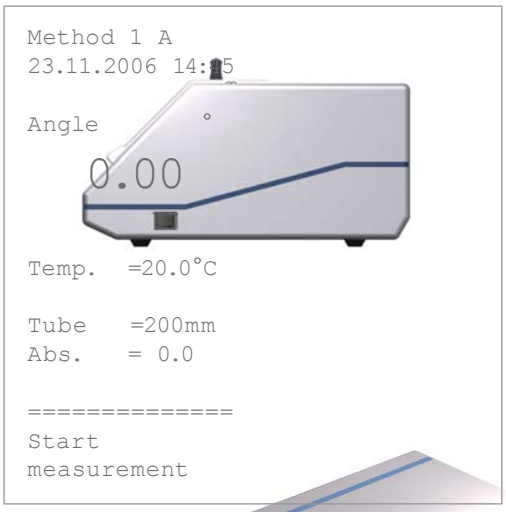
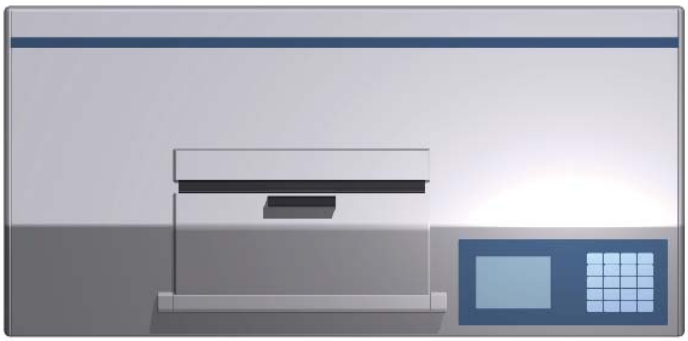
USER MANUAL

SCHMIDT+HAENSCH GMBH & CO.
2006

UNIPOL NEW

UNIVERSALPOLARIMETER





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Content may change without notice.

Every effort has been made to achieve accuracy in this manual.

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SYMBOLS

Navigation symbol. Indicates submenus and sequences of operation.

Key. Indicates which key has to be pressed.

Hint. Important information. Please read carefully!

CONTENT

APPLIANCES

POLARIMETRIC CONCENTRATION AND PURITY ANALYSIS IN FOOD, PHARMACEUTICS, COSMETICS AND CHEMISTRY.

UNIPOL L
FULLY AUTOMATIC POLARIMETER

- For routine measurements
- Discontinued measurements
- Automated multiple measurements with statistical evaluation
- Operation over PC (Remote mode possible)
- Conformity with the European and American pharmacopoeias
- GLP/GMP appropriate documentation
- 4 measuring methods and 10 extra scales programmable

1 INTRODUCTION

The fully automatic digital polarimeter of SCHMIDT+HAENSCH comes in a new modern style case and is equipped with an improved version of the well known software from the ATR-series. Among other options, it is possible to input test sample identification numbers and to request a statistical evaluation of the results of multiple measurements. User defined protocols can be directly send to a printer.

If polarimeter tubes or quartz test tubes with built in temperature sensor are used, the current temperature of the test sample or the quartz will be shown on the display. With measurements of sucrose (or wavelength of the polarimeter by using a quartz control tube), the temperature corrected measurement value in °Z will be displayed automatically.

SPECIFICATIONS	
SCALE	Optical Rotation, International Sugarscale, Concentration, User-defined
MEASURING RANGE	+- 90° +- 259°Z
MEASURING UNIT	Angle ([°], [°Z]) Concentration [%] User-defined
RESOLUTION	0,01° 0,05°Z
PREZISION	+- 0,01° +- 0,05°Z
TEMPERATURE MEASUREMENT	0-99°C
TEMPERATURE PREZISION	+- 0,1°C
WAVELENGHT	589,44 nm (alternatively 546, 578, 633 nm)
DATA IN-/OUTPUT	1 parallel, 1 PS2, 2 serielle RS232
MAIN ADAPTER	85-260 V / 50-60 Hz

The resolution of the UniPol L is conform to the regulations of the European and American pharmacopoeias. A GLP/GMP appropriate measuring protocol can be send to the PC or printer. The UniPol L is usually shipped with 589 nm wavelength. A different wavelength can be installed for special applications.

2 INTRODUCTION IN POLARIMETRY

Polarimeters work with polarised light. This is not very demonstrative, because the human eye can not distinguish polarised light from unpolarised light.

A polarisation filter looks like a simple neutral grey filter. But if one holds two polarisation filters in a row, then there is a certain rotation in which no light can pass the combination of the filters. If then one of the filters is turned 90°, then light can easily pass both. Physicists say, only light of a certain polarisation plane can pass through a polarisation filter. If the passing-planes of both filters are perpendicular to each other, then no light can pass through the combination.

Some materials like quartz or sucrose solutions are called optically active, because they are able to rotate the polarisation plane. Polarimeters are measuring devices which measure the rotation that is caused by optically active test samples.

In a polarimeter, two polarisation filters are placed in a row so that no light can pass. If an optically active test sample is placed between those filters, then some light can pass because the plane of polarisation has been rotated. If now one of the polarisation filters is rotated just so far that no light can pass anymore, then the optical rotation of the sample has been measured directly. That means a polarimeter actually measures an angle.

The angle of optical rotation of diluted substances which are measured in test tubes depends on the

- Kind of sample
- Concentration of the sample
- Length of the tube
- Temperature
- Colour of the light (wavelength)

The according formula has been found by the French physicist Jean B. Biot in the 19th century. The BIOT formula says that:

$$c = \alpha / [\alpha] \bullet 10000 / l$$

with

c	: concentration [g / 100 cm3 solution]
α	: rotation (in degrees angle)
[α]	: specific rotation
l	: length of the test tube [mm]

The specific rotation depends on temperature and wavelength; with some samples also from the concentration itself. Please mind that the unit of concentration is g / 100cm3 and not g / 100g!
Let us, for example, take the specific rotation of a watered sample of sucrose at 20°C and a wavelength of 589.44 nm (that is the balance point of both yellow sodium spectral lines) which was defined by the ICUMSA (“International Commission for Uniform Methods of Sugar Analysis”) to be

$$[\alpha] = 66.588 \pm 0.002$$

So if one takes 26g in 100 cm3 and a 200mm sample tube, then this will result in a rotation of

$$\alpha = 34.626° \pm 0.001°$$

which can be seen easily when using the formula. This sucrose solution is called normal solution and it is defined to have an optical rotation of 100.00 °Z (degrees sugar). The international sugar scale (ISS) is divided linear, that means a rotation of 17.313° is the same as 50.00°Z

2.1 WAVELENGTH EFFECTS

The polarimeters of the sugar industry use four standard wavelengths. These wavelengths result in the following specific rotations, [α], and rotations of normal solutions in a 200 mm test tube, α:

DESCRIPTION	WAVELENGHT [nm]	α	[°]
mercurial - green	546.23	78.4178	40.777
sodium - yellow	589.44	34.6260	34.626
HeNe Laser	632.99	57.2144	29.751
NIR	882.60	28.5306	14.836

Exact definitions concerning the international sugar scale can be found in ”Specification and Standard SPS-1 (1998): Polarimetry and the International Sugar Scale” in the ICUMSA Methods Book.

In the example, the influence of the wavelength on the rotation, the so called optical rotation dispersion (ORD), becomes apparent. An offset of only 0.03 nm causes a difference of 0.01% in rotation. That is why light sources with a small bandwidth between the half power points have to be used. Usually halogen lamps with interference filters are used. These filters can be produced with an adequately small bandwidth; however their central wavelength is not a hundred percent stable in perpetuity.

To determine the exact current working wavelength, the polarimeter has to be tested with a well known sample. Quartz control plates have proven themselves good for that matter. When one measures their rotation in the device, one knows the wavelength of the device.

Fortunately, the ORD of quartz is almost identical with the ORD of sucrose. Therefore, polarimeters in the sugar industry can be easily calibrated by using quartz plates. If the wavelength of the device had shifted a little bit, the quartz will display the same value as the sucrose samples. If then the conversion factor of the displayed rotation in degrees angle is changed so that the quartz plate will display the value which is given in its verification protocol, then the sugar samples will be measured correct again. Trough that, the wavelength of the polarimeter was indeed not corrected, but the display in degrees sugar is correct again – and that is what counts.

An alternative way is to readjust the wavelength of the device. The procedure for that is relatively complicated and demands accurate working. Therefore this should only be performed by trained people.

2.2 TEMPERATURE EFFECTS

The rotation of quartz increases with temperature T:

$$\text{Rotation}(T) = \text{Rotation}(20.0°C) \cdot (1.0 + 1.44 \cdot 10^{-4} \cdot (T - 20.0))$$

A plate which reads 40.000° at 20°C has to read 40.006° 21°C.

In opposite, the rotation of a sucrose solution decreases with temperature:

$$\text{Rotation}(T) = \text{Rotation}(20.0°C) \cdot (1.0 - 4.71 \cdot 10^{-4} \cdot (T - 20.0))$$

The solution which reads 40.000° at 20°C has to read 39.981° at 21°C.

Please note that there are three different influences on the measured value of solutions. The

test tubes, which are filled up to 100 cm3, are calibrated for 20°C. Also, the length of the test tube depends on the temperature. Furthermore, the optical activity of the solution changes with temperature. From these three influences, only the last one is included in the formula above.

The examples show, that during calibration of a polarimeter, it is essential that the temperature is taken into consideration. If a calibration with quartz is done in a laboratory at 22°C and later a normal solution is measured without consideration of the temperature, the solution is going to read only 99.88 °Z instead of 100.00 °Z !

2.3 TUBE LENGTH

The degree of rotation is linear to the length of the test tube. Usually, tubes with 200 mm length are used. For 100 mm tubes, the value in the menu under **DEFAULT VALUES / TUBE LENGTH** has to be changed.

3 INITIAL OPERATION

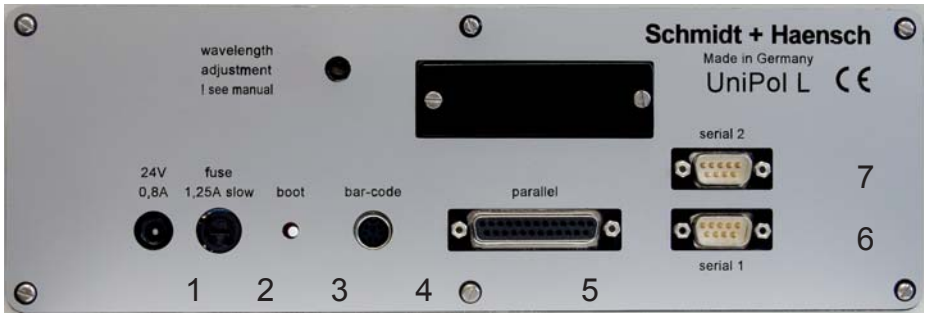
3.1 SETTING UP

The universal polarimeter **UniPol L** should be set up on a stable, vibration free worktop in a preferably dry environment. The device is connected to the provided power supply.
UniPol L can be connected to a printer or a PC by using the serial port.

The device is ready for use immediately after turning on.

3.2 CONNECTORS

The polarimeter has connectors on the back side, which are shown in the following figure.



1 Main adapter
2 Fuse 1,5 A
3 Boot-button
4 Bar-Code Scanner
5 Parallel
6 Com1 (Printer)
7 Com2

4 OPERATION OF THE POLARIMETER

4.1 KEYBOARD

The keyboard is illustrated in this figure.

The number keys are used mainly for numerical input. Through pressing the Alpha-key, characters can be used, for example to label methods.
Negative numbers are input with the "-"-key.
➡ The "."-key (dot) is used for decimal digits.

Key assignments

Menu
Pressing ➡ **MENU** brings up the main menu. To be able to make changes there, a user has to log on with a password first. The settings which are listed in the table (page 17) can be changed in the menu. A detailed description of the settings can be found in chapter 6.

Alpha
By pressing ➡ **ALPHA**, it is possible to switch between number and character input. Characters are chosen by pressing the assigned key multiple times. Both upper case and lower case characters can be input.

Print
The ➡ **PRINT** –key allows printing measuring results and sample data if a printer or a PC is connected.

Arrow-Keys
• ➡ ↑ and ↓ are used for navigating through the menu items.
• ➡ ← has two functions:
1. During data input, this key is used as "backspace" to delete single digits or characters from right to left.
2. After measuring, this key will bring up detailed information about the measurement.

Enter
➡ **ENTER** confirms the current selection. In a lot of submenus, it will bring up information in the bottom display section.

Start
Pressing the ➡ **START**-key will start the measurement.

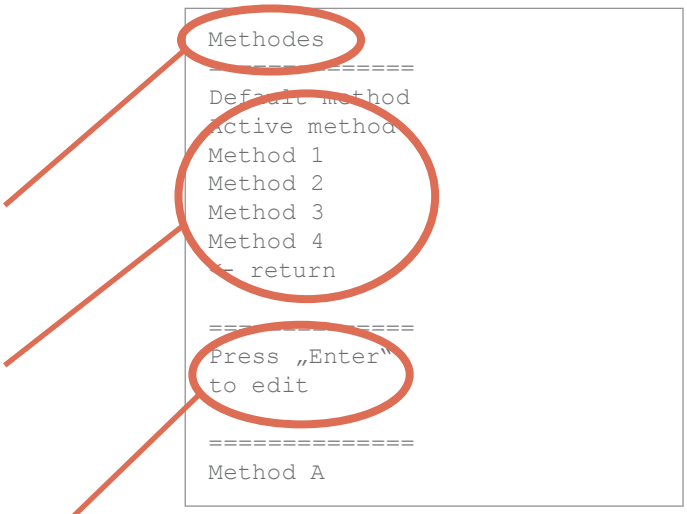
4.2 DISPLAY

The display is divided into three sections: Navigation, selection/display, and operating assistance. The sections are separated from each other by dual lines.

The upper section of the display displays the current position in navigating the menu. It serves as an orientation guide.

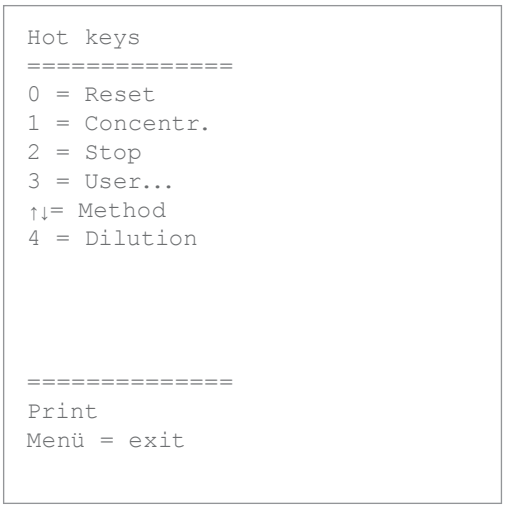
The centre section shows the options and values as well as output information. It can be navigated by using the arrow keys and settings are set by using the number and character buttons

The bottom section displays general operating assistance. It helps the user with giving correct input and operating **UniPol L** in general. It also shows the next steps.



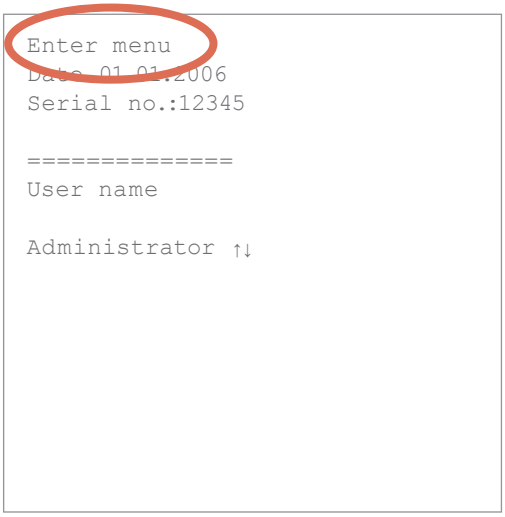
4.3 HOTKEYS

Hotkeys are short cut keys which allow the user to make changes or perform tasks faster and easier without having to leave the current menu.
The hotkey menu can be opened by pressing ➡ **ALPHA**.



4.4 TURNING ON/OFF

The on / off switch is on the right side of the polarimeter. After switched on, **UniPol L** automatically performs a brief self test. The process of the start-up procedure is shown graphically on the display.
If the polarimeter is in GLP-mode, a user has to be selected and confirmed with a password. The clear identification of a user serves for security. If a measurement protocol is printed, the user's name will appear in it.

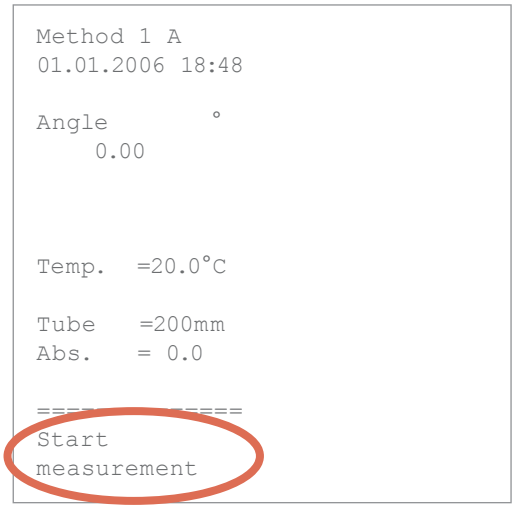


4.5 SETTING ZERO

Before the first measurement can be started, methods have to be defined and the polarimeter has to be set to zero. The creation of methods will be further explained in chapter "How to define methods"
After pressing ➡ **START**, the user will be requested to remove the test tube or fill it with water. Confirmation with ➡ **ENTER** will start the calibration process. A status bar in the bottom section of the display will show the progress of the process.

4.6 MEASURING

After setting zero, the user is requested to start the measurement. For that, the sample is placed in the sample chamber and the sample chamber cover is closed. Pressing ➡ **START** will start the measurement.



4.7 STATUS

There are two different ways in which UniPol L can be operated.

Normal

The *Normal* status allows every user to perform changes in the menu. With this setting, the device is open for all users. That means after turning on, nobody has to log on. The changing of settings is user independent.

GLP

The GLP- (Good Laboratory Praxis) Status serves the user depending operation of the polarimeter. After turning on, the user has to log on with his username and password. The user can only chose from a list of users who have already been inserted by the administrator. Changes in the menu can only be performed by the administrator. The GLP status is set in the security menu. It can only be changed by the administrator under ☞ **MAIN MENU / SECURITY / STATUS**.

4.8 MODES

The universal polarimeter can measure in two different ways:

Rotation

Measurement of the rotation of the plane of polarization by the sample in [°Z]

Alpha

Measurement of the specific rotation from the rotation and the concentration.

4.9 SCALES

User defined scales can be defined and saved under the menu item “Scales” (☞**MAIN MENU / SCALES**). User defined scales can be, for example, for glucose, invert sugar or miscellaneous optically active chemical substances.

5 HOW TO DEFINE METHODS

5.1 WHAT IS A METHOD?

A method includes all important parameters for a certain measuring procedure. The one-time definition of these settings has the advantage, that each measurement of a certain measurement procedure has the same output format on the display. Thus those settings have to be adjusted only once. A method includes parameters like mode (rotation or specific rotation), format for displaying the results (units, dilution), hotkeys, and printing properties.

5.2 PRESET METHODS

UniPol L is shipped with four factory set methods:

NUMBER	NAME	DISPLAY
1	A	angle [°]
2	B	scale 1 [°Z]
3	C	spez. rot. [α]
4	D	angle [°] + printout

```
Methodes
==============
Default method
Active method
Method 1
Method 2
Method 3
Method 4
<- return

==============
Press „Enter"
to edit

==============
Method A
```

5.3 HOW TO DEFINE METHODS

Before measuring with the universal polarimeter **UniPol L** of SCHMIDT+HAENSCH GmbH, at least one and up to four methods have to be defined. If the device is in GLP mode, then these changes have to be performed by the administrator. All parameters that have to be changed are described in the chapter “Settings”.

5.4 HOW TO SELECT METHODS

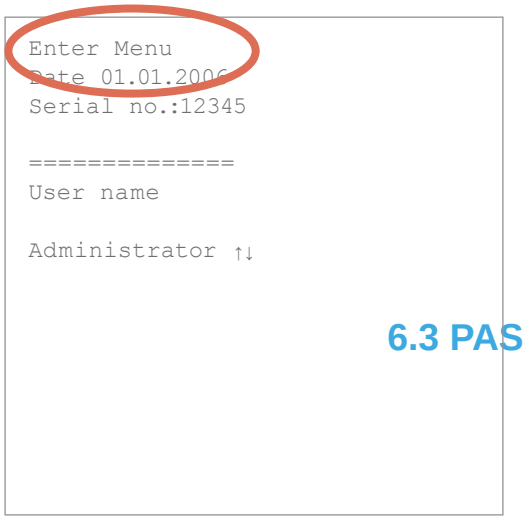
If ➡ ↑ or ➡ ↓ is pressed while the user is not within a menu, then the user is asked to select a method. After accepting with ➡ **ENTER**, the default screen is shown again. Now the desired method can be selected by using the arrow keys again and the measurement can be initiated with
➡ **START**. The user will be able to provide a batch- and sample ID for the printout protocol. The first line in the display will always show the method which is currently in use.

```
Method 1 A
01.01.2006 00:28

Angle          °
**************



Temp.   =----°C

Tube    =---mm
Abs.    =----

==============
0 (2 ) measurements
start
```

6 SETTINGS

General	Date / Time	Year / Month / Day / Hour / Minute	
	Language	English / German	
	Company name 1	„manual input“	
	Company name 2	„manual input“	
Calibration	Reset	„Set zero“	
	Wavelenght	„enter quartz value“	
	Calibration log	„Display Logfile“	
Methods	Default Method	„selection“	
	Aktive Method	„input method name“	
	Method 1-4	Aktiv Name Mode Display Measurement Mode Hotkeys Printout Printeed Columns Repeat count Repeat delay Set to standard Copy Method	Yes / No „manual input“ Degree / [Alpha] Angle / Scale 1-4 auto / manual / manual+print / remote 1+2 „selection assingning keys“ „selection printout“ „selection printed columns“ „input repeat count“ „input repeat delay“ „reset“ „selection Method“
Default values	Temperature	„input temperature“	
	Tube lenght	„input tube lenght“	
	Temp. coef. ppm/°C	„input temp. coef.“	
	Tubes	„selection tubes“	
Scales	„selection scale 1-10“		
Security	Status	Normal / GLP	
	Administrator		
	„input users“		
Communication	Configuration	Programm „Load Save“	
	Serial Port 1	Baudrate / Parität / Stop bits / Test Port / Test echo	
	Printer	Printer Type	ASCII
		Top space	„manual input“
		Left space	„manual input“
		Line space	„manual input“
		Char. size	„manual input“
Service	Test hardware	Polarimeter	LED Test / TemperatureTest / Motor slow / Motor fast Stress Test / Protocol
	Operating hours	„display operating hours“	
	No. Measurements	„input number“	
	Use microswitch	Yes / No	

6.2 MAIN MENU



Pressing **MENU** leads to the main menu. The menu is password protected with a number code. The main menu can be navigated by the up- and down arrow keys and submenus can be selected and entered with **ENTER**. Each change in the menu requires the administrator to log in.

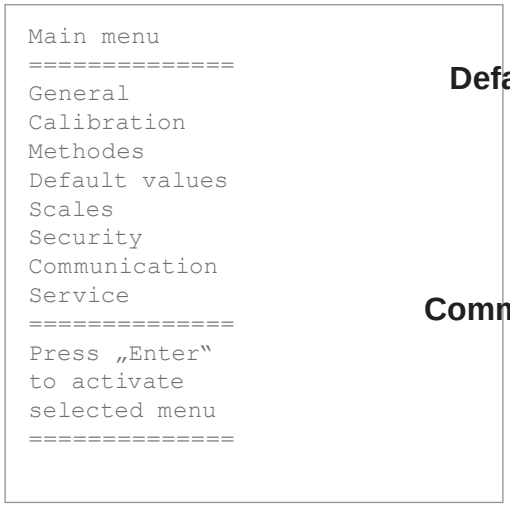
6.3 PASSWORD

UniPol L is password protected on two levels. If the device is in GLP mode, a user who has been authorised by the administrator has to enter his personal password before being able to work with the device. The user cannot perform any changes if the device is in GLP mode.

Password 1234 (default)

The second security level is secured through the administrator password. With this password, the administrator is able to adjust all necessary settings.

Administrator password The administrator password is supplied by SCHMIDT+HAENSCH in a separate envelope.



General
Calibration
Methods
Default values
Scales
Security
Communication
Service

Several settings of **UniPol L** can be set in the submenus. The options listed here are parameters which can only be changed by the administrator.
If the polarimeter is in "Normal"-mode, then the user can perform changes in the menu. However, not all menu items are available for the user. Especially settings concerning security are inaccessible.
The following pages will give short explanations for several settings.

6.4 GENERAL SETTINGS

```
General
==============
Date Time
Language
Company name 1
Company name 2
<- return


==============
Press „Enter"
to activate
selected menu
==============
```

Date / Time Year / Month / Day / Hour / Minute

Language English / German

Company name 1+2 Both values under Company name 1+2 will appear on the printout.

6.5 CALIBRATION

Reset Sets the device to zero as reference

Wavelength As the interference filters suffer from age- and environment depending alteration, it might be necessary in some cases to readjust the wavelength. This is performed by adjusting the interference filter by turning a screw which can be reached through the back side of the device.
The menu helps the user by letting him measure the quartz after each step of adjusting to check the current value and keep on adjusting until the desired value is reached. By pressing **ENTER**, the value is saved.

```
Calibration
==============
Reset
Wavelength
Calibration log
<- return


==============
Press „Enter"
to start
the program
==============
```

Calibration Log Log file of all calibrations performed. The results of the last 10 calibrations and zero settings are documented.

6.6 METHODS

```
Methodes
==============
Default method
Active method
Method 1
Method 2
Method 3
Method 4
<- return

==============
Press „Enter"
to edit

==============
Method A
```

Default Method Sets the default method which can be selected out of four defined methods.

Active Method Sets one of the four available methods to be the one which is currently used (active).

Method 1-4 Selection from one of the four possible user defined methods

Active If activated here, a method can be used for measuring. If deactivated here, a method is disabled for the user.

```
Method 3
01.01.2006 01:20

[α]
  -0.01


Angle =  0.00°
Temp.  =20.0°C
Conz.  = 26.00
Tube   =200mm
Abs.   = 0.0

==============
Start measurement
```

Name User defined label of the method

Mode Measurements of rotation or specific rotation (see chapter 4.8)

Display Output of angle or scales on the working screen

Measurement Mode
auto - automatic measuring
manual - measuring after pressing Start
manual print - manual measuring and printout
remote 1+2 - operation over PC

Hotkeys Sets hotkeys for this method

```
Method 1
==============
Active
Name
Mode
Display
Meas. mode
Hot keys
Printout
Printed columns
Repeat count
Repeat delay
Dilution
Set to standard
Copy method
<- return
==============
Press „Enter"
to leave the
submenu
==============
----
```

Printout De-/activating of information in head of printout

Printed columns De-/activating of single printer columns

Repeat count Number of repeated measurements

Repeat delay Time between two measurements [s]

Dilution Selection for output of dilutions (none / 1:1 / 1:4)

Set to standard Sets settings back to factory default

Copy Method Copies and saves the active method

6.7 DEFAULT VALUES

```
Default values
==============
Temperature
Tube length
T.coef ppm/°C
Tubes
<- return


==============
Press „Enter"
to edit

==============
20.0
```

Temperature Input of default temperature for measurements without temperature sensor

Tube length Input of used tube length

Temp. coef. ppm/°C Expansion coefficient of the test tube

Tubes Selection of (already input) tube sizes

6.8 SCALES

Scale 1-10 Selection and activation of scales

```
Scale 1
==============
Active
Name
Units
Format length
Digits
Last digit
Factor
Coef
Set °Z
<- return
==============
Press „Enter"
to leave the
Submenu
```

Active If activated, a scale can be selected for usage in the working screen.

Name User defined label of the scale

Unit Input of desired unit of the defined scale

Format length Number of all characters which are printed

Digits after decimal point Number of digits after decimal point

Last digit Rounding of last digit

Factor x [g]/100 [ml]
The concentration which reads the highest value on the scale. For sugar and a 200mm test tube, it is x = 26g

Coef Further explanation under appendix A2 “Scales”

Set °Z Sets the correct coefficient for °Z according to the given wave length

6.9 SECURITY

```
Security
==============
Mode
Administrator
1   1111
2   2222
3   1111
4   --------
5   --------
6   --------
==============
Press „Enter"
to edit
==============
----
```

Status GLP / Normal (page 14)

Administrator For changing the administrator password

User 1-10 For adding users of the device

Active For de-/activating users

User Input of a username

Passoword Input of user dependent password

6.10 COMMUNICATION

Configuration Startet das Programm Load/Save

```
Serial port
==============
Baudrate
Parity
Stop bits
Test port
Test Echo
<- return


==============
Press „Enter"
to edit

==============
9600
```

Serial Port 1

Baudrate 9600 *

Parity no parity * / odd parity / even parity

Stop bits 1 Stop Bit * / 2 Stop Bits

Test Port Starts the program

Test echo Starts the program

Printer

```
Printer code
==============
Printer type
Top space
Left space
Line space
Char.size
<- return


==============
Press „Enter"
to edit

==============
0
```

Printer type ASCII

Top space 3 *

Left space 10 *

Line space 1 *

Char. size 0 *

*default

6.11 SERVICE

```
Service
==============
Test hardware
Operating hours
No. measurements
Use microswitch
Limit too dark
Limit dark
Dark repeat
<- zurück
==============
Press „Enter"
to activate
selected menu
==============
----
```

Test Hardware

Polarimeter

LED Test Starts the program

Temperature Test Starts the program

Motor slow Input of number for slow motor rotations

Motor fast Input of number for fast motor rotations

Stress Test Starts the program

```
Test hardware
==============
Polarimeter
Menu structur
Heap
Strings
<- return



==============
Press „Enter"
to activate
selected menu
==============
```

Delay 15 *

Statistik 20 *

Stress test Starts the program

Druck sin^2 Starts the program

Protokoll Starts the program

Menü Struktur Starts the program

Heap 7934

Strings 94 *

```
Test Polar.
==============
LED test
Preamp test
Temperature test
Motor slow
Motor fast
Stress test
Protocol
<- return

==============
Press „Enter"
to activate
selected menu
==============
```

Operating hours Display of hours of operation

No. Measurements Display number of measurements performed so far

Use micro switch De-/activates the switch of the sample chamber cover

Limit too dark 3 *

Limit dark 10 *

Dark repeat 3 *

***default**

7 PRINT OUTPUT

The following figure shows a typical printout. In principle, the **UniPol L** is able to communicate directly with a printer or to send the output to a PC.

The picture below shows, which parameters have to be changed in the menu ➪ **METHODS / PRINTOUT** and ➪ **METHODS / PRINTED COLUMNS** to customise the print-output for user needs.

```
Schmidt+Haensch                          01.01.2006   00:20
Serialnumber          12345
Method                A
User name             Administrator
Charge
ProbenID
Reset :               01.01.06 00:05   Benutzer : S+H
Kalibration :         01.01.06 00:31   Benutzer : Administrator


Angle    Temp.   Abs.   Tube    Sugar
  °        °C             mm      °Z*2

 0.00    20.0     0.0     200    -0.02
 0.00    20.0     0.0     200     0.00
 0.00    20.0     0.0     200    -0.02
 0.00    20.0     0.0     200    -0.02
 0.00    20.0     0.0     200    -0.02
 0.00    20.0     0.0     200    -0.02

 0.00    20.0     0.0            -0.01    Mittelwert
0.0011 0.000    0.00            0.0077    Std.Abw.
```

```
Printout
==============
Print DateTime
Print SerialNo
Print Method
Print Company
Print User
Print Batch
Print SampleID
Print cal.data
Print Header
Print Statistics
Use printer code
Output
Timeout printer
<- return
==============
Press „Enter"
to leave the
Submenu
==============
Yes
```

```
Printed columns
==============
1  Angle
2  Temperature
3  Abs.
4  Tube length
5  -----
6  -----
7  -----
8  -----
==============
Press „Enter"
to edit

==============
```

For sending data to a Computer, it is necessary that all parameters in ➪ **COMMUNICATION** are correct.

APPENDIX

A1 ERROR DESCRIPTION

NUMBER	DESCRIPTION	HELP
01	Value too small to display or value lower than the allowed range	Change format length
02	Value too large to display or value smaller than the allowed range	Change format length
03	Value out of allowable range	
04	Value was not measured	
05	Value not measured due to manual break	Measurement aborted. Press Start
07	Statistic value has error	
31	There is no module which can deliver that value	
40	Scale value smaller than the possible RI-range	
41	Scale value larger than the possible RI-range	
42	Scale value smaller than the possible temperature range	
43	Scale value larger than the possible temperature range	
44	Scale not active	Please activate the scale (Scales-ScaleXY-Active-yes)
45	Scale definition is incorrect	
70	Tube coding is wrong	
71	Quartz platte in the sample room	
72	Tube lenght not known. Please define it in the menu	
73	Calculation of quartz value out of range	
74	Can not calculate the absorption	
75	Sample room door open! Please close it.	Please close sample chamber!
76	Sample too dark	
77	Sample too dark	
78	Too much light, overdrive of preamplifier	

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