

Platon

Speaking Scientific Calculator



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1: Introduction

Platon, our scientific calculator with integrated speech output, not only provides the standard arithmetic functions, but also combines numerous scientific and other functions in one small and handy device!



Consult instructions before use! Do not operate Platon without reading the instruction manual. Get acquainted with the device and all the accessories. Keep the instruction for reference reading and pass it on with the device.

2: Description of the device

The case is long and flat with a shape similar to a remote control. On the surface are various keys, as well as the noticeable, flat display. Put the device in front of you so that the end with the display is furthest away from you.

Upper Side

All the keys can be found on the upper side. They are subdivided into 2 groups. The first group (nearest to you) consists of 4 rows, each including 4 small, square keys. The second group consists of 3 rows, each including 3 bigger, rectangular keys.

Left Side

On the left side of the device, you can find the socket for an optional power supply (not included).

Right Side

On the right side of the device, there are two outlets. The one farther away is a service outlet for our technicians. The one nearer to you is an earphone socket (earphones are also optional and not included).

Bottom Side

On the bottom side of the device, you will find four little rubber feet, the loudspeaker grill and the battery compartment.

3: Power supply

Batteries

PLATON operates with 2 x 1.5V AAA batteries. The battery compartment is situated on the bottom side of the device. To insert the batteries, turn over the device with the display end still furthest away from you. Right between the two upper rubber feet, you can feel a little notch. This is where you can open the battery compartment. Please note, that the lid is not completely removable! Put two 1.5V AAA batteries in the compartment with the flat (negative) end of each battery contacting the coil. Close the lid until it locks in place.

Power Supply

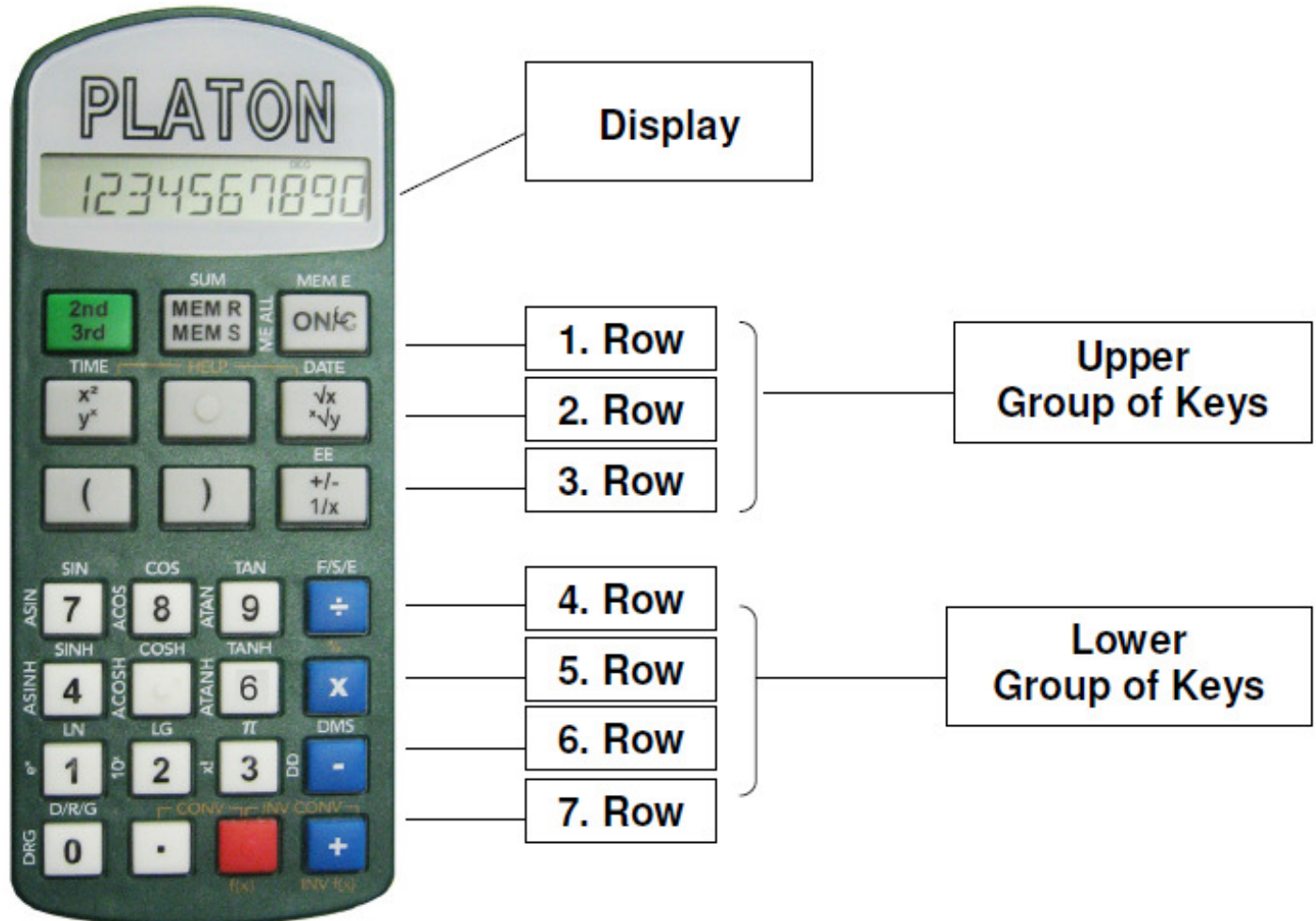
Platon can also be operated with a power supply unit. The power supply unit is not included in the delivery and has to be ordered separately! The socket for the power supply unit is located on the left side of the device.



Caution: Replace the batteries as soon as the device announces „battery weak“.

4: Keyboard Layout

The keyboard is subdivided into 2 groups: the lower group consists of 4 rows, each including 4 small, square keys. The upper group consists of 3 rows, each including 3 bigger, rectangular keys. Each key of the upper group operates two functions. In the following, we will describe each row top down



The button in row 1 column 1 has a shift function as known from a PC. A short press activates the second level (layer) of functions connected to the buttons and pressing long activates the third level.

4.1: Description of Buttons in Calculator Mode

Button		Layer 1		Layer 2	Layer 3
Row	Column	Short	Long		
1	1	2nd	3rd	-	-
1	2	Recall Memory	Save value	Add value	-
1	3	Delete or turn on	1 Step back	Delete 1 Memory	Delete all Memories
2	1	Quadrat	To the Power of	Announce Time	-
2	2	-	Menue	Statistic Mode	-
2	3	Square Root	Roots	Announce Date	-
3	1	Left Parenthesis	-	-	-
3	2	Right Parenthesis	-	-	-
3	3	Algebraic Sign	Reziprocal value	Exponent	-
4	1	Digit 7	Digit 7	Sinus	Arcus Sinus
4	2	Digit 8	Digit 8	Cosinus	Arcus Cosinus
4	3	Digit 9	Digit 9	Tangent	Arcus Tangent
4	4	Divided by	Modulo	Change Display	-
5	1	Digit 4	Digit 4	Sinus hyperbolicus	Area Sinus hyperbolicus
5	2	Digit 5	Digit 5	Cosinus hyperbolicus	Area Cosinus hyperbolicus
5	3	Digit 6	Digit 6	Tangent hyperbolicus	Area Tangent hyperbolicus
5	4	Times	Percent	Choice of number system	-
6	1	Digit 1	Digit 1	Natural Logarithm	e to the power of
6	2	Digit 2	Digit 2	Common logarithm	10 to the power of
6	3	Digit 3	Digit 3	Pi	factorial
6	4	minus	Algebraic sign (in front of Digit)	Convert to	Convert to Dezimal Hours

7	1	Digit 0	Digit 0	Choice of Degree	Convert Degree
7	2	Point	Negate	-	-
7	3	Equals, execute calculation	Execute choosen scientific function	-	-
7	4	plus	Execute choosen scientific function inversely	-	-

Save values

In order to save numbers in memory, choose the function “save value” (press and hold the button in the middle of the first row) and select a memory cell from number keys 1 to 9. This way the value is stored in the appropriate location (there are up to 9 different memory locations).

Select stored values

Use the function “recall memory” (short press on middle button of the first row) and then press the corresponding number key to select the value from a memory location (1 to 9).

Delete stored values

To delete a single space, select the function “delete one memory” (shift two and then on the right button of the top row) and then press a numeric key to delete a memory space (1 to 9). To delete all saved values, use function “delete all memories” (shift three and then press and hold the right button of the top row).

In addition there are multiple combinations of buttons. (several buttons have to be pressed at the same time in order to end up with certain functions):

Square + Square root (short): change to help mode (for details to Help mode please go further down in this manual)

Square + Square root (long): show/announce version number of software

Menue + Square: volume down

Menue + Square root: volume up

Digit 0 + Plus: Key lock

4.2: Description of Buttons in Statistic Mode

With the button menu in the second layer you change into the statistic mode ([2nd] [Menü]). In the statistic mode there are several statistical functions available but no basic calculations possible.

Button		Layer 1		Layer 2	Layer 3
Row	Column	Short	Long		
1	1	2nd	3rd	-	-
1	2	-	-	-	-
1	3	Exit statistic mode	1 Stepp back	-	-
2	1	Arithmetic mean value	Geometric mean value	- Announce Time	-
2	2	-	-	End statistic mode	-
2	3	Root mean square value	Harmonic mean	- Announce Date	-
3	1	Sum of all values	Product of all values	-	-
3	2	Standard deviation	Number of all values	-	-
3	3	Sum of squares of all values	Summ of reciprocal values	-	-
4	1	Digit 7	Digit 7	-	-
4	2	Digit 8	Digit 8	-	-
4	3	Digit 9	Digit 9	-	-
4	4	-	-	-	-
5	1	Digit 4	Digit 4	-	-
5	2	Digit 5	Digit 5	-	-
5	3	Digit 6	Digit 6	-	-
5	4	Factorial	-	-	-
6	1	Digit 1	Digit 1	-	-
6	2	Digit 2	Digit 2	-	-
6	3	Digit 3	Digit 3	-	-
6	4	Deduct a number	-	-	-
7	1	Digit 0	Digit 0	-	-
7	2	Point	-	-	-
7	3	Repeat result	-	-	-
7	4	Add a number	-	-	-

Again there are combinations of buttons to press to end up with certain functions:

Square + Square root (short): change into help mode (for details to Help mode please go further down in this manual)

Square + Square root (long): show/announce version number of software

Menu + Square: volume down

Menu + Square root: volume up

Digit 0 + Plus: Key lock

4.3: Turn Platon on/off

In order to turn Platon on press the button on/c (right button of first row). After some time without pressing a button Platon goes into a stand by mode. In this mode the time is shown. In order to get into stand by mode manually press all three buttons of the first row at the same time till you hear a beep.

4.4: Exiting a menu manually

For a general function of escape in the menu please press the button delete for a short time (1. row, right button).

4.5: Key lock

In order to activate or deactivate key lock press the buttons 0 and + at the same time till you hear a beep (lowest row, left and right buttons).

4.6: Volume

In order to increase the volume please press menu and square root at the same time several times (second row middle and right). In order to decrease the volume please press square and menu at the same time (second row left and middle). The step of volume is announced.

Attention: there is a step with volume 0 which means Platon is silent!

5: Calculations

With Platon you can execute all basic arithmetic operations, percent calculations, extract roots and square, and you have trigonometric functions, logarithms (natural and common), and hyperbolic functions.

The way of entering data is orientated in lines which means that you enter the whole calculation first, than press enter and the whole line is calculated. The

common laws of arithmetic are followed with it (multiplications before additions). For more complicated calculations you can use parentheses. The whole process of entering data and the result is announced. If you want to repeat the result, just press the equals button again and again. If you had an error by entering on digit, you can delete the last data by pressing the delete button (1. row, right button) long.

Numbers can be shown in three ways:

- **Decimal floating point:**
This is the default value. Numbers are shown as decimal numbers. If the space of the display is over or under floated, Platon changes automatically to exponent of 10 mode.
- **Scientific:**
Independent from the size of the number there is always an exponent shown.
- **Technical:**
As in the scientific mode there is always an exponent shown. This exponent can always be divided by three.
In Addition you can diminish the number of decimal places in all three modes. The display rounds the number to the shown decimal places.

5.1: Basic Arithmetic Operations

Addition (plus), subtraction (minus), multiplication (times), and division (divided by) count to the basic arithmetic operations. In order to execute one of these operations please enter a number, then chose an operator (the right button of rows 4 to 7), then enter another number and finally enter the equals button (row 7, second button from the right)

5.2: Extended Arithmetic Operations

Automatic calculation of percentages, squaring and extracting roots are with the extended arithmetic operations.

5.2.1: Automatic Calculation of Percentages

Calculating percentages you face different tasks:

Calculation	Example	Input
Percent	How much are 5% from 250	250 x 5 %
Percentage	250 are 5% from how much	250 / 5 %
Surcharge	How much are 250 plus 5% surcharge	250 + 5 %
Discount	How much are 250 minus 5% discount	250 – 5 %

In order to find out how much are 5% from 250 please enter first 250, then you press the button times (row 5 right button), then enter 5 and finalise the operation by pressing the button % (long press on times).

5.2.2: Squaring

In order to square a number please enter the number than press the buttons square (row 2 left button) and equals.

5.2.3: Extracting Square Roots

In order to extract a square root of a number please enter the number than press the buttons square root (row 2 right button) and equals.

5.2.4: Reziprocal Value

In order to get the reciprocal value of a number please enter the number and then press the buttons arithmetic signs (row 3 right button) for long and then equals.

5.2.5: To the power of

In order to put a number to the power of please enter the number, press the button square (row 2 left button) for long, then enter the exponent and the button equals. The exponent doesn't have to be an integer number.

5.2.6: Extracting of Roots

With Platon you can extract any roots not only square roots. First enter the number you want to extract the root from. Then please press the button square roots (row 2 left button) for long. For next you enter the exponent of the root and finally press equals. The exponent of the root doesn't have to be an integer number.

5.2.7: Π (Pi)

In order to calculate with pi please enter 2nd and 3.

5.3: Scientific Functions

As scientific functions Platon offers you trigonometric functions, logarithms, and hyperbolic functions with their reciprocal values.

As an alternative to complicated multiple combinations of buttons you can preselect a function, which you can use by pressing equals for long or + for long for the reciprocal function. The preselection is done over the menu (trigonometric functions, hyperbolic functions, or logarithms). Preselect the function you need and execute the calculation with a long press on equals or +. Example: calculating natural logarithms

- 1 long press on menu (row 2 middle) announcement: “trigonometric functions”
- 2 press 2 times on square root (row 2 right button) announcement: “hyperbolic functions” – “logarithms”
- 3 long press on menu announcement “logarithms select” - “natural logarithms”
- 4 short press on menu announcement “natural logarithm”
- 5 calculating “ln 22”
 - Enter 2 “2”
 - Enter 2 “22”
 - Press = long “natural logarithm”
 - Press = “equals”
 - Result. 3.091042453
- 6 calculating „e^{1.8}“
 - Same presets as above
 - Enter 1 “1”
 - Enter . „1.“
 - Enter 8 „1.8“
 - Press + long „e to the power of“
 - Press = “equals”
 - Result: 6.049647464

5.4: Conversions

With conversion you can interchange physical units aligned to preset factors quickly and easily.

5.4.1: Choice of physical Units

- Press the button menu for long (row 2 middle).
- Go to the submenu conversions using the buttons square (row 2 left) or square root (row 2 right) and confirm your choice with a long press on the menu button.
- choose the conversion you need using the square or square root buttons and confirm your choice by pressing the menu button for long.
- Platon offers the following conversions:
- custom conversion here you can enter any factor:
- After having chosen custom conversion by pressing the button menu for long custom conversion is announced. Please enter now a number that you have determined as conversion rate e.g. 2,54 for the conversion of centimetres into inches. The input is confirmed with a short press on menu or equals. The conversion rate is announced.
- Currency: As the conversion rates of currencies change very often, you can alter this conversion rate as well. Use the same procedure as used at custom conversion.

– **Temperatur: Conversion from °Celsius to °Fahrenheit**

$$T[°C] = (T[°F] - 32) / 1.8$$

$$T[°F] = T[°C] * 1.8 + 32$$

– **Volume: Conversion from liter to US-gallons**

$$1l = 0.264172052 \text{ US gal}$$

$$1 \text{ US gal} = 3.785411789 \text{ l}$$

– **Length: Conversion from kilometer to English miles:**

$$1\text{km} = 0.621371192\text{mi}$$

$$1\text{mi} = 1.609344001\text{km}$$

– **Weight: Conversion from kilogramm to pound:**

$$1\text{kg} = 2.204622622\text{lb}$$

$$1\text{lb} = 0.453592370\text{kg}$$

5.4.2: Executing a Conversion

Preset the conversion rate as described above. Then enter any number and press the buttons point and equals (row 7 middle buttons) at the same time. In order to revert the result press the buttons equals and plus (row 7 right buttons) at the same time.

5.5: Financial Calculator

Platon offers financial formulars in order to calculate compound interest and cash value as well as calculations of annuities. In order to get to the financial functions please press menue for long and go with the squire or square root buttons to financial calculator and confirm your choice with a short press on menue again.

5.5.1: Compound Interest

The calculation of compound interests gives you the answer to the question which final capital you will have with a starting capital a certain amount of time and a defined rate of interest.

After having choosen the formular with a long press on the menue button you will be asked to insert the initial capital. Enter the sum and confirm by pressing menue shortly. Now enter the rate of interest and confirm again. Finally you are asked to enter the duration in years. After having confirmed the final amount of the deposit is announced including initial capitla, interest, and compuond interests at the maturity. The formula used is:

$$\text{Final capital} = \text{initial capital} * (1 + \text{rate of interest}/100) * \text{duration}$$

5.5.2: Present Value

Present value is the value on a given date of a future payment or series of future payments, discounted to reflect the time value of money and other

factors such as investment risk. This means you can find out how much opening capital is needed in order to achieve a certain final capital, after a certain amount of time, and with a determined interest rate.

After you have chosen the formula, Platon will ask you to enter the final capital. Press the numbers on the numerical key and confirm by pressing the menu-button slightly. Now enter the interest rate and confirm again. In a final step Platon will ask you to tell him the duration. After you have confirmed again, Platon will tell you the sum needed as an opening capital. The formula looks like this:

$$\text{Present value} = \text{final capital} / ((1 + \text{interest rate}/100)^{\text{duration}})$$

5.5.3: Capital recovery factor

A capital recovery factor is the ratio of a constant annuity to the present value of receiving that annuity over a given length of time. This means you can find out how high regular instalments would have to be given the amount of opening capital (e.g. bankloan), the rate of interest, and the duration.

After you have chosen the formula, Platon will ask you to enter the amount of opening capital. Press the numbers on the numerical key and confirm by pressing the menu-button slightly. Now enter the interest rate and confirm again. In a final step Platon will ask you to tell him the duration. After you have confirmed again, Platon will tell you the sum you would have to pay regularly, e.g. for bankloans.

The formula looks like this:

$$\text{Rate} = \text{amount of credits} * \frac{((1 + \text{interest rate}/100)^{\text{duration}} * (\text{i.rate}/100) - 1)}{((1 + \text{interest rate}/100)^{\text{duration}}) - 1} * \frac{1}{12 + ((\text{i.rate}/100)/2) * 11}$$

5.5.4: Annuity (opening capital)

The term annuity is used in financial theory to refer to any closed stream of fixed payments over a specific time period. This means you can find out which final capital would be obtained after a certain amount of time and with a determined interest rate.

After you have chosen the formula, Platon will ask you to enter an annuity (e.g. monthly payments). Press the numbers on the numerical key and confirm by pressing the menu-button slightly. Now enter the interest rate and confirm again. In a final step Platon will ask you to tell him the duration. After you have confirmed again, Platon will tell you the final capital you would get after a certain duration and with a determined interest rate.

The formula looks like this:

$$\text{Capital} = \text{rate} * \frac{((1 + \text{interest rate}/100)^{\text{duration}}) - 1}{((1 + \text{i.rate}/100)^{\text{duration}} * (\text{i.rate}/100))} * (12 + ((\text{interest rate}/100)/2) * 11)$$

6: Statistics

Platon has the following statistical functions available:

- **addition of values**
- **subtraction of values**
- **Calculation of average values:**
 - arithmetic mean
 - geometric mean
 - quadratic mean
 - harmonic mean
- **Calculation of standard deviation**
- **display of the following parameters:**
 - number of entered values
 - sum of entered values
 - sum of the square of entered values
 - sum of reciprocity of entered
 - produkt of entered values

Example

You want to work out the arithmetic mean and standard deviation of a number of values

- 1) Enter to the statistics mode by pressing [2nd] [menu] - output "statistics"
Please notice that you can't do any other calculations in the statistics mode.
- 2) Enter the number series (example 3 - 4- 5):
 - [3] [+] - output "addition of values"
 - [4] [+] - output "addition of values"
 - [5] [+] - output "addition of values"
- 3) Calculation of the arithmetic mean:
 - [x²] - output "arithmetic mean"
 - result: 4
- 4) Calculation of standard deviation:
 - [)] - Output "standard deviation"
 - result: 0.816496581
- 5) In order to check whether all values have been entered, you have the possibility to ask Platon to tell you the entered values:
 - long [)] - output: "number of values"
 - result: 3
 - etc.

Just as when Platon is used as a normal calculator, the help-mode can be entered with regard to the various buttons: Press $[x^2]$ and $[\sqrt{x}]$ at the same time and you will enter to the help-mode ("help mode on"). Now you can press any button you like and Platon will tell you it's function. You can get out of the help mode by pressing both $[x^2]$ and $[\sqrt{x}]$ again ("help mode off").

You have the possibility of leaving the statistics mode by pressing $[2nd]$ $[menu]$ (like access).

7: Menu

In the menu you have the possibility to make modifications and respectively make assortments. To enter the menu, hold down the Menu button: this is the middle button in the second row and is marked with a tactile dot. When pressing the button, you will hear Platon say "menu". Now you can choose your favoured menu item by using the buttons to the left and right in the same row. Confirm your choice by holding down the middle button.

Menutree:

Main menu

```
|
+-- Conversions
|   |
|   +-- user factor (custom conversion)
|   +-- currency
|   +-- temperature
|   +-- capacity
|   +-- distance
|   \-- weight
|
+-- Financial calculator
|   |
|   +-- compound interest
|   +-- present value
|   +-- annuity
|   \-- annuity (opening capital)
|
\-- Settings
    |
    +-- volume
    |
    +-- number output
    |   |
    |   +--- number
    |   +--- digit by digit
    |
    +-- decimal place
    |
    +-- display mode
    |   |
    |   +--- floating decimal
    |   +--- scientific
    |   +--- technical
    |
    +-- goniometer
    |   |
    |   +--- degree
    |   +--- radian
    |   +--- grad
    |
    \-- clock
        |
        +-- alarm clock
        +-- time
        +-- date
```

7.1: Volume

With this menu item can the volume be adjusted. There are 7 volume levels (0-6), in which level 0 means no sound at all (no acoustic output).

7.2: Number output

This menu item provides the possibility of choosing whether Platon tells you the result of a calculation as either a whole number (such as 305) or as single numbers (such as 3_0_5). Confirm the menu item Number Output by holding down the middle button. Select your favoured option (whole or single numbers) by gently pressing the right or the left button, then confirm this choice by holding down the middle button.

7.3: Decimal place

The number of decimal places that are displayed can be limited retrospectively. If the setting is at '10' the zeros at the end of a number will be decreased accordingly

Limit the number of displayed respectively announced decimal places. If the settings are on '10', zeroes at the end of a number will be restrained.

7.4: Display mode

Choosing the display format for the numbers:

- **floating decimal:** Numbers not fitting into Platon's display (e.g. more than 10 digits) will be presented as decimal numbers (e.g. "12365.886", "twelve thousand, three hundred and sixty five point eight eight six"). If a number with the 10 digits on the display can't be demonstrated, Platon will automatically change the settings to "scientific format" - that is, the value will be displayed exponentially (e.g. 1237.653^{13} will be spoken aloud as "one thousand, two hundred and thirty-seven point six five three multiplied by ten, raised to the power thirteen").
- **scientific:** Numbers will be presented with an exponentiation of base 10 (e.g. „345.22-65“ will be three hundred and forty five multiplied by 10 raised to the power of minus sixty five”).

- **scientific:** Numbers will always be presented with an exponentiation of base 10. SI prefixes based on powers of 10 are also used to describe small or large quantities. For example, the prefix kilo means $10^3 = 1000$, so a kilo is 1000 grams:

Name	Abbreviation	Value	Exponential-diction
kilo	k	1 000	10^3
mega	M	1 000 000	10^6
giga	G	1 000 000 000	10^9
milli	m	0.000 1	10^{-3}
micro	μ	0.000 000 1	10^{-6}
nano	n	0.000 000 000 1	10^{-9}

You can also change the settings through the key combination [2nd] [I/].

7.5: Goniometer

With this menu item can the unit be determined by which the trigonometrical functions are calculated. There are the following options:

- Grad: this is the most common type. The full circle has got a radius of 360°
- Radian: the radian is a unit of plane angle, equal to $180/\pi$. Often used in the technical area. A full circle conforms to 2π
- Gon: the grad is a unit of plane angle, equivalent to $1/400$ of a full circle.

7.6: Clock

With this menu item can the time and date be adjusted, and alarm clock set.

7.6.1: Alarm Clock

There is the possibility of setting the alarm clock, and choosing from a variety of ringtones. Select the menu item Alarm Clock by holding down the middle button. Now choose your favoured ringtone by pressing the button to the left or to the right. Confirm this choice by holding down the middle button.

7.6.2: Time

To adjust the time, select the menu item Time by holding down the middle button. First choose the hour with the help of the buttons to the left or to the right. Confirm your choice by lightly pressing the middle button. Then adjust the minutes and confirm again by lightly pressing the middle button.

7.6.3: Date

To adjust the date, confirm the menu item Date by holding down the middle button. Now choose the year with the help of the buttons to the left or to the

right. Confirm your choice by lightly pressing the middle button. Then adjust the month and day and confirm again by lightly pressing the middle button.

8: Safety Instructions

Do not expose the device to extreme humidity, heat, cold, dust or dirt.

When exposed to splash water, wipe the device off. If water enters the device, remove the batteries and make sure the device is dry.

When not using the device for a longer period, remove the batteries, so they can not damage the device by leaking.

Make sure the batteries are inserted in the correct way.

9: Cleaning the Device

To clean the device, use a lightly moistened cloth only!



Caution: No liquid should enter the device! Avoid strong acid or scrubbing cleansers. Do not scrub the surface with rough sponges, as they could damage the case of the device.

10: Technical Data

Size:	l x b x h: ca. 150mm x 60mm x (12-20mm)
Weight:	130 g (incl. batteries)
Electricity:	2 units 1,5V AAA micro-batteries 1 adapter (not included in the contents)
Scope of delivery:	Platon calculator, 2 x 1,5V AAA micro-batteries, Instructions in black & white Optional: adapter, manual on cd

11: Guarantee and Service

From the date of purchase, we issue to the original purchaser of this product a guarantee of:

- twenty-four (24) months on the device itself,
- twelve (12) months on the accessories (e.g. power supply, earphones etc.),
- six (6) months on wear parts (e.g. battery, case etc.)

Please note that we do not issue any guarantee on batteries!

During the guarantee periods mentioned above, the product will be either repaired or replaced free of charge. In no event shall CareTec be liable for indirect, special or consequential damages. The exposure of the device to liquids, strong electromagnetic fields, heat as well as dropping the device or opening the case causes immediate loss of guarantee. In case of problems please contact CareTec or your local distributor before returning the device without any apparent reason. We will then inform you about the necessary procedures. The device may only be opened by authorized technicians!

CareTec reserves the right to make any changes or improvements to its products without further notice.

12: Legal Notice on the Disposal of Electronic Devices

12.1: Disposal of used Electronic Devices



This product must be disposed of separately from household waste at specially designated collection and recycling points. For further information please contact your local authorities.

12.2: Recycling Batteries



Batteries must not be disposed of in household waste. As a consumer you are legally obligated to bring your old batteries to public collecting points (in your community or any shop that provides these batteries).





Pb-Cd-Hg These signs can be found on contaminant-laden batteries.

Pb = containing lead

Cd = containing cadmium

Hg = containing mercury

13: Symbols used

	Caution
	Note
	Dispose of separately from household waste
	Manufacturer

14: Manufacturer



CareTec GmbH, Stubenbastei 1, A-1010 Vienna, Austria
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