

# OPTIONS CALCULATOR 1.3 USER'S GUIDE

## Overview

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**Options Calculator** is a tool, that is used to analyse futures options, index options and stock options.

### THE SOFTWARE CALCULATES:

- theoretical price of call and put options;
- **Delta, Gamma, Theta, Vega** and **Rho** values, used to estimate the price sensitivity to current market situation.

Options Calculator is based on a "Black-Scholes" Option Pricing Model, developed by Fisher Black and Myron Scholes in 1973.

This model allows calculating the appropriate market values on basis of the underlying asset price, volatility, expiration date and current interest rate.

### DEVELOPING THE MODEL, BLACK AND SCHOLES MADE THE FOLLOWING ASSUMPTIONS:

1. The market is considered to be "ideal":
  - commission, other exchange fees and technical costs are not taken into account;
  - all market participants have an opportunity to take or give credit at a "riskless" rate at any time;
  - there are no penalties for short positions;
  - all instruments are partible endlessly (one can buy a part of a stock);
2. Stock prices are distributed lognormally (the distribution curve is bell-shaped) – so the stock price can easily double or halve).

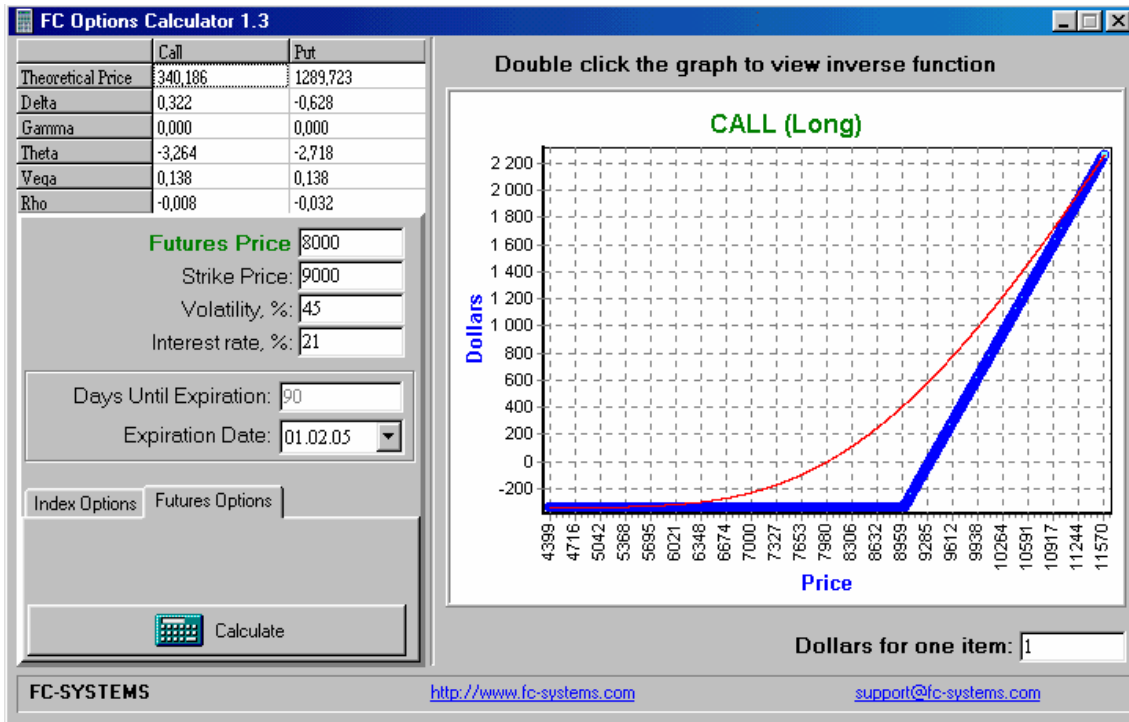
The components of the Option Pricing Model are: underlying asset's price, volatility, expiration date, "riskless" interest rate and dividends (if any).

## Introduction

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Working with the Options Calculator, the user enters all necessary data into the appropriate fields of the program window. Theoretical price of call and put options, Delta, Gamma, Theta, Vega and Rho values, will be calculated automatically.

The derived result can be presented both in figures and as a diagram.

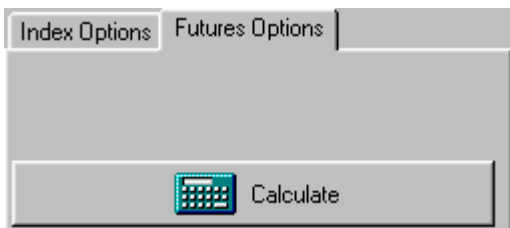


## Data input

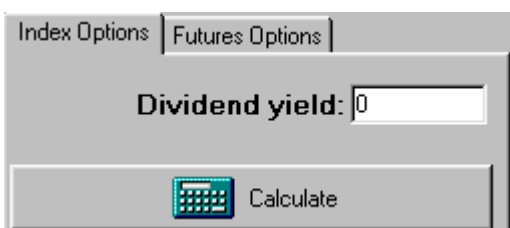
### Option type

- Index Options
- Futures Options

To choose the option type, press the appropriate tab.



Working with an index option, enter theoretical **Dividend Yield** of shares, that the index contains.



### Underlying Asset Price

ACCORDING TO THE CHOSEN OPTION TYPE THIS FIELD, ASSIGNED FOR UNDERLYING ASSET PRICE, CAN BE MARKED THE FOLLOWING WAY:

- **Index Price.**
- **Futures Price.**

<b>Index Price</b>	<input type="text" value="30"/>
Strike Price:	<input type="text" value="30"/>
Volatility, %:	<input type="text" value="45"/>
Interest rate, %:	<input type="text" value="23"/>

<b>Futures Price</b>	<input type="text" value="8000"/>
Strike Price:	<input type="text" value="9000"/>
Volatility, %:	<input type="text" value="45"/>
Interest rate, %:	<input type="text" value="21"/>

Enter current underlying index/futures price into this field.

### Strike Price

Enter strike price into this field.

### Volatility, %

Enter volatility in percentage terms into this field.

### Interest Rate, %

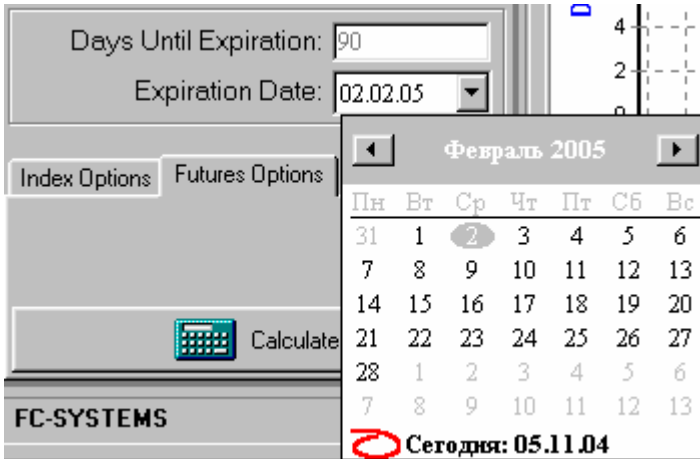
Enter riskless interest rate in percentage terms into this field.

### Expiration Date

Enter Expiration Date of the option into this field. Use your keyboard to enter the date.

Days Until Expiration:	<input type="text" value="90"/>
Expiration Date:	<input type="text" value="02.02.05"/> ▼

You can also use the pulldown calendar, if you click on the button to the right of the date.



### Days Until Expiration

This field is filled in automatically, on basis of the **Expiration Date**.

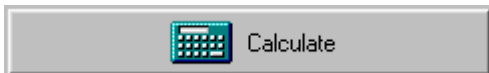
### Dollars for One Item

Enter value of one pip point in dollars into this field.



## Calculation

To calculate theoretical price of call and put options, Delta, Gamma, Theta, Vega and Rho values simply press **“Calculate”**.



The result can be derived only in case all the essential data is entered. Otherwise you will receive an error message.

## Derived Data Analysis

The derived result is presented in figures and as a diagram.

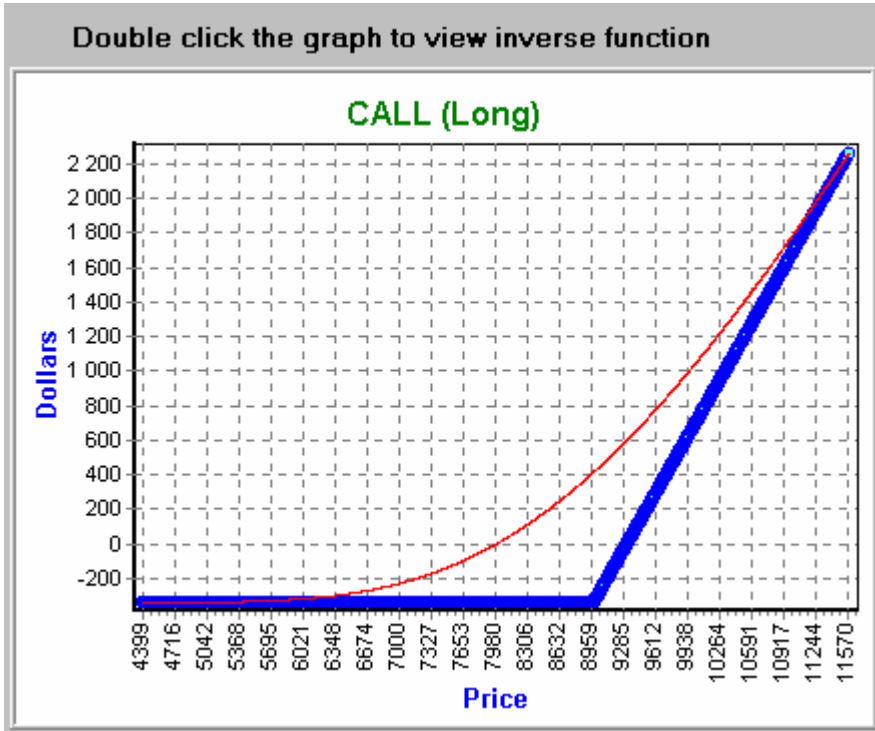
The values are presented in a table in upper-left part of the program window. Two columns show the data for **Call** and **Put** Options.

	Call	Put
Theoretical Price	340,186	1289,723
Delta	0,322	-0,628
Gamma	0,000	0,000
Theta	-3,264	-2,718
Vega	0,138	0,138
Rho	-0,008	-0,032

To show the graph, left-click the field with the appropriate value.

The Theoretical Price graph consists of two curves. Blue curve shows the intrinsic value of the option. Red curve shows the theoretical option price on a calculation date.

To show the inverse diagram double-click the graph.



THE FOLLOWING VALUES ARE PRESENTED IN THE TABLE:

- **Theoretical Price**

Theoretical Price shows, how high the option price should be according to the values of the model components (volatility, underlying asset price, strike price, etc). This value is used to recognise options with disbalanced price and to figure out, whether the option is over- or underrated at the moment.

- **Delta**

Delta indicator is the ratio of option price change to underlying asset price change. It shows the option price velocity relative to underlying asset price velocity. Graphically Delta is the tilt angel of tangent to the option price curve. Delta shows by how much will the option price change with the change of the onderlying asset price by 1 pip point.

- **Gamma**

Gamma indicator is a ratio, that shows Delta velocity relative to underlying asset price velocity. Graphically Gamma is the curvature of Delta, in other words it shows how fast will the curvature of Delta change with the change of the underlying asset price. That is why Gamma is often called the option curvature. If Gamma value is low,

Delta changes little. On the contrary, big value (in modulus) means that Delta will change substantially. Gamma is measured in Deltas per underlying asset price pip point.

- **Theta**

Theta indicator is a ratio, that shows how fast will the option price decrease with the approach of the expiration date, assuming other market conditions constant. As Theta shows the decrease of the option price, it has a negative value. Theta is negative for a long position and positive for a short position (An exclusion is a european option. If its price is lower than the intrinsic value. It has positive Theta. Option price will gradually draw closer to the intrinsic value as the expiration date approaches). Almost for all options Theta and Gamma values will have opposite signs. Big negative Gamma will comply with big positive Theta and vice versa. Big Theta shows that there is a big risk of option value loss with the approach of the Expiration Date.

- **Vega**

Vega indicator is a ratio of option price change to underlying asset price standard deviation. It shows shows by how much will the option price change with the change of the underlying asset price standard deviation by 1 pip point.

- **Rho**

Rho indicator is a ratio, that shows by how much will the option price change with the change of the interest rate by 1 percent. Call option price positively depends on the interest rate. Put option price - negatively. In practice Rho is important for long-term options. Influence of interest rate on the option price for short periods of time is low. Rho is measured in monetary units.