SFX-Calc Support and User Guide

# Introduction

SFX-Calc is a calculator app designed for academic, scientific and engineering purpose. The calculator features:

1. Basic arithmetic calculation: Plus, Minus, Multiply, Divide
2. Calculation with one operand fixed as constant
3. Calculation with an non-volatile memory storage
4. Calculation with 10 volatile memory storage
5. Fraction and percentage calculation
6. Linear regression and Statistic calculation
7. Binary / Octal / Decimal / Hexadecimal calculation
8. Various functions like Trigonometric, Hyperbolic, Logarithm, Exponential, Power, Root, etc.
9. UI/UX similar to Casio scientific calculator
10. Formula calculation including Quadratic formula, Standard Normal Distribution Probability, etc.

# Support

If you find any issues or have any suggestions, please feel free to contact me ([eefelix@yahoo.com.hk](mailto:eefelix@yahoo.com.hk)) or post your message on the support forum <https://github.com/eefelix/SFX-Calc-Public/issues>

# Usage

### Display

The calculator can display up to 10 main digits + 2 exponential digits in default settings, or up to 13 main digits + 3 exponential digits by turning ON some options from the menu. Various numeric formats can be displayed in different states of operation:

|  |  |
| --- | --- |
| Numeric format | The display will show ... |
| Integral |  |
| Decimal |  |
| Exponential |  |
| Fractional |  |
| Hexadecimal |  |
| Error |  |

The display has a top bar to indicate the current state of operation:

|  |  |
| --- | --- |
| When ... | The display will show ... |
| A non-zero value is stored in the non-volatile memory |  |
| The calculation has one operand fixed as constant |  |
| Performing Statistic calculation |  |
| Performing Linear regression |  |
| Performing Binary / Octal / Decimal / Hexadecimal calculation |  |
| Performing Trigonometric calculation with different angle unit (DEG / RAD / GRA) |  |
| Performing Formula calculation |  |

### Key

1. **All Cancel**

Clear the current operation

Clear the fixed constant operand

Clear the display result

Release the error state

Alterative function is to clear the 10 volatile memory spaces in additional to the all cancel functions, or to clear the all the stored data for the linear regression and the statistic calculation.

1. **Clear**

Clear the current entry for correction

1. **Alternative Function**

Enable alternative function from other function keys

1. **Mode Set**

: Normal computation mode

: Base-n mode for Binary / Octal / Decimal / Hexadecimal calculation

: Statistic calculation

: Linear regression calculation

: Trigonometric calculation will be conducted with Degree unit

: Trigonometric calculation will be conducted with Radian unit

: Trigonometric calculation will be conducted with Gradian unit

Alterative function is to show the formula menu. After choosing the formula from the menu, the formula calculation will be executed

1. **to and Digits and dot**

Input numerals for integral and decimal value

Alterative function in normal computation mode is to recall the following scientific constants

: Speed of light = 299792458 ms-1

: Planck constant = 6.62607015x10-34 Js

: Newtonian constant of gravitation = 6.67430x10-11 m3kg-1s-2

: Elementary charge = 1.602176634x10-19 C

: Electron mass = 9.1093837015x10-31 kg

: Atomic mass = 1.66053906660x10-27 kg

: Avogadro constant = 6.02214076x1023

: Boltzmann constant = 1.380649x10-23 JK-1

: Coulomb constant = 8.9875517923x109 kgm3s-2C-2

Alterative function in statistic calculation mode is to calculate the statistic of the stored data

: The average value of the stored data

: The population standard deviation of the stored data

: The sample standard deviation of the stored data

Alterative function in linear regression calculation mode is to calculate the statistic and the regression parameters of the stored data

: The average value of the x-component of stored data

: The population standard deviation of the x-component of stored data

: The sample standard deviation of the x-component of stored data

: The average value of the y-component of stored data

: The population standard deviation of the y-component of stored data

: The sample standard deviation of the y-component of stored data

: The intercept parameter of linear regression of stored data

: The slope parameter of linear regression of stored data

: The correlation parameter of linear regression of stored data

1. Graphical user interface, text

   Description automatically generated**Exponent entry**

Input exponent of base 10

The value will be displayed in exponential format

Alternative function is to recall the last answer

1. **Plus**

Perform addition of the 1st (X) and 2nd (Y) operand:

Tapping twice will store the 1st (X) operand as constant (C) for subsequent addition:

Alternative function is to find the remainder of the 1st (X) operand divided by the 2nd (Y) operand:

1. **Minus**

Perform subtraction of the 1st (X) and 2nd (Y) operand:

Tapping twice will store the 1st (X) operand as constant (C) for subsequent subtraction:

1. **Multiply**

Perform multiplication of the 1st (X) and 2nd (Y) operand:

Tapping twice will store the 1st (X) operand as constant (C) for subsequent multiplication:

Alternative function is to raise the 1st (X) operand to the power of 2nd (Y) operand:

1. **Divide**

Perform division of the 1st (X) and 2nd (Y) operand:

Tapping twice will store the 1st (X) operand as constant (C) for subsequent multiplication:

Alternative function is to take 2nd (Y) operant root of 1st (X) operand:

1. **Equal**

Conduct the 2 operands calculation and display the result

Alternative function is to conduct percentage, premium, discount calculation

1. **Pi**

Recall the constant value pi (3.14 ...)

When the formula calculation is being executed, it is used to enter the input variables and to show the output results. The input variables and the output results will be stored into the volatile memory spaces (from (K0) to (K9)), so that when the formula is invoked next time, then the same calculation can be executed by just pressing this key without entering new values.

1. **Open bracket / Input x-component of data**

Open a new bracket to start prioritized calculation. Nesting of up to 99 pairs of brackets are allowed

In the linear regression calculation mode, it is used to enter the x-component of data

1. **Close bracket / Estimate from linear regression**

Close the nearest bracket to finish prioritized calculation

In the linear regression calculation mode, it is used to estimate the y-component for a given x-component, or the alternative function is to estimate the x-component for a given y-component

1. **Store volatile memory**

Store the currently displayed value into one of the 10 volatile memory spaces

The volatile memory space can be selected from (K0) to (K9)

1. **Recall volatile memory / Shift function in linear regression and statistic calculation mode**

Recall the value from one of the 10 volatile memory spaces

The volatile memory space can be selected from (K0) to (K9)

In the statistic calculation mode, it combines with the digit key to calculate the statistic of the stored data

: The sum of square of the stored data

: The sum of the stored data

: The stored data count

In the linear regression mode, it combines with the digit key to calculate the statistic and the regression parameters of the stored data

: The sum of square of the x-component of stored data

: The sum of the x-component of stored data

: The stored data count

: The sum of square of the y-component of stored data

: The sum of the y-component of stored data

: The sum of product of the x-component and y-component of stored data

1. **Display value in engineering exponential format (forward direction)**

Display value with decimal point shifted and in the form of

Tapping subsequently will display the value in the form of so on

Alternative function is to conduct permutation of the 1st (X) and 2nd (Y) operand: For example to calculate , press A picture containing text, sign

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Description automatically generated**A picture containing text, sign

Description automatically generated**to get the answer.

When the calculation mode is base-n, tapping can switch to Decimal and (Alternative function) Binary calculation

1. **Display value in engineering exponential format (reverse direction)**

Display value with decimal point shifted and in the form of

Tapping subsequently will display the value in the form of so on

Alternative function is to conduct combination of the 1st (X) and 2nd (Y) operand: For example to calculate , press A picture containing text, sign

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Description automatically generated**A picture containing text, sign

Description automatically generated**to get the answer.

When the calculation mode is base-n, tapping can switch to Hexadecimal and (Alternative function) Octal calculation

1. **Factorial**

Calculate the factorial of the 1st (X) operand

Alternative function is to swap the 1st (X) and 2nd (Y) operand in the current calculation

When the calculation mode is base-n, then perform bitwise NOT operation of the 1st (X) operand

1. **Reciprocal**

Calculate the reciprocal of the 1st (X) operand

Alternative function is to swap the 1st (X) and selected volatile memory (K0 to K9)

When the calculation mode is base-n, then perform bitwise AND operation of the 1st (X) and 2nd (Y) operand

1. **Square root**

Calculate the square root of the 1st (X) operand

When the calculation mode is base-n, then perform bitwise OR operation of the 1st (X) and 2nd (Y) operand

1. **Square**

Calculate the square of the 1st (X) operand

When the calculation mode is base-n, then perform bitwise XOR operation of the 1st (X) and 2nd (Y) operand

1. **Common logarithm**

Calculate the common logarithm (base 10) of the 1st (X) operand

Alternative function is to calculate the value of 10 to the power of the 1st (X) operand

When the calculation mode is base-n, then perform bitwise XNOR operation of the 1st (X) and 2nd (Y) operand

1. **Natural logarithm**

Calculate the natural logarithm (base e=2.718...) of the 1st (X) operand

Alternative function is to calculate the value of e to the power of the 1st (X) operand

1. **Fraction**

Input the operand value in fractional format

The value will be displayed in fractional format. E.g. represents the fraction value

Alternative function is to calculate the improper fraction of the current fraction

When the calculation mode is base-n, then input numeral A for hexadecimal value

1. **Degree**

Input the degree value in sexagesimal scale. The value will be displayed in decimal format.

Alternative function is to display the value in degree format

When the calculation mode is base-n, then input numeral B for hexadecimal value

1. **Hyperbolic calculation**

Enable hyperbolic calculation with the subsequent key:

: Calculate the sinh (Alternative function is to calculate the inverse sinh) of the 1st (X) operand

: Calculate the cosh (Alternative function is to calculate the inverse cosh) of the 1st (X) operand

: Calculate the tanh (Alternative function is to calculate the inverse tanh) of the 1st (X) operand

When the calculation mode is base-n, then input numeral C for hexadecimal value

1. **Sine**

Calculate the sine value of the angle given in the 1st (X) operand in the current angle unit

Alternative function is to return the angle in the current angle unit from the arc-sine calculation of the 1st (X) operand

When the calculation mode is base-n, then input numeral D for hexadecimal value

1. **Cosine**

Calculate the cosine value of the angle given in the 1st (X) operand in the current angle unit

Alternative function is to return the angle in the current angle unit from the arc-cosine calculation of the 1st (X) operand

When the calculation mode is base-n, then input numeral E for hexadecimal value

1. **Tangent**

Calculate the tangent value of the angle given in the 1st (X) operand in the current angle unit

Alternative function is to return the angle in the current angle unit from the arc-tangent calculation of the 1st (X) operand

When the calculation mode is base-n, then input numeral F for hexadecimal value

1. **Sign**

Change the sign of the 1st (X) operand

When the calculation mode is base-n, then perform 2s complement operation of the 1st (X) operand for binary / octal / hexadecimal value

1. **Delete**

Delete the previous step(s) of entry

1. **Non-volatile memory recall**

Recall the value from the non-volatile memory (M)

Alterative function is to store the current displayed value into the non-volatile memory (M)

1. **Non-volatile memory plus / store or delete data in linear regression and statistic calculation mode**

Perform addition of the non-volatile memory (M) and 1st (X) operand:

Alterative function is to perform subtraction of the non-volatile memory (M) and 1st (X) operand:

In the linear regression and statistic calculation mode, it is used to store the data, or the alternative function is to delete the current value of 1st (X) operand from the stored data

### Menu

The calculator has the following settings:

1. **Haptic Feedback**: If this option is ON, then there will be a short vibration whenever a key is pressed
2. **Blinking Feedback**: If this option is ON, then there will be a short blinking on the display whenever a key is pressed
3. **Sound**: If this option is ON, then there will be a short “tock” sound whenever a key is pressed
4. **Italic Font**: If this option is ON, then the italic font will be used to display the digits on the display
5. **Exp Form Padding**: If this option is ON, then the exponential digits will be padded with leading zeros (e.g. will be shown as )
6. **Comma Decimal Point**: If this option is ON, then comma will be used as decimal point (e.g. will be shown as )
7. **Thousand Separator**: If this option is ON, then a separator will be placed every 3 digits when displaying a large number (e.g. will be shown as if **Comma Decimal Point** is OFF, or if **Comma Decimal Point** is ON)
8. **13-Digit Mode**: If this option is ON, then the display can show up to 13 main digits instead of 10 main digits with the trade-off of smaller font
9. **3-Exp-Digit Mode**: If this option is ON, then the display can show up to 3 exponential digits instead of 2 exponential digits with the trade-off of smaller font

A screenshot of a calculator

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### Limitation

The calculator has the following limitations:

1. If the calculation result is larger than ( in **3-Exp-Digit Mode**), or smaller than ( in **3-Exp-Digit Mode**), then error will be displayed
2. If the calculation result has absolute value smaller than ( in **3-Exp-Digit Mode**), then error will be displayed
3. Nested-bracket can go up-to 99 level
4. In base-n mode, if **13-Digit Mode** is OFF, then the binary value may range from -512 (1000000000b) to 511 (0111111111b); the decimal value may range from -9999999999 to 9999999999; the octal value may range from -536870912 (4000000000o) to 536870911 (3777777777o); the hexadecimal value may range from -2147483648 (80000000h) to 2147483647 (7FFFFFFFh)
5. In base-n mode, if **13-Digit Mode** is ON, then the binary value may range from -4096 (1000000000000b) to 4095 (0111111111111b); the decimal value may range from -9999999999999 to 9999999999999; the octal value may range from -274877906944 (4000000000000o) to 274877906943 (3777777777o); the hexadecimal value may range from -8796093022208 (80000000000h) to 8796093022207 (7FFFFFFFFFFh)