

# Medicine Devices



***USER MANUAL***  
***MDC 1000part***

# MDC 1000part

## Semi-automated hematology analyzer for blood count

Operator manual 1.0  
February 2005

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# 1 INTRODUCTION

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The **Cellcounter** is a German product that was originally developed for the application in medical laboratories.

Measuring cells with type of electronic measurement replaced the older and tenuous method of counting blood cells visually under the microscope.

The **Cellcounter** is offered in 2 versions.

The first version is a counter that replaces the conventional methods of counting. Practically this means high standard of quality, extreme shortening of the analysis time and simplification of sample processing.

This is a result of the use of microcomputer technology, which allows the control of measuring disturbances, the control of measuring volume and impulse frequency during the whole measurement.

Two photo-optical sensors affect the control of the measuring volume, which ensures an exact keeping of the sample volume.

The second version is the counter extended to an analyzer system, which offers depending on the requirements, different evaluation criteria.

If the distribution curve of the cells is of interest, the distribution can be presented graphically without any adoptions or evaluations.

However, if the cell distribution and the display of the cells during the complete process of fermentation is of interest a computer is required to store, calculate and present the data and to give it out on a printer.

Of course, even our smallest instrument offers a maximum in user friendliness. It shows all reports and displays in clear writing not in number codes on an alphanumerical display, informs on its status and makes suggestions in case of error reports.

The careful study of the following pages is suggested to help the user to get acquainted with the system concerning handling, application and working principle.

## 2 FUNCTIONAL UNITS

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### 2.1 PARTS OF EQUIPMENT

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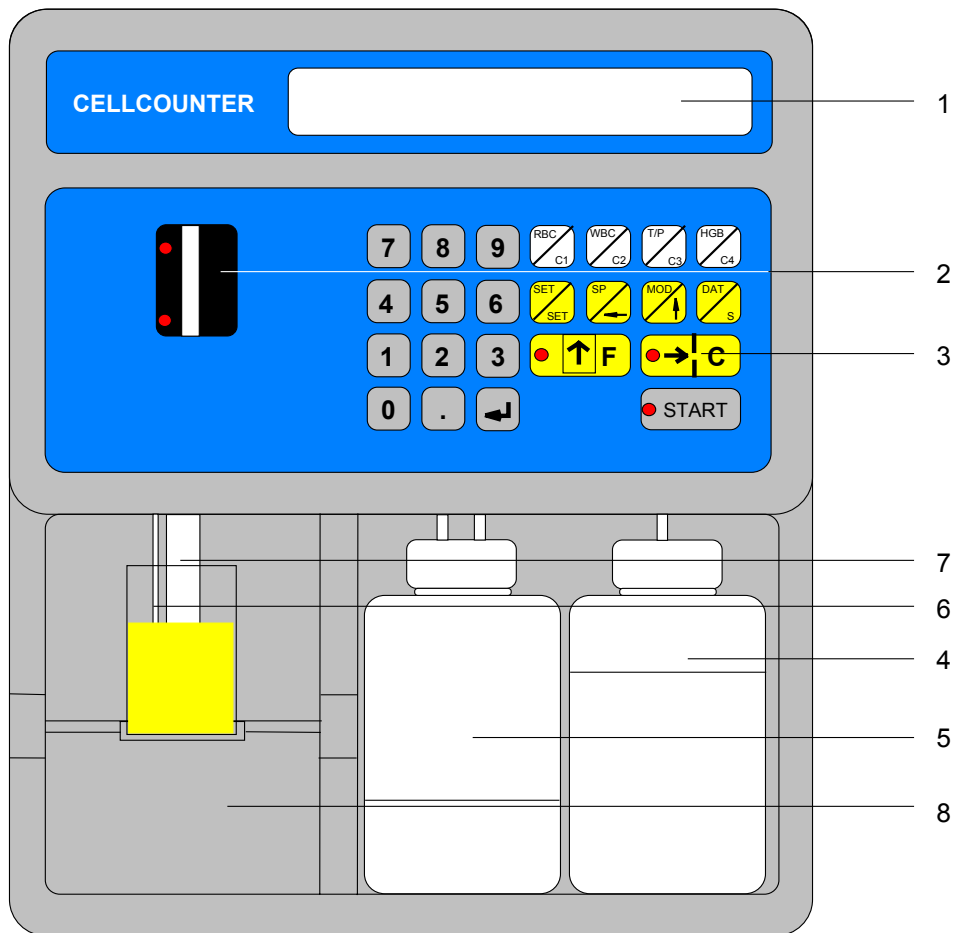
- |  |             |   |
|--|-------------|---|
| 01. Display  | -           | Display for measurement/working instructions          |
| 02. Inspection Window  | -           | Control of the measuring system surveillance          |
| 03. Keyboard   | -           | To feed the system with figures                       |
| 04. Filling Bottle   | -           | Supply bottle for filling the measuring system        |
| 05. Waste Bottle   | -           | Collection container for waste                        |
| 06. Measuring Unit<br>Consisting of:<br>Aperture-tube<br>Reference Electrode | -<br>-<br>- | Instrument transducer (capillary aperture)<br>Voltage |
| 07. Aperture-tube  | -           | Instrument transducer (capillary aperture)            |
| 08. Platform   | -           | For the solution during the measuring cycle           |
| 09. Mains Switch   | -           | Mains switch to switch on the instrument              |
| 10. Plug/Power Switch  | -           | main switch and mains connection                      |
| 11. Fuse   | -           | for mains connection                                  |
| 12. Parallel Connector   | -           | for printer connection                                |
| 13. Serial Connector   | -           | for computer connection                               |

## **2.2 The Keyboard**

- |                   |   |  |
|-------------------|---|--|
| 01. C1 - key      | - | C1 - channel   |
| 02. C2 - key      | - | C2 - channel   |
| 03. C3 - key      | - | C3 - channel   |
| 04. C4 - key      | - | C4 - channel   |
| 05. START - key   | - | starts all working functions   |
| 06. FILL - key    | - | to fill the measuring system   |
| 07. CLEAN - key   | - | to clean the capillary aperture.   |
| 08. Set/Set - key | - | menu-button  |
| 09. SP - key      | - | to type in the sample number   |
| 10. Mod - key     | - | function choice button   |
| 11. DAT - key     | - | to type in the date<br>to type in the contrast<br>to select the print option |
| 12. Number-key    | - | to type in the numerical values  |
| 13. Enter-key     | - | for confirming the input   |

## 2.2.1 Diagram of the Equipment

**Dia. 1 The Instrument and its functions (front)**

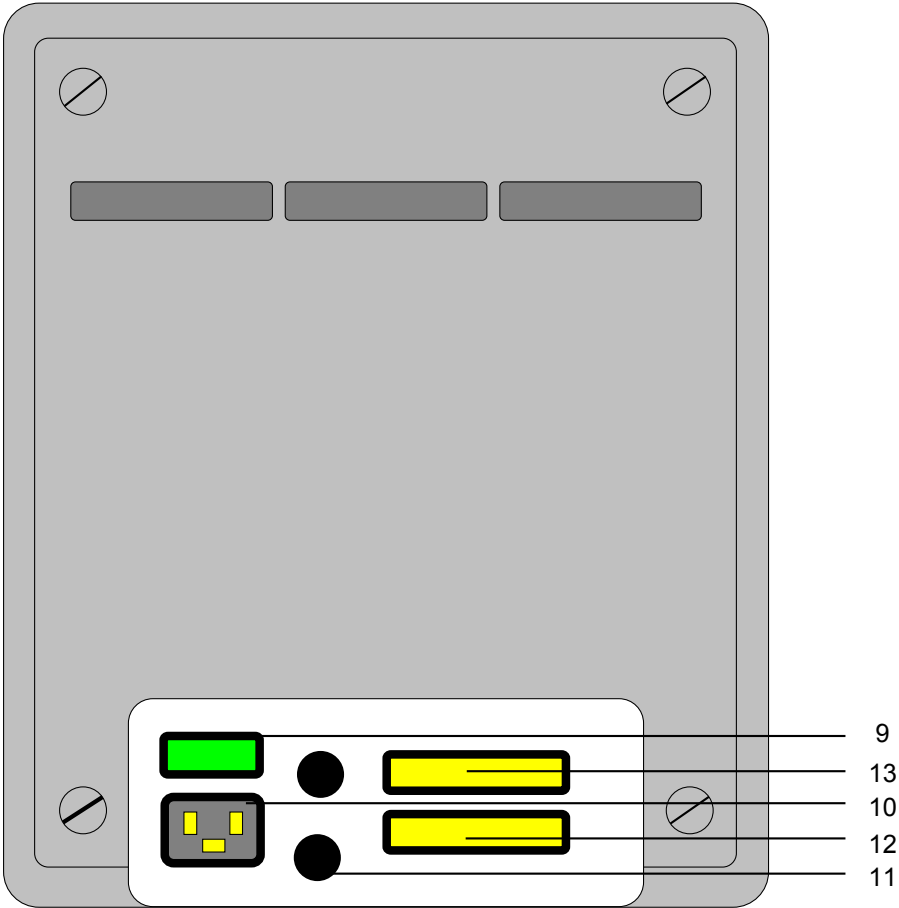


### Functional units

- |                    |                       |                       |
|--------------------|-----------------------|-----------------------|
| 01. Display        | 02. Inspection Window | 03. Keyboard          |
| 04. Filling Bottle | 05. Waste Bottle      | 06. Outside electrode |
| 09. Capillary      | 08. Platform          |                       |

**2.2.2 Diagram of the Equipment**

**Dia. 2 The Instrument and its functions (back)**



**Functional units**

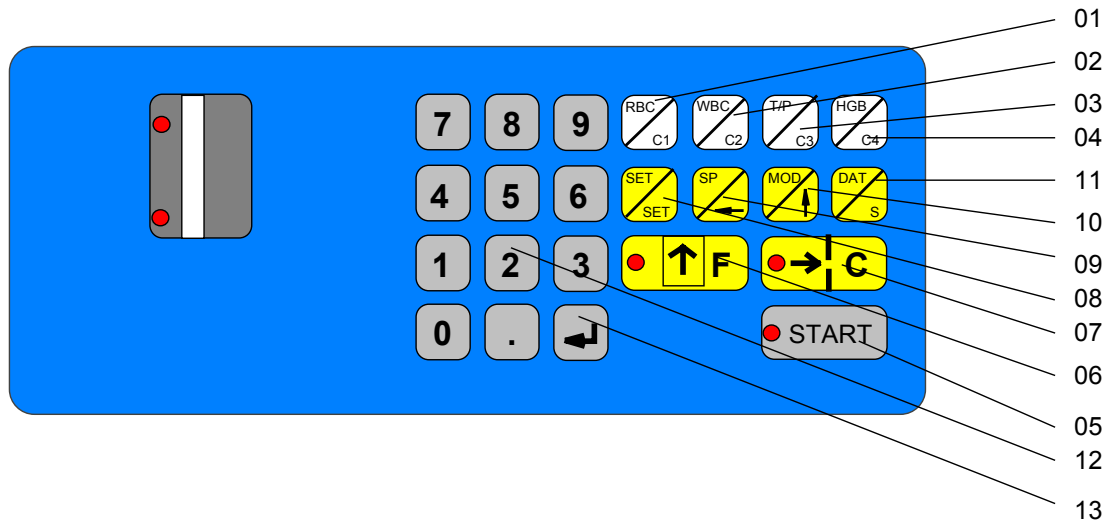
09. Mains Switch  
12. Serial Port

10. Plug  
13. Printer Port

11. Fuse

## 2.2.3 Diagram of the Equipment

Dia. 3 The Keyboard



### Functional units

01. C1-key  
04. C4-key

02. C2-key

03. C3-key

05. START-key

06. FILL-key

07. CLEAN-key

08. SET-key

09. SP-key

10. MOD-key

11. DAT-key

12. NO.-key

13. ENTER-key

## **2.3 EXPLANATION OF TEXT USED ON DISPLAY**

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### **2.3.1 Equipment Displays and their Meanings**

The **Cellcounter** is controlled by a microprocessor and has a 2 x 35- digit display.

Disturbances are shown on this display.

#### **The processor has the following functions:**

- 1. Control of the complete mechanical course**
- 2. Processing of the measured values**
- 3. Error control**
- 4. Control of the indicator**

### **2.3.2 Indicator Text**

By using a 2-line-LCD many tests can be shown in their original length. For the sake of simplicity, only additional functions are explained.

<b>SYSTEMTEST</b>	-	Control of working system
<b>TIME</b>	-	Control of measuring time
<b>SEC</b>	-	Seconds
<b>SP:</b>	-	Sample number
<b>FILL</b>	-	System fill from the supply bottle
<b>CLEAN</b>	-	Pressure on the capillary aperture
<b>C1</b>	-	Measuring of adjusted particle
<b>C2</b>	-	Measuring of adjusted particle
<b>C3</b>	-	Measuring of adjusted particle
<b>C4</b>	-	Measuring of adjusted particle

### **2.3.3 System options**

<b>PRINTING SINGLE SAMPLE ?</b>	Printing sample from the memory
<b>SINGLE MEASUREMENT ?</b>	sample will not be saved
<b>SERIES MEASUREMENT ?</b>	sample will be saved and printed
<b>SERIES PRINTING ?</b>	All results in the memory will be printed
<b>DELETE SERIES ?</b>	The database will be deleted completely

### **2.3.4 System adjustments**

<b>SET DATE AND TIME ?</b>	Set Date and Time
<b>SET CONTRAST ?</b>	Change contrast of LCD
<b>SET CURVE PRINT MODE ?</b>	Switch ON/OFF curve printout Switch ON/OFF curve saving
<b>SET MEASURING TIME ?</b>	For Capillary time setting

#### **Notice:**

If no printer is available or switched off, with some printing options the results will be shown on the LCD.

### 2.3.5 Suggestions for the Elimination of Errors

<b>ERROR: CAPILLARY BLOCKED !</b>	Measuring time too high Push C-button
<b>ERROR: AIR IN SYSTEM !</b>	The volume-control has recognized air-bubbles in the system Check sample and filling bottle Push F-key
<b>UNTERTIME: AIR IN SYSTEM !</b>	The volume control has detected air-bubbles in the volume unit Check sample and filling bottle Push F-key
<b>OVERTIME: CAPILLARY BLOCKED !</b>	The Stop-light-barrier was not reached. Push C-key Eventually clean capillary
<b>ERROR: NO MEASURING VALUES !</b>	Measuring was interrupted Measure sample again
<b>VOLUME ERROR: FILL SYSTEM !</b>	The volume control has detected air-bubbles in the volume unit Check sample and filling bottle Push F-key
<b>INFORMATION: MEMORY FULL !</b>	Memory is full The system switches off the memory
<b>ERROR: CLEAN CAPILLARY !</b>	Push C-key eventually clean capillary manually

### **2.3.6 Function-description**

The waste-bottle collects the waste of the measuring solution. It originates 200 µl waste per measurement.

The fill-bottle should always be filled up with **Celloton**. Exchange **Celloton** in filling-bottle ca. every 2 - 3 weeks.

The outside-electrode provides for the current.

The capillary serves as measuring transducer. By using the standard-volume-unit it takes 200 µl test-liquid for a count of the particles.

## 3 ASSEMBLY OF THE INSTRUMENT

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### 3.1 INSTALLATION

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Remove the coverlid; check if all parts are in correct position.

Fill supply bottle with isotonic solution, place supply tube in the provided hole and let it sink to the bottom of the bottle.

Connect the waste tubes to the waste bottle.

#### 3.1.1 Fitting the Capillary

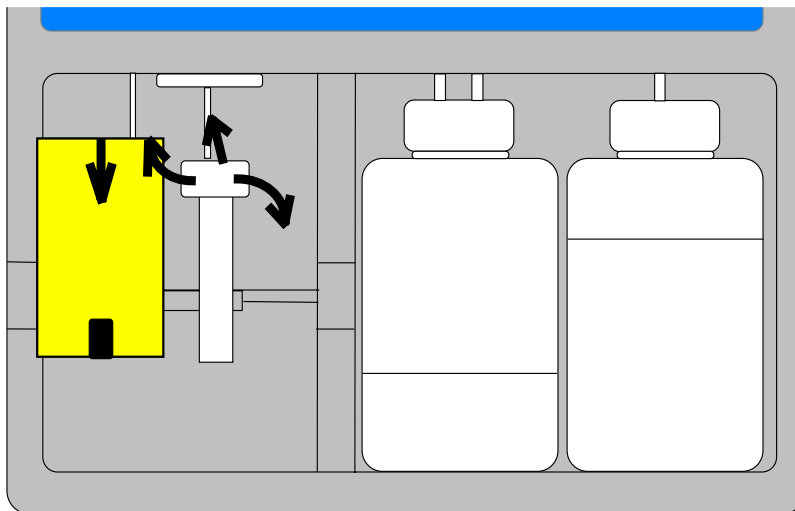
As seen in Dia. 2, the capillary is placed into the measuring chamber as follows:

Remove screw-lid and insert capillary into the screw-lid.

Now screw in the capillary with the screw-lid with moderate strength.

#### Dia. 4 Fitting the Capillary

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#### Note:

The delivered protection for the capillary is only used for high frequency disturbances and can be removed if it is not necessary.

## 4 FUNCTION PANEL

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The **Keyboard** of the **Counter** has been subdivided into equipment control keys, function choice buttons, numeric keys and measuring range choice buttons.

#### **4.1.1 FILL-button**

Press **F-key** briefly. System is filled automatically through the supply bottle.

**When the system is being filled, there must be solution under the capillary.**

This cycle is only needed when the capillary is changed or if there are bubbles in the measuring system.

#### **4.1.2 CLEAN-button**

If the capillary is blocked partially, it is possible, through operating of the **clean-key**, to practice a pressure through the inside pump-system on the capillary-orifice.

The adjusted cleaning-time indicates the length of the pressure.

#### **4.1.3 The START-key**

By pressing the **START-key**, the measuring cycle will be started.

If the **START-key** is pressed again **the functions then operates like a STOP-key.**

**The measurement will be interrupted.**

#### **4.1.4 AREA-SELECTION-keys**

Through the **AREA-SELECTION-keys** the measuring-parameters are chosen.

If the parameter on the display is switched off, you automatically enter into the time-mode to control the measuring time.

#### **4.1.5 The Set-key**

By pressing of the **SET-key** the calibration can be changed after a measurement.

#### **4.1.6 The SP / ← -key**

By pressing the **SP-key** a memory-number, which is increased by one after each measurement, can be typed in.

The memory number can be changed after every measuring.

Also it is used as a delete key.

#### **4.1.7 The MOD / ↑ - key**

By pressing the **MOD-key** the Options menu is displayed.  
By pushing the key several times further options are shown and can be chosen.

#### **4.1.8 The ENTER-key**

With the **ENTER-key** all inputs and options will be confirmed.

#### **4.1.9 The DAT / S-key**

By pressing the **DAT-key** the **options-menu** opens.  
By pushing the key several times further options are shown and can be chosen.  
The time, date, contrast, print and curve saving mode can be changed after pushing the **ENTER-key**.  
If you are in the “Measuring Menu” the printout can be set (single printout or series)

#### **4.1.10 The number-key 0-9**

With the **NUMERIC-keys** the results of the adjustments can be changed.

#### **4.1.11 The DOT-key**

With the **DOT-key** a dot can be set into numbers.

#### **Information:**

**If any key pushed while working, the circle will be interrupted.**

#### 4.1.12 Test of Instrument

Fill measuring cup with isotonic solution and place it under the measuring capillary. Switch on the instrument with the mains switch.

**For all buttons with lamps, the following applies:**

**Button lamp on = Function on**  
**Button lamp off = Function off**

All displays are in normal writing, not in number

THIS IS THE LCD-DISPLAY

After the instrument was switched on information on the system version appears.

PART - ANALYZER (V1.0)  
DAT: 01.01.2000 TIME: 11:11:11

Push **F-key** briefly

SYSTEM IS BEING FILLED... [11:12:00]

The system is filled.

When the filling cycle is correct, the lower LED-control lights up in the inspection window and the measuring tubes of the volume unit are free of bubbles. When the tube system was empty, it is possible that the procedure has to be repeated.

In order to perform a system test switch off all parameters, push **START-key**.

SP: 23 [12:31:14]  
TIME 00,0 SEC

This way a measuring time control is carried out. Simultaneously a mechanical check and a check of the capillary are performed.

SP: 23 [12:31:14]  
TIME 10,5 SEC

When a parameter is chosen and the **START-key** is pressed the measuring was started.

The volume unit is emptied and a measurement is carried out.  
The process can be watched through the inspection window.

**The lower LED-Control shows “start of the measurement”.**  
**The upper LED-Control shows “end of the measurement”.**

When the measurement is completed the result is shown on the display.

SP: 100	[11:12:00]
C2: 21221	MPV 118

In case of an incorrect measurement, the instrument gives an error signal  
(see section Errors).

#### 4.1.13 Determination of Blank Value

Choose the measuring channel with the **AREA-keys** and determine the blank value  
of the measuring solution:

Place a cup of solution under the capillary and press the **START-key**.

C1-MODE MEASURING . . .
SERIES MEASUREMENT 2/90 SP: 100

When the measuring is completed the blank value of the activated parameter is  
displayed.

SP: 100	[11:12:00]
C2: 0,2	

#### **Attention!**

If the indicated blank-values are not reached during a measuring with blank solution,  
the instrument is only partially operational!  
(see also Error-Description).

## 4.2 THE DATE / TIME MENU

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The instrument can be operated with different basic adjustments.  
The most important adjustments will be shown here.

### 4.2.1 Set date and time

By pushing the **DAT-key** the date can be shown.  
With **ENTER-key** the function will be activated and confirmed.

SET DATE AND TIME ?  
OPERATE OPTION = ENTER

After pushing the **ENTER-key** the day, month, year can be typed in  
by the number-keys.

CHANGE DATE / TIME  
DAT: 11.02.2000      TIME: 14:32:12

### 4.2.2 Set contrast

By pushing the **DAT-key** the contrast can be selected.

SET CONTRAST ?  
OPERATE OPTION = ENTER

With **ENTER-key** this function can be activated and confirmed.

CHANGE CONTRAST = ARROW KEY  
DISCONTINUE = ENTER

Through the arrow-keys the intensity of the display can be chosen.  
By pushing the **ENTER-key** you leave this function.  
The adjustment will be saved and used when the system will be started again.

### 4.2.3 Set curve option mode

By pushing the **DAT-key** the option **print / save curve** can be chosen.

SET CURVE OPTION MODE ?  
OPERATE OPTION = ENTER

With **ENTER-key** this function will be activated.

PRINT CURVE ON=1 OFF=0  
PRINTMODE: (0) \_

Is this option switched off, the curves will not be printed.

SAVE CURVE ON=1 OFF=0 BREAK=2  
PRINTMODE: (0) \_

Is this option switched off, the curves will not be saved.  
The measuring memory will be increased from **32 to 90 samples**.  
**If there is a change the measuring memory will be deleted.**

## 4.3 The MOD-Menu

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The instrument is working with an option to printout and save the measured results. For use of the instrument, a printer is not necessary.

The system can be operated in direct/memory or in memory/printing mode

All measured and saved results can be printed in series or single.

The data can be stored with the available curves and also can be printed out.

If the curves are not needed the printout of curves can be switched off. The **memory** then will be **increased** from **32** to **90 samples** and the **memory** will be **deleted**.

During a measurement the display shows information in which mode the system is working.

### 4.3.1 Working with a printer

A selection can be made with the **MOD-key**.

**SP: = Memory No.** which automatically will be increased by one however with

**SP-key** it can be corrected individually.

After switching on the instrument it is working in the serial mode.

#### 4.3.1.1 Printing sample from memory

A stored value can be selected by the **SP-number** and printed or displayed. Press **MOD-key**, choose the desired option and confirm with **ENTER-key**.

**PRINTING SINGLE SAMPLE ?**  
**OPERATE OPTION = ENTER**

Confirm printing single sample with the **ENTER-key**.

**SET SAMPLE NUMBER !**  
**SP: (1/56)          1\_ \_ \_**

Choose the stored measuring value with the sample number.  
Now the measuring value is displayed and printed if the printer is switched on.

**SP: 100** **[11:12:00]**  
**C2: 21,62**

#### 4.3.1.2 Single measurement

The **single measurement** can be activated or deactivated. A measuring will be carried out and the **measured results** can be **shown** and with the printer it can be **printed** out, however the **data will not be saved**.

During measurement the printing mode, saving mode, the total memory amount and the sample number will be shown.

If you have chosen several repeated measurements, the mean value will be calculated from the measured results.

Press **MOD-key**, choose the desired option and confirm with **ENTER-key**.

SINGLE MEASUREMENT ?  
OPERATE OPTION = ENTER

If singles measurement is confirmed with the **ENTER-key**, every measurement is immediately printed after the measuring. The result will not be saved.

C2-MODE MEASURING . . .  
SERIES MEASUREMENT 2/90 SP: 100

After the measuring the result is displayed.

SP: 100 [11:12:00]  
C2: 21,25

### 4.3.1.3 Series measurement

The serial measurement can be activated or deactivated. After the measurement the measured result will be **displayed** and **saved**.

If the option printing is switched on, the result will be printed out.

During the measurement the printing mode, memory number, total number of memory and the sample number are shown.

Press **MOD-key**, choose the desired option and confirm with **ENTER-key**.

```
SERIES MEASUREMENT ?  
OPERATE OPTION = ENTER
```

If **SERIES** measurement is confirmed with the **ENTER-key**, every measurement is immediately printed and saved after the measuring.

```
C1-MODE MEASURING . . .  
SERIES MEASUREMENT  2/90  SP: 100
```

After the measuring the result is displayed.

```
SP: 100 [11:12:00]  
C2: 21,56
```

If the printout is not finished, the print option can be turned off in the **DAT-menu**.

#### 4.3.1.4 Printing series

It is possible to print out the existing data from the memory completely.  
Later the saved data also can be printed out.

**Press MOD-key**, choose the desired option and confirm with **ENTER-key**.

SERIES PRINTING ?  
OPERATE OPTION = ENTER

If **series print** is confirmed with **ENTER-key**, every available data will be printed.

PRINTING SERIES !

#### 4.3.1.5 Delete Series

To avoid a mix-up of old and new measuring data, the saved data has to be deleted  
before the new measuring series will be started.

This will be especially recommended if the option **measuring/printing** was chosen.

**Press MOD-key**, choose the desired option and confirm with **ENTER-key**.

DELETE SERIES ?  
OPERATE OPTION = ENTER

On the display will be confirmed that the memory was deleted.

DELETE SERIES !  
SERIES DELETED !

## 4.4 CHECK OF CALIBRATIONS

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The system is factory-calibrated with control substances. In order to check the system with a suitable control it is recommended to check samples for all parameters as described in section preparation of samples.

### 4.4.1 Check of C1 to C4 measuring

In order to check the **calibration**, select the **C2 channel** and place a cup of blank solution under the capillary and start the determination of the blank value by pressing the **START-key**.

When the blank value is acceptable, place the prepared solution under the capillary and determines the correspondent value for **C1 to C4 range**.

PRODUCE C2-SAMPLE AND  
MEASURE WITH START-key . . . SP:(1)

Press **START-key** for measuring the sample.

SP: 100 [11:12:00]  
C2: 21,26

#### **Notice:**

Should the values differ from the required ones, carry out a standard calibration as described in section **calibration**.

## 4.5 CALIBRATION

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To change the calibration, measure a control in the corresponding measuring range and select the option **calibration** with **SET-key**.

If you try to change a result, which was not measured before, the information **not measured** will appear on the display.

If this option was activated by mistake, it can be interrupted with **ENTER-key**.

The measuring results only should be changed in normal range.

### 4.5.1 Important Information for Calibration

In order to check the functions of the measuring system and the individual measuring channels, switch on the individual channels with **keys** (one by one) and carry out a determination of the blank and standard values from the blank solution and the prepared samples.

The determined values should be compared with the given control results.

The value that was measured ought to be within the acceptable range of the control.

#### Attention!

**In case you are using various kinds of control, be aware that not every control is suitable to be measured with a cell-counting system, as the discriminators and analyzing criteria are set up for regular cells.**

**For this reason it is important that the measured values match the cells that is measured and not necessarily the control.**

**If the system is calibrated with defective- or wrong control, the measured results will be wrong.**

#### 4.5.2 Standard calibration for C1 to C4-channel

Push area key on **keyboard**.

PRODUCE C1-SAMPLE AND  
MEASURE WITH START-key . . . SP:(1)

Produce and measure **standard-solution**.

C2-MODE MEASURING . . .  
SERIES MEASUREMENT 2/90 SP: 100

When the measurement is finished the display shows: (e. g.)

SP: 1 [11:12:00]  
C2: 24,51

Press **SET-key**.

ADJUSTMENT RANGE 1.0 - 9999  
C2 24.51 RATED VALUE: \_ \_ \_ \_

Type in required value in digits by **keyboard**.

Confirm with **ENTER-key**.

After this confirmation the display shows the correct result.

#### 4.5.3 Delete Calibration

To delete the calibration and return back to the factory-calibration, switch off the instrument, push **SET-key** and keep it pressed while you switch on the system again.

## 5 WORKING WITH THE INSTRUMENT

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### 5.1 SYSTEM-HANDLING

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The mains switch at the backside switches on the instrument. It is immediately ready to work.

Make sure that the filling bottle (right) is full and the waste bottle (left) is empty.

After removing the cup with cleaning solution prepare a cup of Celloton and place one cup under the capillary.

Activate the test cycle by switching off all measuring channels. Start the instrument and check the measuring time.

**Measuring time is: 10,5 sec. + 1,5 - 1 sec.**

If the measuring time is not correct, the instrument indicates an appropriate error report. Please clear the disturbance with the recommended steps given on the display (see chapter errors).

A check of the isotonic solution in the **C1 to C4-area** shows that the measuring system is working correctly.

The measuring times for different capillary are:

<b>45</b>	<b>ul</b>	<b>Capillary 22.0 sec.</b>	<b>+ - 4,5 Second</b>
<b>60</b>	<b>ul</b>	<b>Capillary 18.0 sec.</b>	<b>+ - 3,5 Second</b>
<b>80</b>	<b>ul</b>	<b>Capillary 10.5 sec.</b>	<b>+ - 2,5 Second</b>
<b>100</b>	<b>ul</b>	<b>Capillary 7.5 sec.</b>	<b>+ - 2,5 Second</b>
<b>150</b>	<b>ul</b>	<b>Capillary 5.0 sec.</b>	<b>+ - 1,5 Second</b>

By using different capillary the setup of the system must be adjusted.  
(See special functional)

### **5.1.1 Preparing of the Samples**

As the **samples cannot** be used **directly**, first a suitable measuring sample has to be prepared. A measuring sample can be prepared manually or with an automatic **Diluter** or by a **Pipette**.

Place the **sample** into a **particle-free Cellcup** and add the corresponding reagent as per manufacturer's instructions.

Then **dilute** the sample with **Celloton** by using a **Pipette** or an automatic **Diluter** and **measure** the prepared **sample** in the **corresponding** measuring channel.

If the channel not correct adjusted, you can use the manual setting or Computer setting procedure.

(See adjustments)

## **5.2 DETERMINATION OF CELL ANALYSIS**

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### **5.2.1 Required Materials**

Apart from the measuring instrument, the following equipment is required for measuring.

- |                     |              |                 |
|---------------------|--------------|-----------------|
| - Solution          | Celloton     | Order No. 78411 |
| - Container         | (Cell-) Cups | Order No. 78664 |
| - Stand for Samples | Sample Rack  | Order No. 78004 |

## 5.3 PREPARATION OF THE SAMPLE

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The well-mixed sample, which was prepared in the mixer, is processed as follows:

### 5.3.1 Example for a Dilution

Absorb 20 µl Cells with a pipette  
Use 10,0 ml isotonic solution  
and transferred into a cup

Dilution 1 : 500

## 5.4 DILUTION-RATIOS

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The **Counter** can work with different end-dilution ratio

**Example**    **C1 = 1 : 10**  
                 **C2 = 1 : 100**  
                 **C3 = 1 : 200**  
                 **C4 = 1 : 40000**

In order to have a higher precision and reproducibility it is recommended to use a diluter for preparation of the samples.

### 5.4.1 Dilution C1:

1000 µl suspension to 10 ml Celloton        = 1 : 10

### 5.4.2 Dilution C2:

100 µl suspension to 10 ml Celloton        = 1 : 100

### 5.4.3 Dilution C3:

50 µl suspension to 10 ml Celloton        = 1 : 200

### 5.4.4 Dilution C4:

50 µl suspension to 10 ml Celloton        = 1 : 200  
50 µl dilution to 10 ml Celloton        = 1 : 40000

## 6 VARIOUS INFORMATION

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### 6.1 REQUIRED MATERIALS AND REAGENTS

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To operate the instrument, high quality solutions and disposable materials are required, which are guaranteed to be particle-free and always of the same quality.

When in doubt, always use the original **Accessories**.

In the following, you will find names and order numbers as well as packing sizes of all **Accessories**.

ARTICLE	NAME	USING	PACK SIZE
78411	Celloton	Diluting solution	2x10 l
77664	Cellcup	Particle free cups	2.000 pcs.
78415	Celloclean <sup>E</sup>	Cleaning solution	3x500 ml

#### ADDITIONAL EQUIPMENT

Diluter for the preparation of dilutions

## **7 ERRORS, WHICH OFTEN OCCUR**

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Most of the disturbances in the measuring cycle and of the result are avoidable. Therefore, please accept the following advice:

**Use tested solutions and particle-free one-way material.**

Most errors are caused by partial or complete blockage of the capillary aperture.

**Other causes are:**

**Particle polluted sample containers**  
**Pollution of the reagents**  
**Pollution caused by unsuitable cloths**  
**Unclean aids (pipettes a.s.o.)**

Further causes are incorrect wiping of the suction tube and therefore inaccurate dilution.

The **Counter** are recognized most electrical and mechanical disorders. This is vital for the correctness of the measuring results.

**The following disturbances may occur:**

**The capillary aperture is partly or completely blocked**  
**Bubbles are in the hydraulic system**  
**Measuring unit is polluted**  
**Instrument needs a follow-up calibration**  
**Wrong dilution was measured**

## 8 SPECIAL FUNCTIONS

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### 8.1 SETUP SETTINGS

---

With the **MDCt** is possible to measure different applications.  
In this case the adjustment of the instrument must be changed.

For the adjustment choose **TIME MODE** and type in fooling **CODE NUMBERS**:

**Start number 0 = Adjustment for ground setting and mechanic**

0	=	Model (don't use it)
1	=	Language
2	=	Baud rate
3	=	Measurements for middle value
4	=	Measuring-Volume (don't use it)
5	=	Capillary min. Time
6	=	Capillary max. Time
7	=	Run-Time1 (don't use it)
8	=	Push-Time1 (don't use it)
9	=	Delay1 (don't use it)
10	=	Run-Time2 (don't use it)
11	=	Push-Time2 (don't use it)
12	=	Delay2 (don't use it)
13	=	Clean-Time
14	=	don't use it

**Start number 100 = Adjustment for C1 - Channel**

100	=	Capillary-Voltage
101	=	Amplifier
102	=	Lower Discriminator
103	=	Lower Limit for Calculation
104	=	Upper Limit for Calculation
105	=	Dilution for the Sample

**Start number 200 = Adjustment for C2 - Channel**

200	=	Capillary - Voltage
201	=	Amplifier
202	=	Lower Discriminator
203	=	Lower Limit for Calculation
204	=	Upper Limit for Calculation
205	=	Dilution for the Sample

**Start number 200 = Adjustment for C3 - Channel**

300	=	Capillary - Voltage
301	=	Amplifier
302	=	Lower Discriminator
303	=	Lower Limit for Calculation
304	=	Upper Limit for Calculation
305	=	Dilution for the Sample

**Start number 300 = Adjustment for C3 - Channel**

400	=	Capillary - Voltage
401	=	Amplifier
402	=	Lower Discriminator
403	=	Lower Limit for Calculation
404	=	Upper Limit for Calculation
405	=	Dilution for the Sample

**Information**

**For easy handling, Setup-settings and Distribution-control, use Computer Software M901.**

## 9 MAINTENANCE

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### 9.1 DAILY MAINTENANCE

---

The **Counter** will work with little disturbances, if the following steps will be considered:

#### 9.1.1 The System:

Empty the waste bottle daily and refill the supply bottle if necessary. Discard the leftovers in the supply bottle, so that leftovers of an older bottle do not pollute new Celloton.

#### 9.1.2 The Capillary:

The capillary aperture must always be kept in cleaning solution (**Celloclean<sup>E</sup>**) in order to dissolve pollution and proteins.

**Take care that there is always sufficient solution under the capillary so that it can not dry out.**

**Never use any other solutions than those, which have been mentioned, because otherwise the valve system could be damaged.**

## **9.2 REGULAR MAINTENANCE / INSPECTION**

---

### **9.2.1 The Capillary**

To enable the equipment to run free of disturbances, the capillary must be kept in good condition. In the surrounding of the aperture and inside the aperture, protein deposits can occur.

#### **The following guidelines are to be kept:**

**Never let the capillary dry out**

**Never let the capillary stand in a sample for too long.**

**Rinse the system well with Celloton and cleaning solution between working phases or when the Cellcounter is not going to be used for some time.**

**Inspect the aperture regularly under a microscope with a 10 x enlargement for deposits or cracks.**

#### **Cleaning of the Capillary:**

Depending on the amount of samples that are measured, the capillary should be replaced from time to time. For cleaning, the capillary is emptied and taken into fresh Celloclean E, so that the inside of the capillary is filled with the cleaning solution through the aperture which is thus rinsed and freed of albumin deposits.

Then rinse well with distilled water and keep the capillary stored dry.

#### **Notice:**

**For cleaning the capillary never use any cleaning agents that contain alcohol or other aggressive substances that could attack plastic materials and Plexiglas !**

**The Cellcounter is equipped with one capillary. However to be safe, a spare capillary should always be at hand.**

**Before reinstalling the capillary must be well rinsed. Never let any cleaning solution enter the tube system.**

#### **Important!**

**The capillary must never be cleaned mechanically or with ultrasound. Do not use alcohol or other cleaning solutions that attack plastic materials.**

### **9.2.2 Measuring and Volume Unit**

This part is to be inspected occasionally through the inspection window at the front of the instrument. The inside walls of the volume tubes must not show any signs of stains or deposits. This can be avoided by using an appropriate cleaning reagent. In extreme cases, remove the cap and clean glass tube with a tube brush.

### **9.2.3 System**

To avoid soiling of the valves and glass parts, the fluid system must be rinsed with cleaning agent during the work-series or when the Cellcounter is out of action for some time.

Place a cup of cleaning solution under the capillary, push the **F-key** and rinse the system several times.

#### **Attention !**

**Never rinse the Cellcounter with other fluids such as concentrated bleaching reagents.**

**Regular rinsing with cleaning solution secures of sufficient cleanliness.**

### **9.2.4 LONG-PERIOD USAGE BREAK**

Empty the waste-bottle and fill the supply bottle with aqua-dest (distilled water). Remove and empty the capillary and insert it again. Place a Cellcup filled with distilled water under the capillary and start the instrument by pressing the **Fill-key** two to three times.

#### **Attention !**

**Never use other fluids than the solutions mentioned, otherwise the valve system may be damaged.**

When the instrument is taken back into operation after a longer time, replace distilled water with isotonic-solution and reverse the process.

## 10 ERROR DESCRIPTION

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### 10.1 WHAT TO DO WHEN?

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Situation	Possible Reason	Solution
instrument does not work	loose wire or plug	check wire and plug of the instrument and mains plug
no display	mains switch out or fuse defective	turn on mains switch, check fuse, if necessary replace it (pay attention to correct value!)
	electrical defect	inform service
instrument out of action, display on	fuse on power board defective	replace fuse
	wires loose at PC-board or aggregate	check correct placement of wire and connect to correct plug if necessary
	loose mechanical parts or aggregate motor defective	inform service
instrument works but turns off after a short time	no vacuum system leaks	check measuring
	capillary placed incorrectly	check placement of capillary
	seal defective	replace seal
	filling cycle was forgotten	start filling cycle
	aperture blocked	clean capillary, if necessary replace it by a clean capillary or inform service

<b>Situation</b>	<b>Possible Reason</b>	<b>Solution</b>
no filling cycle or turns off immediately	filling bottle empty or filling tube not in filling solution	fill bottle, sink tube to the bottom of the bottle
	filling tube bent capillary leaks	check path of tube check capillary for correct placement
	no cup with solution under capillary	check cup and solution
	mechanical defect	inform service
blank values too high	aperture blocked or polluted	replace or clean capillary
	capillary or seal broken	check seal, check capillary replace if necessary
	solution soiled diluter soiled	replace solution clean diluter
	bubbles in the solution	don't shake solution too much, or if the diluter tip is too thin, replace it
	electronic defect	inform service

<b>Situation</b>	<b>Possible Reason</b>	<b>Solution</b>
measuring value too high	sample defective or wrong concentration	check extraction system (tubes) check diluter, carry out counter control
	measuring cup soiled i.e. not particle free	check cup for cleanliness (blank value)
	wrong sample	use dilution
	electrical or mechanical defect	inform service
measuring value too low	sample defective or wrong measuring volume	check extraction system (tubes), check diluter, carry out counter control with capillary solution if necessary

<b>Situation</b>	<b>Possible Reason</b>	<b>Solution</b>
instrument does not measure	measuring system not filled	fill system with filling cycle
	aperture blocked	replace or clean capillary
	measuring optic soiled tube	clean measuring unit
	electronic defect	inform service
instrument shows function aborted on the display	upper light barrier defect or glass tubes soiled	clean glass tube lean system
	incorrect placement of capillary	place capillary correctly
	protective function	not necessary a mistake;
	vacuum system was activated	if it occurs repeatedly, use special cleaning cycle
	electronic or mechanic defect	inform service

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