EngCalc

(Electrical)
For Palm OS

Version 2.0
User Guide

Product of:-

3GR Technologies

For Installation information & Sales/Support contacts refer the Read Me file.

Contents

1. Introduction:

EngCalc (Electrical) is a Powerful calculator tool for Engineering professionals. It combines performance & accuracy which enables to perform complex engineering calculations. Embedded is another great tool - MxCalc SE, for Converting Units (Most comprehensive converter available) & Evaluating Expressions.

New Features: NEW

- Supports High Resolution (320x320).
- Search feature to quickly access the calculators.
- Calculations in **US units** or **Metric units**. Apply settings for all the calculators.
- Includes large input panel to enter values.
- Mostly operated with finger, no need of stylus.
- Uniquely designed Calculator display for accepting Inputs.
- In-place Unit Conversion to switch between **US-Metric units for single Input/Output**.

1.1 Installation/Uninstallation

Installation

The EngCalc (Electrical) program package is packaged separately for PalmOS 3.x to 4.x and PalmOS 5.x & HiResolution devices. To know the version of PalmOS running on the device go to the Main Application screen where you see all the application in the device. Please go to Menu - > Info -> Version (tab). The version is mentioned on the top of the screen as PalmOS Software vx.x. To know the Resolution information, see the device manual.

- For Palm OS 5.x loaded devices with resolution 160x160 (e.g. Treo 600) install the EngCalc-Elect-5x-Install.prc
- For Palm OS 3.0 to 4.x loaded devices with resolution 320x320 & True HiRes (e.g. Treo 650 & later)install the EngCalc-Elect-3x-Install.prc
- For Palm OS 5.x loaded devices with resolution 320x320 & True HiRes (e.g. Treo 650 & later) EngCalc-Elect-HR-5x-Install.prc
- The following message will appear in case you have installed a wrong file. "This version of the Booster is not valid for your device. Please visit ..... "
- You need to then reinstall the program. For this delete the following files from the device & install the correct PRC file.
  ASFXfix
  BasicIngots - BASI
  Booster
  ConstUnitConverter.
  DataCommIngots - DTCI
  EnhancedIngots - ENHI

GameIngots-GAMI
MultimediaIngots-Ml
OwnerDrawIngots-O

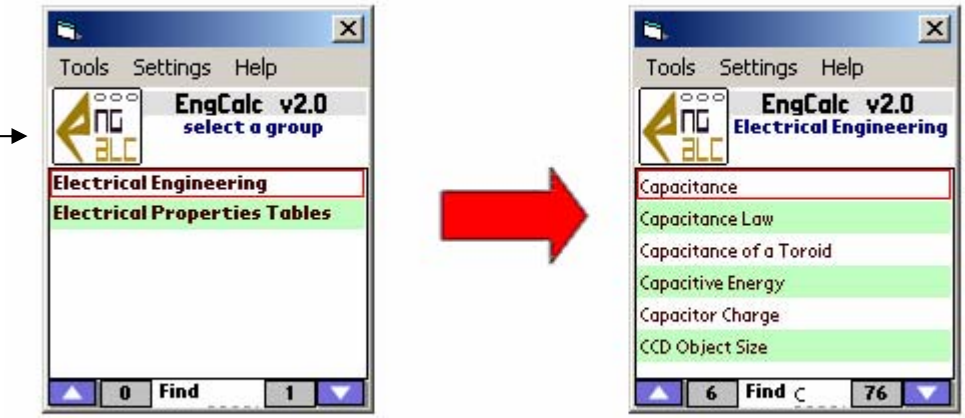
Steps to install EngCalc (Electrical) program:

- First decompress the downloaded file onto the hard drive of your desktop computer.
- You will use the Install Tool application included with the Palm Desktop software to transfer the EngCalc (Electrical) program onto your handheld.
- Start the Install Tool program.
- In the User drop down list, select the user name that corresponds to your handheld.
- Click the Add button.
- Navigate to the directory where you decompressed the EngCalcElect files (c:\EngCalcElect).
- Select the .PRC file (**Specific to your device**) file, and then click the Open button.
- Click the Done button.
- Synchronize your handheld with the desktop to transfer the files onto your handheld.

Steps to uninstall EngCalc (Electrical) program:

- Load the programs Menu in the device
- Select 'Delete' from the menu.
- Select the 'EngCalcElect' program from the list & tap on 'Delete' button.

2. Application Overview



How to start……..

- To start with, select the group from the list of Groups.
- As shown in the above figure tap the button shown to select the group.

- Select Group from the list of groups. **(E.g. In the above figure Electrical Engineering is selected.)**
- After that select calculator **(E.g. after selecting Electrical Engineering group, Capacitance calculator is selected.)**
- Tap on the selected area, respective calculator will launch.
- Use this advance Calculator for further calculations.
- The calculator consists of Inputs and Outputs. After entering the values in all the Inputs (**Mandatory**) tap on **Calculate** button.
- To search the group, enter the letter with which the required group name starts and all the groups starting with that letter are shown.
- To load the MxCalc go to Menu -> Tools -> MxCalc.
- Options module helps you to customize Properties, Units, Calculator(s), and Group(s) by making them visible or hidden thereby saving the time to load.
- To add a New Property in the MxCalc Unit Converter module go to Menu-> Tools -> New.

2.1 List of Calculators:

Electrical Engineering

Ammeter Shunts
Cap. of a Sphere in Space (Capacitance)
Cap. of a Sphere in Space (Radius)
Capacitance
Capacitance Law
Capacitance of a Toroid
Capacitive Energy
Capacitor Charge
Cap-Freq-Ind (Capacitance)
Cap-Freq-Ind (Frequency)
Cap-Freq-Ind (Inductance)
CCD Object Size
Coulombs Law
Cylindrical Capacitor
DC Inductor Voltage
Electrical Harmonics
Helical Coil Inductance
Helical Primary Turns for Coils
Horsepower Created by a hydraulic motor
H-Pad Resistance
Impedance & Resonant Capacitor for Coils
Impedance & Resonant Capacitor for Coils
Inductance For Spiral Flat Coils
Inductive Energy
Inverting Amplifier
Jar Capacitance For Coils
L / C Reactance (Capacitive Reactance)
L / C Reactance (Inductive Reactance)
Len of Wire AND Freq. of Coil (Freq.of Coil)
Len of Wire AND Freq. of Coil (Len of Wire)
Motor calculation (Fan - compressor motors)
Motor calculation (Lifts, elevators and cranes)
Motor calculation (Pump motor)
Motor Estimators (Find Amps)
Motor Estimators (Find HP)
Motor Estimators (Kva (3 Phase))

Non-inverting Amplifier
Operation Amplifier (Differential Amplifier)
Operation Amplifier (Inverting Amplifier)
Operation Amplifier (Non-inverting Amplifier)
Parallel Capacitance
Parallel Inductance
Parallel Resistance
PCB Trace Width (External Layer Results)
PCB Trace Width (Internal Layer Results)
Plate Capacitor
Plate Type or Rolled Capacitor
Potential Divider (R1)
Potential Divider (R2)
Potential Divider (Resistors)
Potential Divider (Voltage Out)
Power Calculation
Power Calculation-Current
Power Calculation-Power
Power Calculation-Voltage
Power Factor from Power Factor Angle
Power Factor from Real Power
RC Transient
Reactance of Capacitor
Res-Freq-Cap (Capacitance)
Res-Freq-Cap (Frequency)
Res-Freq-Cap (Resistance)
Resistively
Resonant LC Freq
RL Transient
RMS Calculations (Pulse Waveform)
RMS Calculations (Trapezoidal Waveform)
RMS Calculations (Triangle Waveform)
Series Capacitance
Series Inductance
Series Resistance
Solenoid Magnetic Field
Speaker 70 Volt Powered Line
Star/Delta Transformation (Delta to Star)
Star/Delta Transformation (Star to Delta)
Straight Wire Magnetic Field
Temperature Coefficient
Toroid Magnetic Field
T-Pad Resistance

Transformer Impedence
Transformer KVA Quick Calc (1 ph)
Transformer KVA Quick Calc(3 ph)
Wheatstone Bridge

2.2 List of Property Tables:

Electrical Properties Table

IEC Frame Dimensions-AC Motors
IEC vs. NEMA Frame Comparison
Motor Ampere Rating
NEMA Standard Frame size For AC Motors
NEMA Starter Sizes For AC Motors
Ohm's Law
Properties Of Bare Aluminum Wire(Met)
Properties Of Bare Aluminum Wire(US)
Properties Of Bare Copper Wire(Met)
Properties Of Bare Aluminum Wire(US)
Resistor Color Codes
Three – Phase AC Motors
Three – Phase AC Motors – 50 Hz

Vapor Pressure – R-502 Type(Met)
Vapor Pressure – R-502 Type(US)

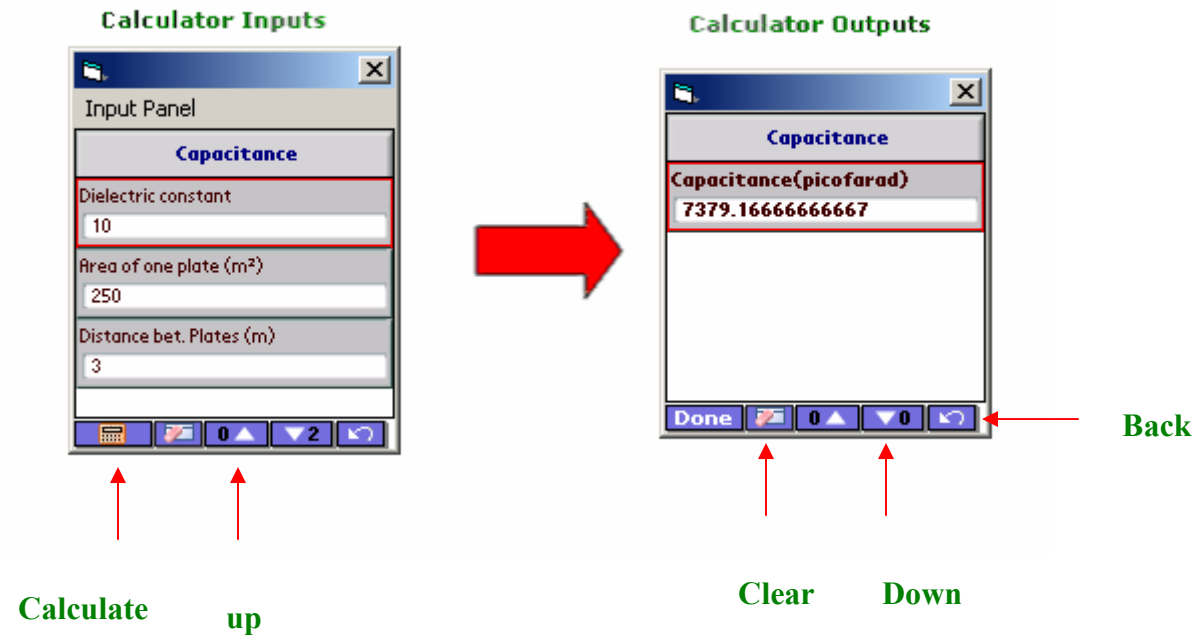
Vapor Pressure – Ultra Low Temp(Met)
Vapor Pressure –Ultra Low Temp(US)

2.3 To Start with Calculator Functions:

- The Calculator consists of Inputs and Outputs.
- For Ex: Name of the Calculator: Capacitance

Inputs: Dielectric constant, Area of one plate, Distance bet. Plates (m)

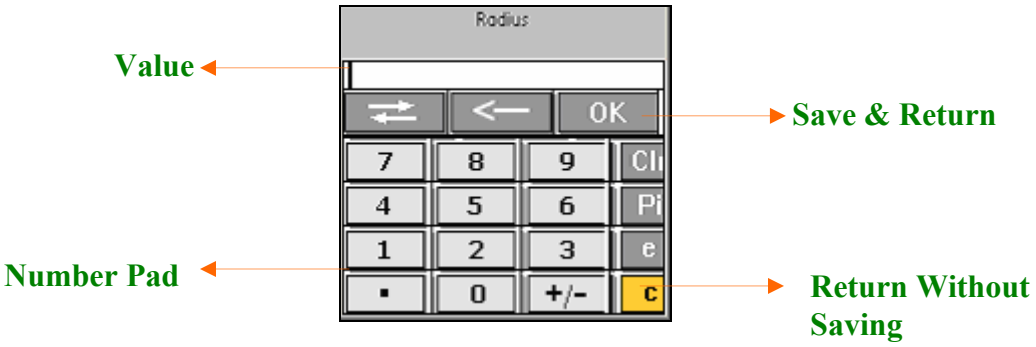
Outputs: Capacitance (picofarad)



- After entering values in the Inputs, Tap on **Calculate** button at the bottom of the screen, the output will be displayed.
- By Tapping on **Back** button ,you will get the previous form
- Tap on **up and down arrow** button to move up and down.
- Tap **Clear** to clear values.
- Tap on **Done** to return to the main screen.

3. Input Panel:

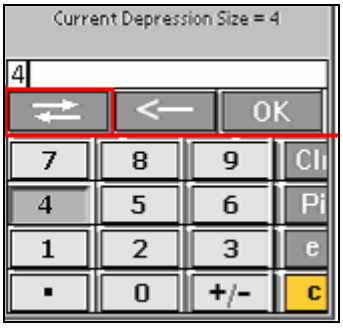
- The inputs Panel will pop-up as soon as you tap the input Area. You can see the complete input at the top of the screen.
- It is used to enter values for inputs; the Input Panel is a very smartly designed Number Pad.
- Tap on any Input Box and tap on any number pad item to enter the data
- You can also hide the input panel.



4. In-place Unit Converter:

You can now convert units with the help of In-place unit converter utility which is strongly integrated with calculator in a manner by which you can enter the inputs in the Unit you have acquired the value. This is useful at the time of changing between **US units-Metric units without changing the preferences**. To select the Unit tap on the button highlighted in the fig. given below. Before tapping on the conversion button you will need to enter the value in the Inputs Box

- For example if you have the acquired the value in Centimeters & the Inputs requires in Inches, in such case enter the Values Acquired then you need to select Centimeters from the list of Units that you see after tapping on the Conversion button



Tap here to load the In-place Unit Converter

- If you want to calculate the input entered in the given textbox with another unit, Tap to get In-place Unit Converter as shown in the figure.
- After clicking In-place Unit Converter you will get the screen as below,
- Select the unit in which you want to convert.

5. Preferences:

5.1 Customize

You can hide the Groups or properties.

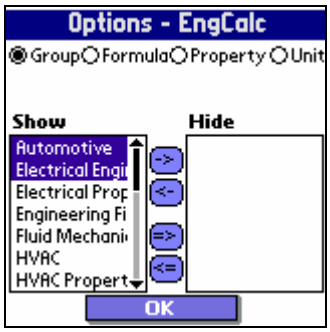
- Select an option from top of the screen. Selecting a Group or Property will display the Formulas or Units respectively
- Select items from the list (**multiple selection supported**) and then tap on ' - >' Button to hide or '< - ' Button to show. Tapping on '=>' Button will make all the items in the Left list Hidden and tapping on '<=' Button will make all the items in the Right list Visible

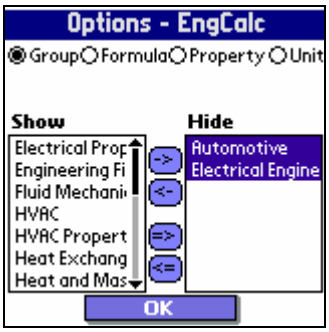
Note: Properties and Groups marked, as Hidden will not be displayed in the List

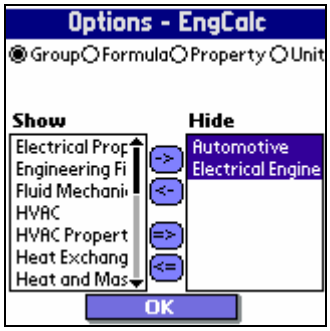
The options module allows you to hide/show items in the list of Groups, Properties, and Formulas & Units. The items which are very rarely used can be hidden. Those items which are marked as hidden are not populated in the list and hence making the list short and easy to scroll.

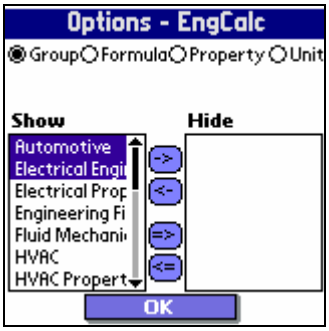
Following are the steps for Hiding/Showing any Group or Property:-

- Select an option from top of the screen. This will load the lists with visible items (**left**) and Hidden items (**right**).
- Select items from the list (**multiple selection supported**), then tap on'->' Button to hide or '<-' Button to show. Tapping on '=>' Button will make all the items in the Left list Hidden and tapping on '<=' Button will make all the items in the Right list Visible





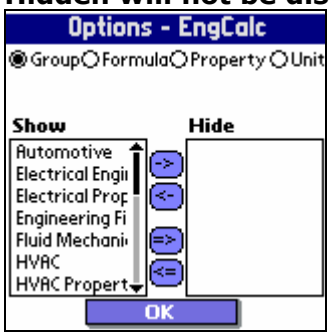


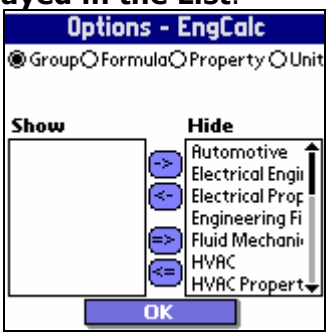


Following are the steps for Hiding/Showing any Formula or Unit:-

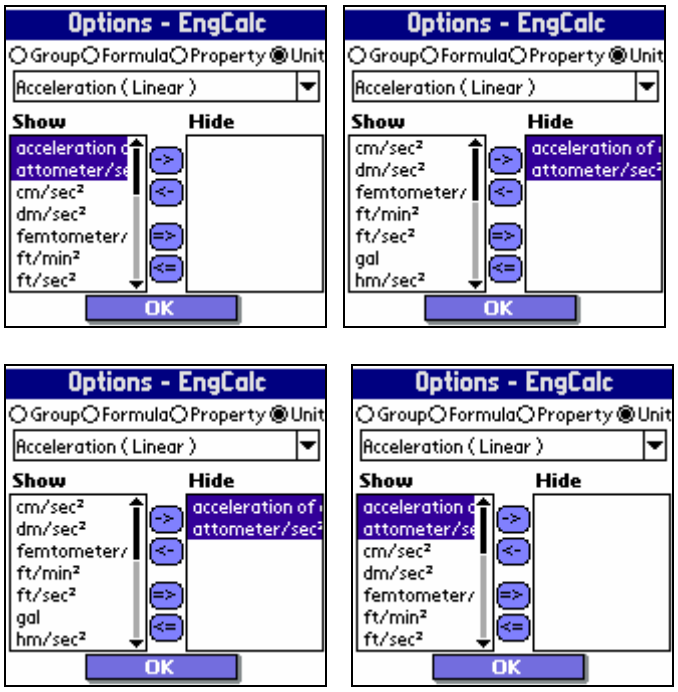
- Select an option from top of the screen. Selecting a Group or Property will display the Formulas or Units respectively.
- Select items from the list (**multiple selection supported**), then tap on '->' Button to hide or '<-' Button to show. Tapping on '=>' Button will make all the items

Note: Properties and Groups marked as Hidden will not be displayed in the List.



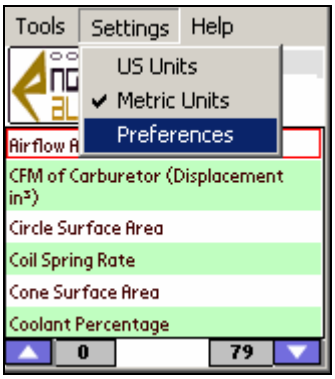


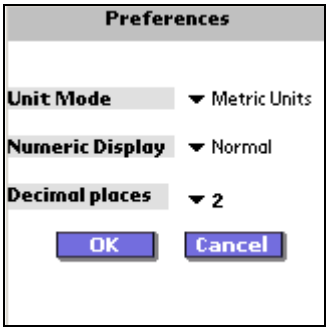
in the Left list Hidden and tapping on '<=' Button will make all the items in the Right list Visible



5.2 Settings

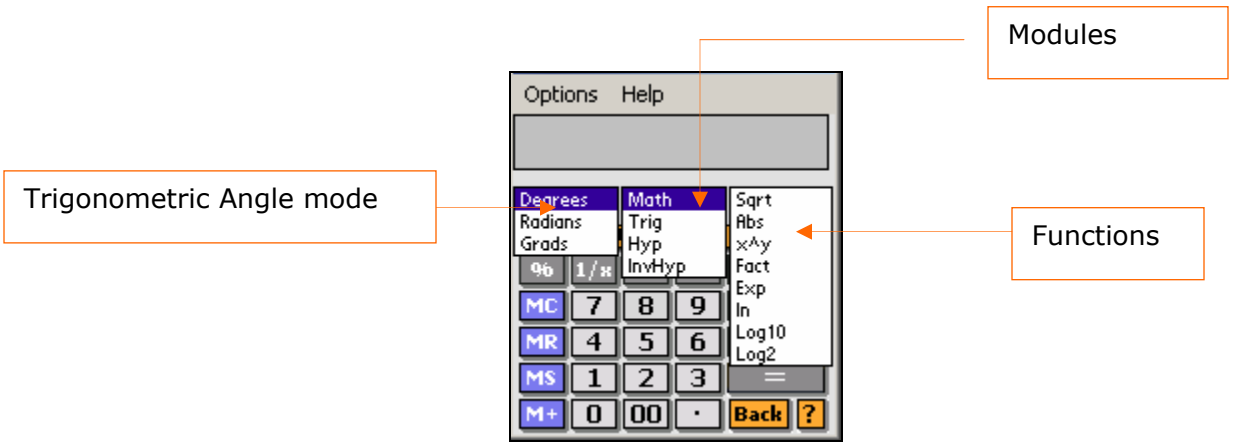
- Tap On **Settings** in Menu bar.
- Select **Preferences**
- Select **US unit** or **Metric unit** standard. This will become the units standard across all the calculators
- You can also change the units from the calculator with the help of In Place unit conversion which is discussed in this document in a separate topic.
- Select Numeric Display from the drop down list. 3 modes are there. Fix, Scientific and Normal
- Select the Decimal Places.



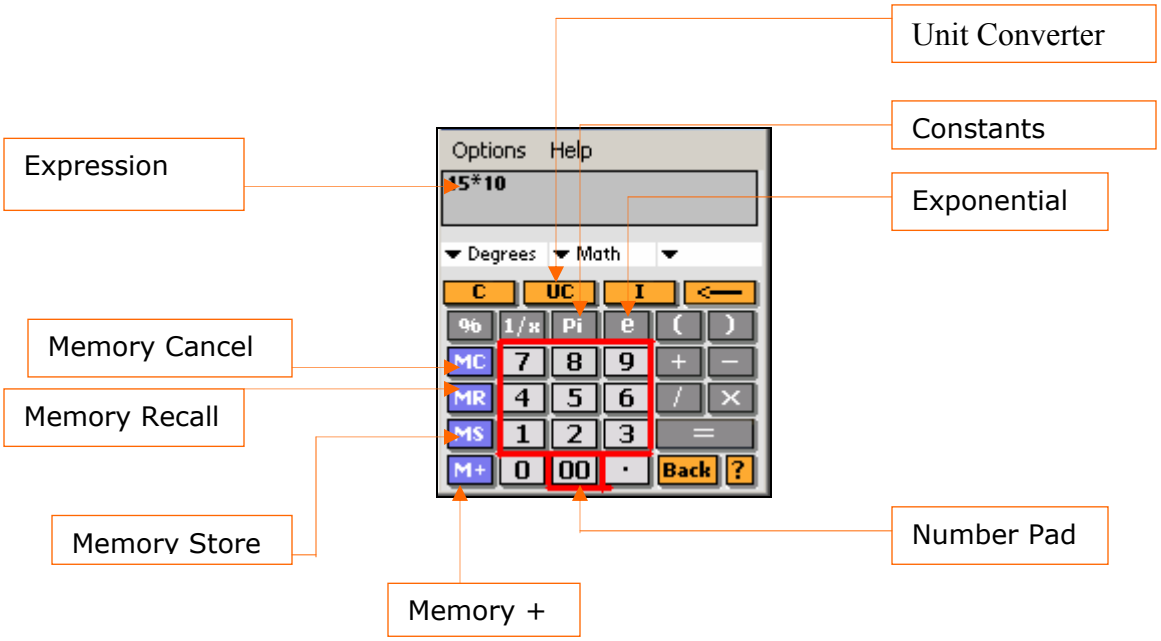


6. MxCalc

- To load the MxCalc go to Menu -> Tools -> MxCalc.
- The different Calculation Modes are Degree mode, Radians mode and Grade mode.
- Tap on Functions Menu and it will display the list of Mathematic Category, Trigonometric Category, Hyperbolic Category and Inverse Hyperbolic Category.

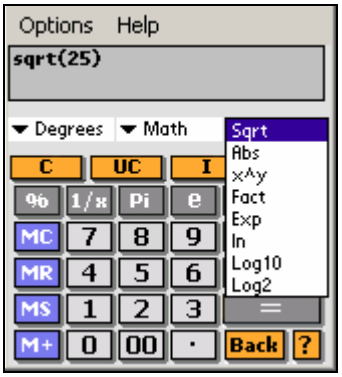


General Usage



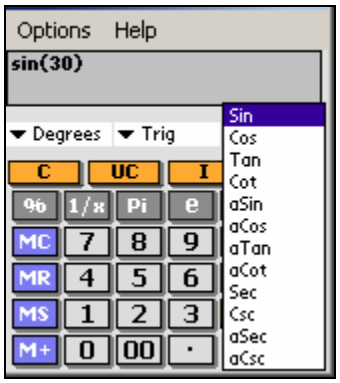
6.1 Supported Functions:

6.1.1 Mathematical Functions:



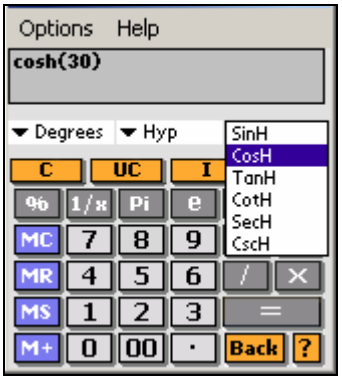
- Select **Math**
- **1/x** - Returns the inverse of a number.
- **Sqrt**- Returns the square root of number
- **Exp** – Returns e to the power of the number.
- **ln** - Returns the logarithm of a number to the natural base 'e'.
- **log10** - Returns the logarithm of a number to the base 10.
- **log2** - Returns the logarithm of a number to the base 2.
- **%**- Returns Percentage.
- **X^y –** Returns the y^{th} power of the number.

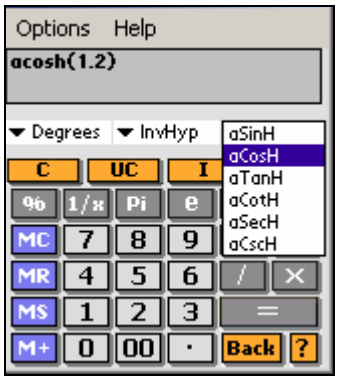
6.1.2 Trigonometric Functions:



- Select **Trig.**
- **Sin** - Returns the sine of the given angle.
- **Cos** - Returns the cosine of the given angle
- **Tan** - Returns the tangent of the given angle.
- **Cot** – Returns the cotangent of the given angle.
- **Sec** – Returns the secant of the given angle.
- **Cosec** – Returns the cosecant of the given angle.
- **asin** - Returns the arcsine of the given number.
- **acos** - Returns the inverse hyperbolic cosine of any real number. Number must be Greater than or equal to 1. The inverse hyperbolic cosine is the value whose Hyperbolic cosine is number, so ACOSH(COSH(number)) equals number.
- **atan** - Returns the arctangent of a number. The arctangent is the angle whose tangent is number.
- **acot** - Returns the arccotangent of a number. The arccotangent is the angle whose tangent is number.
- **asec** – Returns the arcsecant of the given angle.
- **acosec**- Returns the arccosecant of the given angle.

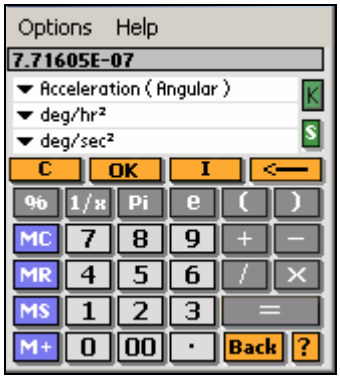
6.1.3 Hyperbolic Functions:



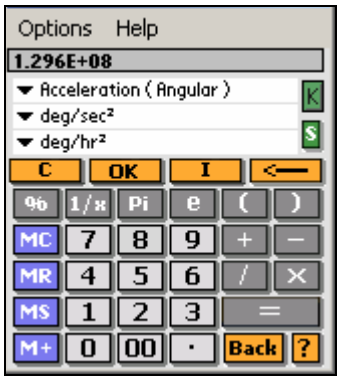


- Tap on **Hyp**
- **sinh** - Returns the hyperbolic sine of a real number.
- **cosh** - Returns the hyperbolic cosine of a real number
- **tanh** - Returns the hyperbolic tangent of a real number
- **Sech**– Returns the hyperbolic secant of the given angle.
- **cosech** – Returns the hyperbolic cosecant of the given angle.
- **coth**-Returns the cotangent of the given
- **asinh** - Returns the inverse hyperbolic sine of a real number. The inverse hyperbolic sine is the value whose hyperbolic sine is number, so ASINH (SINH (number)) equals number.
- **acosh** - Returns the inverse hyperbolic cosine of a number. Number must be greater than or equal to 1. The inverse hyperbolic cosine is the value whose hyperbolic cosine is number, so ACOSH (COSH (number)) equals number.
- **atanh** - Returns the inverse hyperbolic tangent of a number. Number must be between - 1 and 1 (excluding - 1 and 1). The inverse hyperbolic tangent is the value whose hyperbolic tangent is number, so ATANH (TANH (number)) equals number.
- **acot** - Returns the arccotangent of a number. The arccotangent is the angle whose tangent is number.
- **asec** – Returns the arcsecant of the given angle
- **acosec**- Returns the arccosecant of the given angle.

6.2 Unit Converter:



After Swap



- Tap on **UC** UC button.

- This module of unit converter offers a very comprehensive collection of properties with respective units. A very useful utility to Convert Values from one unit to another. Following are the steps for Converting Values.

- Choose a property from the list.
- Enter the value and Choose a unit from the 'From Value'
- Choose a unit from the 'To Value' and tap Calculate to see the conversion.
- You can use the Swap button to swap the value entered in 'From Value' with the value entered in 'To Value'**.** Shown in the figure.
- Tap on clear button to clear Input values.

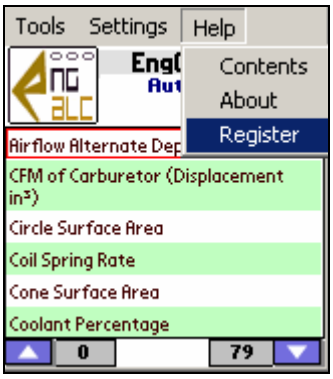
Note: Properties marked as Hidden will not be displayed in the List. Same goes with the Units.

6.2.1 List of Properties:

Absolute Zero	Enthalpy
Acceleration (Angular)	Feed
Acceleration (Linear)	Feet of Pipe
Activation Energy	Flow Rate(Mass)
Angle	Flow Rate(Volume)
Angular Momentum	Force
Area	Force (Body)
Area per unit Volume	Force Per Unit Mass
Boltzmann Constant	Fouling Factor
Charge / Mole	Frequency
Concentration	Fuel Efficiency
Conductivity	Geometric Displacement
Cost of Power	Heat of Combustion
Cp	Heat of Fusion
Cutting Tools	Heat of Vaporization
Data Rate	Heat Transfer Co-efficient
Data Storage	Height
Density	Henry's Law Constant
Depth	Illuminance
Dimensionless	Inductance
Displacement	Integration Constant
Distance	Intensity of Ionizing Radiation
Dynamic Fluidity (1/viscosity)	Kinetic Energy of Turbulence
Electric Dipole Moment	Length
Electric Field Strength	Linear Momentum
Electrical Capacitance	Linear Thermal expansion coefficient
Electrical Charge	Luminance
Electrical Conductivity	Magnetic Field Strength
Electrical Current	Magnetic Flux
Electrical Inductance	Magnetic Flux Density
Electrical Potential	Magnetic Moment
Electrical Resistance	Magnetomotive Force
Electrical Resistivity	Mass
Energy	Mass Density
Energy Flux	Mass Flowrate
Energy per unit Area	Mass Flux
Mass Per Unit Length	Mass Per Unit Area
Mass Transfer Co-efficient	Viscosity (Kinematic)
Molar Concentration	Voltage (emf)
Molar Flow Rate	Voltage Ratio / Frequency
Molar Heat Capacity	Volume
Molecular Weight	Volumetric Calorific Value
Moment of Inertia	Volumetric Coefficient of Expansion
Moment of Inertia (Area)	Volumetric Flow
Momentum	Volumetric Mass Flow rate
Momentum Flow Rate	Wave Number
Momentum Flux	Wavelength of max. Radiation Intensity
Number	Width
Permeability	Work
Permeability Factor	Temperature (Boiling pt. At 1 atm)
Photon Emission Rate	Torque Conversion

Population Power Power / Unit Mass Power / Unit Volume Press Impulse Pressure Pressure Gradient Radioactive Dose Radioactive Exposure Radioactivity Rate of Expenditure Slope Solid Angle Specific Enthalpy Specific Gravity Specific Heat Specific Heat Capacity Specific Surface Specific Volume Speed Surface Tension Temperature Difference Thermal Conductance Thermal Conductivity Thermal Resistance Time Torque Total Head Turbulence Energy Dissipation Rate U Value Unit Power Velocity Velocity (Angular) Velocity (Linear) Viscosity (Dynamic) Viscosity (Kinematic)	Cooking Butter Metric Conversion for Length Mass(metric) flow rate (mole) conversion Electric Power Currency

7. How to Register……..



Trial version of EngCalc (Electrical) i.e. version 2.0 is available. You can use the trial this version up to 15 uses. After that you will have to register the product. Registration process is simple.

- Tap on **Help → Register**
- Enter Serial number.
- Tap 'Enter Key' button.

- To register you will need the HotSync ID. You can locate the HotSync ID as shown below in the figure.
- Select 'Custom' by clicking on the HotSync Icon in the System Tray. In the example given below **'John Cruz'** is the HotSync ID.
- Enter the key provided with your purchase (or later via email) in the input area below the serial # and tap on **'Enter Key'** button.