

CITIZEN

SR-281 / SR-282

Scientific Calculator

HDBMR17EE01 D25

General Guide

Turning on or off

To turn the calculator on, press [ON/C] ; To turn the calculator off, press [2nd] [OFF] .

Battery replacement

SR-281 is powered by two alkaline batteries (GP76A or LR44).
SR-282 is powered two AA-size (UM-3) batteries. If the display becomes dim and difficult to read, the batteries should be replaced as soon as possible.

To replace batteries :

- 1) Slide the battery compartment cover in the direction indicated by the arrow and remove it.
- 2) Remove the old batteries and install new ones with polarity in correct directions, then replace the battery compartment cover and press [ON/C] .

Auto power-off function

This calculator automatically turns it off when not operated for approximately 6~9 minutes. It can be reactivated by pressing [ON/C] key and the display, memory, settings are retained.

Reset operation

If the calculator is on but you get unexpected results, press [MODE] [4] (RESET) in sequence. A message appears on the display to confirm whether you want to reset the calculator and clear memory contents.

RESET : N Y

Move the cursor to " Y " by [→], then press [ENTER] to clear all variables, pending operations, statistical data, answers, all previous entries, and memory; To cancel the reset operation without clearing the calculator, please choose " N " .

If the calculator is lock and further key operations becomes impossible, please press [0] [CE] at the same time to release the condition. It will return all settings to default settings.

Contrast adjustment

Pressing the [-] or [+] following [MODE] key can make the contrast of the screen lighter or darker. Holding either key down will make the display become respectively lighter or darker.

Display readout

The display comprises two lines and indicators. The upper line is a dot display up to 128 characters. The lower line is capable of displaying a result of up to 12 digits, as well as 2-digits positive or negative exponent.

When formulas are input and executed the calculation by [ENTER] , they are displayed on the upper line, and then results are shown on the lower line.

The following indicators appear on the display to indicate you the current status of the calculator.

Indicator	Meaning
M	Running memory
-	Result is negative
E	Error
STO	Storing variable mode is active
RCL	Recalling variable mode is active
2nd	2nd set of function keys are active
HYP	Hyperbolic-trig function will be calculated
ENG	Engineering symbol notation
CPLX	Complex number mode is active
CONST	Display physics constants
DEGRAD	Angle mode : DEGrees, GRADs, or RADs
BIN	Binary base
OCT	Octal base
HEX	Hexadecimal base
()	Open parentheses
TAB	Number of decimal places displayed is fixed
STAT	Statistics mode is active
REG	Regression mode is active
EDIT	Statistics data is being edited
CPK	CPK : Process capability CP : Precision capability
USL	Set upper specification limit
LSL	Setting lower specification limit
<i>i</i>	Imaginary part
↶	Allow to use undo function

Before Starting Calculation

Using "MODE" keys

Press [MODE] to display mode menus when specifying an operating mode (" 1 MAIN ", " 2 STAT ", " 3 CPLX ", " 4 RESET ") or the engineering symbol notation (" 5 ENG ").

- 1 MAIN : Use this mode for basic calculations, including scientific calculations and Base-n calculations.
- 2 STAT : Use this mode to perform single-variable and paired-variable statistical calculations and regression calculations.
- 3 CPLX : Use this mode to perform complex number calculation.
- 4 RESET : Use this mode to perform reset operation.
- 5 ENG : Use this mode to allow engineering calculations utilizing engineering symbol.

Give " 2 STAT " as an example :

Method 1 : Press [MODE] and then scroll through the menus using [→] or [2nd][↶] until " 2 STAT " is underlined, then enter the desired mode by pressing [ENTER].

Method 2 : Press [MODE] and then key in directly the number of the mode, [2], to enter the desired mode immediately.

Using "2nd" Keys

When you press [2nd], the "2nd" indicator shown in the display is to tell you that you will be selecting the second function of the next key you press. If you press [2nd] by mistake, simply press [2nd] again to remove the "2nd" indicator.

Corrections

If you have made a mistake when entering a number (but you have not yet pressed an arithmetic operator key), just press [CE] to clear the last entry then input it again, or delete individual digits by the backspace key [←], or clear all entry by [ON/C].

After making corrections, input of the formula is complete, the answer can be obtained by pressing [ENTER]. You can also press [ON/C] to clear the immediate results completely (except clearing memory). If you press the wrong arithmetic operation key, just press the correct key to replace it.

Undo function

The unit offers an undo function which allows you to undo some of the errors you just have made.

When a character which is just deleted by [→], an entry which is just cleared [CE], or which is just cleared by [ON/C], the "↶" indicator shown in the display is to tell you that you can press [2nd][↶] to cancel the operation.

Replay function

This function stores operations that just have been executed. After execution is completed, pressing [→] or [2nd][↶] key will display the operation executed. Pressing [→] will display the operation from the beginning, with the cursor located under the first character. Pressing [2nd][↶] will display the operation from the end, with the cursor located at the space following the last character. You can continue moving the cursor by [→] or [2nd][↶] and editing values or commands for subsequent execution.

Memory calculation

Memory variable

The calculator has nine memory variables for repeated use -- A, B, C, D, E, F, M, X, Y. You can store a real number in any of the nine memory variables.

- [STO] + [A] ~ [F], [M], [X] ~ [Y] lets you store values to variables.
- [RCL] + [A] ~ [F], [M], [X] ~ [Y] recalls the value of the variable.
- [0][STO] + [A] ~ [F], [M], [X] ~ [Y] clears the content to a specified memory variable.

➤ (1) Put the value 30 into variable A

30 [STO] [A]	DEG 30 → A 30 .
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➤ (2) Multiple 5 to variable A, then put the result into variable B

5 [x] [RCL] [A] [<u>ENTER</u>]	DEG 5 * A = 150 .
[STO] [B]	DEG 150 → B 150 .

➤ (3) Clear the value of variable B

0 [STO] [B]	DEG 0 → B 0 .
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[RCL][B][<u>ENTER</u>]	DEG B = 0.
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Running memory

You should keep the following rules in mind when using running memory.

- Press [M+] to add a result to running memory and the " M " indicator appears when a number is stored in the memory. Press [MR] to recall the content of running memory.
- Recalling from running memory by pressing [MR] key does not affect its contents .
- Running memory is not available when you are in statistics mode.
- The memory variable M and running memory utilize the same memory area.
- In order to replace the content of the memory with the displayed number, please press [X \rightarrow M] key.
- To clear the content of running memory, you can press [0] [X \rightarrow M], [CE] [X \rightarrow M] or [0] [STO] [M] in sequence.

➤ $((3 \times 5) + (56 \div 7) + (74 - 8 \times 7)) = 41$

0 [X \rightarrow M]	DEG 0.
3 [x] 5 [M+] 56 [÷] 7 [M+] 74 [-] 8 [x] 7 [M+]	DEG 7 4 - 8 * 7 M+ M 1 8 .
[MR]	DEG M M 4 1 .
0 [X \rightarrow M]	DEG 0.

(Note) : Besides pressing [STO] or [X \rightarrow M] key to store a value, you can also assign values to memory variable M by [M+]. However, when [STO] [M] or [X \rightarrow M] is used, previous memory contents stored in variable M are cleared and replaced it with the newly assigned value. When [M+] is used, values is added to present sum in memory.

Order of operations

Each calculation is performed in the following order of precedence:

- 1) Fractions
- 2) Expression inside parentheses.
- 3) Coordinates transformation (P \rightarrow R , R \rightarrow P)

- 4) Type A functions which are required entering values before pressing the function key, for example, x^2 , $1/x$, π , $x!$, $\%$, RND, ENG, $\circ \rightarrow \rightarrow \rightarrow$, $\rightarrow \circ \rightarrow \rightarrow$, x^y , y^x .
- 5) x^y , $\sqrt[y]{x}$
- 6) Type B functions which are required pressing the function key before entering, for example, \sin , \cos , \tan , \sin^{-1} , \cos^{-1} , \tan^{-1} , \sinh , \cosh , \tanh , \sinh^{-1} , \cosh^{-1} , \tanh^{-1} , \log , \ln , FRAC, INT, $\sqrt{\quad}$, $\sqrt[3]{\quad}$, 10^x , e^x , NOT, EXP, DATA in STAT mode.
- 7) + / -, NEG
- 8) nPr, nCr
- 9) x, +
- 10) +, -
- 11) AND, NAND --- only Base-n mode
- 12) OR, XOR, XNOR --- only Base-n mode

Accuracy and Capacity

Output digits : Up to 12 digits.

Calculating digits : Up to 14 digits

In general, every reasonable calculation is displayed up to 12 digits mantissa, or 12-digits mantissa plus 2-digits exponent up to $10^{\pm 99}$.

Numbers used as input must be within the range of the given function as follow :

Functions	Input range
$\sin x$ $\cos x$ $\tan x$	Deg : $ x < 4.5 \times 10^{10}$ deg Rad : $ x < 2.5 \times 10^8 \pi$ rad Grad : $ x < 5 \times 10^{10}$ grad however, for $\tan x$ Deg : $ x \neq 90 (2n+1)$ Rad : $ x \neq \frac{\pi}{2} (2n+1)$ Grad : $ x \neq 100 (2n+1)$, (n is an integer)
$\sin^{-1} x$, $\cos^{-1} x$	$ x \leq 1$
$\tan^{-1} x$	$ x < 1 \times 10^{100}$
$\sinh x$, $\cosh x$	$ x \leq 230.2585092$
$\tanh x$	$ x < 1 \times 10^{100}$
$\sinh^{-1} x$	$ x < 5 \times 10^{99}$
$\cosh^{-1} x$	$1 \leq x < 5 \times 10^{99}$
$\tanh^{-1} x$	$ x < 1$

For negative values, press [+/-] after entering the value; You can enter a number in mantissa and exponent form by [EXP] key.

- $2.75 \times 10^{-5} = 0.0000275$

2.75 [EXP] 5 [+/-] [<u>ENTER</u>]	DEG 2 . 7 5 E - 0 5 = 0.0000275
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Results greater than 10^{12} or less than 10^{-11} are displayed in exponential form.

- $12369 \times 7532 \times 74103 = 6903680612720$
 $= 6.90368061272 \times 10^{12}$

12369 [x] 7532 [x] 74103 [<u>ENTER</u>]	DEG 1 2 3 6 9 * 7 5 3 2 * 7 6.90368061272
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Parentheses calculations

Operations inside parentheses are always executed first. **SR-281 / SR-282** can use up to 13 levels of consecutive parentheses in a single calculation.

Closed parentheses occurring immediately before operation of the []] key may be omitted, no matter how many are required.

- $2 \times (7 + 6 \times (5 + 4)) = 122$

2 [(] 7 [+] 6 [(] 5 [+] 4 [<u>ENTER</u>]	DEG 2 * (7 + 6 * (5 + 4 = 1 2 2 .
--	---

(Note) : A multiplication sign " x " occurring immediately before an open parenthesis can be omitted.

The correct result cannot be derived by entering [(] 2 [+] 3 [)] [EXP] 2. Be sure to enter [x] between the [)] and [EXP] in the below example.

- $(2 + 3) \times 10^2 = 500$

[(] 2 [+] 3 [)] [x] [EXP] 2 [<u>ENTER</u>]	DEG (2 + 3) * 1 E 0 2 = 5 0 0 .
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Percentage calculation

[2nd] [%] divides the number in the display by 100. You can use this key sequence to calculate percentages, add-ons, discounts, and percentage ratios.

- $120 \times 30 \% = 36$

120 [x] 30 [2nd] [%] [<u>ENTER</u>]	DEG 1 2 0 * 3 0 % = 3 6 .
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- $88 \div 55 \% = 160$

88 [÷] 55 [2nd] [%] [<u>ENTER</u>]	DEG 8 8 ÷ 5 5 % = 1 6 0 .
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Display notations

The calculator has the following display notations for the display value.

Fixed-point / Floating Notations

To specify the number of decimal places, press [2nd] [TAB] and then a value indicating the number of places (0-9). Values are displayed rounded off to the place specified. To return floating setting, press [2nd] [TAB] [*].

Scientific Notation

To change the display mode between floating and scientific notation, press [F↔E].

Engineering Notation

Pressing [ENG] or [2nd] [←] will cause the exponent display for the number being displayed to change in multiples of 3.

- $6 \div 7 = 0.85714285714\dots$

6 [÷] 7 [<u>ENTER</u>]	DEG 6 ÷ 7 = 0.85714285714
[2nd] [TAB] 4	DEG TAB 6 ÷ 7 = 0.8571
[2nd] [TAB] 2	DEG TAB 6 ÷ 7 = 0.86
[2nd] [TAB] [*]	DEG 6 ÷ 7 = 0.85714285714
[F↔E]	DEG 6 ÷ 7 = 8.57142857143

[ENG]	DEG	
		857.142857143 ⁻⁰³
[2nd] [←] [2nd] [←]	DEG	
		0.00085714285 ⁰³

Engineering Symbol Notation

Each time you specify the ENG mode, a displayed result is automatically shown with the corresponding engineering symbol.

yotta $Y = 10^{24}$, zetta $Z = 10^{21}$, exa $E = 10^{18}$, peta $P = 10^{15}$, tera $T = 10^{12}$, giga $G = 10^9$, mega $M = 10^6$, kilo $K = 10^3$, milli $m = 10^{-3}$, micro $\mu = 10^{-6}$, nano $n = 10^{-9}$, pico $p = 10^{-12}$, femto $f = 10^{-15}$, atto $a = 10^{-18}$, zepto $z = 10^{-21}$, yocto $y = 10^{-24}$

Perform the following operation to specify engineering symbol notation.

[MODE] 5 (ENG)

To exit from this mode, press [MODE] 5 once again.

➤ $6 \div 7 = 0.85714285714\dots$

[MODE] 5	ENG DEG	
		0.
6 [÷] 7 [$\frac{\square}{\square}$]	ENG DEG	
		6 ÷ 7 = m 857.142857143
[ENG]	ENG DEG	
		μ 857.142.857143
[2nd] [←] [2nd] [←] [2nd] [←]	ENG DEG	
		K 0.00085714285

Scientific Functional Calculations

Use MAIN ([MODE] 1 (MAIN)) mode for scientific function calculations.

Logarithms and Antilogarithms

The calculator can calculate common and natural logarithms and anti-logarithms using [log], [ln], [2nd] [10^x], and [2nd] [e^x].

➤ $\ln 7 + \log 100 = 3.94591014906$

[ln] 7 [+] [log] 100 [$\frac{\square}{\square}$]	DEG	
		ln 7 + log 100 3.94591014906

➤ $10^2 + e^{-5} = 100.006737947$

[2nd] [10^x] 2 [+] [2nd] [e^x] 5 [+ / -] [$\frac{\square}{\square}$]	DEG	
		$10^2 + e^{-5} =$ 100.006737947

Fraction calculation

Fraction value display is as follow :

5 \sqcup 12	Display of $\frac{5}{12}$	56 \sqcup 5 \sqcup 12	Display of $56\frac{5}{12}$
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(Note): Values are automatically displayed in decimal format whenever the total number of digits of a fractional values (integer + numerator + denominator + separator marks) exceeds 12.

To enter a mixed number, enter the integer part, press [a b/c], enter the numerator, press [a b/c], and enter the denominator ; To enter an improper fraction, enter the numerator, press [a b/c], and enter the denominator.

➤ $7\frac{2}{3} + 14\frac{5}{7} = 22\frac{8}{21}$

7 [a b/c] 2 [a b/c] 3 [+] 14 [a b/c] 5 [a b/c] 7 [$\frac{\square}{\square}$]	DEG	
		7 \sqcup 2 \sqcup 3 + 14 \sqcup 5 \sqcup 7 22 \sqcup 8 \sqcup 21.

During a fraction calculation, if the figure is reducible, a figure is reduced to the lowest terms after pressing a function command key ([+], [-], [\times] or [\div]) or the [$\frac{\square}{\square}$] key. By pressing [2nd] [$\rightarrow d/e$], the displayed value will be converted to the improper fraction and vice versa. To convert between a decimal and fractional result, press [a b/c].

➤ $4\frac{2}{4} = 4\frac{1}{2} = 4.5 = \frac{9}{2}$

4 [a b/c] 2 [a b/c] 4 [$\frac{\square}{\square}$]	DEG	
		4 \sqcup 2 \sqcup 4 = 4 \sqcup 1 \sqcup 2.
[a b/c]	DEG	
		4 \sqcup 2 \sqcup 4 = 4.5

[2nd] [\rightarrow d/e]	DEG 4 \square 2 \square 4 = 9 \square 2 .
[2nd] [\rightarrow d/e]	DEG 4 \square 2 \square 4 = 4 \square 1 \square 2 .

Calculations containing both fractions and decimals are calculated in decimal format.

➤ $8\frac{4}{5} + 3.75 = 12.55$

8 [a b/c] 4 [a b/c] 5 [+] 3.75 [\rightarrow ENTER]	DEG 8 \square 4 \square 5 + 3 . 7 5 = 1 2 . 5 5
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Angle unit conversions

The calculator enables you to convert an angle unit among degrees(DEG), radians(RAD), and grads(GRAD).

The relation among the three angle units is :

$$180^\circ = \pi \text{ rad} = 200 \text{ grad}$$

- To change the default setting to another setting, first press [2nd] [DRG] key repeatedly until the angle unit you want is indicated in the display.
 - After entering a value, press [2nd] [DRG \rightarrow] repeatedly until the unit you want is displayed.
- 90 deg. = 1.57079632679 rad. = 100 grad.

[2nd] [DRG]	DEG 0 .
90 [2nd] [DRG \rightarrow]	RAD 9 0 ° = 1 . 5 7 0 7 9 6 3 2 6 7 9
[2nd] [DRG \rightarrow]	GRAD 1 . 5 7 0 7 9 6 3 2 6 7 1 0 0 .

Sexagesimal \leftrightarrow Decimal transformation

The calculator enables you to convert the sexagesimal figure (degree, minute and second) to decimal notation by pressing [\circ \rightarrow \rightarrow] or convert the decimal notation to the sexagesimal notation by [2nd] [\rightarrow \circ \rightarrow].

Sexagesimal figure value display is as follow :

125 \square 45 \square 30 \square 55	Represent 125 degrees (D), 45 minutes(M), 30.55 seconds(S)
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(Note) : The total digits of D, M and S and separator marks must be within 12 digits, or the sexagesimal couldn't be shown completely.

➤ $12.755 = 12^\circ 45' 18''$

12.755 [2nd] [\rightarrow \circ \rightarrow]	DEG 1 2 \square 4 5 \square 1 8 \square ''
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➤ $2^\circ 45' 10.5'' = 2.75291666667$

2 [\circ \rightarrow \rightarrow] 45 [\circ \rightarrow \rightarrow] 10.5 [\circ \rightarrow \rightarrow]	DEG 2 . 7 5 2 9 1 6 6 6 6 6 7
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Trigonometric / Inverse-Tri. functions

SR-281 / SR-282 provides standard trigonometric functions and inverse trigonometric functions - sin, cos, tan, \sin^{-1} , \cos^{-1} and \tan^{-1} .

(Note) : When using those keys, make sure the calculator is set for the angle unit you want.

➤ $\sin 30 \text{ deg.} = 0.5$

[sin] 30 [\rightarrow ENTER]	DEG s i n 3 0 = 0 . 5
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➤ $3 \cos\left(\frac{2}{3}\pi \text{ rad}\right) = -1.5$

3 [cos] [(] 2 [x] [2nd] [π] [\div] 3 [\rightarrow ENTER]	RAD 3 * c o s (2 * π \div 3 = - 1 . 5
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➤ $3 \sin^{-1} 0.5 = 90 \text{ deg}$

3 [2nd] [\sin^{-1}] 0.5 [\rightarrow ENTER]	DEG 3 * s i n $^{-1}$ 0 . 5 = 9 0 .
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Hyperbolic / Inverse-Hyp. functions

SR-281 / SR-282 uses [2nd] [HYP] to calculate the hyperbolic functions and inverse-hyperbolic functions - sinh, cosh, tanh, \sinh^{-1} , \cosh^{-1} and \tanh^{-1} .

(Note) : When using those keys, make sure the calculator is set for the angle unit you want.

➤ $\cosh 1.5 + 2 = 4.35240961524$

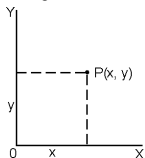
[2nd][HYP][cos]1.5[+]2 [ENTER]	DEG c o s h 1 . 5 + = 4.35240961524
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➤ $\sinh^{-1} 7 = 2.64412076106$

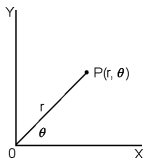
[2nd][HYP][2nd][sin ⁻¹]7 [ENTER]	DEG s i n h 1 ⁻¹ 7 = 2.64412076106
---	---

Coordinates transformation

Rectangular Coordinates



Polar Coordinates



$$x + y i = r (\cos \theta + i \sin \theta)$$

(Note) : When using those key, make sure the calculator is set for the angle unit you want.

The calculator can perform the conversion between rectangular coordinates and polar coordinates by [2nd][P→R] and [2nd][R→P].

➤ If $x = 5$, $y = 30$, what are r , θ ? Ans : $r = 30.4138126515$, $\theta = 80.537677792^\circ$

[2nd][R→P]5[2nd][↵]30	DEG () R→P (5 , 3 0
[ENTER]	DEG r 30.4138126515
[2nd][x↔y]	DEG θ 80.537677792

➤ If $r = 25$, $\theta = 56^\circ$ what are x , y ? Ans : $x = 13.9798225868$, $y = 20.7259393139$

[2nd][P→R]25[2nd][↵]56	DEG () P→R (2 5 , 5 6
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r ENTER 1	DEG X 13.9798225868
[2nd][x↔y]	DEG Y 20.7259393139

Probability

This calculator provides the following probability functions :

- [nPr] Calculates the number of possible permutations of n items taken r at a time.
 - [nCr] Calculates the number of possible combinations of n items taken r at a time.
 - [X!] Calculates the factorial of a specified positive integer n , where $n \leq 69$.
 - [RND] Generates a random number between 0.000 and 0.999
- $\frac{7!}{[(7-4)!]} = 840$

7[2nd][nPr]4[ENTER]	DEG 7 P 4 = 840.
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➤ $\frac{7!}{4![(7-4)!]} = 35$

7[2nd][nCr]4[ENTER]	DEG 7 C 4 = 35.
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➤ $5! = 120$

5[2nd][X!][ENTER]	DEG 5! 120.
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➤ Generates a random between 0.000 ~ 0.999

[2nd][RND]	DEG R n d 0.449
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Other functions (1/x, $\sqrt{\quad}$, $\sqrt[3]{\quad}$, $\sqrt[n]{\quad}$, x^2 , x^3 , x^y , INT, FRAC)

The calculator also provides reciprocal ([2nd][1/x]), square root ($\sqrt{\quad}$), cubic root ([2nd][$\sqrt[3]{\quad}$]), universal root ([2nd][$\sqrt[n]{\quad}$]), square ($[x^2]$), cubic ($[x^3]$), and exponentiation ($[x^y]$) functions.

$$\triangleright \frac{1}{1.25} = 0.8$$

1.25 [2nd] [1/x] [ENTER]	DEG 1 . 2 5 ⁻¹ 0.8
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$$\triangleright 2^2 + \sqrt{4+21} + \sqrt[3]{125} + 5^3 = 139$$

2 [x^2] [+] [√] [(1[4][+]21[])] [+] [2nd] [∛] [125[+] 5[2nd] [x^3] [ENTER]	DEG 2 ^ 2 + √ (4 + 2 1) + 1 3 9 .
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$$\triangleright 7^5 + \sqrt[4]{625} = 16812$$

7 [x^y] 5 [+] 4 [∛] 625 [ENTER]	DEG 7 x ^ y 5 + 4 ^ √ 6 2 5 = 1 6 8 1 2 .
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INT Indicate the integer part of a given number

FRAC Indicate the fractional part of a given number

$$\triangleright \text{INT} (10 \div 8) = \text{INT} (1.25) = 1$$

[2nd] [INT] 10 [÷] 8 [ENTER]	DEG I N T (1 0 ÷ 8 = 1 .
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$$\triangleright \text{FRAC} (10 \div 8) = \text{FRAC} (1.25) = 0.25$$

[2nd] [FRAC] 10 [÷] 8 [ENTER]	DEG F R A C (1 0 ÷ 8 = 0.2 5
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Unit Conversion

The calculator has a built-in unit conversion feature that enables you to convert numbers among different units.

1. Enter the number you want to convert.
2. Press [CONV] to display the menu. There are 7 menus, covering distance, area, temperature, capacity, weight, energy, and pressure.
3. Use the [CONV] to scroll through the list of units until a appropriate units menu is shown, then [ENTER].
4. Pressing [→] or [2nd] [↶] can convert the number to another unit.

$$\triangleright 1 \text{ yd}^2 = 9 \text{ ft}^2 = 0.0000083612 \text{ km}^2$$

1 [CONV] [CONV] [→] [ENTER]	DEG f t ^ 2 y d ^ 2 m ^ 2 1 .
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[2nd] [↶]	DEG f t ^ 2 y d ^ 2 m ^ 2 9 .
[→] [→] [→]	DEG k m ^ 2 h e c t a r e s 0.0 0 0 0 0 0 8 3 6 1 2

Physics constants

You can use 136 physics constants in your calculations. With the following constants :

Data is referred to Peter J.Mohr and Barry N.Taylor, CODATA Recommended Values of the Fundamental Physical Constants:1998, Journal of Physical and Chemical Reference Data,Vol.28, No.6,1999 and Reviews of Modern Physics,Vol.72, No.2, 2000.

No.	Quantity	Symbol	Value, Unit
1.	Speed of light in vacuum	c	299792458 m s ⁻¹
2.	Magnetic constant	μ ₀	1.2566370614 x10 ⁻⁶ N A ⁻²
3.	Electric constant	ε ₀	8.854187817 x10 ⁻¹² F m ⁻¹
4.	Characteristic impedance of vacuum	Z ₀	376.730313461 Ω
5.	Newtonian constant of gravitation	G	6.67310 x10 ⁻¹¹ m ³ kg ⁻¹ s ⁻²
6.	Planck constant	h	6.6260687652 x10 ⁻³⁴ J s
7.	Planck constant over 2 pi	ħ	1.05457159682 x10 ⁻³⁴ J s
8.	Avogadro constant	N _A	6.0221419947 x10 ²³ mol ⁻¹
9.	Planck length	l _p	1.616012 x10 ⁻³⁵ m
10.	Planck time	t _p	5.390640 x10 ⁻⁴⁴ s
11.	Planck mass	m _p	2.176716 x10 ⁻⁸ kg
12.	Atomic mass constant	m _u	1.6605387313 x10 ⁻²⁷ kg
13.	Atomic mass constant energy equivalent	m _u c ²	1.4924177812 x10 ⁻¹⁰ J
14.	Faraday constant	IF	96485.341539 C mol ⁻¹
15.	Elementary charge	e	1.60217646263 x10 ⁻¹⁹ C
16.	Electron volt-joule relationship	eV	1.60217646263 x10 ⁻¹⁹ J
17.	Elementary charge over h	e/h	2.41798949195 x10 ¹⁴ A J ⁻¹
18.	Molar gas constant	R	8.31447215 J mol ⁻¹ K ⁻¹
19.	Boltzmann constant	k	1.380650324 x10 ⁻²³ J K ⁻¹
20.	Molar planck constant	N _A h	3.99031268930x10 ⁻¹⁰ Js mol ⁻¹
21.	Sackur-Tetrode constant	S ₀ /R	- 1.164867844
22.	Wien displacement law constant	b	2.897768651 x10 ⁻³ m K
23.	Lattice parameter of silicon	a	543.10208816 x10 ⁻¹² m
24.	Stefan-Boltzmann constant	σ	5.67040040 x10 ⁻⁸ W m ⁻² K ⁻⁴

25.	Standard acceleration of gravity	g	9.80665 m s ⁻²
26.	Atomic mass unit–kilogram relationship	μ	1.6605387313 x10 ⁻²⁷ kg
27.	First radiation constant	c ₁	3.7417710729 x10 ⁻¹⁶ Wm ²
28.	First radiation constant for spectral radiance	c ₁ L	1.19104272293x10 ⁻¹⁶ Wm ² sr ⁻¹
29.	Second radiation constant	c ₂	1.438775225 x10 ⁻² m K
30.	Molar volume of ideal gas	V _m	22.41399639 x10 ⁻³ m ³ mol ⁻¹
31.	Rydberg constant	R _∞	10973731.5685 m ⁻¹
32.	Rydberg constant in Hz	R _∞ c	3.28984196037 x10 ¹⁵ Hz
33.	Rydberg constant in joules	R _∞ hc	2.1798719017 x10 ⁻¹⁸ J
34.	Hartree energy	E _h	4.3597438134 x10 ⁻¹⁸ J
35.	Quantum of circulation	h/m _e	7.27389503253 x10 ⁻⁴ m ² s ⁻¹
36.	Fine structure constant	α	7.29735253327 x10 ⁻³
37.	Loschmidt constant	n ₀	2.686777547 x10 ²⁵ m ⁻³
38.	Bohr radius	a ₀	0.52917720832 x10 ⁻¹⁰ m
39.	Magnetic flux quantum	Φ ₀	2.06783363681 x10 ⁻¹⁵ Wb
40.	Conductance quantum	G ₀	7.74809169628 x10 ⁻⁵ S
41.	Inverse of conductance quantum	G ₀ ⁻¹	12906.4037865 Ω
42.	Josephson constant	K _J	483597.89819 x10 ⁹ Hz V ⁻¹
43.	Von Klitzing constant	R _K	25812.8075730 Ω
44.	Bohr magneton	μ _B	927.40089937 x10 ⁻²⁶ J T ⁻¹
45.	Bohr magneton in Hz/T	μ _B /h	13.9962462456 x10 ⁹ Hz T ⁻¹
46.	Bohr magneton in K/T	μ _B /k	0.671713112 K T ⁻¹
47.	Nuclear magneton	μ _N	5.0507831720 x10 ⁻²⁷ J T ⁻¹
48.	Nuclear magneton in MHz/T	μ _N /h	7.6225939631 MHz T ⁻¹
49.	Nuclear magneton in K/T	μ _N /k	3.658263864 x10 ⁻⁴ K T ⁻¹
50.	Classical electron radius	r _e	2.81794028531 x10 ⁻¹⁵ m
51.	Electron mass	m _e	9.1093818872 x10 ⁻³¹ kg
52.	Electron mass energy equivalent	m _e c ²	8.1871041464 x10 ⁻¹⁴ J
53.	Electron–muon mass ratio	m _e /m _μ	4.8363321015 x10 ⁻³
54.	Electron–tau mass ratio	m _e /m _τ	2.8755547 x10 ⁻⁴
55.	Electron–proton mass ratio	m _e /m _p	5.44617023212 x10 ⁻⁴
56.	Electron–neutron mass ratio	m _e /m _n	5.43867346212 x10 ⁻⁴
57.	Electron–deuteron mass ratio	m _e /m _d	2.72443711706x10 ⁻⁴
58.	Electron charge to mass quotient	- e/m _e	- 1.75882017471 x10 ¹¹ Ckg ⁻¹
59.	Compton wavelength	λ _c	2.42631021518 x10 ⁻¹² m
60.	Compton wavelength over 2 pi	λ̄ _c	386.159264228 x10 ⁻¹⁵ m
61.	Thomson cross section	σ _e	0.66524585415 x10 ⁻²⁸ m ²

62.	Electron magnetic moment	μ _e	- 928.47636237x10 ⁻²⁶ J T ⁻¹
63.	Electron magnetic moment to Bohr magneton ratio	μ _e /μ _B	- 1.001115965219
64.	Electron magnetic moment to nuclear magneton ratio	μ _e /μ _N	- 1838.28196604
65.	Electron–muon magnetic moment ratio	μ _e /μ _μ	206.766972063
66.	Electron–proton magnetic moment ratio	μ _e /μ _p	- 658.210687566
67.	Electron–neutron magnetic moment ratio	μ _e /μ _n	960.9205023
68.	Electron–deuteron magnetic moment ratio	μ _e /μ _d	- 2143.92349823
69.	Electron to shielded helium magnetic moment ratio	μ _e /μ ^h	864.05825510
70.	Electron magnetic moment anomaly	a _e	1.15965218694 x10 ⁻³
71.	Electron g-factor	g _e	- 2.00231930437
72.	Electron gyromagnetic ratio	γ _e	1.760855979471 x10 ¹¹ s ⁻¹ T ⁻¹
73.	Muon mass	m _μ	1.8835310916 x10 ⁻²⁸ kg
74.	Muon mass energy equivalent	m _μ c ²	1.6928333214 x10 ⁻¹¹ J
75.	Muon–tau mass ratio	m _μ /m _τ	5.9457297 x10 ⁻²
76.	Muon–proton mass ratio	m _μ /m _p	0.11260951733
77.	Muon–neutron mass ratio	m _μ /m _n	0.11245450793
78.	Muon magnetic moment anomaly	a _μ	1.1659160264 x10 ⁻³
79.	Muon g-factor	g _μ	- 2.00233183201
80.	Muon Compton wavelength	λ _{c, μ}	11.7344419735 x10 ⁻¹⁵ m
81.	Muon Compton wavelength over 2 pi	λ̄ _{c, μ}	1.86759444455 x10 ⁻¹⁵ m
82.	Muon magnetic moment	μ _μ	- 4.4904481322x10 ⁻²⁶ J T ⁻¹
83.	Muon magnetic moment to Bohr magneton ratio	μ _μ /μ _B	- 4.8419708515 x10 ⁻³
84.	Muon magnetic moment to nuclear magneton ratio	μ _μ /μ _N	- 8.8905977027
85.	Muon–proton magnetic moment ratio	μ _μ /μ _p	- 3.1833453910
86.	Tau Compton wavelength	λ _{c, τ}	0.6977011 x10 ⁻¹⁵ m
87.	Tau Compton wavelength over 2 pi	λ̄ _{c, τ}	0.1104218 x10 ⁻¹⁵ m
88.	Tau mass	m _τ	3.1678852 x10 ⁻²⁷ kg
89.	Tau mass energy equivalent	m _τ c ²	2.8471546 x10 ⁻¹⁰ J
90.	Tau–proton mass ratio	m _τ /m _p	1.8939631
91.	Proton Compton wavelength	λ _{c, p}	1.32140984710 x10 ⁻¹⁵ m

92.	Proton Compton wavelength over 2 pi	$\bar{\lambda}_{c,p}$	$0.21030890892 \times 10^{-15} \text{ m}$
93.	Proton mass	m_p	$1.6726215813 \times 10^{-27} \text{ kg}$
94.	Proton mass energy equivalent	$m_p c^2$	$1.5032773112 \times 10^{-10} \text{ J}$
95.	Proton-neutron mass ratio	m_p/m_n	0.99862347856
96.	Proton charge to mass quotient	e/m_p	$9.5788340838 \times 10^7 \text{ C kg}^{-1}$
97.	Proton magnetic moment	μ_p	$1.41060663358 \times 10^{-26} \text{ J T}^{-1}$
98.	Shielded proton magnetic moment	μ'_p	$1.41057039959 \times 10^{-26} \text{ J T}^{-1}$
99.	Proton magnetic moment to nuclear magneton ratio	μ_p/μ_N	2.79284733729
100.	Proton-neutron magnetic moment ratio	μ_p/μ_n	- 1.4598980534
101.	Shielded proton magnetic moment to Bohr magneton ratio	μ'_p/μ_B	$1.52099313216 \times 10^{-3}$
102.	Proton gyromagnetic ratio	γ_p	$2.6752221211 \times 10^8 \text{ s}^{-1} \text{ T}^{-1}$
103.	Shielded proton gyromagnetic ratio	γ'_p	$2.6751534111 \times 10^8 \text{ s}^{-1} \text{ T}^{-1}$
104.	Proton magnetic shielding correction	σ'_p	25.68715×10^{-6}
105.	Proton g-factor	g_p	5.58569467557
106.	Neutron Compton wavelength	$\lambda_{c,n}$	$1.31959089810 \times 10^{-15} \text{ m}$
107.	Neutron Compton wavelength over 2 pi	$\bar{\lambda}_{c,n}$	$0.21001941422 \times 10^{-15} \text{ m}$
108.	Neutron mass	m_n	$1.6749271613 \times 10^{-27} \text{ kg}$
109.	Neutron mass energy equivalent	$m_n c^2$	$1.5053494612 \times 10^{-10} \text{ J}$
110.	Neutron magnetic moment	μ_n	$-0.9662364023 \times 10^{-26} \text{ J T}^{-1}$
111.	Neutron magnetic moment to Bohr magneton ratio	μ_n/μ_B	$-1.0418756325 \times 10^{-3}$
112.	Neutron g-factor	g_n	- 3.8260854590
113.	Neutron gyromagnetic ratio	γ_n	$1.8324718844 \times 10^8 \text{ s}^{-1} \text{ T}^{-1}$
114.	Deuteron mass	m_d	$3.3435830926 \times 10^{-27} \text{ kg}$
115.	Deuteron mass energy equivalent	$m_d c^2$	$3.0050626224 \times 10^{-10} \text{ J}$
116.	Deuteron molar mass	$M(d)$	$2.01355321271 \times 10^{-3} \text{ kg mol}^{-1}$
117.	Deuteron-electron mass ratio	m_d/m_e	3670.48295508
118.	Deuteron-proton mass ratio	m_d/m_p	1.99900750083
119.	Deuteron magnetic moment	μ_d	$0.43307345718 \times 10^{-26} \text{ J T}^{-1}$

120.	Deuteron magnetic moment to Bohr magneton ratio	μ_d/μ_B	$0.46697545565 \times 10^{-3}$
121.	Deuteron magnetic moment to nuclear magneton ratio	μ_d/μ_N	0.85743822849
122.	Deuteron-proton magnetic moment ratio	μ_d/μ_p	0.30701220835
123.	Helion mass	m_h	$5.0064117439 \times 10^{-27} \text{ kg}$
124.	Helion mass energy equivalent	$m_h c^2$	$4.4995384835 \times 10^{-10} \text{ J}$
125.	Helion molar mass	$M(h)$	$3.01493223470 \times 10^{-3} \text{ kg mol}^{-1}$
126.	Helion-electron mass ratio	m_h/m_e	5495.88523812
127.	Helion-proton mass ratio	m_h/m_p	2.99315265851
128.	Shielded helion magnetic moment	μ'_h	$-1.07455296745 \times 10^{-26} \text{ J T}^{-1}$
129.	Shielded helion magnetic moment to Bohr magneton ratio	μ'_h/μ_B	- 1.15867147414 $\times 10^{-3}$
130.	Shielded helion magnetic moment to nuclear magneton ratio	μ'_h/μ_N	- 2.12749771825
131.	Shielded helion gyromagnetic ratio	γ'_h	$2.03789476485 \times 10^8 \text{ s}^{-1} \text{ T}^{-1}$
132.	Alpha particle mass	m_α	$6.6446559852 \times 10^{-27} \text{ kg}$
133.	Alpha particle mass energy equivalent	$m_\alpha c^2$	$5.9719189747 \times 10^{-10} \text{ J}$
134.	Alpha particle molar mass	$M(\alpha)$	$4.00150617471 \times 10^{-3} \text{ kg mol}^{-1}$
135.	Alpha particle to electron mass ratio	m_α/m_e	7294.29950816
136.	Alpha particle to proton mass ratio	m_α/m_p	3.97259968461

To insert a constant at the cursor position :

1. Press [CONST] to display the physics constants menu.
2. Press [\rightarrow] or [2nd] [\leftarrow] until the constant you want is underlined.
3. Press [ENTER].

You also can use the [CONST] key in combination with a number, 1 through 136, to recall a physical constant. For example, press 15 [CONST].

DEG
e
1.60217646263 $\times 10^{-19}$

$\Rightarrow 3 \times N_A = 1.80664259841 \times 10^{24}$

3[x][CONST][CONST][→]	CONST DEG h N A l p t p 23 6.0 2 2 1 4 1 9 9 4 7
[ENTER]	CONST DEG 0 0 8 : m o l -1 23 6.0 2 2 1 4 1 9 9 4 7
[ENTER][ENTER]	CONST DEG 3 * N A = 24 1.8 0 6 6 4 2 5 9 8 4 1

Base-N calculations

Use MAIN ([MODE] 1 (MAIN)) mode for Base-n calculations.

The unit enables you to calculate in number base other than decimal. The calculator can add, subtract, multiply, and divide binary, octal, and hexadecimal numbers.

The following shows the numerals that can be used in each number base.

Binary base (b) : 0, 1

Octal base (o) : 0, 1, 2, 3, 4, 5, 6, 7

Decimal base : 0, 1, 2, 3, 4, 5, 6, 7, 8, 9

Hexadecimal base (h) : 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F

To distinguish the A, B, C, D, E and F used in the hexadecimal base from standard letters, they appear as shown in the below.

Key	Display (Upper)	Display (Lower)	Key	Display (Upper)	Display (Lower)
A	/A	ā	D	ID	đ
B	IB	b	E	IE	ē
C	IC	ċ	F	IF	f

Select the number base you want to use with [→BIN], [→OCT], [→DEC], [→HEX]. The "BIN", "b", "OCT", "o", "HEX", "h" indicators show you which number base you are using. If none of the indicators appears in the display, you are in decimal base.

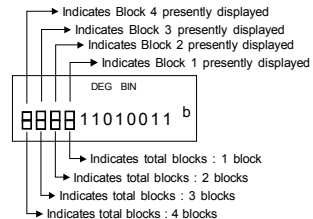
Bases conversions

➤ 37 (base 8) = 31 (base 10) = 1F (base 16)

[2nd][→OCT]137	DEG OCT 0 0 0 0 0 0 0 0 3 7 o
[2nd][→DEC]	DEG 3 1 .
[2nd][→HEX]	DEG HEX 0 0 0 0 0 1 F h

Block Function

For a result in binary base, it will be displayed using block function. The maximum of 32 digits are displayed in 4 blocks of 8 digits.

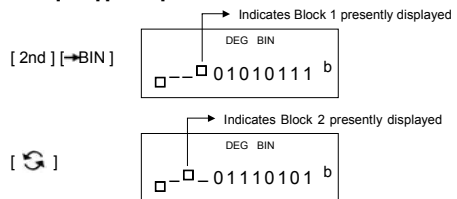


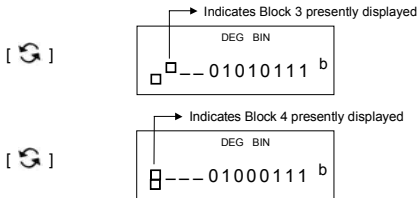
The block function comprises upper and lower block indicators. The upper indicator means current block position, and the lower indicator means total blocks for a result.

In the binary base, the block 1 is displayed immediately after calculation. Other blocks (block 2 ~ block 4) are displayed by pressing [↺].

For example, input 47577557₁₆

Press [2nd][→HEX] 47577557





47577557₁₆ = Block 4 + Block 3 + Block 2 + Block 1
 = 01000111010101110111011010101010111₂

Basic arithmetic operations for bases

➤ 11E1F₁₆ + 1234₁₀ ÷ 1001₂ = 1170₈

[2nd][←]HEX]1E F[+] [2nd] [←]DEC]1234[÷] [2nd][→]BIN] 1001[<u>ENTER</u>] [2nd][→]OCT]	DEG OCT h 1 1E1F + 1 2 3 4 ÷ b 1 0 0 0 0 0 0 0 1 1 7 0
---	--

Negative expressions

In binary, octal, and hexadecimal bases, the calculator represents negative numbers using complement notation. The complement is the result of subtracting that number from 1000000000 in that number's base by pressing [NEG] key in non-decimal bases.

➤ 3/A₁₆ = NEG IFIFIFIFIFIC6₁₆

[2nd][←]HEX]3 A[NEG]	DEG HEX NEG h 3/A F F F F F F C 6 h
----------------------	---

Logical operation

Logical operations are performed through logical products (AND), negative logical (NAND), logical sums (OR), exclusive logical sums (XOR), negation (NOT), and negation of exclusive logical sums (XNOR).

➤ 1010₂ AND (/A₁₆ OR 7₁₆) = 12₈

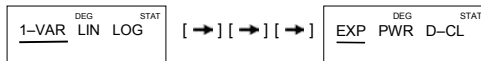
[2nd][←]BIN]1010[AND][()][2nd] [←]HEX]A[OR]7[)][<u>ENTER</u>] [2nd] [←]OCT]	DEG BIN b 1 0 1 0 AND (h 0 0 0 0 0 0 0 0 1 2
---	---

Statistical Calculations

Use STAT ([MODE] 2 (STAT)) mode for statistical calculations.

The calculators can perform both single-variable statistical calculations and paired-variable in this mode.

Press [MODE] 2 (STAT) to enter STAT mode. There are six items in STAT mode, asking you to select one of them,



Single-variable statistics

1-VAR Single-variable statistics

Paired-variable / Regression statistics

LIN	Linear Regression	$y = a + b x$
LOG	Logarithmic Regression	$y = a + b \ln x$
EXP	Exponential Regression	$y = a \cdot e^{bx}$
POW	Power Regression	$y = a \cdot x^b$

D-CLEAR Clear all statistical data

Entering data

Always make sure you clear statistical data by D-CLEAR before performing statistical calculations.

(A) To input single-variable data using the following syntaxes :

- # Individual data : [DATA] < x value >
- # Multiple data of the same value :
[DATA] < x value > [x] < Number of repeats >

(B) To input paired-variable / regression data using the following syntaxes :

- # Individual data-set : [DATA] < x value > [y] < y value >
- # Multiple data of the same value :
[DATA] < x value > [y] < y value > [x] < Number of repeats >

(Note) : Even you exit STAT mode, all data are still retained unless you clear all data by selecting D-CLEAR mode.

Displaying results

The values of the statistical variables depend on the data you input. You can recall them by the key operations shown in the below table.

Single-variable statistics calculations

Variables	Meaning
n ([n])	Number of the x values entered
\bar{x} ([2nd][+][x])	Mean of the x values
S_x ([2nd][+][Sx])	Sample standard deviation of x values

σ_x ([2nd][σ_x])	Population standard deviation of x values
Σx ([2nd][Σx])	Sum of all x values
Σx^2 ([2nd][Σx^2])	Sum of all x^2 values
CP ([2nd][CP])	Potential capability precision of the x values
CPK ([CPK])	Minimum (CPU, CPL) of the x values, where CPU is upper spec. limit of capability precision and CPL is lower spec. limit of capability precision CPK = Min (CPU , CPL) = CP (1 - Ca)

Paired-variable statistics / Regression calculations

Variables	Meaning
n ([n])	Number of x-y pairs entered
\bar{x} ([2nd][\bar{x}]) \bar{y} ([2nd][\bar{y}])	Mean of the x values or y values
Sx ([2nd][Sx]) Sy ([2nd][Sy])	Sample standard deviation of x values or y values
σ_x ([2nd][σ_x]) σ_y ([2nd][σ_y])	Population standard deviation of x values or y values
Σx ([2nd][Σx]) Σy ([2nd][Σy])	Sum of all x values or y values
Σx^2 ([2nd][Σx^2]) Σy^2 ([2nd][Σy^2])	Sum of all x^2 values or y^2 values
Σxy	Sum of (x * y) for all x-y pairs
CP ([2nd][CP])	Potential capability precision of the x values
CPK ([CPK])	Minimum (CPU, CPL) of the x values, where CPU is upper spec. limit of capability precision and CPL is lower spec. limit of capability precision CPK = Min (CPU , CPL) = CP (1 - Ca)
a ([2nd][a])	Regression formula constant term a
b ([2nd][b])	Regression formula regression coefficient b
r ([2nd][r])	Correlation coefficient r

x' ([x'])	Estimated value of x
y' ([y'])	Estimated value of y

You also can add a new data anytime. The unit automatically recalculates statistics each time you press [DATA] and enter a new data value.

- Enter data : USL = 95, LSL = 70, DATA 1 = 75, DATA 2 = 85, DATA 3 = 90, DATA 4 = 82, DATA 5 = 77, then find out n = 5, \bar{x} = 81.8, Sx = 6.05805249234, σ_x = 5.41848687366, CP = 0.76897236513, and CPK = 0.72590991268

[MODE] 2	DEG	STAT
<u>1-V AR</u> L I N L O G		
[ENTER] [DATA] 75 [DATA] 85 [DATA] 90 [DATA] 82 [DATA] 77	DEG	STAT
	D A T A 5	7 7
[n]	DEG	STAT
	n	5 .
[2nd][\bar{x}]	DEG	STAT
	\bar{x}	8 1 . 8
[2nd][Sx]	DEG	STAT
	S X	6 . 0 5 8 0 5 2 4 9 2 3 4
[2nd][σ_x]	DEG	STAT
	σx	5 . 4 1 8 4 8 6 8 7 3 6 6
[2nd][CP] 95	DEG	STAT
	U S L =	9 5
[ENTER] 70	DEG	STAT
	L S L =	7 0
[ENTER]	DEG	STAT
	C P	0 . 7 6 8 9 7 2 3 6 5 1 3
[CPK]	DEG	STAT
	U S L =	9 5 . USL

[<u>ENTER</u>]	DEG	STAT
	L S L =	CPK
		7 0 . LSL
[<u>ENTER</u>]	DEG	STAT
	C P K	
	0.7 2 5 9 0 9 9 1 2 6 8	

- Find a, b and r for the following data using linear regression and estimate $x = ?$ for $y = 573$ and $y = ?$ for $x = 19$.

Data item	15	17	21	28
FREQ.	451	475	525	678

[MODE] 2 [→]	DEG	STAT
	1-VAR	<u>L I N</u> LOG
[<u>ENTER</u>] [DATA] 15 [↵] 451 [DATA] 17 [↵] 475 [DATA] 21 [↵] 525 [DATA] 28 [↵] 678	DEG	STAT REG
	D A T A	4 = 2 8 , 6 7 8
[2nd] [<u>a</u>]	DEG	STAT REG
	a	1 7 6 . 1 0 6 3 2 9 1 1 4
[2nd] [<u>b</u>]	DEG	STAT REG
	b	1 7 . 5 8 7 3 4 1 7 7 2 2
[2nd] [<u>r</u>]	DEG	STAT REG
	r	0 . 9 8 9 8 4 5 1 6 4 1 3
573 [x']	DEG	STAT REG
	x ' 5 7 3	2 2 . 5 6 7 0 0 7 3 4 1 3
19 [y']	DEG	STAT REG
	y ' 1 9	5 1 0 . 2 6 5 8 2 2 7 8 5

Deleting data

The method to delete data depends on whether you have already stored the data by next pressing [DATA] key or not.

To delete data you just input but have not yet stored it by next pressing [DATA], simple press [CE].

To delete data that you have already stored by next pressing [DATA],

- (A) To delete single-variable data using the following syntaxes :

< x value > [2nd] [DEL]

< x value > [x] < Number of repeats > [2nd] [DEL]

- (B) To delete paired-variable / regression data using the following syntaxes:

Individual data-set : < x value > [↵] < y value > [2nd] [DEL]

Multiple data-set with the same value :
< x value > [↵] < y value > [x] < Number of repeats > [2nd] [DEL]

If you enter and delete a value that isn't included in the stored data by mistake, "dEL Error " appears, but the previous data are still retained.

Editing data

Press [2nd] [EDIT] to enter EDIT mode. The EDIT mode is convenient and friendly for you to view, correct, delete data.

- (A) In 1-VAR mode, the method to view data depends on whether you want to view data item or not.

Each time you press [DATA], first data item appears 1 second and then the corresponding value.

[DATA]	DEG	STAT EDIT	1 second	DEG	STAT EDIT
	dATA 1			15.	

Each time you press [ENTER], value appears directly on the display without data item.

[<u>ENTER</u>]	DEG	STAT EDIT
	15.	

- (B) In REG mode, each time you press [DATA], data item and x value appear on the screen at the same time. You can press [↵] to switch between x and y value.

[DATA]	DEG	STAT EDIT	[↵]	DEG	STAT EDIT
	D A T A 1 = 15 , 45	15		D A T A 1 = 15 , 45	451

If you want to correct data, find out and enter a new entry to replace it.

FULL message

A "FULL" is indicated when any of the following conditions occur and further data entry becomes impossible. Just pressing any key can

clear the indicator. The previous data entries are still retained unless you exit STAT mode.

- 1) If the times of data entry by [DATA] is more than 50
- 2) The number of repeats is more than 255
- 3) $n > 12750$ ($n = 12750$ appears when the times of data entry by [DATA] are up to 50 and the number of repeats for each value are all 255, i.e. $12750 = 50 \times 255$)

Complex Calculations

Use CPLX ([MODE] 3 (CPLX)) mode for complex calculations.

Complex mode enables you to add, subtract, multiply, and divide complex numbers.

The results of a complex operation are displayed as follow :

Re Real value Im Imaginary value

ab Absolute value ar Argument value

➤ $(7 - 9i) + (15 + 12i) = 22 + 3i$, ab = 22.2036033112, ar = 7.76516601843

[MODE] 3	CPLX DEG 0 .
7 [-] 9 [i] [+] 15 [+] 12 [i] [<u>ENTER</u>]	CPLX DEG <u>Re</u> Im ab ar 2 2 .
[→]	CPLX DEG <u>Re</u> Im ab ar 3 . i
[→]	CPLX DEG <u>Re</u> Im ab ar 2 2 . 2 0 3 6 0 3 3 1 1 2
[→]	CPLX DEG <u>Re</u> Im ab ar 7 7 6 5 1 6 6 0 1 8 4 3

The unit complies with the requirements of Directive 89/336/EEC as amended by 93/68/EEC

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