel with PLT results can be viewed.

Browsing among selected tests can be made by pressing DOWN and UP ARROW keys (↑ and ↓).





Database local menu	
1. Go to specified record	
2. Selection	
3. Change sort order	
4. Manage selected records	
5. View external	
6. Backup one day	



<DATABASE LOCAL MENU>

From the database table screen, enter the Database local menu by pressing the  key.

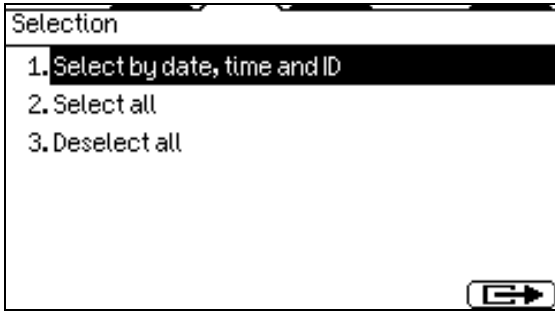
Go to specified record	
Go to the first record measured after:	
10.06.2003 00:00A	
and has Sample ID:	
and has Patient ID:	

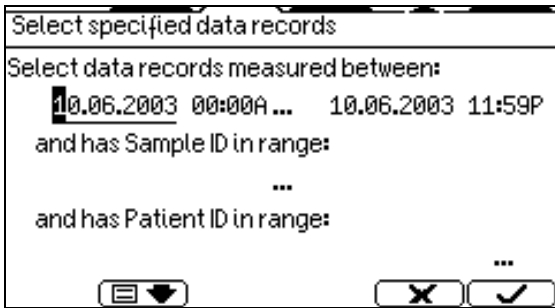
<DATABASE LOCAL MENU>

GO TO SPECIFIED RECORD (1)

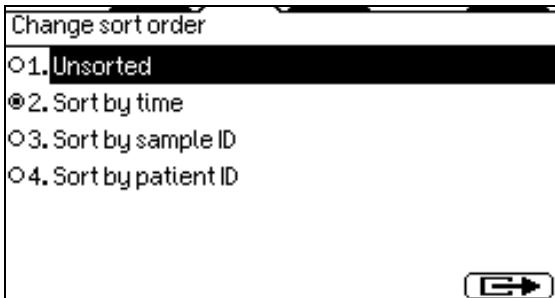
Item 1 of the previous menu accesses a screen asking for parameters defining any given sample (date, time ID) and jumps to it. If any ID is left as 0, searching is performed only by date/time.



<DATABASE LOCAL MENU>
SELECTION (2)
Besides checking samples one-by-one, selection can also be done within Database local menu.
SELECT ALL checks all boxes, DESELECT ALL clears all boxes.



<DATABASE LOCAL MENU>
SELECTION (2)
SELECT BY DATE, TIME AND ID (1)
Select a range by date, time and/or ID number (see next screen)
Entering 0 as an ID results in a search by date only. Corresponding results will be marked with a filled box.



<DATABASE LOCAL MENU>
CHANGE SORT ORDER (3)
The order of results can be selected within this menu.

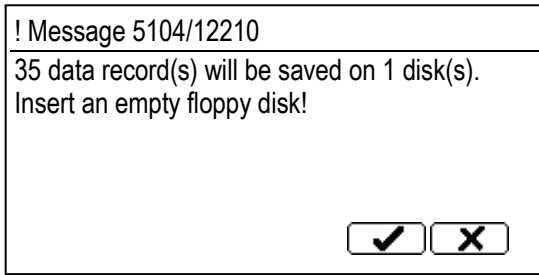


<DATABASE LOCAL MENU>
MANAGE SELECTED RECORDS (4)
From this sub-menu you can send the selected database to a PC or you can delete them or you can save on a floppy and disk. This menu will open up another one where you can select between floppy and USB device.

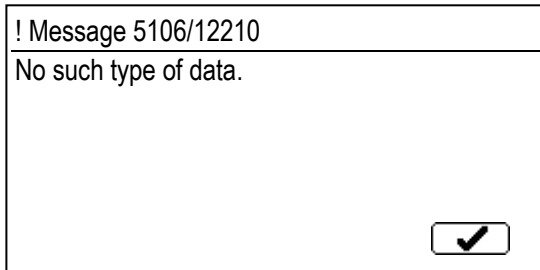
Data backup and monitoring can be performed in this submenu. Before menu selection, insert a 3.5" floppy disk (800 records) into the drive located on the front-bottom panel of the analyzer, or connect a USB storage device (no record limit).



DATABASE
BACKUP ONE DAY (6)
Specify the day whose records you wish to backup to a floppy disk.

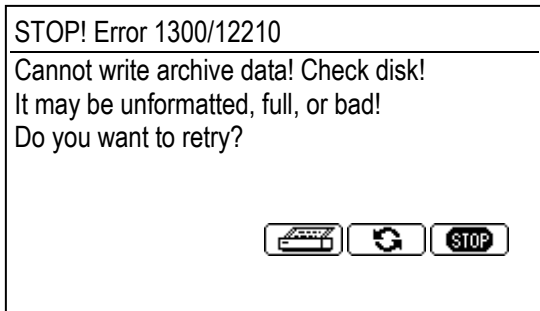


When you have selected the day or data to be saved, and confirmed it with the key, the instrument will prompt you for an empty disk.



Possible error messages include:

The instrument gives this warning in case you tried to save data of a day, which had no data, or no data are selected.



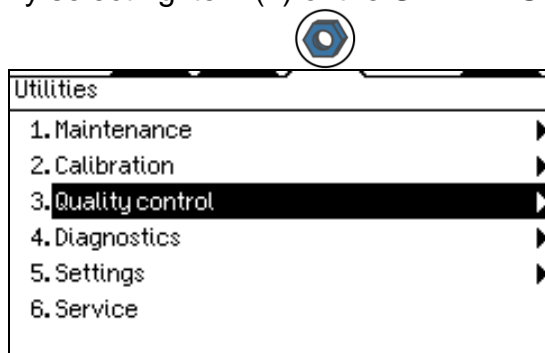
This warning appears, if the disk you inserted had errors on it, or was write-protected.

Check the write protection of the disk or if necessary, insert a new, formatted disk.

7 UTILITIES

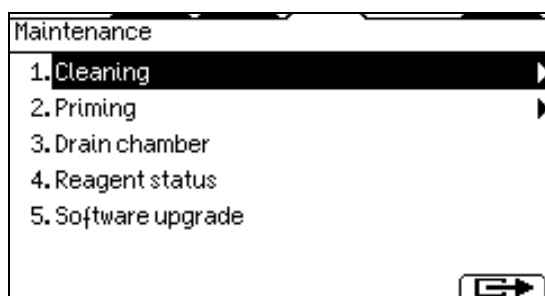
7.1 Maintenance

By selecting item (1) of the UTILITIES you can access the MAINTENANCE menu.



7.1.1 Regular Maintenance Jobs

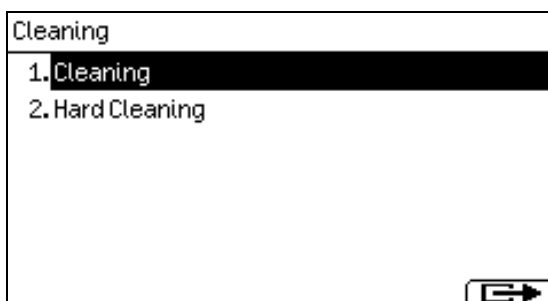
From Maintenance submenu, the user can initiate maintenance procedures such as cleaning, priming, draining.



MAINTENANCE (1)

Select the required submenu.

7.1.1.1 Cleaning

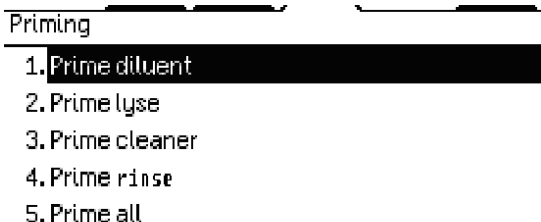


Item 1 in the above menu brings up cleaning functions.

Item 1 starts a washing cycle using the system cleaner reagent. This action is recommended if clogging problems are experienced (C or Q error flag).

Item 2 initiates a process that uses a light solution of hypochlorite, and washes the entire system with it. The instrument will ask for the cleaning solution in a sampling tube.

7.1.1.2 Priming



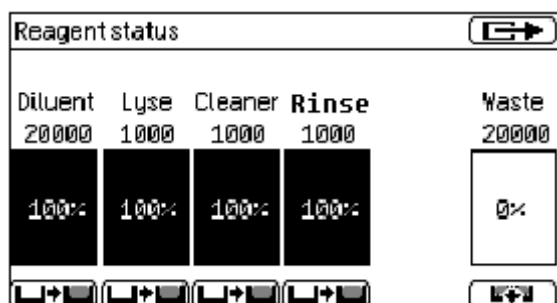
During the priming cycle, the fluidic system is rinsed with a large amount of diluent. It differs from the process in a start-up procedure; as in the latter case a simple filling up of the fluidics is performed. If fluid sensors are on, then the analyzer makes these procedures automatically, otherwise the User must initiate them activating the appropriate item within this submenu.



7.1.1.3 Draining chambers

Draining of chambers should be run before removal or replacement of parts related to the measuring chambers or apertures.

7.1.1.4 Reagent status



The screen on the left shows reagent volumes in containers, as calculated by the instrument. As measurements are performed, the volumes are changing accordingly. When reagent volume in container is running low, instrument will notify user, and ask replacement.

7.1.1.5 Software upgrade

Upon selecting this option, the instrument will ask the user to prepare and insert the SW upgrade media (floppy or USB storage device). When confirmed, the instrument restarts, and performs automatic SW upgrade. If the SW media is not inserted, a regular starting up procedure will be performed.

WASTE HANDLING – VERY IMPORTANT

Waste contains poisonous substances (because of possible cyanide content) and human origin substances causing biohazard. These substances are representing potential danger to environment. For this reason, safe handling of the waste liquid is very important.

Please contact your distributor which kind of reagent is supplied to you, whether the lyse reagent contains cyanide or it is cyanide-free. Please, disregard point 1. below if your lyse reagent does not contain cyanide.

The following steps should be made for environmental protection and safety reasons:

1. Neutralization of waste containing cyanide:

- *Use the set of cyanide neutralizer reagents (contact your distributor):
 Component A (alkaline oxidant reagent)
 Component B (neutralizer reagent)*
- *Put 5 ml/l of component A into the waste container when it is empty, then connect it to the analyzer.*
- *When the waste container becomes full replace it.*
- *Wait 1-2 hours for oxidation to complete.*
- *Put 5 ml/l of component B into the waste container.*
- *Wait 2-3 hours.*

2. Neutralization of biohazard effect

- *Independently of the fact that the waste contains cyanide or not, you should make this step.*
- *Put 2 ml/l hypochlorite solution into the waste. Close the cap, shake the container and wait 1 hour.*
- *Annihilate the waste by spilling it into the drain system.*

7.1.2 Weekly maintenance

Weekly maintenance should be performed before turning on the power switch.

- **How to open the side doors:**

On the left side and the rear side of both instruments there is a side door, which allows to reach the fluidic system and the mechanical parts easily (Figure 11 and 12). Other parts of the analyzers (electronic parts, etc.) can be accessed by opening the front cover and the rear cover.

Please take care:

- to open the doors you have to turn the lock clockwise several turns (2-3)

- to close the doors turn the lock counter clockwise until the door is blocked

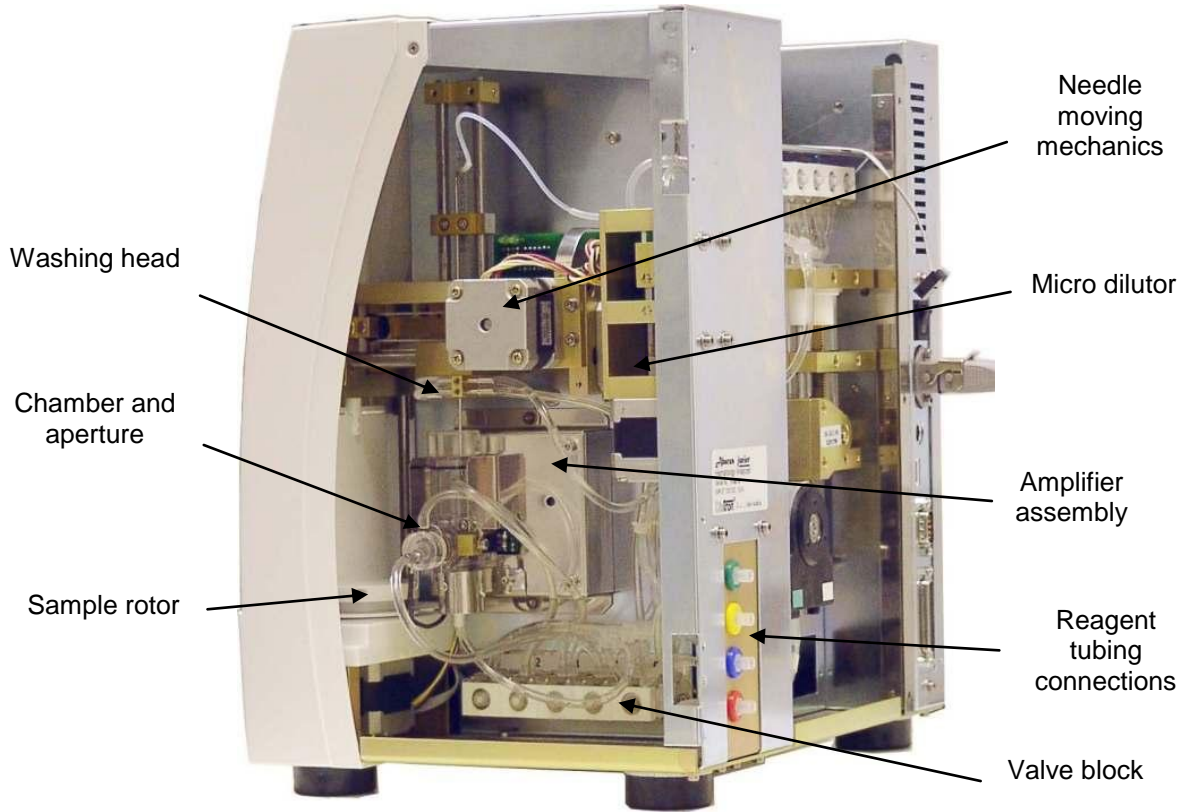


Figure 11.

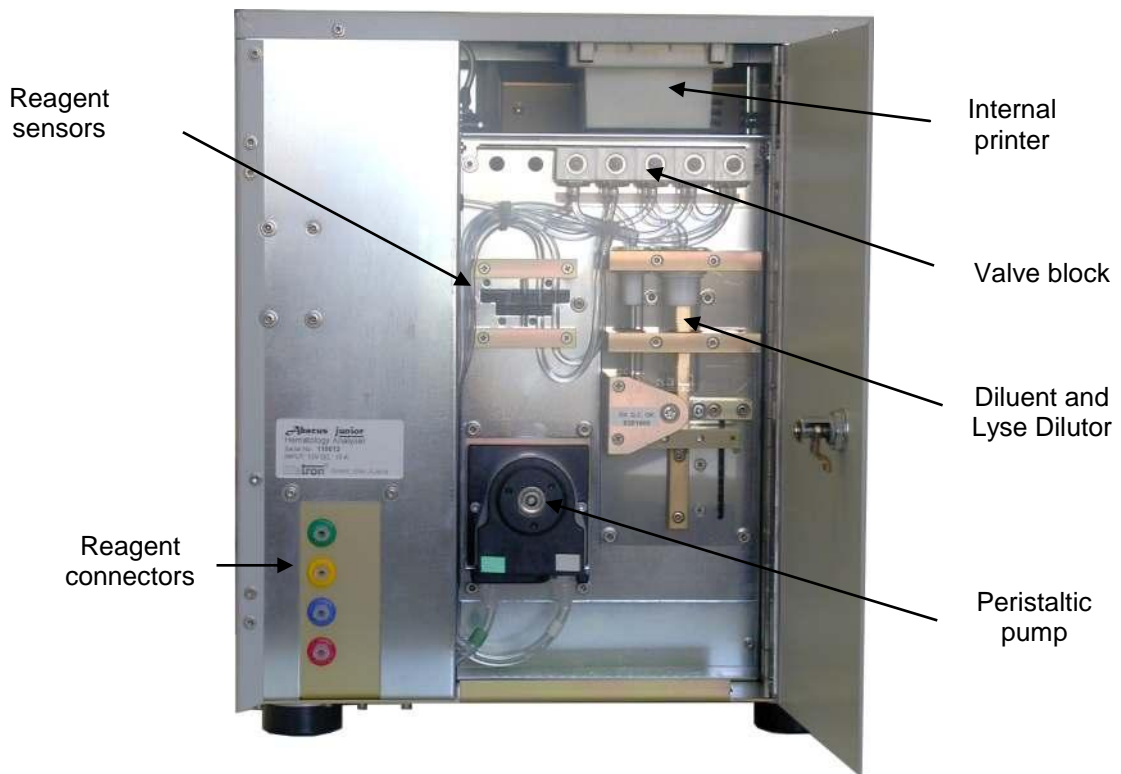


Figure 12.

7.1.2.1 Cleaning the washing head

The washing head cleans the outer surface of the aspirating tip with saline diluent. Any salt build-up on the lower surface may cause malfunction during operation. Use warm tap water and a soft cloth to clean this area. You can see the washing head indicated in the following figure:

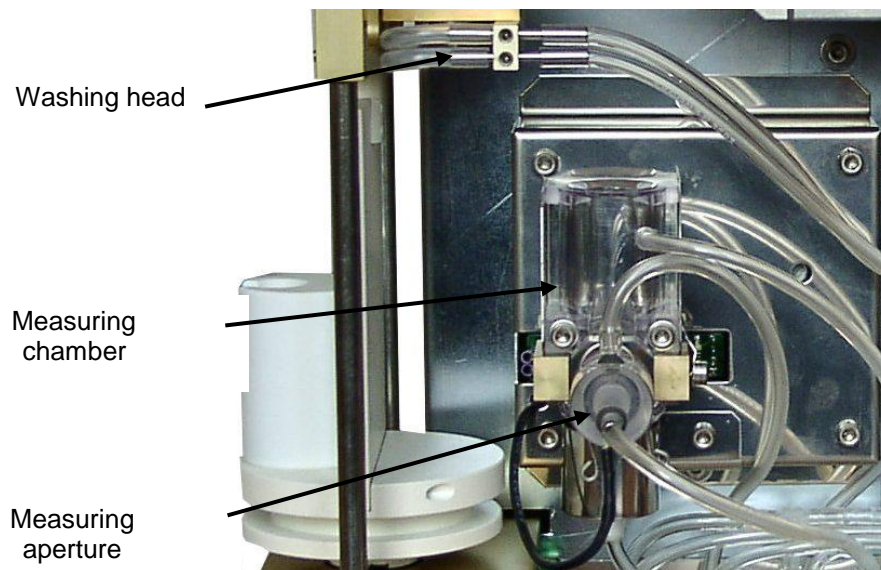


Figure 13. Parts of measuring block

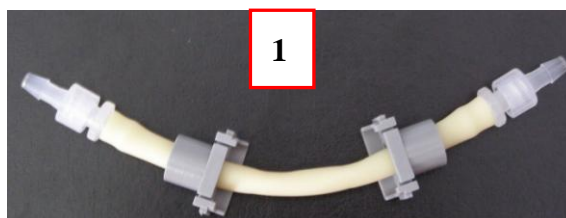
1. Exit the Measurement menu. Open the side door after the needle has stopped moving.
2. Gently rub the lower surface of the washing head to remove the salt build-up.
3. Close the side door.

7.1.2.2 Peristaltic pump maintenance

The pump installed in the instrument is maintenance free. However, would you experience leakage from the pump, or vacuum error, you may replace the tube used.

1. Remove the tubes from the pump by opening the screw connectors.
2. Push in the two sides of the pump cassette.
3. Pull the cassette off the pump.
4. Pushing aside the two tubes, bend the tube out of the pump.

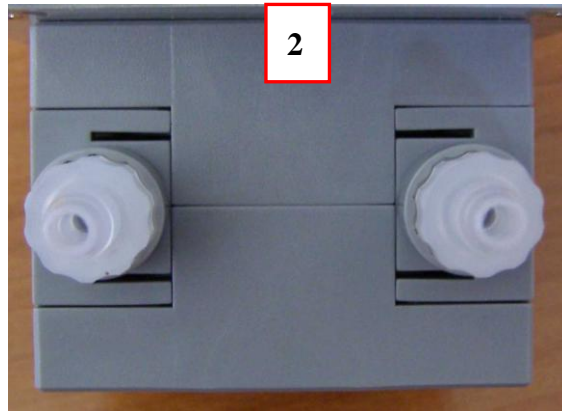
Now you have the tube as figure 1 shows.



Using a standard screwdriver, ease the tube on the plastic connector, and pull the tube off. Repeat the same procedure on the other end of the tube.

Now you can pull the plastic holders off the tube. Retain all parts except the old tube.

Put the tube back into the pump mechanics, and drive the grey plastic parts into their seats as figure 2 indicates. (view from the “top” of the pump)



Slide the cassette housing back. There are pins on the cassette, make sure to drive them in their paths.

The cassette must click into its place.

7.2 Calibration

Calibration is the procedure used to standardize the instrument by applying the necessary correction factors. Preferred hematology control is **R&D Systems® CBC-3D** Low, Normal and High.

It is recommended to do calibration in the following cases:

1. At analyzer installation, before beginning the analyses.
2. After replacing any component, related to the process of dilution or measurement.
3. When quality control measurements show any systematic error (bias) or they are outside predefined limits.
4. At regular time intervals (determined by the lab itself).
5. If you want to use the instrument in Prediluted mode.

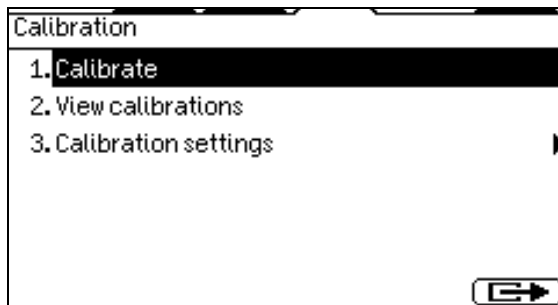
Calibration can be performed in two ways:

1. User can enter calibration factors - without any calibration measurements – using the numerical keypad.
2. One-, two- or three-fold measurements of control or special calibrations material with known parameters. In this case, the instrument automatically calculates new factors using the following formula:

$$\text{New factor} = \frac{\text{Assigned value} \times \text{Stored factor}}{\text{Measured value(s) (or average of those)}}$$

CAUTION! New calibration will invalidate the previous factors. Old values cannot be retrieved, but can be reviewed in the VIEW CALIBRATIONS menu.

Calibration can be initiated by choosing Calibration in the UTILITIES.



Item 1 opens the CALIBRATE menu level, which is displayed in the following screen.
Item 2 displays only the pervious control calibration factors.
In item 3 you can set the calibration type.

7.2.1 Factorial calibration

If the CALIBRATION MODE has been previously set to Factorial Calibration, the factors can be set manually in the **0.80 - 1.20** range.

Calibration	
Control	
RBC	1.00
MCV	1.00
RDWc	1.00
PLT	1.00
MPV	1.00

UTILITIES

CALIBRATION (2)

CALIBRATE (1) (factorial)

Enter previously calculated factors using the numerical keys; confirm with the OK key.

7.2.2 Automatic calibration by measurement

If the CALIBRATION MODE is set to one- or three-fold measurements, calibration measurements are performed with a hematology control substance.

Calibration		
Control		
RBC	7.80	10 ¹² /l
MCV	84	fL
RDWc	16.0	%
PLT	260	10 ⁹ /l
MPV	7.8	fL

UTILITIES

CALIBRATION (2)

CALIBRATE (1) (automatic)

Set target values of the control material using the numerical keys. Use the OK key to accept a value.

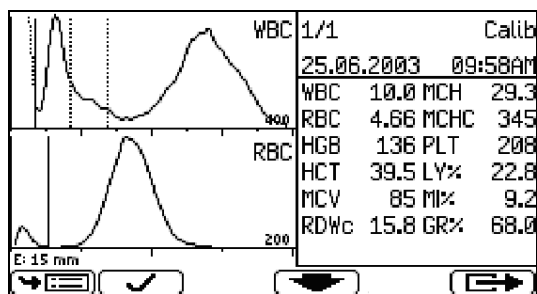
Specify 0 as target value for parameters that should be omitted from calibration.

After setting the values, press to validate and start calibration measurements.

Target values for calibrated parameters can be set within the following ranges:

Parameter	Low limit	High limit
RBC	1.00	8.00
HCT	0.1	0.6
MCV	50	120
RDW CV	10	50
PLT	30	800
PCT	0	2
MPV	5	15
PDW CV	5	50
HGB g/l	30	300
WBC	1.0	30.0

Table 7. Calibration ranges



After entering the required reference values, perform analyses on the control material.

Press to accept results.

The number of calibration analyses performed is shown on the first line.

Calibration		
RBC	1.02	(1.03)
MCV	1.05	(1.01)
RDWc	1.12	(1.09)
PLT	1.00	(0.92)
MPV	0.98	(0.96)
HGB	1.08	(1.05)
WBC	1.15	(1.11)

Following calibration, the new factors are displayed. The previously used factors are shown in parentheses for reference. Offered calibration factors can be accepted by pressing .

The factors will not be modified, but are flagged:

- if 0 was entered for low and high limits
- **B** if blank was not in the acceptable range
- **E** if the factor is out of the 0.80-1.20 range

7.2.3 View calibrations

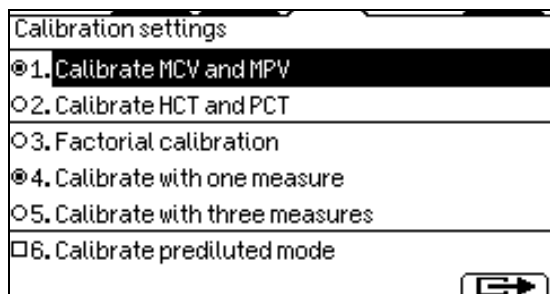
From the Calibration menu, you can monitor previous calibration factors. The instrument logs all calibration events, and displays them in the following format.

Date	Time	OpID	RBC	MCV	RDWc	PLT
19.06.2003	16:50	0	0.80	0.80	0.80	0.80
18.06.2003	20:13	0	1.00	1.00	1.00	1.00
18.06.2003	20:05	0	1.00	1.00	1.00	1.00
16.06.2003	09:30	26	1.00	1.00	1.00	1.00
11.06.2003	14:53	0	1.00	1.00	1.00	1.00
11.06.2003	13:29	0	1.00	1.00	1.00	1.00
10.06.2003	11:31	0	1.00	1.00	1.00	1.00
16.05.2003	08:48	0	1.00	1.00	1.00	1.00

You can scroll to remaining parameters using the left and right arrow keys. The calibrations are listed in chronological order.

7.2.4 Calibration settings

When CALIBRATION SETTINGS is selected, the following screen appears:



UTILITIES
 CALIBRATION (2)
 CALIBRATION SETTINGS
 (3)

Items 1-2 select between parameters
 Items 3-5 select between calibration modes.

Select item to perform **CALIBRATION FOR PREDILUTED MODE.**

When *Calibrate prediluted mode* is selected, *Calibration/Prediluted mode* will appear as the first line on the Calibration screens.

Previous *Prediluted calibration factors* cannot be monitored in the VIEW CALIBRATIONS submenu.

To perform factorial calibration, enter reference parameters (MCV and MPV or HCT and PCT), and choose item 3, **Factorial Calibration**. In this case, User must have had the necessary amount of measurements with the control material, based on which an average value can be calculated. This average value is used for fine-tuning the calibration parameters.

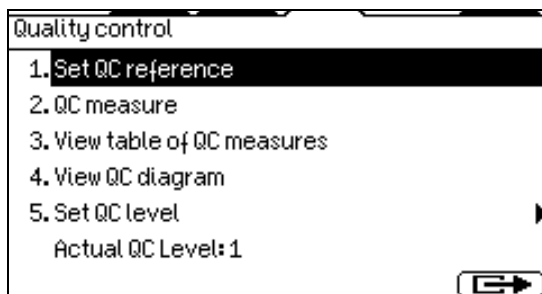
7.3 Quality Control

By analyzing control materials, day-to-day reproducibility can be monitored. In this submenu, both target values and acceptable ranges for each parameter can be specified for different QC levels.

The *Abacus Junior Vet* provides six different Quality Control levels. You can set up six individual reference sheets for each control material (e.g. low, normal and high control blood). QC measurement results will be added to the selected level, as indicated at the top right corner.

NOTE: Target values of the control material should be set only once, at the beginning of the QC measurements. Resetting parameters deletes previous QC results of the active level.

CAUTION! Any change in the QC material setting deletes previous QC results. It is strongly recommended to print results prior to changes.



From the UTILITIES you can access Quality Control Menu
 UTILITIES
 QUALITY CONTROL (3)
 This menu allows entry and monitoring of data related to the QC procedure.
 Use commercially available control material. The preparation and analysis process is the same as with patient samples.



UTILITIES
 QUALITY CONTROL (3)
 SET QC LEVEL (5)
 Select the level you wish to use. The active level is displayed in the top right corner on QC related screens.

QC reference values

QC Level: 1

LOT No.: 177

Exp. date: 19.11.2006

Lyse 0.80 ml

WBC 7.10+- 0.40 10⁹/l


RBC 4.83+- 0.15 10¹²/l

UTILITIES

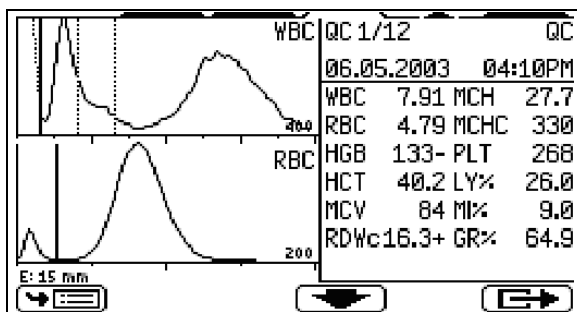
QUALITY CONTROL (3)

SET QC REFERENCE (1)

Both target values and acceptable ranges can be specified. Only the parameters displayed on these screens are utilized. Modify displayed values using the numerical keyboard. Pressing the OK key accepts data. Use the page down function key to view additional parameters. Setting 0.0 disables QC of the parameter.

Function key F4 () allows loading reference values from floppy or USB flash device.

NOTE: Quality control measurements can only be made after an optimal blank measurement result has been accepted (all parameters were in the 1st range).



UTILITIES

QUALITY CONTROL (3)

QC MEASURE (2)

After selecting target values (or targeted level), use the above menu to perform a QC analysis.

The result screen displays Quality Control as ID.

CAUTION! A result will be accepted only if it is confirmed with the  key.

7.3.1 QC database

The database of measured and stored QC results can be displayed at any time in table or graphic (Levey-Jennings) formats. The QC measurement results will have sequential ID numbers.

SmpID	Date	PatID
<input type="checkbox"/> QC 1/07	06.05.2003 03:59PM	
<input type="checkbox"/> QC 1/08	06.05.2003 04:01PM	
<input type="checkbox"/> QC 1/09	06.05.2003 04:03PM	
<input type="checkbox"/> QC 1/10	06.05.2003 04:06PM	
<input type="checkbox"/> QC 1/11	06.05.2003 04:08PM	
<input checked="" type="checkbox"/> QC 1/12	06.05.2003 04:10PM	

(#9999)

UTILITIES

QUALITY CONTROL (3)

VIEW TABLE OF QC

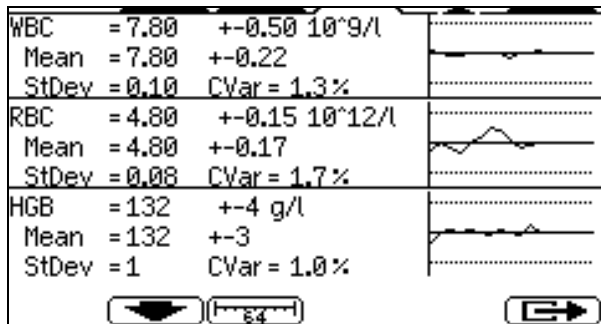
MEASURE (3)

Move the selection bar over entries with the ↑ and ↓ keys.

Move among parameters with ← and → keys.

CAUTION! Any change in the QC material settings is followed by deletion of the QC database. It is strongly recommended to print the database before making modifications.

The analyzer produces graphic figures of the QC measurements.

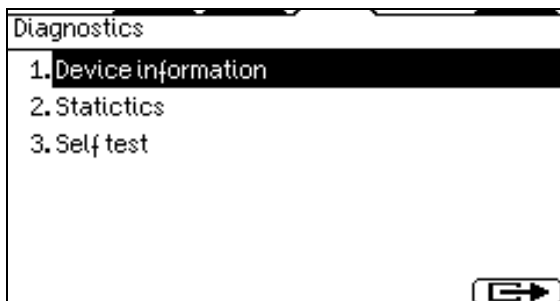


UTILITIES
 QUALITY CONTROL (3)
 VIEW QC DIAGRAM (4)
 Means, standard deviations (StDev) and coefficients of variation (CVar) are calculated based on the QC analyses. The dotted lines delineate acceptable ranges on Levey-Jennings charts.

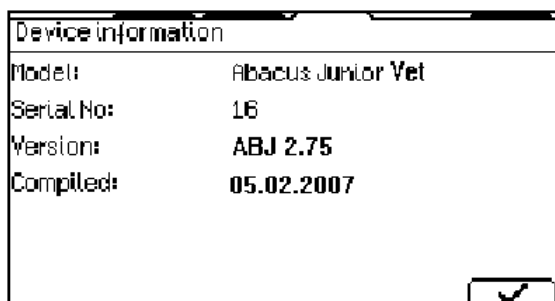
You can look at Quality Control information and results in table format as well. To access this format, select item 3 View table of QC measures of Quality Control.

7.4 Diagnostics

The DIAGNOSTICS submenu provides important information about the analyzer, statistics and the built-in Self test.



UTILITIES
 DIAGNOSTICS (4)
 This is the diagnostics menu. Select the desired item.



UTILITIES
 DIAGNOSTICS (4)
 DEVICE INFORMATION (1)
 Here, device-specific information can be retrieved. Model name, serial number, software version and the date of the compilation of the software are available.

7.4.1 Device statistics

Device statistics	
Measurements	3
WBC clogging	0
RBC clogging	0
Vacuum error	0
Successful StartUps	3
Successful ShutDowns	0

UTILITIES
 DIAGNOSTICS (4)
 STATISTICS (2)

This menu includes important information about analyses previously performed: the total number and any clogging or errors incurred.

7.4.2 Self test

The Self test is a procedure to verify proper operation of essential components of the instrument.

The Self test should be performed:

- At installation.
- After replacing any component.
- After extended time out of use.

The automatic Self test procedure can be initiated from the DIAGNOSTICS menu. During the test, you can see its progress. The components, that have passed the test, get checked.

Self test results	
Date of testing:	07.02.2007
Model/Serial No.:	Abacus JunVet / 123456
Version:	SW 2.75 / FW3.2s
Compiled:	01.02.2007
Overall result:	Successful
Press PGDN for details	

The first panel of result screen includes the date of testing and device information. It also has the overall test result displayed, which can be *Successful* (every test result is *OK*), or *Errors found* (if *HIGH*, *LOW* or *ERROR* results appeared).

You can repeat self test by pressing 

Self test results		
HGB dark:	0	OK
HGB light:	8382	OK
Electr. voltage:	50.5 V	OK
current:	873 uA	OK
offset:	-0.7 mV	OK
Noise test:	0 pls/5sec	OK

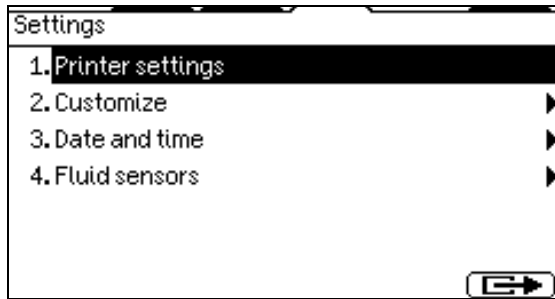
The second, third and fourth panels of the result screen include every test result. At the end of the result line, *OK*, *HIGH*, *LOW*, or *ERROR* is displayed, which means that the actual test result is at the normal range (*OK*), higher (*HIGH*), lower (*LOW*) than the pre-determined limits, or the result is an error (*ERROR*).

Self test results		
Ampl. test:	19999 pls	OK
peak:	1630 mV	OK
dev.:	53 mV	OK
Atm. press.:	943 mBar	OK
Vacuum:	370 mBar	OK
drift:	3 mBar/10sec	OK

Self test results		
Power +12V:	12.0 V	OK
Power -12V:	-12.2 V	OK
Power Batt:	3.2 V	OK
CoreTemp :	44.8 °C	OK

7.5 Settings

Selecting item four (4) of the UTILITIES you can access this menu.



The SETTINGS sub-menu allows the user to set the fluid detector operation, printing parameters, dates, user modes and various data.

7.5.1 Printer Settings

Make sure to select the appropriate printer mode for correct operation before printing.

The instrument supports the following printer modes and languages:

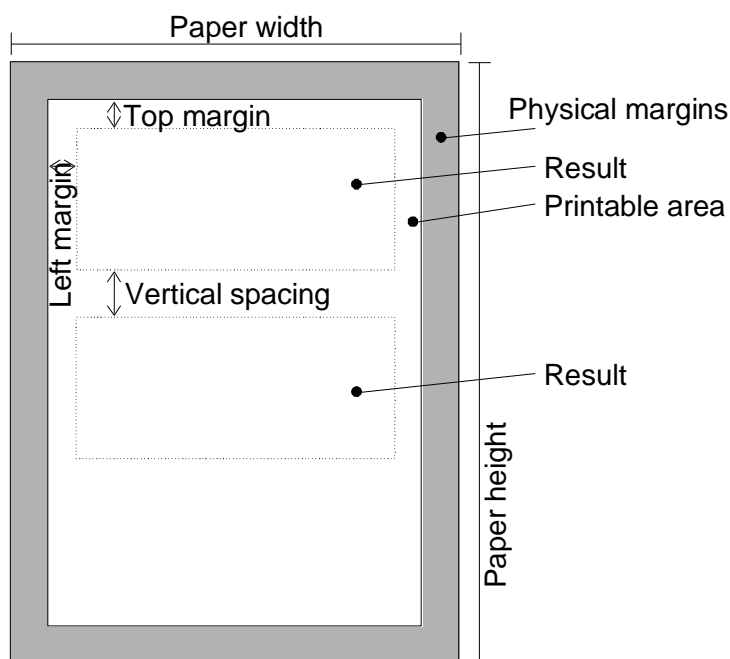
Selected mode	Printer language	Supported printers
"Built in Seiko"	Special language	Built-in thermal printer
"Canon BJC" "Canon BJC in 9-pin mode"	Canon BJC	Canon BJ and BJC series, e.g. BJC 100
"Epson 9-pin"	ESC/P	EPSON 9-pin dot matrix series, e.g. FX-980
"Epson 24-pin" "Epson 24-pin in 9-pin mode"	ESC/P2	EPSON 24-pin dot matrix series, e.g. LQ-580
"Epson Stylus Raster "	Epson ESC/P Raster	EPSON Stylus series, e.g. C20, C40SX, C60, C62, C80
"HP DeskJet"	PCL4	HP DeskJet series, e.g. DJ 920c, 940c, 960c
"HP LaserJet"	PCL4	HP LaserJet series and compatibles, e.g. LJ1100
"Seiko DPU414"	Special printer language	Seiko DPU414 printer
"Canon i70"	Canon BJC*	Canon i70 series
"EPSON C64"	EPSON Raster*	EPSON C64
"EPSON C84"	EPSON Raster**	EPSON C84

Table 7. List of selectable printers

Any printer compatible with the above listed modes (printer languages) can be connected to the instrument.

To set up the instrument for your printer, go to the “**Utilities/Printer/Printer Settings**” menu. Select from the options using the up and down arrow keys within the text fields, and fill in the numerical fields using the number keys.

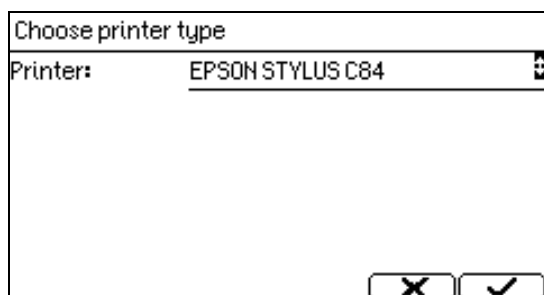
The general characteristics of the printable area of printer paper are below:



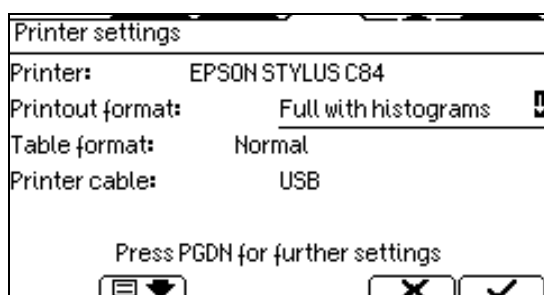
The paper is defined by its size: it can be a standard size (A4, Letter) or any custom sized paper (specify the actual size). Printers cannot print on the whole surface of the paper. The blank area is described by the physical **Margins**, which may vary by printer models. The paper area inside the physical margins is called the *printable area*.

Top margin and **Left margin** settings are used for determining the location of printed results on the page. If more than one result is to be printed per sheet, use the **Vertical spacing** to specify the

distance between reports.



On the first page of the Printer Settings sub-menu, printer type can be selected. Here you can choose between Seiko built-in printer, or any compatible external printer. Initially, only the printer driver can be selected, and when accepted, driver and printout format details become available.



Select the **Printer** matching your printer hardware. Pressing the accept key () will bring up printout details dialogs.

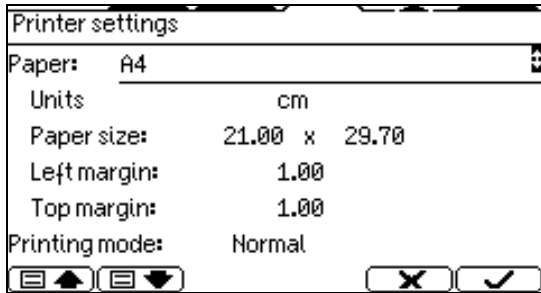
Printout format can be specified as one of the following (availability but depends on printer driver – allowable paper size):

- Full with histograms
- Narrow text only
- Wide text only

- Narrow full
- Full with histograms, ½ page

Table format defines how a table-printout will look like. You can select normal or narrow view. A normal table is as wide as the paper, narrow format has parameters grouped such, that

Printer cable defines which communication is to be used between instrument and printer. Available options are USB and LPT. LPT refers to regular Centronics (parallel) printer cable. Not all drivers support USB communication.



Pressing PgDn brings up printout format definitions.

Paper size can be selected from the list below:

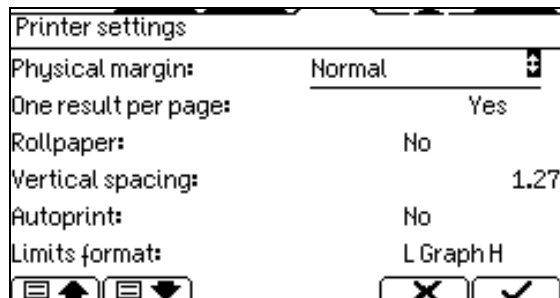
(name)	(size)
A4	21 x 29.7 (cm)
Legal	8 x 14 (in)
Letter	8 x 11 (in)
Executive	18.42 x 26.67 (cm)
Rollpaper	.. x NA
Custom	user x user

Paper sizes and margin positions can be defined freely (custom size).

Printing Mode changes printout sizes. Choose the one matching your needs. The available modes depend on the selected printer type. Possible options are:

- Mini, Small, Normal, Enhanced** and **Large** for vertical printout resolution
- Wide** and **Narrow** for horizontal resolution
- Fast** mode is optional, it usually saves ink.

Recommended mode is **Normal**.



The third page of printer settings contains further options to adjust printouts.

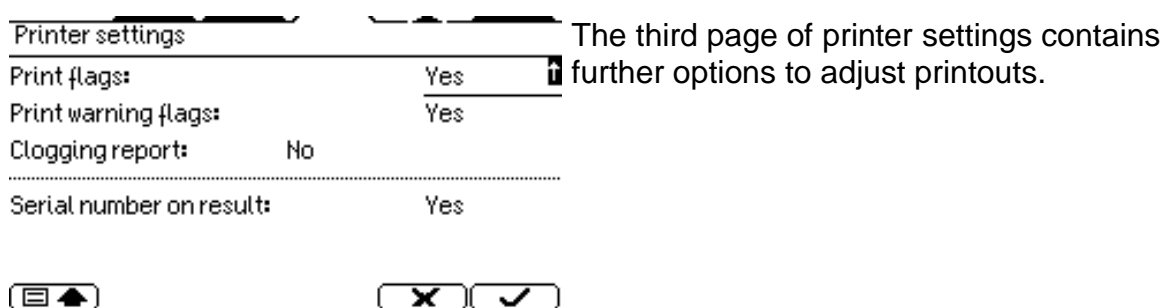
Physical margin defines how the margin should be handled.

One result per page – if enabled – starts each printout on a separate sheet, if disabled then it will print as many records on a page as possible (small printout size combined with disabled “One result per page” may give e.g. 3 small reports on one sheet.)

Rollpaper ON will disable starting a new page at end of each record.

Vertical spacing will determine how much space should be left between two reports printed on the same sheet (One result per page must be OFF to let this option take effect)

Limits format defines what the ranges should look like on the printout. You can have range (limit) printing disabled, or displayed with numbers, or graphical signs.



The third page of printer settings contains further options to adjust printouts.

If **Print flags** is set to **Yes**, any measured value out of the reference range or error incurred during analysis be shown on the printout.

If **Print warning flags** is enabled, any flags appearing on the result screen will be included on the printout.

Clogging report prints diagnostic numbers on how a possibly clogged measurement was handled. It should be enabled, when instrument starts giving repeated clogging errors, despite

IMPORTANT!
When changing printer types you always have to check the following items:

1. For built-in printer:
 - Left-top margins both to 0.00
 - Rollpaper: Yes
 - Autoprint: No
 - Printout format: Narrow full (with histograms) or Narrow text only (without histograms)
 - Table format: Normal
 - One result per page: No
2. For other printer types:
 - Left-top margins both to 1.00

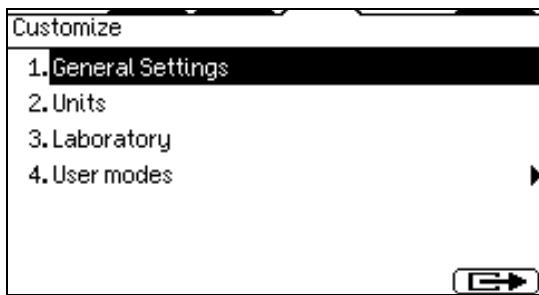
Utilities

- Rollpaper: No (especially for LaserJets)
 - Printout format: Full with histogram or Wide text only
 - One result per page: Use “No” to save paper
-

7.5.1.1 Troubleshooting guide for printing problems

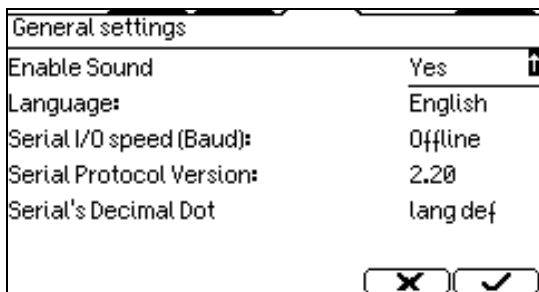
Problem	Possible reasons/remedies
Printer does not respond, no printout.	<ul style="list-style-type: none"> • Printer is off. Turn it on. • Printer is not connected to analyzer. Connect it to the parallel or USB port of analyzer. • Printer is not on-line. Switch it to on-line mode. • Printer is out of paper. Load paper.
Strange signs or letters appear on the printout.	<ul style="list-style-type: none"> • The selected printer type does not match your printer. Select different driver in Printer settings. • Printer is not set up properly for HP or Epson (or compatible) mode. Modify the printer setup. Consult the printer's manual.
Right side of the printed report is missing or appears on the next line.	<ul style="list-style-type: none"> • Decrease Margin settings in Printer Settings. • Try changing Mode to a smaller printout.
The printed report is too small with excess space on the paper.	<ul style="list-style-type: none"> • Try selecting Mode to a larger printout.
The end of the printout appears on the next page.	<ul style="list-style-type: none"> • Enter the correct Paper size. • Try increasing Margin.
One more patient report could fit on the same page.	<ul style="list-style-type: none"> • Enter the correct Paper size. • Decrease Margin, Top margin, Vertical spacing.
The printed result is not centered horizontally.	<ul style="list-style-type: none"> • Modify Left margin.
The printed result is not centered vertically.	<ul style="list-style-type: none"> • Modify Top margin.
The distance between two results is too small or too big.	<ul style="list-style-type: none"> • Modify Vertical spacing.
After printing, the printer does not eject the paper.	<ul style="list-style-type: none"> • Common in bubble-jet or laser printers. Do not repeat printing. When the page is full, or you leave the menu, the printer will eject the paper automatically.

7.5.2 Customize



SETTINGS (5)
 CUSTOMIZE (2)
 This is a collection of settings influencing instrument operation, customization.

7.5.2.1 General settings



SETTINGS (5)
 CUSTOMIZE (2)
 GENERAL SETTINGS (1)
 This is a collection of settings influencing instrument operation, customization.

Enable Sound: Selecting NO will disable all system sounds.

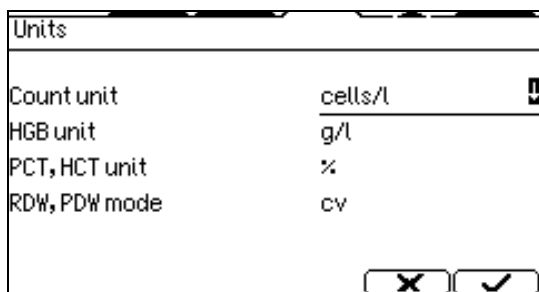
Language: list of available languages

Serial I/O speed: select any other setting other than offline to enable serial communication

Serial Protocol version: Select version after consulting your Service partner and data management software vendor.

Serial's Decimal Dot: Defines how numerical data should be sent to PC. Select option after consulting your Service partner and data management software vendor.

7.5.2.2 Units



SETTINGS (5)
 CUSTOMIZE (2)
 UNITS (2)

Units can be set in a sequential order. The arrow on the right indicates that there are more options for the entry. Select among options using the ↑ and ↓ keys. When done, press OK to open the next parameter. When the last entry is set, pressing confirms the data and returns the display to the Settings menu.

The possible units for above parameters are as follows:

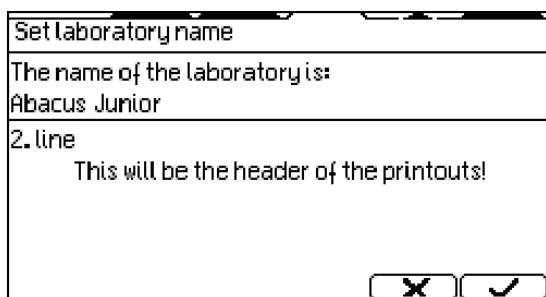
Count unit	cells/liter (cells/l), cells/μl (cells/μl)
HGB unit	grams/liter (g/l), grams/deciliter (g/dl), millimols/liter (mmol/l)
PCT, HCT unit	percentage (%), absolute (abs)
RDW, PDW mode	standard deviation (sd), coefficient of variation (cv)

Table 8. Selectable units of parameters

7.5.2.3 Laboratory

This menu allows entering laboratory information.

This will be printed in the header of reports printed by the instrument.



SETTINGS (4)
 CUSTOMIZE (2)
 LABORATORY (5)

A maximum of 40 characters can be entered in each line. User can enter this data by either using an external standard PC (US-layout) keyboard connected to the instrument, or by scrolling to each letter using the ↑ and ↓ keys, or using the keypad as the keyboard of a cellular phone to enter text. Move between character places using the ← and → keys.

7.5.2.4 User modes

Selecting item six (6) of the Settings menu you access this menu, where you can enable Multi-user Mode of **Abacus Junior Vet.**

CAUTION: **Multi-user mode** has both advantages, and disadvantages. As it is a **security** option, maximum care should be taken when using it. It is based on operator ID's and passwords. Would any operator **forget the password** corresponding to the ID, a user with supervisor rights is required for changing or re-enabling the user's password for the instrument.

There MUST be always a user with supervisor rights! Would the user with supervisor rights forget the password for his/her ID, only an authorized service person can re-enable entry of the supervisor, and change the password.

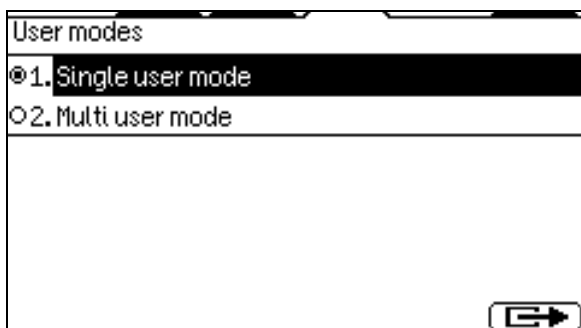
The multi-user mode allows identification of operators through their personal settings, or profiles. It also restricts users to certain software functions.

In *Abacus Junior Vet*, the term 'multi-user' means storing profiles for different users, but does not mean allowing more than one user being logged in simultaneously.

- An operator at **Basic** level can perform analyses and enter patient data prior to the measurement process.
- **Advanced** users, in addition to Basic level functions, can modify instrument software settings, perform calibration and quality control and modify patient data when browsing the database.
- A **Supervisor** has the ability to do all of the above, and to modify user access or passwords.

With multi-user mode enabled, users with different access levels will have different abilities within the menu system.

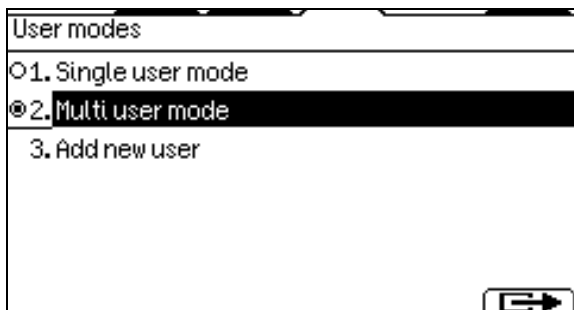
Some items will not be accessible for them.



USER MODES (6)

This menu allows configuring the instrument for single-user or multi-user mode.

Care must be taken when changing to multi-user mode to designate a Supervisor on initial entry.



USER MODES (6)

MULTI USER MODE (2)

By selecting item 2, the instrument enters multi-user mode, and a new item appears on the screen:

Add new user.

User information	
User ID	2
Name	
Level	Basic
Active	Yes
Password	
<input type="button" value="X"/> <input type="button" value="✓"/>	

USERS MODES (6)
ADD NEW USER (3)

The software assigns an individual **ID** to each new user.

In the **name** field, a user name of 32 characters can be specified. You can use either the keypad, or the external PC-keyboard.

When the name is entered, the **level** should be defined as Supervisor, Advanced or Basic.

The default setting for **Active** is Yes. Use this option if you want to disable a user.

The last data to enter is the **password**, a maximum of 8 alphanumeric characters.

7.5.2.4.1 Multi-user mode

Login	
User ID	0
Password	
User name	
<input type="button" value="STOP"/> <input type="button" value="X"/> <input type="button" value="✓"/>	

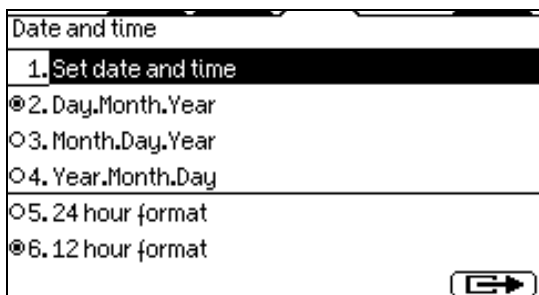
If the analyzer is in multi-user mode, a login screen will be displayed during start-up, asking for a *user ID* and a *password*.

Login	
User ID	0
Password	*****_
User name	
Service	
<input type="button" value="STOP"/> <input type="button" value="X"/> <input type="button" value="✓"/>	

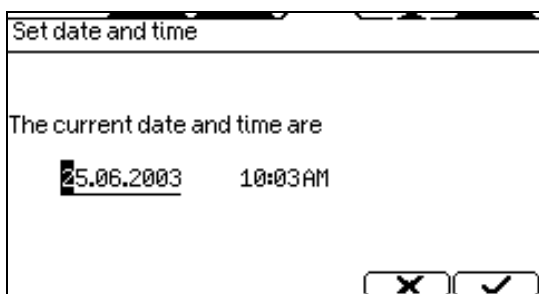
After the User ID is entered and confirmed with the OK key, the user name corresponding to the ID appears in the bottom line. If the user name was correct, enter the *password*, and confirm with the function key. If the password was correct, the analyzer continues initialization and is ready to work.

7.5.3 Date and Time

The date and time of each analysis is stored with the results. This menu allows setting the built-in clock and the format of the date displayed.



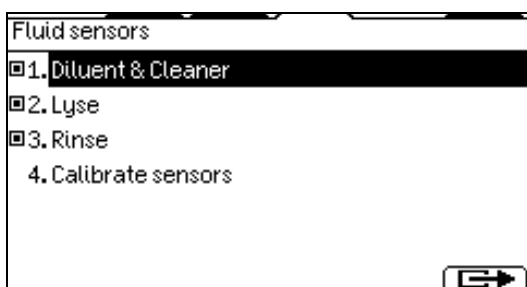
SETTINGS (5)
DATE AND TIME (2)
By selecting item 1, you will enter date and time setting mode (next screen). Items 2...4 and 5...6 are radio-buttons; only one can be selected.



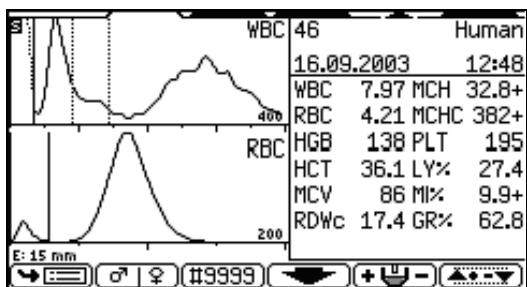
SETTINGS (5)
DATE AND TIME (2)
SET DATE AND TIME (1)
Enter the date and time using the numeric keys. Date format can be set in the previous menu. Confirm them by pressing the button.

7.5.4 Fluid Sensors

Fluid sensors check for the presence of diluent, cleaner and lysing reagents. In the event of a malfunctioning sensor, instrument operation can continue by disabling the defective component in this sub-menu.



SETTINGS (5)
FLUID SENSORS (4)
Using the OK key can toggle the state of each sensor. On the figure, lyse sensor is disabled. Item 3 sets automatically the fluid sensors.




When any of the fluid sensors is switched off, an **S** mark appears in the upper left corner of the display during analysis.

8 PRINTING

This chapter covers information on making reports on measured samples.
This chapter covers information on making reports on measured samples.

8.1 Printouts

When required, the following items can be sent to an external printer or to a built-in printer by pressing the  function key button.

- Database result(s) (table format)
- Database (specified patient results with histograms)
- QC result (Levey-Jennings chart)
- QC result(s) (table format)
- Calibration results
- Last measured blank result
- Last measured patient result (with histograms)
- Last measured QC result
- Device information and statistics
- Self test result
- Set parameters

Printout format of typical patient results are shown in Figure 16. (the appropriate printout format can be selected in UTILITIES/SETTINGS/PRINTER SETTINGS).

Full printout formats with histograms:

Header

Abacus Junior

Abacus Junior

Patient info

Patient ID:
 Name:
 Birth/Sex: 00.00.0000 / -
 Mode: Horse
 Doctor:
 Sample ID: 25
 Test date: 09.04.2003
 Test time: 13:56
 Report date: 08.07.2003

Sample and measurement info

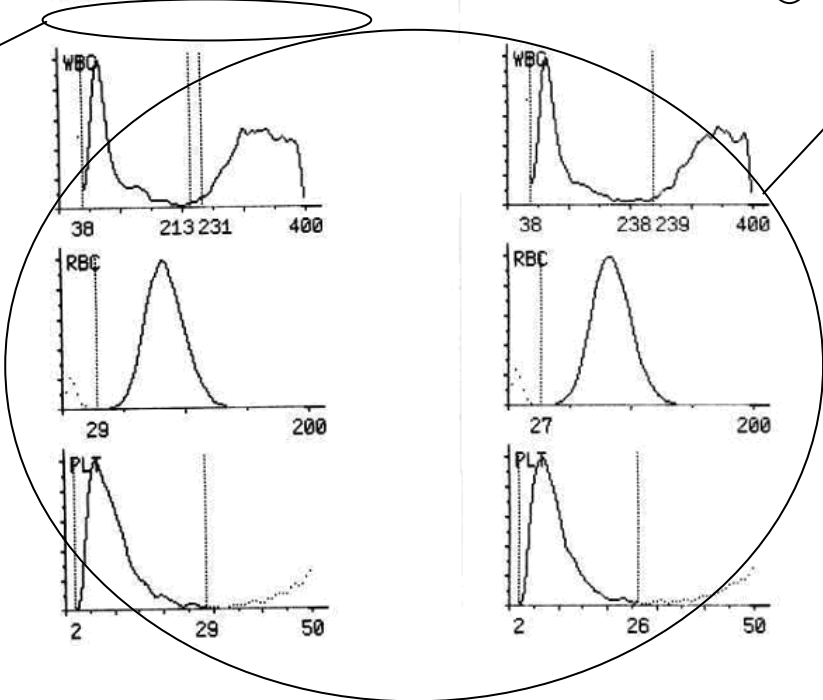
Patient ID:
 Name:
 Birth/Sex: 00.00.0000 / -
 Mode: Horse
 Doctor:
 Sample ID: 26
 Test date: 23.04.2003
 Test time: 11:41
 Report date: 08.07.2003

Test	Result	Limit
WBC	8.73	10 ⁹ /l [6.00 - 17.0]
LYM	3.52	10 ⁹ /l [1.00 - 4.80]
MID	0.57	10 ⁹ /l
GRA	4.64	10 ⁹ /l [3.00 - 12.0]
LY%	40.3	+ % [12.0 - 30.0]
MI%	6.6	%
GR%	53.2	- % [62.0 - 87.0]
RBC	4.86	- 10 ¹² /l [5.50 - 8.50]
HGB	132	g/l [120 - 180]
HCT	41.1	% [37.0 - 55.0]
MCV	85	+ fl [60 - 77]
MCH	28.0	+ pg [19.5 - 24.5]
MCHC	330	g/l [310 - 340]
RDWc	17.6	%
PLT	263	10 ⁹ /l [200 - 500]
PCT	0.20	%
MPV	7.8	fl
PDWc	35.7	%

Test	Result	Limit
WBC	8.90	10 ⁹ /l
LYM	3.96	10 ⁹ /l
MID	0.05	10 ⁹ /l
GRA	4.89	10 ⁹ /l
LY%	44.5	+ %
MI%	0.6	%
GR%	54.9	- %
RBC	4.74	- 10 ¹² /l
HGB	131	g/l
HCT	40.2	%
MCV	85	+ fl
MCH	28.6	+ pg
MCHC	337	g/l
RDWc	18.1	%
PLT	262	10 ⁹ /l
PCT	0.19	%
MPV	7.3	fl
PDWc	36.2	%

Limits, or graphical location of the result within the range of limits

Location of warning flags (not displayed now)



Histograms

Figure 16. Built-in printer printout

In the left side printout the reference ranges (limits) are in normal mode (indicated by numbers) while in the right side printout the reference ranges (limits) are in graphical mode, flags and warning flags are not enabled. The printing modes of these parameters can be selected within PRINTER SETTINGS submenu.

In graphical mode the normal range of each parameter is indicated with a rectangle. The left side of the rectangle shows the lower level and the right side shows the upper level. The value in the normal range is indicated with a marker.

If normal ranges are set, flags are enabled, and patient values are over or below the limits specified, the result out of the range is marked with an +/- mark near the value and the rectangle is compressed because of lack of space and the high/low value is indicated out of the rectangle on the right/left side.

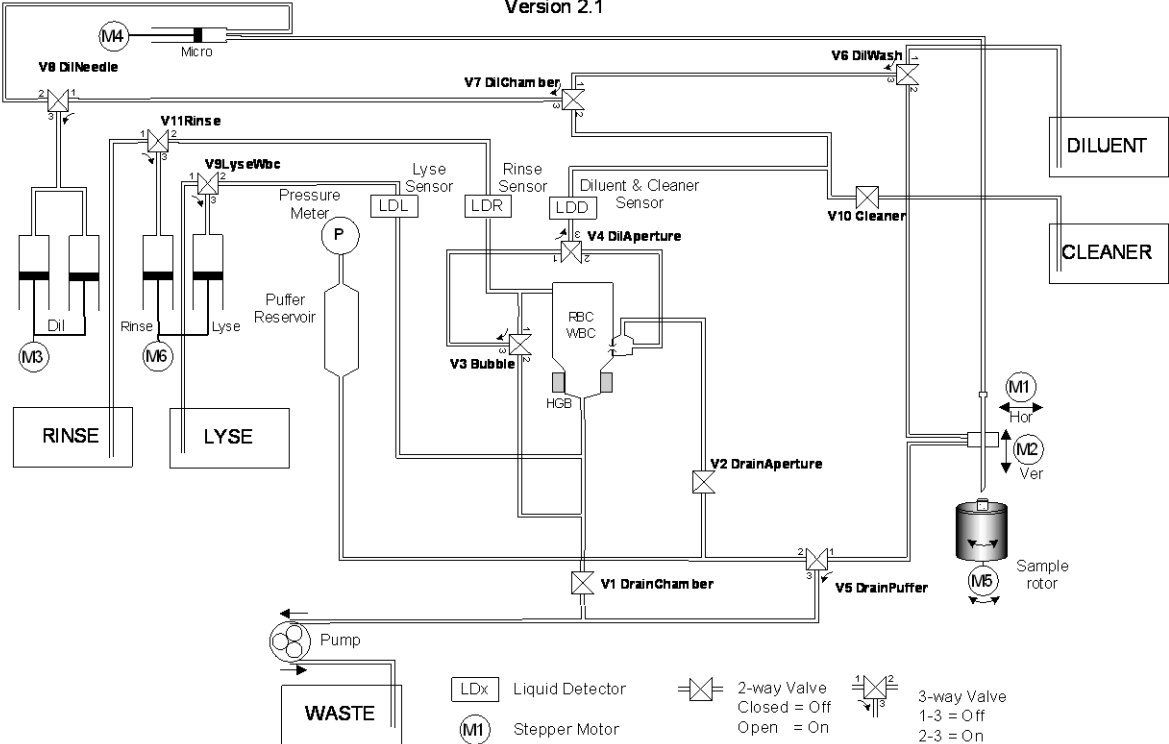
IMPORTANT!

- **The lifetime of the built-in printer printout (thermal rollpaper) is 1 year**
 - **Do not expose the printout to heat**
 - **Copy the printout to normal paper**
-

9 Fluidic Schematics

Abacus junior vet Fluidic Schematics

Version 2.1



Revision history:

Revision	Section	Modification	By	At
1.2	All	Menu system	I. Losonczi	2003.07.10
1.21	5.1	Needle setting possibility	I. Losonczi	2003.09.16.
1.21	2.3.4	Emergency handling	I. Losonczi	2003.09.16.
1.21	7.1.5	Waste handling	I. Losonczi	2003.09.16.
1.21	5.1	Use of rubber gloves	I. Losonczi	2003.09.16.
1.21	5.3.1	New sub-menu: WBC only	I. Losonczi	2003.10.08.
1.22	1.2	Environmental requirements	A. Gyetvai	2003.11.14.
2.7	All	Revision to update to 2.7	C. Magyar	2005.11.10
2.76	1.3, 7.1.2.2	New pump, new power supply	I. Losonczi	2009.10.06
