

OLYMPIA 

SCIENTIFIC CALCULATOR

LCD-8110



USER'S GUIDE

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**LCD-8110
Scientific Calculator**

Safety Information

It is essential to read the following safety information before starting to use the calculator. Keep this guide close to hand for reference later.

Intended Use

This calculator serves exclusively for completing arithmetical processes indoors. Any other use is considered unintended use.

Batteries

- After removing the batteries from the calculator, put them in a safe place where there is no danger of them getting into the hands of small children and accidentally swallowed.
- Keep batteries out of the reach of small children. If accidentally swallowed, consult with a physician immediately.
- Never charge batteries, try to take batteries apart, or allow batteries to become shorted. Never expose batteries to direct heat or dispose them by incineration.
- Misuse of batteries can cause them to leak and damage nearby items. They also create the risk of fire and personal injury.
- Always make sure that a battery's positive (+) and negative (-) sides are facing correctly when you load it into the calculator.
- Remove the batteries if you do not plan to use the calculator for a long time.
- Use only the type of batteries specified for this calculator in this manual.

Disposal instructions

The implementation of European law in domestic legislation and national regulations requires a suitable disposal of durable goods. The aim is to protect people and the environment. The symbol on the side indicates that old electrical and electronic devices should not be disposed of in domestic waste.



After devices and equipment have reached the end of their service life, they must be brought to a collection point provided by an authorised waste disposal enterprise.

Old batteries must be returned to the point-of-sale or to a collection point provided by an authorised waste disposal enterprise.

Packing material must be disposed of according to local regulations.

Precautionary Measures When Using the Calculator

- It is essential to press the **ON/C** key before using the calculator for the first time.
- Be sure to press the Reset button on the back of the calculator before using it for the first time.
- Dead battery can leak, causing damage to and malfunction of the calculator. Never leave the dead battery in the calculator.
- The battery that comes with the unit discharges slightly during shipment and storage. Because of this, it may require replacement sooner than the normal expected battery life.

- Low battery power can cause memory contents to become corrupted or lost completely. Always keep written records of all important data.
- Avoid use and storage in areas subjected to temperature extremes. Very low temperatures can cause slow display response, total failure of the display, and shortening of battery life. Also avoid leaving the calculator in direct sunlight, near a window, near a heater or anywhere else it might become exposed to very high temperatures. Heat can cause discoloration or deformation of the calculator's case, and damage to internal circuitry.
- Avoid use and storage in areas subjected to large amounts of humidity and dust. Take care never to leave the calculator where it might be splashed by water or exposed to large amounts of humidity or dust. Such elements can damage internal circuitry.
- Never drop the calculator or otherwise subject it to strong impact.
- Never twist or bend the calculator. Avoid carrying the calculator in the pocket of your trousers or other tight-fitting clothing where it might be subjected to twisting or bending.
- Never try to take the calculator apart.
- Never press the keys on the calculator with a ballpoint pen or another pointed object.
- Use a soft, dry cloth to clean the exterior of the unit. If the calculator becomes very dirty, wipe it off with a cloth moistened in a weak solution of water and a mild neutral household detergent. Wring out all excess moisture before wiping the calculator. Never use thinner, benzine or other volatile agents to clean the calculator. Doing so can remove printed markings and damage the case.

Two-line Display

You can simultaneously check the calculation formula and its answer. The first line displays the calculation formula. The second line displays the answer.

$5 \times 3 + 2 \sin 60$
16.73205081

Before Starting to Calculate.....

Modes

Application	Mode name	Mode identification
Calculation modes		
Normal calculations	COMP	--
Standard deviation calculations	SD	SD
Regression calculations	REG	REG
Angle Unit Modes		
Degrees	Deg	D
Radians	Rad	R
Grads	Gra	g
Display Modes		
Exponential notation (Canceling FIX and SCI specification)	NORM 1 NORM 2	-- --
Number of decimal place specification	Fix	Fix
Number of significant digit specification	Sci	Sci

Note!

- Mode indicators appear in the lower part of the display.
- The COMP, SD and REG modes can be used in combination with the angle unit modes.
- Be sure to check the current calculation mode (SD, REG, COMP) and angle unit mode (DEG, RAD, GRA) before beginning a calculation.

Input capacity

- The memory area used for calculation input can hold 79 "steps". Whenever you input the 73rd step of any calculation, the cursor changes from "┌" to "■" to let you know memory is running low. If you still need to input more, you should divide your calculations into two or more parts.

Making corrections during input

- Use \leftarrow and \rightarrow to move the cursor to the location you want.
- Press **DEL** to delete the number or function at the current cursor position.

- Press **SHIFT** **INS** to change to an insert cursor I . Inputting something while the insert cursor is on the display inserts the input at the insert cursor position.
- Press **←**, **→**, **SHIFT** **INS** or **⇩** returns to the normal cursor from the insert cursor.

Replay function

- Pressing **←** or **→** recalls the last calculation you performed. You can then make any changes you want in the calculation and reexecute it.
- Pressing **AC** does not clear Replay memory, so you can recall the last calculation even after you press **AC**.
- Replay memory is cleared whenever you start a new calculation, change to another mode or turn off power.

Error locator

- Pressing **←** or **→** after an error occurs displays the calculation with the cursor positioned at the location where the error occurred.

Exponential display formats

This calculator can display up to 10 digits. Larger values are automatically displayed using exponential notation. In the case of decimal values, you can select between two formats that determine at what point exponential notation is used.

Press **MODE** **MODE** **MODE** **3** **1** (or **2**) to select NORM 1 or NORM 2.

- NORM 1

With NORM 1, exponential notation is automatically used for integer values with more than 10 digits and decimal values with more than two decimal places.

- NORM 2

With NORM 2, exponential notation is automatically used for integer values with more than 10 digits and decimal values with more than nine decimal places.

- All of the examples in this manual show calculation results using the NORM 1 format.

Answer memory

- Whenever you press **⇩** after inputting values or an expression, the calculated result is automatically stored in Answer Memory. You can recall Answer Memory contents by pressing **ANS**.
- Answer Memory can store up to 12 digits for the mantissa and two digits for the exponent.
- Answer Memory contents are not changed if the operation performed by any of the above key operations results in an error.

Basic Calculations

Note!

Use the $\boxed{\text{MODE}}$ key to activate COMP mode in order to carry out basic calculations.

COMP: $\boxed{\text{MODE}} \boxed{1}$

Example 1.: $3 \times (5 \times 10^{-9})$

$3 \times \boxed{5} \boxed{\text{EXP}} \boxed{(-)} \boxed{9} \boxed{=}$ 1.5⁻⁰⁸

Example 2.: $5 \times (9 + 7)$

$5 \times \boxed{9} \boxed{+} \boxed{7} \boxed{=}$ 80.

Memory Calculations

Note!

Use the $\boxed{\text{MODE}}$ key to activate COMP mode to complete calculations using the memory.

COMP: $\boxed{\text{MODE}} \boxed{1}$

Independent memory

- The values can be entered directly in the memory or added to and subtracted from the memory. Independent memory is convenient for calculating cumulative totals.
- Independent memory uses the same memory area as variable M.
- To clear independent memory, input $\boxed{\text{C}} \boxed{\text{STO}} \boxed{\text{M}+}$.

Example 1.:

$23 + 9 = 32$
 $53 - 6 = 47$
 $-) 45 \times 2 = 90$
(Total) -11

$23 \boxed{+} \boxed{9} \boxed{\text{STO}} \boxed{\text{M}+}$ 32.

$53 \boxed{-} \boxed{6} \boxed{\text{M}+}$ 47.

$45 \boxed{\times} \boxed{2} \boxed{\text{SHIFT}} \boxed{\text{M}+}$ 90.

$\boxed{\text{RC}} \boxed{\text{L}} \boxed{\text{M}}$ -11.

Variables

- There are nine variables (A through F, M, X and Y), which can be used to store data, constants, results and other values.
- Use the following operation to delete data assigned to all nine variables: $\boxed{\text{SHIFT}} \boxed{\text{MC}} \boxed{=}$ key.
- Use the following operation to delete data assigned to a particular variable: $\boxed{\text{C}} \boxed{\text{STO}} \boxed{\text{A}}$. This operation deletes the data assigned to variable A.

Example 1:

$$\frac{193.2}{23} = 8.4$$

$$\frac{193.2}{28} = 6.9$$

193.2 $\frac{STO}{\square}$ $\frac{A}{\square}$ $\frac{\div}{\square}$ 23 $\frac{=}{\square}$ 8.4
 $\frac{ALPHA}{\square}$ $\frac{A}{\square}$ $\frac{\div}{\square}$ 28 $\frac{=}{\square}$ 6.9

Fraction calculations

Note!

Use the $\frac{MODE}{\square}$ key to activate COMP mode when you want to perform fraction calculations. COMP: $\frac{MODE}{\square}$ $\frac{1}{\square}$

- Values are automatically displayed in decimal format whenever the total number of digits of a fractional value (integer+numerator+denominator+separator marks) exceeds 10.

Example 1: $\frac{2}{3} + 1\frac{4}{5}$

2 $\frac{\square}{\square}$ 3 $\frac{+}{\square}$ 1 $\frac{\square}{\square}$ 4 $\frac{\square}{\square}$ 5 $\frac{=}{\square}$ 2.715

Example 2: $\frac{1}{2} + 1.6$

1 $\frac{\square}{\square}$ 2 $\frac{+}{\square}$ 1.6 $\frac{=}{\square}$ 2.1

- Fraction/decimal calculation results are always decimal.

Decimal-to-Fraction Conversion

Example 1: $2.75 \rightarrow 2\frac{3}{4}$

2.75 $\frac{=}{\square}$ 2.75
 $\frac{\square}{\square}$ 2.34.
 $\frac{SHIFT}{\square}$ $\frac{\square}{\square}$ 11.4.

Fraction-to-Decimal Conversion

Example 1: $\frac{1}{2} \leftrightarrow 0.5$ (Fraction \leftrightarrow Decimal)

1 $\frac{\square}{\square}$ 2 $\frac{=}{\square}$ 1.2.
 $\frac{\square}{\square}$ 0.5
 $\frac{\square}{\square}$ 1.2.

Percentage calculation

Note!

Use the $\frac{MODE}{\square}$ key to activate COMP mode in order to carry out calculation of percentages. COMP: $\frac{MODE}{\square}$ $\frac{1}{\square}$

Example 1: Calculate 12% of 1500

1500 $\frac{\times}{\square}$ 12 $\frac{SHIFT}{\square}$ $\frac{\%}{\square}$ 180.

Example 2: To calculate what percentage of 880 is 660

660 $\frac{\div}{\square}$ 880 $\frac{SHIFT}{\square}$ $\frac{\%}{\square}$ 75.

Hyperbolic/Inverse hyperbolic functions

Example 1.: $\sinh 3.6$

$\boxed{\text{hyp}} \boxed{\text{sin}} 3.6 \boxed{=}$ 18.28545536

Example 2.: $\sinh^{-1} 30$

$\boxed{\text{hyp}} \boxed{\text{SHFT}} \boxed{\text{sin}^{-1}} 30 \boxed{=}$ 4.094622224

Angle Unit Conversion

- Press $\boxed{\text{SHFT}} \boxed{\text{DPS}}$ to display the the following menu:

D R G
1 2 3

- Pressing $\boxed{1}$, $\boxed{2}$ or $\boxed{3}$ converts the displayed value to the corresponding angle unit.

Example 1.: To convert 4.25 radians to degrees:

$4.25 \boxed{\text{SHFT}} \boxed{\text{DPS}} \boxed{1} \boxed{\text{R}} \boxed{=}$ 4.25r
243.5070629

Common and natural logarithms / antilogarithms

Example 1.: $\log 1.23$

$\boxed{\log} 1.23 \boxed{=}$ 0.089905111

Example 2.: $\ln 90$ ($=\log_e 90$)

$\boxed{\ln} 90 \boxed{=}$ 4.49980967

Example 3.: e^{10}

$\boxed{\text{SHFT}} \boxed{e^x} 10 \boxed{=}$ 22026.46579

Example 4.: $10^{1.5}$

$\boxed{\text{SHFT}} \boxed{10^x} 1.5 \boxed{=}$ 31.6227766

Example 5.: 2^4

$2 \boxed{X^Y} 4 \boxed{=}$ 16.

Square Roots, Cube Roots, Roots, Squares, Cubes, Reciprocals, Factorials, Random Numbers and π

Example 1.: $\sqrt{2 + \sqrt{3} \times \sqrt{5}}$

$\boxed{\sqrt{}} 2 \boxed{+} \boxed{\sqrt{}} 3 \boxed{\times} \boxed{\sqrt{}} 5 \boxed{=}$ 5.287196909

Example 2.: $3\sqrt{5+3}\sqrt{-27}$

$\boxed{3} \boxed{\sqrt{}} 5 \boxed{+} \boxed{3} \boxed{\sqrt{}} \boxed{-} 27 \boxed{=}$ -1.290024053

Example 3.: $\sqrt[7]{123}$ ($= 123^{\frac{1}{7}}$)

$7 \boxed{\text{SHFT}} \boxed{X^Y} 123 \boxed{=}$ 1.988647795

Example 4.: $123 + 30^2$

$123 \boxed{+} 30 \boxed{X^2} \boxed{=}$ 1023.

Example 5.: 12^3

12 [X³] = 1728.

Example 6.: $\frac{1}{3} - \frac{1}{4}$

[1] [3] [X⁻¹] [4] [X⁻¹] [=] 12.

Example 7.: $8!$

8 [SHIFT] [x!] = 40320.

Example 8.: To generate a random number between 0.000 and 0.999

[SHIFT] [RND] = 0.664

Example 9.: 3π

3 [SHIFT] [π] = 9.424777961

FIX, SCI, RND

Example 1.: $200 \div 7 \times 14 = 400$

200 [÷] 7 [×] 14 [=] 400.

(Defines three decimal places.)

[MODE] [MODE] [MODE] [3] [1] 400.000
Fix

(Calculation continues using 10 display digits)

200 [÷] 7 [=] 28.571

[×] 14 [=] 400.000

Complete the same calculation with the defined number of decimal places

200 [÷] 7 [=] 28.571

(Internal rounding)

[SHIFT] [RND] 28.571

[×] 14 [=] 399.994

- Press [MODE] [MODE] [MODE] [3] [1] to delete the FIX entry.

Example 2.: $1 \div 3$, to display results with two significant digits (SCI2).

[MODE] [MODE] [MODE] [2] [2] 1 [÷] 3 [=] 3.3⁻⁰¹
Sci

- Press [MODE] [MODE] [MODE] [3] [1] to delete the SCI entry.

ENG Calculations

Example 1.: Convert 56088 meters to kilometers.

$$56088 \text{ [ENG]} = 56.088^{03}$$

Example 2.: Convert 0.08125 gram to milligrams.

$$0.08125 \text{ [ENG]} = 81.25^{-03}$$

Coordinate conversion (Pol (x, y), Rec (r, θ))

- The results of the calculation are automatically assigned to variables E and F.

Example 1.: To convert polar coordinates ($r=2$, $\theta=60^\circ$) to rectangular coordinates (x, y) (DEG mode)

$$x \quad \text{[SHIFT] [REC] 2 [D] 60 [D] [ENG]} = 1.$$

$$y \quad \text{[RC] [D] [F]} = 1.732050808$$

- [RC] [D] [E] , [RC] [D] [F] swaps displayed value with value in memory.

Example 2.: To convert rectangular coordinates (1, $\sqrt{3}$) to polar coordinates (r, θ) (RAD mode)

$$r \quad \text{[POL] 1 [D] [D] 3 [D] [ENG]} = 2.$$

$$\theta \quad \text{[RC] [D] [F]} = 1.047197551$$

- [RC] [D] [E] , [RC] [D] [F] swaps displayed value with value in memory.

Permutation

Example 1.: To determine how many different 4-digit values can be produced using the numbers 1 through 7.

- Numbers cannot be duplicated within the same 4-digit value (1234 is allowed, but 1123 is not).

$$7 \text{ [SHIFT] [nPr] 4 [ENG]} = 840.$$

Combination

Example 1.: To determine how many different 4-member groups can be organized in a group of 10 individuals.

$$10 \text{ [nCr] 4 [ENG]} = 210.$$

Statistical Calculations

Note!

Use the \square key to activate SD mode to complete statistical calculations using standard deviation.

SD: \square

Standard Deviation (SD mode)

- Data input always starts with \square \square \square to clear statistical memory.
- Input data is used to calculate values for $\sum x^2$, $\sum x$, n , \bar{x} , σ_{n-1} , σ_n , σ_{n-1} which you can recall using the key operations noted nearby.

\square	\square	$\sum x^2$
\square	\square	$\sum x$
\square	\square	n
\square	\square	\bar{x}
\square	\square	σ_n
\square	\square	σ_{n-1}

Example 1.: Calculate σ_{n-1} , σ_n , \bar{x} , n , $\sum x$, $\sum x^2$ for the following data:
55, 54, 51, 55, 53, 53, 54, 52

Memory Clear: \square \square \square

55 \square 54 \square 51 \square 55 \square 52.
53 \square 54 \square 52 \square SD

(Sample Standard Deviation σ_{n-1})

\square \square \square 1.407885953

(Population Standard Deviation σ_n)

\square \square \square 1.316956719

(Arithmetic mean \bar{x})

\square \square \square 53.375

(No. of entries n)

\square \square \square 8.

(Sum of values $\sum x$)

\square \square \square 427.

(Sum of the squares of the values $\sum x^2$)

\square \square \square 22805.

Precautionary measures when entering data

- \square \square inputs the same data twice.
- You can also input multiple entries of the same data using \square \square .
To input the data 110 ten times, for example, press 110 \square \square 10 \square .
- The above results can be obtained in any order, and not necessarily that shown above.
- To delete data you have just input, press \square \square .

Regression calculation (REG mode)

Note!

Use the $\boxed{\text{MODE}}$ key to activate Reg mode to complete statistical calculations with regressions. REG: $\boxed{\text{MODE}}$ $\boxed{\text{3}}$

- $\boxed{1}$ Linear regression
- $\boxed{2}$ Logarithmic regression
- $\boxed{3}$ Exponential regression
- \blacktriangleright $\boxed{1}$ Power regression
- \blacktriangleright $\boxed{2}$ Inverse regression
- \blacktriangleright $\boxed{3}$ Quadratic regression

- Data input always starts with $\boxed{\text{SHIFT}}$ $\boxed{\text{SC}} \boxed{\text{MC}}$ to clear statistical memory.
- The values produced by a regression calculation depend on the values input, and results can be recalled using the key operations shown in the table below.

$\boxed{\text{RCL}}$ $\boxed{\text{A}}$	Σx^2	$\boxed{\text{SHIFT}}$ $\boxed{x\sigma_{n-1}}$	$x\sigma_{n-1}$
$\boxed{\text{RCL}}$ $\boxed{\text{B}}$	Σx	$\boxed{\text{SHIFT}}$ $\boxed{\bar{y}}$	\bar{y}
$\boxed{\text{RCL}}$ $\boxed{\text{C}}$	n	$\boxed{\text{SHIFT}}$ $\boxed{y\sigma_n}$	$y\sigma_n$
$\boxed{\text{RCL}}$ $\boxed{\text{D}}$	Σy^2	$\boxed{\text{SHIFT}}$ $\boxed{y\sigma_{n-1}}$	$y\sigma_{n-1}$
$\boxed{\text{RCL}}$ $\boxed{\text{E}}$	Σy	$\boxed{\text{SHIFT}}$ $\boxed{\text{A}}$	Regression coefficient A
$\boxed{\text{RCL}}$ $\boxed{\text{F}}$	Σxy	$\boxed{\text{SHIFT}}$ $\boxed{\text{B}}$	Regression coefficient B
$\boxed{\text{RCL}}$ $\boxed{\text{M}}$	Σx^3	$\boxed{\text{SHIFT}}$ $\boxed{\text{C}}$	Regression coefficient C
$\boxed{\text{RCL}}$ $\boxed{\text{X}}$	$\Sigma x^2 y$	$\boxed{\text{SHIFT}}$ \boxed{r}	Correlation coefficient r
$\boxed{\text{RCL}}$ $\boxed{\text{Y}}$	Σx^4	$\boxed{\text{SHIFT}}$ $\boxed{\hat{x}}$	(estimated value of x) \hat{x}
$\boxed{\text{SHIFT}}$ $\boxed{\bar{x}}$	\bar{x}	$\boxed{\text{SHIFT}}$ $\boxed{\hat{y}}$	(estimated value of y) \hat{y}
$\boxed{\text{SHIFT}}$ $\boxed{x\sigma_n}$	$x\sigma_n$		

Linear regression

The regression equation for linear regression is: $y = A+Bx$.

Example 1.: Atmospheric pressure vs. temperature

Temperature	Atmospheric pressure
10°C	1003 hPa
15°C	1005 hPa
20°C	1010 hPa
25°C	1011 hPa
30°C	1014 hPa

Perform linear regression to determine the regression formula terms and correlation coefficient for the data nearby. Next, use the regression formula to estimate atmospheric pressure at 18°C and temperature at 1000 hPa.

Enter REG Mode (Linear Regression): **MODE** **3** **1**

Memory Clear: **SHIFT** **SC** **=**

10 **→** 1003 **GT** 15 **→** 1005 **GT**

20 **→** 1010 **GT** 25 **→** 1011 **GT**

30 **→** 1014 **GT**

30.
REG

(Regression coefficient A)

SHIFT **A** **=**

997.4

(Regression coefficient B)

SHIFT **B** **=**

0.56

(Correlation coefficient r)

SHIFT **r** **=**

0.982607368

(Atmospheric pressure at 18°C)

18 **SHIFT** **Y** **=**

1007.48

(Temperature at 1000 hPa)

1000 **SHIFT** **X** **=**

4.642857143

Quadratic regression

- The regression equation for quadratic regression is:
 $y = A+Bx+Cx^2$
- Input data using the following key sequence.
<x-data> **→** <y-data> **GT**
- Example:

x_i	y_i
29	1.6
50	23.5
74	38.0
103	46.4
118	48.0

Perform quadratic regression to determine the regression formula terms and correlation coefficient for the data nearby. Next, use the regression formula to estimate the values for \hat{y} (estimated value of y) for $x_i = 16$ and \hat{x} (estimated value of x) for $y_i = 20$.

Enter REG mode (Quadratic regression)

MODE **3** **▶** **3**

Memory Clear: **SHIFT** **SC** **=**

29 **→** 1.6 **GT** 50 **→** 23.5 **GT**

74 **→** 38.0 **GT** 103 **→** 46.4 **GT**

118 **→** 48.0 **GT**

118.
REG

(Regression coefficient A)

SHIFT **A** **=**

-35.599856934

(Regression coefficient B)

SHIFT **B** **=**

1.495939413

(Regression coefficient C)

SHIFT **C** **=**

-6.71629667⁻⁰³

(\hat{y} when $x_i = 16$)

16 [SHIFT] [Y] [=] -13.38291067

(\hat{x} when $y_i = 20$)

20 [SHIFT] [X] [=] 47.14556728

(\hat{x}_2 when $y_i = 20$)

[SHIFT] [X] [=] 175.5872105

Precautionary measures when entering data

- [C] [C] inputs the same data twice.
- You can also input multiple entries of the same data using [SHIFT] [Z] .
To input the data "20 and 30" five times, for example, press 20 [SHIFT] [Z] 30 [SHIFT] [Z] 5 [C] .
- The above results can be obtained in any order, and not necessarily that shown above.
- To delete data you have just input, press [SHIFT] [C] .

Degrees, Minutes, Seconds Calculations

- You can complete sexagesimal calculations using degrees (hours), minutes and seconds and convert between sexagesimal and decimal values.

Example 1.: To convert the decimal value 2.258 to a sexagesimal value

2.258 [=] [SHIFT] [DMS] [=] 2.258
 [SHIFT] [DMS] [=] 2°15'28.8"

Example 2.: To perform the following calculation:
12°34'56" x 3.45

12 [DMS] 34 [DMS] 56 [DMS] [X] 3.45 [=] 43°24'31.2"

Technical Information

When you have a problem...

If calculation results are not what you expect or if an error occurs, perform the following steps.

1. [MODE] [1] (COMP mode)
2. [MODE] [MODE] [1] (DEG mode)
3. [MODE] [MODE] [MODE] [3] [1] (NORM 1 mode)
4. Check the formula you are working with to confirm it is correct.
5. Enter the correct modes to perform the calculation and try again.

Error messages

The calculator is locked up while an error message is on the display. Press **AC** to clear the error, or press **◀** or **▶** to display the calculation and correct the problem.

Ma ERROR

- **Cause**
- Calculation result is outside the allowable calculation range.
- Attempt to perform a function calculation using a value that exceeds the allowable input range.
- Attempt to perform an illogical operation (division by zero, etc.).
- **Action**
- Check your input values and make sure they are all within the allowable ranges. Pay special attention to values in any memory areas you are using.

Stk ERROR

- **Cause**
- Capacity of the numeric stack or operator stack is exceeded.
- **Action**
- Simplify the calculation. The numeric stack has 10 levels and the operator stack has 24 levels.
- Divide your calculation into two or more separate parts.

Syn ERROR

- **Cause**
- Attempt to perform an illegal mathematical operation.
- **Action**
- Press **◀** or **▶** to display the calculation with the cursor located at the location of the error. Make necessary corrections.

Arg ERROR

- **Cause**
- Improper use of argument
- **Action**
- Press **◀** or **▶** to display the location of the cause of the error and make required corrections.

Order of Operations

Calculations are performed in the following order of precedence.

1. Coordinate conversion: Pol (x, y), Rec (r, θ)
2. Type A functions: With these functions, the value is entered and then the function key is pressed.
 x^2 , x^{-1} , $x!$, o''''
3. Powers and roots: x^y , $x\sqrt{\quad}$
4. $a^{b/c}$
5. Abbreviated multiplication format in front of π , memory name, or variable name: 2π , $5A$, πA etc.
6. Type B functions: With these functions, the function key is pressed and then the value is entered.
 $\sqrt{\quad}$, $\sqrt[3]{\quad}$, \log , \ln , e^x , 10^x , \sin , \cos , \tan , \sin^{-1} , \cos^{-1} , \tan^{-1} , \sinh , \cosh , \tanh , \sinh^{-1} , \cosh^{-1} , \tanh^{-1} , $(-)$
7. Abbreviated multiplication format in front of Type B functions: $2\sqrt{3}$, $A\log 2$ etc.
8. Permutation and combination: nPr , nCr

9. \times , \div
10. $+$, $-$

Operations of the same precedence are performed from right to left, $e^{\ln\sqrt{120}} > e^{\sqrt{\ln(120)}}$. Other operations are performed from left to right. Operations enclosed in parentheses are performed first.

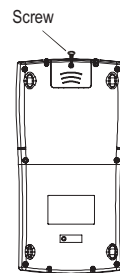
Stacks

This calculator uses memory areas, called "stacks", to temporarily store values (numeric stack) and commands (command stack) according to their precedence during calculations. The numeric stack has 10 levels and the command stack has 24 levels. A stack error (Stk ERROR) occurs whenever you try to perform a calculation that is so complex that the capacity of a stack is exceeded.

Replacing the Battery

Dim figures on the display of the calculator indicate that battery power is low. Continued use of the calculator when the battery is low can result in improper operation. Replace the battery as soon as possible when display figures become dim.

1. Press **OFF** to turn power off.
2. Remove the one screw that hold the battery cover in place and then remove the battery cover.
3. Remove the old battery.
4. Wipe off the sides of new battery with a dry, soft cloth. Load it into the unit with the positive **+** side facing up (so you can see it).
5. Replace the battery cover and secure it in place with the one screw.
6. Use a thin, pointed object to press the Reset button. Be sure not to skip this step.
7. Press **AC** to turn power on.



Auto Power Off

Calculator power automatically turns off if you do not perform any operation for about six minutes. When this happens, press **AC** to turn power on.

Input ranges

Internal digits: 12

Accuracy: As a rule, accuracy is +/- 1 at the 10th digit.

Functions	Input range	
sin x	DEG	$0 \leq x \leq 4,499999999 \times 10^{10}$
	RAD	$0 \leq x \leq 785398163,3$
	GRA	$0 \leq x \leq 4,499999999 \times 10^{10}$
cos x	DEG	$0 \leq x \leq 4,500000008 \times 10^{10}$
	RAD	$0 \leq x \leq 785398164,9$
	GRA	$0 \leq x \leq 5,000000009 \times 10^{10}$
tan x	DEG	Same as sin x, except when $ x = (2n-1) \times 90$.
	RAD	Same as sin x, except when $ x = (2n-1) \times \pi/2$.
	GRA	Same as sin x, except when $ x = (2n-1) \times 100$.
sin ⁻¹ x	$0 \leq x \leq 1$	
cos ⁻¹ x	$0 \leq x \leq 1$	
tan ⁻¹ x	$0 \leq x \leq 9,999999999 \times 10^{99}$	
sinh x	$0 \leq x \leq 230,2585092$	
cosh x	$0 \leq x \leq 230,2585092$	
sinh ⁻¹ x	$0 \leq x \leq 4,999999999 \times 10^{99}$	
cosh ⁻¹ x	$0 \leq x \leq 4,999999999 \times 10^{99}$	
tanh x	$0 \leq x \leq 9,999999999 \times 10^1$	
tanh ⁻¹ x	$0 \leq x \leq 9,999999999 \times 10^1$	
log x / ln x	$0 < x$	
10 ^x	$-9,999999999 \times 10^{99} \leq x \leq 99,99999999$	
e ^x	$-9,999999999 \times 10^{99} \leq x \leq 230,2585092$	
\sqrt{x}	$0 \leq x < 1 \times 10^{100}$	
x ²	$ x < 1 \times 10^{60}$	
1/x	$ x < 1 \times 10^{100}; x \neq 0$	

Functions	Input range
$\sqrt[3]{x}$	$ x < 1 \times 10^{100}$
$x!$	$0 \leq x \leq 69$ (x is an integer)
nPr	$0 \leq n \leq 99, r \leq n$ (n, r is an integer) $1 \leq \frac{n!}{(n-r)!} \leq 9,999,999,999 \times 10^{99}$
nCr	$0 \leq n \leq 99, r \leq n$
$\text{Pol}(x, y)$	$ x , y \leq 9,999,999,999 \times 10^{49}$ $(x^2 + y^2) \leq 9,999,999,999 \times 10^{99}$
$\text{Rec}(r, \theta)$	$0 \leq r \leq 9,999,999,999 \times 10^{99}$ θ : Same as $\sin x, \cos x$
$\circ \circ "$	$ a , b , c < 1 \times 10^{100}$ $0 \leq b, c$
$\overleftarrow{\circ \circ "}$	$ x < 1 \times 10^{100}$ Decimal \leftrightarrow Sexagesimal Conversions $0^\circ 0' 0'' \leq x \leq 99999999999^\circ 59'$
x^y	$x > 0: -1 \times 10^{100} < y \log x < 100$ $x = 0: y > 0$ $x < 0: y = n, \frac{1}{2n+1}$ (n is an integer) However: $-1 \times 10^{100} < y \log x < 100$
$x \sqrt[y]{y}$	$y > 0: x \neq 0$ $-1 \times 10^{100} < 1/x \log y < 100$ $y = 0: x > 0$ $y < 0: x = 2n+1, \frac{1}{n}$ ($n \neq 0$; n is an integer) However: $-1 \times 10^{100} < 1/x \log y < 100$
a^b/c	Total of integer, numerator, and denominator must be 10 digits or less (including division marks).
SD (REG)	$ x < 1 \times 10^{60}$ $ y < 1 \times 10^{60}$ $ n < 1 \times 10^{100}$ $x\sigma_n, y\sigma_n, \bar{x}, \bar{y}$ $A, B, r: n \neq 0$ $x\sigma_{n-1}, y\sigma_{n-1}: n \neq 0, 1$

Note!
Error are cumulative with such internal continuous calculations as $x^y, x\sqrt[y]{y}, x!, \sqrt[3]{x}$ so accuracy may be adversely affected.

Guarantee

Dear Customer,

We are very pleased that you have decided to buy this product. Should the device show signs of a defect, please return it, together with the purchase receipt and original packing, to the point-of-sale.

Homepage

User manuals for the following countries are available on the www.olympia-vertrieb.de homepage:

Germany, France, Italy, England, Portugal, Netherland, Greece, Finland, Czech Republic, Sweden, Slovakia, Hungary, Denmark, Croatia and Slovenia.

Hotline Germany: 0180 5012370 (0,14 € per minute)

Hotline foreign countries: 00800 10022100



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EN 55022: 2006

EN 55024: 1998 + A1: 2001+A2:2003

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OLYMPIA  [®]

Olympia Business Systems Vertriebs GmbH

Weg zum Wasserwerk 10

45525 Hattingen

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