

## **MetaQuotes Language 4**

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## **MQL4 quick reference**

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## **About MetaQuotes Language 4**

MetaQuotes Language 4 (MQL4) is a new built-in language for programming trading strategies. This language allows to create your own Expert Advisors that render the trade process management automatic and are perfectly suitable for implementing your own trade strategies. Also, with the help of MQL4 you can create your own Custom Indicators, Scripts and Libraries of functions.

A large number of functions necessary for the analysis of the current and past quotations, the basic arithmetic and logic operations are included in MQL4 structure. There are also basic indicators built in and commands of order placement and control.

The MetaEditor 4 text editor that highlights different constructions of MQL4 language is used for writing the program code. It helps users to orient in the expert system text quite easily. As an information book for MQL4 language we use MetaQuotes Language Dictionary. A brief guide contains functions divided into categories, operations, reserved words, and other language constructions and allows finding the description of every element we use.

Programs written in MetaQuotes Language 4 have different features and purposes:

- Expert Advisors is a mechanical trade system (MTS) linked up to a certain plot. The Advisor can not only inform you about a possibility to strike bargains, but also can make deals on the trade account automatically and direct them right to the trade server. Like most trade systems, the terminal supports testing strategies on historical data with displaying on the chart the spots where trades come in and out.
- Custom Indicators are an analogue of a technical indicator. In other words, Custom Indicators allow to create technical indicators in addition to those already integrated into client terminal. Like built-in indicators, they cannot make deals automatically and are aimed only at implementing analytical functions.
- Scripts are programs intended for single execution of some actions. Unlike Expert Advisors, Scripts are not run tick wise and have no access to indicator functions.
- Libraries are user functions libraries where frequently used blocks of user programs are stored.

## **Syntax**

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## Format

Spaces, tabs, line feed/form feed symbols are used as separators. You can use any amount of such symbols instead of one. You should use tab symbols to enhance the readability of the text .

## Comments

Multi line comments start with /\* symbols and end with \*/ symbols. Such comments cannot be nested. Single comments start with // symbols, end with the symbol of a new line and can be nested into multi line comments. Comments are allowed where blank spaces are possible and tolerate any number of spaces.

Examples:

```
// single comment
/* multi-
   line          // nested single comment
   comment
*/
```

## Identifiers

Identifiers are used as names of variables, functions, and data types. The length of an identifier cannot exceed 31 characters.

Symbols you can use: the numbers 0-9, Latin capital and small letters a-z, A-Z (recognized as different symbols), the symbol of underlining (\_). The first symbol cannot be a number. The identifier must not coincide with any reserved word.

Examples:

```
NAME1 name1 Total_5 Paper
```

## Reserved words

The identifiers listed below are fixed reserved words. A certain action is assigned to each of them, and they cannot be used for other purposes:

Data types	Memory classes	Operators	Other
bool	extern	break	false
color	static	case	true
datetime		continue	
double		default	
int		else	
string		for	
void		if	
		return	
		switch	
		while	

## Data types

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## Data types overview

The main data types are:

- [Integer \(int\)](#)
- [Boolean \(bool\)](#)
- [Literals \(char\)](#)
- [String \(string\)](#)
- [Floating-point number \(double\)](#)
- [Color \(color\)](#)
- [Datetime \(datetime\)](#)

We need the Color and Datetime types only to facilitate visualization and entering those parameters that we set from expert advisor property tab or custom indicator "Input parameters" tab. The data of Color and Datetime types are represented as integer values.

We use implicit type transformation. The priority of types at a transformation in ascending order is the following:

```
int (bool,color,datetime);  
double;  
string;
```

Before operations (except for the assignment ones) are performed, the data have been transferred to the maximum precision type. Before assignment operations are performed, the data have been transferred to the integer type.

## Integer constants

**Decimal:** numbers from 0 to 9; Zero should not be the first number.

Examples:

```
12, 111, -956 1007
```

**Hexadecimal:** numbers from 0 to 9, letters a-f or A-F to represent the values 10-15; they start with 0x or 0X.

Examples:

```
0x0A, 0x12, 0X12, 0x2f, 0xA3, 0xA3, 0X7C7
```

Integer constants can assume values from -2147483648 to 2147483647. If a constant exceeds this range, the result will not be defined.

## Literal constants

Any single character enclosed in single quotes or a hexadecimal ASCII-code of a character looking like '\x10' is a character constant of integer type. Some characters like a single quote ('), double quote (") a question mark (?), a reverse slash (\) and control characters can be represented as a combination of characters starting with a reverse slash (\) according to the table below:

line feed	NL (LF)	\n
horizontal tab	HT	\t
carriage return	CR	\r
reverse slash	\	\\
single quote	'	\'
double quote	"	\"
hexadecimal ASCII-code	hh	\xhh

If a character different from those listed above follows the reverse slash, the result will not be defined.

#### Examples:

```
int a = 'A';
int b = '$';
int c = '@'; // code 0xA9
int d = '\xAE'; // symbol code ®
```

#### Boolean constants

Boolean constants may have the value of true or false, numeric representation of them is 1 or 0 respectively. We can also use synonyms True and TRUE, False and FALSE.

#### Examples:

```
bool a = true;
bool b = false;
bool c = 1;
```

#### Floating-point number constants

Floating-point constants consist of an integer part, a dot (.) and a fractional part. The integer and the fractional parts are a succession of decimal numbers. An unimportant fractional part with the dot can be absent.

#### Examples:

```
double a = 12.111;
double b = -956.1007;
double c = 0.0001;
double d = 16;
```

Floating-point constants can assume values from 2.2e-308 to 1.8e308. If a constant exceeds this range, the result will not be defined.

#### String constants

String constant is a succession of ASCII-code characters enclosed in double quotes: "Character constant".

A string constant is an array of characters enclosed in quotes. It is of the string type. Each string constant, even if it is identical to another string constant, is saved in a separate memory space. If you need to insert a double quote (") into the line, you must place a reverse slash (\) before it. You can insert any special character constants into the line if they have a reverse slash (\) before them. The length of a string constant lies between 0 and 255 characters. If the string constant is longer, the superfluous characters on the right are rejected.

#### Examples:

```
"This is a character string"
"Copyright symbol \t\xA9"
"this line with LF symbol \n"
"A" "1234567890" "0" "$"
```

#### Color constants

Color constants can be represented in three ways: by character representation; by integer representation; by name (for concrete Web colors only).

Character representation consists of four parts representing numerical rate values of three main color components - red, green, blue. The constant starts with the symbol C and is enclosed in single quotes. Numerical rate values of a color component lie in the range from 0 to 255.

Integer-valued representation is written in a form of hexadecimal or a decimal number. A hexadecimal number looks like 0x00BBGGRR where RR is the rate of the red color component, GG - of the green one and BB - of the blue one. Decimal constants are not directly reflected in RGB. They represent the decimal value of the hexadecimal integer representation.

Specific colors reflect the so-called [Web colors set](#).

#### Examples:

```
// symbol constants
C'128,128,128' // gray
```

```

C'0x00,0x00,0xFF' // blue
// named color
Red
Yellow
Black
// integer-valued representation
0xFFFFFFFF // white
16777215 // white
0x008000 // green
32768 // green

```

### Datetime constants

Datetime constants can be represented as a character line consisting of 6 parts for value of year, month, date, hour, minutes, and seconds. The constant is enclosed in simple quotes and starts with a D character.

Datetime constant can vary from Jan 1, 1970 to Dec 31, 2037.

Examples:

```

D'2004.01.01 00:00' // New Year
D'1980.07.19 12:30:27'
D'19.07.1980 12:30:27'
D'19.07.1980 12' //equal to D'1980.07.19 12:00:00'
D'01.01.2004' //equal to D'01.01.2004 00:00:00'
D'12:30:27' //equal to D'[compilation date] 12:30:27'
D'' //equal to D'[compilation date] 00:00:00'

```

### Operations & Expressions

#### [Expressions](#)

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#### [Other operations](#)

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### Expressions

An expression consists of one or more operands and operation characters. An expression can be written in several lines.

Example:

```
a++; b = 10; x = (y*z)/w;
```

Note: An expression that ends with a semicolon is an operator.

### Arithmetical operations

Sum of values	<code>i = j + 2;</code>
Difference of values	<code>i = j - 3;</code>
Changing the operation sign	<code>x = - x;</code>
Product of values	<code>z = 3 * x;</code>
Division quotient	<code>i = j / 5;</code>
Division remainder	<code>minutes = time % 60;</code>
Adding 1 to the variable value	<code>i++;</code>
Subtracting 1 from the variable value	<code>k--;</code>

The operations of adding/subtracting 1 cannot be implemented in expressions.

Example:

```
int a=3;
a++;           // valid expression
int b=(a++)*3; // invalid expression
```

### The operation of assignment

**Note:** The value of the expression that includes this operation is the value of the left operand following the bind character.

Assigning the y value to the x variable	<code>y = x;</code>
Adding x to the y variable	<code>y += x;</code>
Subtracting x from the y variable	<code>y -= x;</code>
Multiplying the y variable by x	<code>y *= x;</code>
Dividing the y variable by x	<code>y /= x;</code>
Module x value of y	<code>y %= x;</code>
Logical shift of y representation to the right by x bit	<code>y &gt;&gt;= x;</code>
Logical shift of y representation to the left by x bit	<code>y &lt;&lt;= x;</code>
Bitwise operation AND	<code>y &amp;= x;</code>
Bitwise operation OR	<code>y  = x;</code>
Bitwise operation exclusive OR	<code>y ^= x;</code>

**Note:** There can be only one operation of assignment in the expression. You can implement bitwise operations with integer numbers only. The logical shift operation uses values of x less than 5 binary digits. The greater digits are rejected, so the shift is for the range of 0-31 bit. By %= operation a result sign is equal to the sign of divided number.

### Operations of relation

The logical value false is represented with an integer zero value, while the logical value true is represented with any value differing from zero.

The value of expressions containing operations of relation or logical operations is 0 (false) or 1 (true).

True if a equals b	<code>a == b;</code>
True if a does not equal b	<code>a != b;</code>
True if a is less than b	<code>a &lt; b;</code>
True if a is greater than b	<code>a &gt; b;</code>
True if a is less than or equals b	<code>a &lt;= b;</code>
True if a is greater than or equals b	<code>a &gt;= b;</code>

Two unnormalized floating-point numbers cannot be linked by == or != operations. That is why it is necessary to subtract one from another, and the normalized outcome needs to be compared to null.

### Boolean operations

The operand of negation NOT (!) must be of arithmetic type; the result equals 1 if the operand value is 0; the result equals 0 if the operand differs from 0.

```
// True if a is false.
if(!a)
    Print("not 'a'");
```

The logical operation OR (||) of values k and 1. The value k is checked first, the value 1 is checked only if k value is false. The value of this expression is true if the value of k or 1 is true.

Example:

```
if(x<k || x>l)
    Print("out of range");
```

The logical operation AND (&&) of values x and y. The value x is checked first; the value y is checked only if k value

is true. The value of this expression is true if the values of both x and y are true.

Example:

```
if(p!=x && p>y)
    Print("true");
n++;
```

### Bitwise operations

One's complement of values of variables. The value of the expression contains 1 in all digits where n contains 0; the value of the expression contains 0 in all digits where n contains 1.

```
b = ~n;
```

Binary-coded representation of x is shifted to the right by y digits. The right shift is logical shift, that is the freed left-side bits will be filled with zeros.

Example:

```
x = x >> y;
```

The binary-coded representation of x is shifted to the right by y digits; the free digits on the right will be filled with zeroes.

Example:

```
x = x << y;
```

Bitwise operation AND of binary-coded x and y representations. The value of the expression contains 1 (true) in all digits where both x and y are not equal to zero; the value of the expression contains 0 (false) in all other digits.

Example:

```
b = ((x & y) != 0);
```

Bitwise operation OR of binary-coded x and y representations. The expression contains 1 in all digits where x and y not equals 0; the value of the expression contains 0 in all other digits.

Example:

```
b = x | y;
```

Bitwise operation EXCLUSIVE OR of binary-coded x and y representations. The expression contains 1 in all digits where x and y have different binary values; the value of the expression contains 0 in all other digits.

Example:

```
b = x ^ y;
```

Note: Bitwise operations are executed with integers only.

### Other operations

Indexing. At addressing to i element of array, the value of the expression equals the value of the variable numbered as i.

Example:

```
array[i] = 3;
//Assign the value of 3 to array element with index i.
//Mind that the first array element
//is described with the expression array [0].
```

The call of function with x1,x2,...,xn arguments. The expression accepts the value returned by the function. If the returned value is of the void type, you cannot place such function call on the right in the assignment operation. Mind that the expressions x1,x2,...,xn are surely executed in this order.

Example:

```
double SL=Ask-25*Point;
double TP=Ask+25*Point;
int ticket=OrderSend(Symbol(),OP_BUY,1,Ask,3,SL,TP,
                    "My comment",123,0,Red);
```

The "comma" operation is executed from left to right. A pair of expressions separated by a comma is calculated from left to right with a subsequent deletion of the left expression value. All side effects of left expression calculation can appear before we calculate the right expression. The result type and value coincide with the type and value of the right expression.

## Precedence rules

Each group of operations in the table has the same priority. The higher the priority is, the higher the position of the group in the table is.

The execution order determines the grouping of operations and operands.

()	Function call	From left to right
[]	Array element selection	
!	Negation	From left to right
~	Bitwise negation	
-	Sign changing operation	
*	Multiplication	From left to right
/	Division	
%	Module division	
+	Addition	From left to right
-	Subtraction	
<<	Left shift	From left to right
>>	Right shift	
<	Less than	From left to right
<=	Less than or equals	
>	Greater than	
>=	Greater than or equals	
==	Equals	From left to right
!=	Not equal	
&	Bitwise AND operation	From left to right
^	Bitwise exclusive OR	From left to right
	Bitwise OR operation	From left to right
&&	Logical AND	From left to right
	Logical OR	From left to right
=	Assignment	From right to left
+=	Assignment addition	
-=	Assignment subtraction	
*=	Assignment multiplication	
/=	Assignment division	
%=	Assignment module	
>>=	Assignment right shift	
<<=	Assignment left shift	
&=	Assignment bitwise AND	
=	Assignment bitwise OR	
^=	Assignment exclusive OR	
,	Comma	From left to right

Use parentheses to change the execution order of the operations.

## Operators

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### Format and nesting

Format. One operator can occupy one or several lines. Two or more operators can be located in the same line. Nesting. Execution order control operators (if, if-else, switch, while and for) can be nested into each other.

### Compound operator

A compound operator (a block) consists of one or more operators of any type enclosed in braces {}. The closing brace should not be followed by a semicolon (;).

Example:

```
if (x==0)
{
    x=1; y=2; z=3;
}
```

### Expression operator

Any expression followed by a semicolon (;) is an operator. Here are some examples of expression operators:

**Assignment operator.**

*Identifier=expression;*

Example:

```
x=3;
y=x=3; // error
```

You can use an assignment operator in an expression only once.

**Function call operator**

*Function\_name(argument1,..., argumentN);*

Example:

```
fclose(file);
```

**Null operator**

It consists of a semicolon (;) only. We use it to denote a null body of a control operator.

### Break operator

A break; operator terminates the execution of the nearest nested outward operator switch, while or for. The control is given to the operator that follows the terminated one. One of the purposes of this operator is to finish the looping execution when a certain value is assigned to a variable.

Example:

```
// searching first zero element
for(i=0;i<array_size;i++)
    if((array[i]==0)
        break;
```

### Continue operator

A continue; operator gives control to the beginning of the nearest outward cycle operator while or for, calling the next iteration. The purpose of this operator is opposite to that of break.

Example:

```
// summary of nonzero elements of array
int func(int array[])
{
    int array_size=ArraySize(array);
```

```

int sum=0;
for(int i=0;i<array_size; i++)
{
    if(a[i]==0) continue;
    sum+=a[i];
}
return(sum);
}

```

### Return operator

A return; operator terminates the current function execution and returns the control to the calling program.

A return(expression); operator terminates the current function execution and returns the control to the calling program together with the expression value. The operator expression is enclosed in parentheses. The expression should not contain an assignment operator.

Example:

```
return(x+y);
```

### Conditional operator if

```

if (expression)
    operator;

```

If the expression is true, the operator will be executed. If the expression is false, the control will be given to the expression following the operator.

Example:

```

if(a==x)
    temp*=3;
temp=MathAbs(temp);

```

### Conditional operator if-else

```

if (expression)
    operator1
else
    operator2

```

If the expression is true, operator1 is executed and the control is given to the operator that follows operator2 (operator2 is not executed). If the expression is false, operator2 is executed.

The "else" part of the "if" operator can be omitted. Thus, a divergence may appear in nested "if" operators with an omitted "else" part. If it happens, "else" addresses to the nearest previous operator "if" in the block that has no "else" part.

Example:

```

// The "else" part refers to the second "if" operator:
if(x>1)
    if(y==2)
        z=5;
    else
        z=6;
// The "else" part refers to the first "if" operator:
if(x>1)
{
    if(y==2) z=5;
}
else

```

```

{
    z=6;
}
// Nested operators
if(x=='a')
{
    y=1;
}
else if(x=='b')
{
    y=2;
    z=3;
}
else if(x=='c')
{
    y = 4;
}
else
{
    Print("ERROR");
}

```

## Switch operator

```

switch (expression)
{
    case constant1: operators; break;
    case constant2: operators; break;
    ...
    default: operators; break;
}

```

It compares the expression value with constants in all variants of case and gives control to the operator that resembles the expression value. Each variant of the case can be marked with an integer or character constant or a constant expression. The constant expression must not include variables and function calls.

Example:

```

case 3+4: //valid
case X+Y: //invalid

```

Operators connected with a default label are executed if none of the constants in case operators equals the expression value. The default variant is not obligatory final. If none of the constants resembles the expression value and the default variant is absent, no actions are executed. The keyword case and the constant are just labels and if operators are executed for some variant of case the program will further execute the operators of all following variants until it hits a break operator. It allows linking one succession of operators with several variants. A constant expression is calculated during compilation.

None of two constants in one switch operator can have the same values.

Example:

```

switch(x)
{
    case 'A':
        Print("CASE A\n");
        break;
    case 'B':
    case 'C':
        Print("CASE B or C\n");
        break;
    default:
        Print("NOT A, B or C\n");
}

```

```
break;
}
```

### Cycle operator while

```
while (expression)
    operator;
```

If the expression is true, the operator is executed till the expression becomes false. If the expression is false, the control will be given to the next operator.

Note: An expression value has been defined before the operator is executed. Therefore, if the expression is false from the very beginning, the operator is not executed at all.

Example:

```
while (k<n)
{
    y=y*x;
    k++;
}
```

### Cycle operator for

```
for (expression1; expression2; expression3)
    operator;
```

Expression1 describes the initialization of the cycle. Expression2 is the cycle termination check. If it is true, the loop body operator will be executed, Expression3 is executed. The cycle is repeated until Expression2 becomes false. If it is not false, the cycle is terminated, and the control is given to the next operator. Expression3 is calculated after each iteration. The 'for' operator is equivalent to the following succession of operators:

```
expression1;
while (expression2)
{
    operator;
    expression3;
};
```

Example:

```
for (x=1;x<=7;x++)
    Print (MathPower (x, 2) );
```

Any of the three or all three expressions can be absent in the FOR operator, but you should not omit the semicolons (;) that separate them.

If Expression2 is omitted, it is considered constantly true. The FOR (;;) operator is a continuous cycle equivalent to the WHILE(1) operator.

Each of the expressions 1 to 3 can consist of several expressions united by a comma operator ','.

Example:

```
//
for (i=0,j=n-1;i<n;i++,j--)
    a[i]=a[j];
```

## Functions

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## Function definition

A function is defined by return value type declaration, by formal parameters and a compound operator (block) that describes actions the function executes.

Example:

```
double // type
linfunc (double x, double a, double b) // function name and
// parameters list
{
    // nested operators
    return (a*x + b); // returned value
}
```

The "return" operator can return the value of the expression included into this operator. In case of a necessity, the expression value assumes the type of function result. A function that does not return a value must be of "void" type.

Example:

```
void errmesg(string s)
{
    Print("error: "+s);
}
```

### Function call

*function\_name (x1,x2,...,xn)*

Arguments (actual parameters) are transferred according to their value. Each expression  $x_1, \dots, x_n$  is calculated, and the value is passed to the function. The order of expressions calculation and the order of values loading are guaranteed. During the execution, the system checks the number and type of arguments given to the function. Such way of addressing to the function is called a value call. There is also another way: call by link. A function call is an expression that assumes the value returned by the function. This function type must correspond with the type of the returned value. The function can be declared or described in any part of the program:

```
int somefunc()
{
    double a=linfunc(0.3, 10.5, 8);
}
double linfunc(double x, double a, double b)
{
    return (a*x + b);
}
```

### Special functions init(), deinit() and start()

Any program begins its work with the "init()" function. "Init()" function attached to charts is launched also after client terminal has started and in case of changing financial symbol and/or charts periodicity.

Every program finishes its work with the "deinit()" function. "deinit()" function is launched also by client terminal shutdown, chart window closing, changing financial symbol and/or charts periodicity.

When new quotations are received, the "start()" function of attached expert advisors and custom indicator programs is executed. If, when receiving new quotations, the "start()" function triggered on the previous quotations was performed, the next calling "start()" function is executed only after "return()" instruction. All new quotations received during the program execution are ignored by the program.

Detaching of the program from charts, changing financial symbol and/or charts periodicity, charts closing and also client terminal exiting interrupts execution of program.

Execution of scripts does not depend on quotations coming.

### Variables

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## Definitions

Definitions are used to define variables and to declare types of variables and functions defined somewhere else. A definition is not an operator. Variables must be declared before being used. Only constants can be used to initialize variables.

### The basic types are:

- string - a string of characters;
- int - an integer;
- double - a floating-point number (double precision);
- bool - a boolean number "true" or "false".

Example:

```
string MessageBox;  
int Orders;  
double SymbolPrice;  
bool bLog;
```

### The additional types are:

- datetime is date and time, unsigned integer, containing seconds since 0 o'clock on January, 1, 1970.
- color - integer reflecting a collection of three color components.

The additional data types make sense only at the declaration of input data for more convenient their representation in a property sheet.

Example:

```
extern datetime tBegin_Data = D'2004.01.01 00:00';  
extern color cModify_Color = C'0x44,0xB9,0xE6';
```

## Arrays

Array is the indexed sequence of the identical-type data.

Example:

```
int a[50]; //A one-dimensional array of 50 integers.  
double m[7][50]; //Two-dimensional array of seven arrays,  
//each of them consisting of 50 integers.
```

Only an integer can be an array index. No more than four-dimensional arrays can be declared.

## Defining local variables

The variable declared inside any function is local. The scope of a local variable is limited to limits of the function inside which it is declared. The local variable can be initialized by outcome of any expression. Every call of function execute the initialization of local variables. Local variables are stored in memory area of corresponding function.

### Formal parameters

Examples:

```
void func(int x, double y, bool z)  
{  
    ...  
}
```

Formal parameters are local. Scope is the block of the function. Formal parameters must have names differing from those of external variables and local variables defined within one function. In the block of the function to the formal parameters some values can be assigned. Formal parameters can be initialized by constants. In this case, the initializing value is considered as a default value. The parameters following the initialized parameter should be

initialized, as well.

By calling this function the initialized parameters can be omitted, instead of them defaults will be substituted.

Example:

```
func(123, 0.5);
```

Parameters are passed by value. These are modifications of a corresponding local variable inside the called function will not be reflected in any way in the calling function. It is possible to pass arrays as parameters. However, for an array passed as parameter, it is impossible to change the array elements.

There is a possibility to pass parameters by reference. In this case, modification of such parameters will be reflected on corresponded variables in the called function. To point, that the parameter is passed by reference, after a data type, it is necessary to put the modifier &.

Example:

```
void func(int& x, double& y, double& z[])
{
    ...
}
```

Arrays also can be passed by reference, all modifications will be reflected in the initial array. The parameters that passed by reference, cannot be initialized by default values.

### Static variables

The memory class "static" defines a static variable. The specifier "static" is declared before a data type.

Example:

```
{
    static int flag
}
```

Static variables are constant ones since their values are not lost when the function is exited. Any variables in a block, except the formal parameters of the function, can be defined as static. The static variable can be initialized by corresponded type constant, as against a simple local variable which can be initialized by any expression. If there is no explicit initialization, the static variable is initialized with zero. Static variables are initialized only once before calling "init()" function. That is at exit from the function inside which the static variable is declared, the value of this variable being not lost.

### Defining global variables

They are defined on the same level as functions, i.e. they are not local in any block.

Example:

```
int Global_flag;
int start()
{
    ...
}
```

Scope of global variables is the whole program. Global variables are accessible from all functions defined in the program. They are initialized with zero if no other initial value is explicitly defined. The global variable can be initialized only by corresponded type constant. Initialization of global variables is made only once before execution of "init()" function.

Note: it is not necessary to confuse the variables declared at a global level, to global variables of Client Terminal, access to which is carried out by GlobalVariable...() function.

### Defining extern variables

The memory class "extern" defines an extern variable. The specifier "extern" is declared before a data type.

Example:

```
extern double InputParameter1 = 1.0;
int init()
```

```
{  
  ...  
}
```

Extern variables define input data of the program, they are accessible from a property program sheet. It is not meaningful to define extern variables in scripts. Arrays cannot represent itself as extern variables.

### Initializing variables

Any variable can be initialized during its definition. Any permanently located variable is initialized with zero (0) if no other initial value is explicitly defined. Global and static variables can be initialized only by constant of corresponded type. Local variables can be initialized by any expression, and not just a constant. Initialization of global and static variables is made only once. Initialization of local variables is made each time by call of corresponded functions.

#### Basic types

Examples:

```
int mt = 1;           // integer initialization  
// initialization floating-point number (double precision)  
double p = MarketInfo(Symbol(),MODE_POINT);  
// string initialization  
string s = "hello";
```

#### Arrays

Example:

```
int mta[6] = {1,4,9,16,25,36};
```

The list of array elements must be enclosed by curly braces. If the array size is defined, the values being not explicitly defined equal 0.

### External function definition

The type of external functions defined in another component of a program must be explicitly defined. The absence of such a definition may result in errors during the compilation, assembling or execution of your program. While describing an external object, use the key word `#import` with the reference to the module.

Examples:

```
#import "user32.dll"  
    int      MessageBoxA(int hWnd ,string szText,  
                        string szCaption,int nType);  
    int      SendMessageA(int hWnd,int Msg,int wParam,int lParam);  
#import "lib.ex4"  
    double   round(double value);  
#import
```

### Preprocessor

[Declaring of constant](#)

[Controlling compilation](#)

[Including files](#)

[Importing functions and other modules](#)

### Declaring of constant

If the first character in a program line is `#`, it means that this line is a compiler command. Such a compiler command ends with a carriage-return character.

```
#define identifier_value
```

The identifier of a constant obeys the same rules as variable names. The value can be of any type. Example:

```
#define ABC          100
```



```
#define PI 0.314
#define COMPANY_NAME "MetaQuotes Software Corp."
```

The compiler will replace each occurrence of an identifier in your source code with the corresponding value.

### Controlling compilation

*#property identifier\_value*

The list of predefined constant identifiers. Example:

```
#property link "http://www.metaquotes.net"
#property copyright "MetaQuotes Software Corp."
#property stacksize 1024
```

Constant	Type	Description
link	string	a link to the company website
copyright	string	the company name
stacksize	int	stack size
indicator_chart_window	void	show the indicator in the chart window
indicator_separate_window	void	show the indicator in a separate window
indicator_buffers	int	the number of buffers for calculation, up to 8
indicator_minimum	int	the bottom border for the chart
indicator_maximum	int	the top border for the chart
indicator_colorN	color	the color for displaying line N, where N lies between 1 and 8
indicator_levelN	double	predefined level N for separate window custom indicator, where N lies between 1 and 8
show_confirm	void	before script run message box with confirmation appears
show_inputs	void	before script run its property sheet appears; disables show_confirm property

The compiler

will write the declared values to the settings of the executable module.

### Including files

Note: The `#include` command line can be placed anywhere in the program, but usually all inclusions are placed at the beginning of the source code.

```
#include <file_name>
```

Example:

```
#include <win32.h>
```

The preprocessor replaces this line with the content of the file `win32.h`. Angle brackets mean that the file `win32.h` will be taken from the default directory (usually, `terminal_directory\experts\include`). The current directory is not searched.

```
#include "file_name"
```

Example:

```
#include "mylib.h"
```

The compiler replaces this line with the content of the file `mylib.h`. Since this name is enclosed in quotes, the search is performed in the current directory (where the main file of the source code is located). If the file is not found in the current directory, the error will be messaged.

### Importing functions and other modules

```
#import "file_name"
func1();
func2();
```

```
#import
```

Example:

```
#import "user32.dll"
    int MessageBoxA(int hWnd,string lpText,string lpCaption,
                    int uType);
    int MessageBoxExA(int hWnd,string lpText,string lpCaption,
                     int uType,int wLanguageId);

#import "melib.ex4"
#import "gdi32.dll"
    int      GetDC(int hWnd);
    int      ReleaseDC(int hWnd,int hDC);
#import
```

Functions are imported from MQL4 compiled modules (\*.ex4 files) and from operating system modules (\*.dll files). In the latter case, the imported functions are also declared. A new #import command (it can be without parameters) finishes the description of imported functions.

## Account Information

[AccountBalance\(\)](#)  
[AccountCredit\(\)](#)  
[AccountCompany\(\)](#)  
[AccountCurrency\(\)](#)  
[AccountEquity\(\)](#)  
[AccountFreeMargin\(\)](#)  
[AccountLeverage\(\)](#)  
[AccountMargin\(\)](#)  
[AccountName\(\)](#)  
[AccountNumber\(\)](#)  
[AccountProfit\(\)](#)

**double** AccountBalance()

Returns balance value of the current account.

### Sample

```
Print("Account balance = ",AccountBalance());
```

**double** AccountCredit()

Returns credit value of the current account.

### Sample

```
Print("Account number ", AccountCredit());
```

**string** AccountCompany()

Returns the current account company name.

### Sample

```
Print("Account company name ", AccountCompany());
```

**string** AccountCurrency()

Returns currency name of the current account.

### Sample

```
Print("account currency is ", AccountCurrency());
```

#### **double AccountEquity()**

Returns equity value of the current account.

##### **Sample**

```
Print("Account equity = ",AccountEquity());
```

#### **double AccountFreeMargin()**

Returns free margin value of the current account.

##### **Sample**

```
Print("Account free margin = ",AccountFreeMargin());
```

#### **int AccountLeverage()**

Returns leverage of the current account.

##### **Sample**

```
Print("Account #",AccountNumber(), " leverage is ", AccountLeverage());
```

#### **double AccountMargin()**

Returns margin value of the current account.

##### **Sample**

```
Print("Account margin ", AccountMargin());
```

#### **string AccountName()**

Returns the current account name.

##### **Sample**

```
Print("Account name ", AccountName());
```

#### **int AccountNumber()**

Returns the number of the current account.

##### **Sample**

```
Print("account number ", AccountNumber());
```

#### **double AccountProfit()**

Returns profit value of the current account .

##### **Sample**

```
Print("Account profit ", AccountProfit());
```

### **Array Functions**

[\*\*ArrayBsearch\(\)\*\*](#)

[\*\*ArrayCopy\(\)\*\*](#)

[\*\*ArrayCopyRates\(\)\*\*](#)

[\*\*ArrayCopySeries\(\)\*\*](#)

[\*\*ArrayDimension\(\)\*\*](#)

[\*\*ArrayGetAsSeries\(\)\*\*](#)

[ArrayInitialize\(\)](#)  
[ArrayIsSeries\(\)](#)  
[ArrayMaximum\(\)](#)  
[ArrayMinimum\(\)](#)  
[ArrayRange\(\)](#)  
[ArrayResize\(\)](#)  
[ArraySetAsSeries\(\)](#)  
[ArraySize\(\)](#)  
[ArraySort\(\)](#)

```
int      double array[], double value, int count=WHOLE_ARRAY, int start=0,
ArrayBsearch( int direction=MODE_ASCEND)
```

Returns the index of the first occurrence of a value in the first dimension of array if possible, or the nearest one, if the occurrence is not found.

The function cannot be used with string arrays and serial numeric arrays.

**Note:** Binary search processes only sorted arrays. To sort numeric arrays use [ArraySort\(\)](#) functions.

### Parameters

- array[]** - The numeric array to search for.
- value** - The value to search for.
- count** - Count of elements to search for. By default, it searches in the whole array.
- start** - Starting index to search for. By default, the search starts on the first element.
- direction** - Search direction. It can be any of the following values:  
MODE\_ASCEND searching in forward direction,  
MODE\_DESCEND searching in the backward direction.

### Sample

```
datetime daytimes[];
int      shift=10,dayshift;
// All the Time[] timeseries are sorted in descendant mode
ArrayCopySeries(daytimes,MODE_TIME,Symbol(),PERIOD_D1);
if(Time[shift]>=daytimes[0]) dayshift=0;
else
{
    dayshift=ArrayBsearch(daytimes,Time[shift],WHOLE_ARRAY,0,MODE_DESCEND);
    if(Period()<PERIOD_D1) dayshift++;
}
Print(TimeToStr(Time[shift])," corresponds to ",dayshift," day bar opened at ",
      TimeToStr(daytimes[dayshift]));
```

```
int      object& dest[], object source[], int start_dest=0, int start_source=0,
ArrayCopy( int count=WHOLE_ARRAY)
```

Copies an array to another one. Arrays must be of the same type, but arrays with type double[], int[], datetime[], color[], and bool[] can be copied as arrays with same type.

Returns the amount of copied elements.

### Parameters

- dest[]** - Destination array.
- source[]** - Source array.
- start\_dest** - Starting index for the destination array. By default, start index is 0.
- start\_source** - Starting index for the source array. By default, start index is 0.
- count** - The count of elements that should be copied. By default, it is WHOLE\_ARRAY constant.

### Sample

```
double array1[][6];
double array2[10][6];
// fill array with some data
ArrayCopyRates(array1);
ArrayCopy(array2, array1,0,Bars-9,10);
// now array2 has first 10 bars in the history
```

```
int ArrayCopyRates(double& dest_array[], string symbol=NULL, int timeframe=0)
```

Copies rates to the two-dimensional array from chart RateInfo array, where second dimension has 6 elements:

0 - time,  
1 - open,  
2 - low,  
3 - high,  
4 - close,  
5 - volume.

**Note:** Usually retrieved array used to pass large blocks of data to the DLL functions.

#### Parameters

**dest\_array[]** - Reference to the two-dimensional destination numeric array.  
**symbol** - symbol name, by default, current chart symbol name is used.  
**timeframe** - Time frame, by default, the current chart time frame is used. It can be any of [Time frame enumeration](#) values.

#### Sample

```
double array1[][6];  
ArrayCopyRates(array1,"EURUSD", PERIOD_H1);  
Print("Current bar ",TimeToStr(array1[0][0]),"Open", array1[0][1]);
```

```
int ArrayCopySeries(double& array[], int series_index, string symbol=NULL,  
int timeframe=0)
```

Copies a series array to another one and returns the count of copied elements.

**Note:** If series\_index is MODE\_TIME, the first parameter must be a datetime array.

#### Parameters

**array[]** - Reference to the destination one-dimensional numeric array.  
**series\_index** - Series array identifier. It can be any of [Series array identifiers enumeration](#) values.  
**symbol** - Symbol name, by default, the current chart symbol name is used.  
**timeframe** - Time frame, by default, the current chart time frame is used. It can be any of [Time frame enumeration](#) values.

#### Sample

```
datetime daytimes[];  
int shift=10,dayshift;  
// All the Time[] timeseries are sorted in descendant mode  
ArrayCopySeries(daytimes,MODE_TIME,Symbol(),PERIOD_D1);  
if(Time[shift]>=daytimes[0]) dayshift=0;  
else  
{  
    dayshift=ArrayBsearch(daytimes,Time[shift],WHOLE_ARRAY,0,MODE_DESCEND);  
    if(Period()<PERIOD_D1) dayshift++;  
}  
Print(TimeToStr(Time[shift])," corresponds to ",dayshift," day bar opened at ",  
TimeToStr(daytimes[dayshift]));
```

```
int ArrayDimension(int array[])
```

Returns array rank (dimensions count).

#### Parameters

**array[]** - array to retrieve dimensions count.

#### Sample

```
int num_array[10][5];  
int dim_size;  
dim_size=ArrayDimension(num_array);  
// dim_size is 2
```

**bool** ArrayGetAsSeries(**object** array[])

Returns true if array is organized as a series array (array elements indexed from last to first) otherwise return false.

#### Parameters

**array[]** - Array to check.

#### Sample

```
if(ArrayGetAsSeries(array1)==true)
    Print("array1 is indexed as a series array");
else
    Print("array1 is indexed normally (from left to right)");
```

**int** ArrayInitialize(**double&** array[], **double** value)

Sets all elements of numeric array to the same value. Returns the count of initialized element.

**Note:** It is useless to initialize index buffers in the custom indicator *init()* function.

#### Parameters

**array[]** - Numeric array to be initialized.

**value** - New value to be set.

#### Sample

```
//---- setting all elements of array to 2.1
double myarray[10];
ArrayInitialize(myarray,2.1);
```

**bool** ArrayIsSeries(**object** array[])

Returns true if the array checked is a series array (time,open,close,high,low, or volume).

#### Parameters

**array[]** - Array to check.

#### Sample

```
if(ArrayIsSeries(array1)==false)
    ArrayInitialize(array1,0);
else
{
    Print("Series array cannot be initialized!");
    return(-1);
}
```

**int** ArrayMaximum(**double** array[], **int** count=WHOLE\_ARRAY, **int** start=0)

Searches for elements with maximum value and returns its position.

#### Parameters

**array[]** - The numeric array to search for.

**count** - Scans for the count of elements in the array.

**start** - Start searching on the start index.

#### Sample

```
double num_array[15]={4,1,6,3,9,4,1,6,3,9,4,1,6,3,9};
int maxValIdx=ArrayMaximum(num_array);
Print("Max value = ", num_array[maxValIdx]);
```

**int** ArrayMinimum(**double** array[], **int** count=WHOLE\_ARRAY, **int** start=0)

Searches for element with minimum value and returns its position.

#### Parameters

- array[]** - The numeric array to search for.
- count** - Scans for the count of elements in the array.
- start** - Start searching on the start index.

### Sample

```
double num_array[15]={4,1,6,3,9,4,1,6,3,9,4,1,6,3,9};
double minValuIdx=ArrayMinimum(num_array);
Print("Min value = ", num_array[minValueIdx]);
```

### **int** ArrayRange(**object** array[], **int** range\_index)

Returns the count of elements in the indicated dimension of the array. Since indexes are zero-based, the size of dimension is 1 greater than the largest index.

#### Parameters

- array[]** - Array to check
- range\_index** - Dimension index.

### Sample

```
int    dim_size;
double num_array[10,10,10];
dim_size=ArrayRange(num_array, 1);
```

### **int** ArrayResize(**object&** array[], **int** new\_size)

Sets new size to the first dimension. If success returns count of all elements contained in the array after resizing, otherwise, returns zero and array is not resized.

#### Parameters

- array[]** - Array to resize.
- new\_size** - New size for the first dimension.

### Sample

```
double array1[][4];
int    element_count=ArrayResize(array, 20);
// element count is 80 elements
```

### **bool** ArraySetAsSeries(**double&** array[], **bool** set)

Sets indexing order of the array like a series arrays, i.e. last element has zero index. Returns previous state.

#### Parameters

- array[]** - The numeric array to set.
- set** - The Series flag to set (true) or drop (false).

### Sample

```
double macd_buffer[300];
double signal_buffer[300];
int    i,limit=ArraySize(macd_buffer);
ArraySetAsSeries(macd_buffer,true);
for(i=0; i<limit; i++)
    macd_buffer[i]=iMA(NULL,0,12,0,MODE_EMA,PRICE_CLOSE,i)-
iMA(NULL,0,26,0,MODE_EMA,PRICE_CLOSE,i);
for(i=0; i<limit; i++)
    signal_buffer[i]=iMAOnArray(macd_buffer,limit,9,0,MODE_SMA,i);
```

### **int** ArraySize(**object** array[])

Returns the count of elements contained in the array.

## Parameters

**array[]** - Array of any type.

## Sample

```
int count=ArraySize(array1);
for(int i=0; i<count; i++)
{
    // do some calculations.
}
```

```
int          double& array[], int count=WHOLE_ARRAY, int start=0,
ArraySort(   int sort_dir=MODE_ASCEND)
```

Sorts numeric arrays by first dimension. Series arrays cannot be sorted by ArraySort().

## Parameters

**array[]** - The numeric array to sort.  
**count** - Count of elements to sort.  
**start** - Starting index.  
**sort\_dir** - Array sorting direction. It can be any of the following values:  
MODE\_ASCEND - sort ascending,  
MODE\_DESCEND - sort descending.

## Sample

```
double num_array[5]={4,1,6,3,9};
// now array contains values 4,1,6,3,9
ArraySort(num_array);
// now array is sorted 1,3,4,6,9
ArraySort(num_array,MODE_DESCEND);
// now array is sorted 9,6,4,3,1
```

## Common functions

[Alert\(\)](#)  
[ClientTerminalName\(\)](#)  
[CompanyName\(\)](#)  
[Comment\(\)](#)  
[GetLastError\(\)](#)  
[GetTickCount\(\)](#)  
[HideTestIndicators\(\)](#)  
[IsConnected\(\)](#)  
[IsDemo\(\)](#)  
[IsDllsAllowed\(\)](#)  
[IsLibrariesAllowed\(\)](#)  
[IsStopped\(\)](#)  
[IsTesting\(\)](#)  
[IsTradeAllowed\(\)](#)  
[MarketInfo\(\)](#)  
[MessageBox\(\)](#)  
[Period\(\)](#)  
[PlaySound\(\)](#)  
[Print\(\)](#)  
[RefreshRates\(\)](#)  
[SendMail\(\)](#)  
[ServerAddress\(\)](#)  
[Sleep\(\)](#)  
[SpeechText\(\)](#)  
[Symbol\(\)](#)  
[UninitializeReason\(\)](#)



### **void Alert(... )**

Displays a dialog box containing the user-defined data. Parameters can be of any type. Arrays cannot be passed to the Alert function. Data of double type printed with 4 decimal digits after point. To print with more precision use [DoubleToStr\(\)](#) function. Data of bool, datetime and color types will be printed as its numeric presentation. To print values of datetime type as string convert it by [TimeToStr\(\)](#) function.

**See also:** [Comment\(\)](#) and [Print\(\)](#) functions.

#### **Parameters**

... - Any values, separated by commas.

#### **Sample**

```
if(Close[0]>SignalLevel)
    Alert("Close price coming ", Close[0],"!!!");
```

### **string ClientTerminalName()**

Returns Client Terminal Name.

#### **Sample**

```
Print("Terminal name is ",ClientTerminalName());
```

### **string CompanyName()**

Returns Company name

#### **Sample**

```
Print("Company name is ",CompanyName());
```

### **void Comment(... )**

Prints some message to the left top corner of the chart. Parameters can be of any type. Arrays cannot be passed to the Comment() function. Arrays should be output elementwise. Data of double type printed with 4 decimal digits after point. To print with more precision use [DoubleToStr\(\)](#) function. Data of bool, datetime and color types will be printed as its numeric presentation. To print values of datetime type as string convert it by [TimeToStr\(\)](#) function.

**See also:** [Alert\(\)](#) and [Print\(\)](#) functions.

#### **Parameters**

... - Any values, separated by commas.

#### **Sample**

```
double free=AccountFreeMargin();
Comment("Account free margin is ",DoubleToStr(free,2),"\\n","Current time is ",TimeToStr(CurTime()));
```

### **int GetLastError()**

Returns [last occurred error](#) after an operation and sets internal last error value to zero.

#### **Sample**

```
int err;
int handle=FileOpen("somefile.dat", FILE_READ|FILE_BIN);
if(handle<1)
{
    err=GetLastError();
    Print("error(",err,"): ",ErrorDescription(err));
    return(0);
}
```

### **int GetTickCount()**

The GetTickCount() function retrieves the number of milliseconds that have elapsed since the system was started. It is limited to the resolution of the system timer.

#### **Sample**

```
int start=GetTickCount();
// do some hard calculation...
Print("Calculation time is ", GetTickCount()-start, " milliseconds.");
```

### **void HideTestIndicators(bool hide)**

The function sets a flag hiding indicators called by the Expert Advisor. After the chart has been tested and opened the flagged indicators will not be drawn on the testing chart. Every indicator called will first be flagged with the current hiding flag.

#### **Parameters**

**hide** - TRUE - if indicators must be hidden, otherwise, FALSE.

#### **Sample**

```
HideTestIndicators(true);
```

### **bool IsConnected()**

Returns true if client terminal has opened connection to the server, otherwise returns false.

#### **Sample**

```
if(!IsConnected())
{
    Print("Connection is broken!");
    return(0);
}
// Expert body that need opened connection
// ...
```

### **bool IsDemo()**

Returns true if expert runs on demo account, otherwise returns false.

#### **Sample**

```
if(IsDemo()) Print("I am working on demo account");
else Print("I am working on real account");
```

### **bool IsDllsAllowed()**

Returns true if DLL function call is allowed for the expert, otherwise returns false. **See also** [IsLibrariesAllowed\(\)](#), [IsTradeAllowed\(\)](#).

#### **Sample**

```
#import "user32.dll"
int      MessageBoxA(int hWnd ,string szText, string szCaption,int nType);
...
...
if(IsDllsAllowed()==false)
{
    Print("DLL call is not allowed. Experts cannot run.");
    return(0);
}
// expert body that calls external DLL functions
MessageBoxA(0,"an message","Message",MB_OK);
```

**bool IsLibrariesAllowed()**

Returns true if expert can call library function, otherwise returns false. **See also** [IsDllsAllowed\(\)](#), [IsTradeAllowed\(\)](#).

**Sample**

```
#import "somelibrary.ex4"
    int somefunc();
...
...
if(IsLibrariesAllowed()==false)
{
    Print("Library call is not allowed. Experts cannot run.");
    return(0);
}
// expert body that calls external DLL functions
somefunc();
```

**bool IsStopped()**

Returns true if expert in the stopping state, otherwise returns false. This function can be used in the cycles to determine expert unloading.

**Sample**

```
while(expr!=false)
{
    if(IsStopped()==true) return(0);
    // long time procesing cycle
    // ...
}
```

**bool IsTesting()**

Returns true if expert runs in the testing mode, otherwise returns false.

**Sample**

```
if(IsTesting()) Print("I am testing now");
```

**bool IsTradeAllowed()**

Returns true if trade is allowed for the expert, otherwise returns false. **See also** [IsDllsAllowed\(\)](#), [IsLibrariesAllowed\(\)](#).

**Sample**

```
if(IsTradeAllowed()) Print("Trade allowed");
```

**double MarketInfo(string symbol, int type)**

Returns value from Market watch window.

**Parameters**

- symbol** - Instrument symbol.
- type** - Returning data type index. It can be any of [Market information identifiers](#) value.

**Sample**

```
double var;
var=MarketInfo("EURUSD",MODE_BID);
```

**int MessageBox(string text=NULL, string caption=NULL, int flags=EMPTY)**

The MessageBox function creates, displays, and operates a message box. The message box contains an application-defined

message and title, plus any combination of predefined icons and push buttons. If the function succeeds, the return value is one of the [MessageBox return code](#) values.

### Parameters

- text** - Optional text that contains the message to be displayed.
- caption** - Optional text that contains the dialog box title. If this parameter is NULL, the title will be name of expert.
- flags** - Specifies the contents and behavior of the dialog box. This optional parameter can be a combination of [flags](#) from the following groups of flags.

### Sample

```
#include <WinUser32.mqh>

if(ObjectCreate("text_object", OBJ_TEXT, 0, D'2004.02.20 12:30', 1.0045)==false)
{
    int ret=MessageBox("ObjectCreate() fails with code
"+GetLastError()+"\nContinue?", "Question", MB_YESNO|MB_ICONQUESTION);
    if(ret==IDNO) return(false);
}
// continue
```

### **int** Period()

Returns the [number of minutes](#) defining the used period (chart timeframe).

### Sample

```
Print("Period is ", Period());
```

### **void** PlaySound(**string** filename)

Function plays sound file. File must be located at the `terminal_dir\sounds` directory or its subdirectory.

### Parameters

- filename** - Sound file name.

### Sample

```
if(IsDemo()) PlaySound("alert.wav");
```

### **void** Print(... )

Prints some message to the experts log. Parameters can be of any type. Arrays cannot be passed to the Print() function. Arrays should be printed elementwise. Data of double type printed with 4 decimal digits after point. To print with more precision use [DoubleToStr\(\)](#) function. Data of bool, datetime and color types will be printed as its numeric presentation. To print values of datetime type as string convert it by [TimeToStr\(\)](#) function.

**See also:** [Alert\(\)](#) and [Comment\(\)](#) functions.

### Parameters

- ...** - Any values, separated by commas.

### Sample

```
Print("Account free margin is ", AccountFreeMargin());
Print("Current time is ", TimeToStr(CurTime()));
double pi=3.141592653589793;
Print("PI number is ", DoubleToStr(pi,8));
// Output: PI number is 3.14159265
// Array printing
for(int i=0;i<10;i++)
    Print(Close[i]);
```

### **bool** RefreshRates()

Refreshing data in the built-in variables and series arrays. This function is used when expert advisor calculates for a long time and needs refreshing data. Returns true if data are refreshed, otherwise false.

### Sample

```
int ticket;
while(true)
{
    ticket=OrderSend(Symbol(),OP_BUY,1.0,Ask,3,0,0,"expert
comment",255,0,CLR_NONE);
    if(ticket<=0)
    {
        int error=GetLastError();
        if(error==134) break;           // not enough money
        if(error==135) RefreshRates(); // prices changed
        break;
    }
    else { OrderPrint(); break; }
    //---- 10 seconds wait
    Sleep(10000);
}
```

**void SendMail(string subject, string some\_text)**

Sends mail to address set in the Tools->Options->Email tab if enabled. **Note:** Posting e-mail can be denied or address can be empty.

### Parameters

**subject** - Subject text.  
**some\_text** - Mail body.

### Sample

```
double lastclose=Close[0];
if(lastclose<my_signal)
    SendMail("from your expert", "Price dropped down to "+DoubleToStr(lastclose));
```

**string ServerAddress()**

Returns connected server address in form of a text string.

### Sample

```
Print("Server address is ", ServerAddress());
```

**void Sleep(int milliseconds)**

The Sleep function suspends the execution of the current expert for a specified interval.

### Parameters

**milliseconds** - Sleeping interval in milliseconds.

### Sample

```
Sleep(5);
```

**void SpeechText(string text, int lang\_mode=SPEECH\_ENGLISH)**

Computer speaks some text.

### Parameters

**text** - Speaking text.  
**lang\_mode** - SPEECH\_ENGLISH (by default) or SPEECH\_NATIVE values.

### Sample

```
double lastclose=Close[0];
SpeechText("Price dropped down to "+DoubleToStr(lastclose));
```

**string Symbol()**

Returns a text string with the name of the current financial instrument.

#### Sample

```
int total=OrdersTotal();
for(int pos=0;pos<total;pos++)
{
    // check selection result because order may be closed or deleted at this time!
    if(OrderSelect(pos, SELECT_BY_POS)==false) continue;
    if(OrderType()>OP_SELL || OrderSymbol()!=Symbol()) continue;
    // do some orders processing...
}
```

**int UninitializeReason()**

Returns the code of the uninitialization reason for the experts, custom indicators, and scripts. Return values can be one of [Uninitialize reason codes](#).

#### Sample

```
// this is example
int deinit()
{
    switch(UninitializeReason())
    {
        case REASON_CHARTCLOSE:
        case REASON_REMOVE:      Cleanup(); break; // clean up and free all expert's
resources.
        case REASON_RECOMPILE:
        case REASON_CHARTCHANGE:
        case REASON_PARAMETERS:
        case REASON_ACCOUNT:    StoreData(); break; // prepare to restart
    }
    //...
}
```

### Conversion functions

[CharToStr\(\)](#)

[DoubleToStr\(\)](#)

[NormalizeDouble\(\)](#)

[StrToDouble\(\)](#)

[StrToInteger\(\)](#)

[StrToTime\(\)](#)

[TimeToStr\(\)](#)

**string CharToStr(int char\_code)**

Returns string with one symbol that have specified code

#### Parameters

**char\_code** - ASCII char code.

#### Sample

```
string str="WORLD" + CharToStr(44); // 44 is code for 'D'
// resulting string will be WORLD
```

**string** DoubleToStr(**double** value, **int** digits)

Returns text string with the specified numerical value transformed into the specified precision format.

#### Parameters

- value** - Numerical value.
- digits** - Precision format, number of digits after decimal point (0-8).

#### Sample

```
string value=DoubleToStr(1.28473418, 5);  
// value is 1.28473
```

**double** NormalizeDouble(**double** value, **int** digits)

Rounds floating point number to specified decimal places.

#### Parameters

- value** - Floating point value.
- digits** - Precision format, number of digits after decimal point (0-8).

#### Sample

```
double var1=0.123456789;  
Print(NormalizeDouble(var1,5));  
// output: 0.12346
```

**double** StrToDouble(**string** value)

Converts string representation of number to type double.

#### Parameters

- value** - String containing value in fixed number format.

#### Sample

```
double var=StrToDouble("103.2812");
```

**int** StrToInteger(**string** value)

Converts string representation of number to type integer.

#### Parameters

- value** - String containing integer number.

#### Sample

```
int var1=StrToInteger("1024");
```

**datetime** StrToTime(**string** value)

Converts string in the format "yyyy.mm.dd hh:mi" to type datetime.

#### Parameters

- value** - String value of date/time format such as "yyyy.mm.dd hh:mi".

#### Sample

```
datetime var1;  
var1=StrToTime("2003.8.12 17:35");  
var1=StrToTime("17:35"); // returns with current date  
var1=StrToTime("2003.8.12"); // returns with midnight time "00:00"
```

**string** TimeToStr(**datetime** value, **int** mode=TIME\_DATE|TIME\_MINUTES)

Returns time as string in the format "yyyy.mm.dd hh:mi".

#### Parameters

- value** - Positive number of seconds from 00:00 January 1, 1970.
- mode** - Optional data output mode can be one or combination of:  
 TIME\_DATE get result in form "yyyy.mm.dd",  
 TIME\_MINUTES get result in form "hh:mi",  
 TIME\_SECONDS get result in form "hh:mi:ss".

### Sample

```
strign var1=TimeToStr(CurTime(),TIME_DATE|TIME_SECONDS);
```

### Custom Indicator functions

[IndicatorBuffers\(\)](#)  
[IndicatorCounted\(\)](#)  
[IndicatorDigits\(\)](#)  
[IndicatorShortName\(\)](#)  
[SetIndexArrow\(\)](#)  
[SetIndexBuffer\(\)](#)  
[SetIndexDrawBegin\(\)](#)  
[SetIndexEmptyValue\(\)](#)  
[SetIndexLabel\(\)](#)  
[SetIndexShift\(\)](#)  
[SetIndexStyle\(\)](#)  
[SetLevelStyle\(\)](#)  
[SetLevelValue\(\)](#)

#### **void IndicatorBuffers(int count)**

Allocates memory for buffers used for custom indicator calculations. Cannot be greater than 8 and less than [indicator\\_buffers](#) property. If custom indicator requires additional buffers for counting then use this function for pointing common buffers count.

#### Parameters

- count** - Buffers count to allocate. Should be up to 8 buffers.

#### Sample

```
#property indicator_separate_window
#property indicator_buffers 1
#property indicator_color1 Silver
//---- indicator parameters
extern int FastEMA=12;
extern int SlowEMA=26;
extern int SignalSMA=9;
//---- indicator buffers
double ind_buffer1[];
double ind_buffer2[];
double ind_buffer3[];
//+-----+
//| Custom indicator initialization function |
//+-----+
int init()
{
//---- 2 additional buffers are used for counting.
IndicatorBuffers(3);
//---- drawing settings
SetIndexStyle(0,DRAW_HISTOGRAM,STYLE_SOLID,3);
SetIndexDrawBegin(0,SignalSMA);
IndicatorDigits(MarketInfo(Symbol(),MODE_DIGITS)+2);
//---- 3 indicator buffers mapping
SetIndexBuffer(0,ind_buffer1);
SetIndexBuffer(1,ind_buffer2);
SetIndexBuffer(2,ind_buffer3);
```



```
//---- name for DataWindow and indicator subwindow label
IndicatorShortName("OsMA("+FastEMA+", "+SlowEMA+", "+SignalSMA+")");
//---- initialization done
return(0);
}
```

### **int IndicatorCounted()**

Returns bars count that does not changed after last indicator launch. In most cases same count of index values do not need for recalculation. Used for optimizing calculations.

#### **Sample**

```
int start()
{
    int limit;
    int counted_bars=IndicatorCounted();
//---- check for possible errors
    if(counted_bars<0) return(-1);
//---- last counted bar will be recounted
    if(counted_bars>0) counted_bars--;
    limit=Bars-counted_bars;
//---- main loop
    for(int i=0; i<limit; i++)
    {
        //---- ma_shift set to 0 because SetIndexShift called above
        ExtBlueBuffer[i]=iMA(NULL,0,JawsPeriod,0,MODE_SMMA,PRICE_MEDIAN,i);
        ExtRedBuffer[i]=iMA(NULL,0,TeethPeriod,0,MODE_SMMA,PRICE_MEDIAN,i);
        ExtLimeBuffer[i]=iMA(NULL,0,LipsPeriod,0,MODE_SMMA,PRICE_MEDIAN,i);
    }
//---- done
    return(0);
}
```

### **void IndicatorDigits(int digits)**

Sets default precision format for indicators visualization.

#### **Parameters**

**digits** - Precision format, number of digits after decimal point.

#### **Sample**

```
#property indicator_separate_window
#property indicator_buffers 1
#property indicator_color1 Silver
//---- indicator parameters
extern int FastEMA=12;
extern int SlowEMA=26;
extern int SignalSMA=9;
//---- indicator buffers
double ind_buffer1[];
double ind_buffer2[];
double ind_buffer3[];
//+-----+
//| Custom indicator initialization function |
//+-----+
int init()
{
    //---- 2 additional buffers are used for counting.
```

```

IndicatorBuffers(3);
//---- drawing settings
SetIndexStyle(0,DRAW_HISTOGRAM,STYLE_SOLID,3);
SetIndexDrawBegin(0,SignalSMA);
IndicatorDigits(MarketInfo(Symbol(),MODE_DIGITS)+2);
//---- 3 indicator buffers mapping
SetIndexBuffer(0,ind_buffer1);
SetIndexBuffer(1,ind_buffer2);
SetIndexBuffer(2,ind_buffer3);
//---- name for DataWindow and indicator subwindow label
IndicatorShortName("OsMA("+FastEMA+", "+SlowEMA+", "+SignalSMA+")");
//---- initialization done
return(0);
}

```

**void IndicatorShortName(string name)**

Sets indicator short name for showing on the chart subwindow.

### Parameters

**name** - New short name.

### Sample

```

#property indicator_separate_window
#property indicator_buffers 1
#property indicator_color1 Silver
//---- indicator parameters
extern int FastEMA=12;
extern int SlowEMA=26;
extern int SignalSMA=9;
//---- indicator buffers
double ind_buffer1[];
double ind_buffer2[];
double ind_buffer3[];
//+-----+
//| Custom indicator initialization function |
//+-----+
int init()
{
//---- 2 additional buffers are used for counting.
IndicatorBuffers(3);
//---- drawing settings
SetIndexStyle(0,DRAW_HISTOGRAM,STYLE_SOLID,3);
SetIndexDrawBegin(0,SignalSMA);
IndicatorDigits(MarketInfo(Symbol(),MODE_DIGITS)+2);
//---- 3 indicator buffers mapping
SetIndexBuffer(0,ind_buffer1);
SetIndexBuffer(1,ind_buffer2);
SetIndexBuffer(2,ind_buffer3);
//---- name for DataWindow and indicator subwindow label
IndicatorShortName("OsMA("+FastEMA+", "+SlowEMA+", "+SignalSMA+")");
//---- initialization done
return(0);
}

```

**void SetIndexArrow(int index, int code)**

Sets arrow symbol for indicators that draws some lines as arrow.

### Parameters

- index** - Line index. Should be from 0 to 7.
- code** - Symbol code from [Wingdings](#) font or [Array constants](#).

### Sample

```
SetIndexArrow(0, 217);
```

**bool SetIndexBuffer(int index, double array[])**

Sets buffer for calculating line. The indicated array bound with previously allocated custom indicator buffer. If the function succeeds, the return value is true. If the function fails, the return value is false. To get the detailed error information, call [GetLastError\(\)](#).

### Parameters

- index** - Line index. Should be from 0 to 7.
- array[]** - Array that stores calculated indicator values.

### Sample

```
double ExtBufferSilver[];  
int init()  
{  
    SetIndexBuffer(0, ExtBufferSilver); // set buffer for first line  
    // ...  
}
```

**void SetIndexDrawBegin(int index, int begin)**

Sets first bar from what index will be drawn. Index values before draw begin are not significant and does not drawn and not show in the DataWindow.

### Parameters

- index** - Line index. Should be from 0 to 7.
- begin** - First drawing bar position number.

### Sample

```
#property indicator_separate_window  
#property indicator_buffers 1  
#property indicator_color1 Silver  
//---- indicator parameters  
extern int FastEMA=12;  
extern int SlowEMA=26;  
extern int SignalSMA=9;  
//---- indicator buffers  
double ind_buffer1[];  
double ind_buffer2[];  
double ind_buffer3[];  
//+-----+  
//| Custom indicator initialization function |  
//+-----+  
int init()  
{  
    //---- 2 additional buffers are used for counting.  
    IndicatorBuffers(3);  
    //---- drawing settings  
    SetIndexStyle(0, DRAW_HISTOGRAM, STYLE_SOLID, 3);  
    SetIndexDrawBegin(0, SignalSMA);  
    IndicatorDigits(MarketInfo(Symbol(), MODE_DIGITS)+2);  
    //---- 3 indicator buffers mapping  
    SetIndexBuffer(0, ind_buffer1);
```

```

SetIndexBuffer(1, ind_buffer2);
SetIndexBuffer(2, ind_buffer3);
//---- name for DataWindow and indicator subwindow label
IndicatorShortName("OsMA("+FastEMA+", "+SlowEMA+", "+SignalSMA+")");
//---- initialization done
return(0);
}

```

**void SetIndexEmptyValue(int index, double value)**

Sets drawing line empty value. By default, empty value line is EMPTY\_VALUE. Empty values are not drawn and not show in the DataWindow.

#### Parameters

- index** - Line index. Should be from 0 to 7.
- value** - New empty value.

#### Sample

```
SetIndexEmptyValue(6, 0.0001);
```

**void SetIndexLabel(int index, string text)**

Sets drawing line description for showing in the DataWindow.

#### Parameters

- index** - Line index. Should be from 0 to 7.
- text** - Label text. NULL means that index value does not show in the DataWindow.

#### Sample

```

//+-----+
//| Ichimoku Kinko Hyo initialization function |
//+-----+
int init()
{
//----
SetIndexStyle(0, DRAW_LINE);
SetIndexBuffer(0, Tenkan_Buffer);
SetIndexDrawBegin(0, Tenkan-1);
SetIndexLabel(0, "Tenkan Sen");
//----
SetIndexStyle(1, DRAW_LINE);
SetIndexBuffer(1, Kijun_Buffer);
SetIndexDrawBegin(1, Kijun-1);
SetIndexLabel(1, "Kijun Sen");
//----
a_begin=Kijun; if(a_begin<Tenkan) a_begin=Tenkan;
SetIndexStyle(2, DRAW_HISTOGRAM, STYLE_DOT);
SetIndexBuffer(2, SpanA_Buffer);
SetIndexDrawBegin(2, Kijun+a_begin-1);
SetIndexShift(2, Kijun);
//---- Up Kumo bounding line does not show in the DataWindow
SetIndexLabel(2, NULL);
SetIndexStyle(5, DRAW_LINE, STYLE_DOT);
SetIndexBuffer(5, SpanA2_Buffer);
SetIndexDrawBegin(5, Kijun+a_begin-1);
SetIndexShift(5, Kijun);
SetIndexLabel(5, "Senkou Span A");
//----
SetIndexStyle(3, DRAW_HISTOGRAM, STYLE_DOT);

```

```

SetIndexBuffer(3, SpanB_Buffer);
SetIndexDrawBegin(3, Kijun+Senkou-1);
SetIndexShift(3, Kijun);
//---- Down Kumo bounding line does not show in the DataWindow
SetIndexLabel(3, NULL);
//----
SetIndexStyle(6, DRAW_LINE, STYLE_DOT);
SetIndexBuffer(6, SpanB2_Buffer);
SetIndexDrawBegin(6, Kijun+Senkou-1);
SetIndexShift(6, Kijun);
SetIndexLabel(6, "Senkou Span B");
//----
SetIndexStyle(4, DRAW_LINE);
SetIndexBuffer(4, Chinkou_Buffer);
SetIndexShift(4, -Kijun);
SetIndexLabel(4, "Chinkou Span");
//----
return(0);
}

```

**void SetIndexShift(int index, int shift)**

Sets offset for drawing line. Line will be counted on the current bar, but will be drawn shifted.

#### Parameters

- index** - Line index. Should be from 0 to 7.
- shift** - Shift value in bars.

#### Sample

```

//+-----+
//| Alligator initialization function |
//+-----+
int init()
{
//---- line shifts when drawing
SetIndexShift(0, JawsShift);
SetIndexShift(1, TeethShift);
SetIndexShift(2, LipsShift);
//---- first positions skipped when drawing
SetIndexDrawBegin(0, JawsShift+JawsPeriod);
SetIndexDrawBegin(1, TeethShift+TeethPeriod);
SetIndexDrawBegin(2, LipsShift+LipsPeriod);
//---- 3 indicator buffers mapping
SetIndexBuffer(0, ExtBlueBuffer);
SetIndexBuffer(1, ExtRedBuffer);
SetIndexBuffer(2, ExtLimeBuffer);
//---- drawing settings
SetIndexStyle(0, DRAW_LINE);
SetIndexStyle(1, DRAW_LINE);
SetIndexStyle(2, DRAW_LINE);
//---- index labels
SetIndexLabel(0, "Gator Jaws");
SetIndexLabel(1, "Gator Teeth");
SetIndexLabel(2, "Gator Lips");
//---- initialization done
return(0);
}

```

```
void SetIndexStyle(int index, int type, int style=EMPTY, int width=EMPTY,
color clr=CLR_NONE)
```

Sets new type, style, width and color for a given indicator line.

#### Parameters

- index** - Line index. Should be from 0 to 7.
- type** - Shape style. Can be one of [Drawing shape style](#) enumeration.
- style** - Drawing style. Except STYLE\_SOLID style all other styles valid when width is 1 pixel. Can be one of [Shape style](#) enumeration. EMPTY value indicates that style does not changed.
- width** - Line width. valid values - 1,2,3,4,5. EMPTY value indicates that width does not changed.
- clr** - Line color.

#### Sample

```
SetIndexStyle(3, DRAW_LINE, EMPTY, 2, Red);
```

```
void SetLevelStyle(int draw_style, int line_width, color clr=CLR_NONE)
```

Function sets new style, width and color of indicator levels.

#### Parameters

- draw\_style** - Drawing style. Except for STYLE\_SOLID, all other styles are valid if the width is 1 pixel. Can be one of [Shape style](#) constants. EMPTY value indicates that style will not be changed.
- line\_width** - Line width. Valid values are 1,2,3,4,5. EMPTY value indicates that width will not be changed.
- clr** - Line color.

#### Sample

```
//---- show levels as thick red lines
SetLevelStyle(STYLE_SOLID, 2, Red)
```

```
int SetLevelValue(int level, double value)
```

Function sets a new value for the given indicator level.

#### Parameters

- level** - Level index (0-31).
- value** - Value for the given indicator level.

#### Sample

```
SetLevelValue(1, 3.14);
```

### Date & Time functions

[CurTime\(\)](#)  
[Day\(\)](#)  
[DayOfWeek\(\)](#)  
[DayOfYear\(\)](#)  
[Hour\(\)](#)  
[LocalTime\(\)](#)  
[Minute\(\)](#)  
[Month\(\)](#)  
[Seconds\(\)](#)  
[TimeDay\(\)](#)  
[TimeDayOfWeek\(\)](#)  
[TimeDayOfYear\(\)](#)  
[TimeHour\(\)](#)  
[TimeMinute\(\)](#)  
[TimeMonth\(\)](#)  
[TimeSeconds\(\)](#)  
[TimeYear\(\)](#)  
[Year\(\)](#)

**datetime CurTime()**

Returns the last known server time, number of seconds elapsed from 00:00 January 1, 1970.

**Sample**

```
if (CurTime() - OrderOpenTime() < 360) return (0);
```

**int Day()**

Returns the current day of the month.

**Sample**

```
if (Day() < 5) return (0);
```

**int DayOfWeek()**

Returns the current zero based day of the week (0-Sunday,1,2,3,4,5,6).

**Sample**

```
// do not work on holidays.  
if (DayOfWeek() == 0 || DayOfWeek() == 6) return (0);
```

**int DayOfYear()**

Returns the current day of the year (1-1 january,...,365(6) - 31 december).

**Sample**

```
if (DayOfYear() == 245)  
    return (true);
```

**int Hour()**

Returns current hour (0,1,2,...23)

**Sample**

```
bool is_siesta=false;  
if (Hour() >= 12 || Hour() < 17)  
    is_siesta=true;
```

**datetime LocalTime()**

Returns local computer time, number of seconds elapsed from 00:00 January 1, 1970.

**Sample**

```
if (LocalTime() - OrderOpenTime() < 360) return (0);
```

**int Minute()**

Returns current minute (0,1,2,...59).

**Sample**

```
if (Minute() <= 15)  
    return ("first quarter");
```

**int Month()**

Returns current month as number (1-January,2,3,4,5,6,7,8,9,10,11,12).

**Sample**

```
if (Month() <= 5)
    return("first half of year");
```

#### **int Seconds()**

Returns current second (0,1,2,..59).

##### **Sample**

```
if (Seconds() <= 15)
    return(0);
```

#### **int TimeDay(datetime date)**

Returns day of month (1 - 31) for specified date.

##### **Parameters**

**date** - Datetime is the number of seconds elapsed since midnight (00:00:00), January 1, 1970.

##### **Sample**

```
int day=TimeDay(D'2003.12.31');
// day is 31
```

#### **int TimeDayOfWeek(datetime date)**

Returns zero based day of week (0-Sunday,1,2,3,4,5,6) for specified date.

##### **Parameters**

**date** - Datetime is the number of seconds elapsed since midnight (00:00:00), January 1, 1970.

##### **Sample**

```
int weekday=TimeDayOfWeek(D'2004.11.2');
// day is 2 - tuesday
```

#### **int TimeDayOfYear(datetime date)**

Returns day (1-1 january,...,365(6) - 31 december) of year for specified date.

##### **Parameters**

**date** - Datetime is the number of seconds elapsed since midnight (00:00:00), January 1, 1970.

##### **Sample**

```
int day=TimeDayOfYear(CurTime());
```

#### **int TimeHour(datetime time)**

Returns hour for specified time.

##### **Parameters**

**time** - Datetime is the number of seconds elapsed since midnight (00:00:00), January 1, 1970.

##### **Sample**

```
int h=TimeHour(CurTime());
```

#### **int TimeMinute(datetime time)**

Returns minute for specified time.

##### **Parameters**

**time** - Datetime is the number of seconds elapsed since midnight (00:00:00), January 1, 1970.

##### **Sample**

```
int m=TimeMinute(CurTime());
```



```
int TimeMonth(datetime time)
```

Returns month for specified time.

#### Parameters

**time** - Datetime is the number of seconds elapsed since midnight (00:00:00), January 1, 1970.

#### Sample

```
int m=TimeMonth(CurTime());
```

```
int TimeSeconds(datetime time)
```

Returns seconds after minute (0 – 59) for specified time.

#### Parameters

**time** - Datetime is the number of seconds elapsed since midnight (00:00:00), January 1, 1970.

#### Sample

```
int m=TimeSeconds(CurTime());
```

```
int TimeYear(datetime time)
```

Returns year for specified date. Return values can be in range 1970-2037.

#### Parameters

**time** - Datetime is the number of seconds elapsed since midnight (00:00:00), January 1, 1970.

#### Sample

```
int y=TimeYear(CurTime());
```

```
int Year()
```

Returns current year.

#### Sample

```
// return if date before 1 May 2002
if(Year()==2002 && Month()<5)
    return(0);
```

### File functions

[FileClose\(\)](#)

[FileDelete\(\)](#)

[FileFlush\(\)](#)

[FileIsEnding\(\)](#)

[FileIsLineEnding\(\)](#)

[FileOpen\(\)](#)

[FileOpenHistory\(\)](#)

[FileReadArray\(\)](#)

[FileReadDouble\(\)](#)

[FileReadInteger\(\)](#)

[FileReadNumber\(\)](#)

[FileReadString\(\)](#)

[FileSeek\(\)](#)

[FileSize\(\)](#)

[FileTell\(\)](#)

[FileWrite\(\)](#)

[FileWriteArray\(\)](#)

[FileWriteDouble\(\)](#)

[FileWriteInteger\(\)](#)

## **FileWriteString()**

### **void FileClose(int handle)**

Closes file previously opened by FileOpen() functions.

#### **Parameters**

**handle** - File handle, returned by FileOpen() functions

#### **Sample**

```
int handle=FileOpen("filename", FILE_CSV|FILE_READ);
if(handle>0)
{
    // working with file ...
    FileClose(handle);
}
```

### **void FileClose(int handle)**

Closes file previously opened by FileOpen() functions.

#### **Parameters**

**handle** - File handle, returned by FileOpen() functions

#### **Sample**

```
int handle=FileOpen("filename", FILE_CSV|FILE_READ);
if(handle>0)
{
    // working with file ...
    FileClose(handle);
}
```

### **void FileFlush(int handle)**

Flushes all data stored in the file buffer to disk.

#### **Parameters**

**handle** - File handle, returned by FileOpen() functions.

#### **Sample**

```
int bars_count=Bars;
int handle=FileOpen("mydat.csv",FILE_CSV|FILE_WRITE);
if(handle>0)
{
    FileWrite(handle, "#","OPEN","CLOSE","HIGH","LOW");
    for(int i=0;i<bars_count;i++)
        FileWrite(handle, i+1,Open[i],Close[i],High[i], Low[i]);
    FileFlush(handle);
    ...
    for(int i=0;i<bars_count;i++)
        FileWrite(handle, i+1,Open[i],Close[i],High[i], Low[i]);
    FileClose(handle);
}
```

### **bool FileIsEnding(int handle)**

Returns logical true if file pointer is at the end of the file, otherwise returns false. To get the detailed error information, call [GetLastError\(\)](#) function.

#### **Parameters**

**handle** - File handle, returned by FileOpen() functions.

### Sample

```
if (FileIsEnding(h1))
{
    FileClose(h1);
    return(false);
}
```

**bool FileIsLineEnding(int handle)**

For CSV file returns logical true if file pointer is at the end of the line, otherwise returns false. To get the detailed error information, call [GetLastError\(\)](#) function.

### Parameters

**handle** - File handle, returned by FileOpen() function.

### Sample

```
if (FileIsLineEnding(h1))
{
    FileClose(h1);
    return(false);
}
```

**int FileOpen(string filename, int mode, int delimiter=';')**

Opens file for input and/or output. Returns a file handle for the opened file. If the function fails, the return value less than 1. To get the detailed error information, call [GetLastError\(\)](#) function.

**Note:** Files can be opened only from terminal\_dir\experts\files directory and its subdirectories.

### Parameters

**filename** - File name, file may be with any extensions.

**mode** - Open mode. can be one or combination of values: FILE\_BIN, FILE\_CSV, FILE\_READ, FILE\_WRITE.

**delimiter** - Delimiter character for csv files. By default passed ';' symbol.

### Sample

```
int handle;
handle=FileOpen("my_data.csv",FILE_CSV|FILE_READ,';');
if (handle<1)
{
    Print("File my_data.dat not found, the last error is ", GetLastError());
    return(false);
}
```

**int FileOpenHistory(string filename, int mode, int delimiter=';')**

Opens file in the current history directory for input and/or output. Returns a file handle for the opened file. If the function fails, the return value less than 1. To get the detailed error information, call [GetLastError\(\)](#).

### Parameters

**filename** - File name, file may be with any extensions.

**mode** - Open mode. can be one or combination of values: FILE\_BIN, FILE\_CSV, FILE\_READ, FILE\_WRITE.

**delimiter** - Delimiter character for csv files. By default passed ';' symbol.

### Sample

```
int handle=FileOpenHistory("USDx240.HST",FILE_BIN|FILE_WRITE);
if (handle<1)
{
    Print("Cannot create file USDx240.HST");
    return(false);
}
```

```
// work with file
// ...
FileClose(handle);
```

**int FileReadArray(int handle, object& array[], int start, int count)**

Reads the indicated count of elements from the binary file to array. Returns actual read elements count. To get the detailed error information, call [GetLastError\(\)](#) function. **Note:** Before reading the data, array must be resized to a sufficient size.

#### Parameters

- handle** - File handle, returned by FileOpen() function.
- array[]** - Array where data will be stored.
- start** - Storing start position into array.
- count** - Count of elements to read.

#### Sample

```
int handle;
double varray[10];
handle=FileOpen("filename.dat", FILE_BIN|FILE_READ);
if(handle>0)
{
    FileReadArray(handle, varray, 0, 10);
    FileClose(handle);
}
```

**int FileReadArray(int handle, object& array[], int start, int count)**

Reads the indicated count of elements from the binary file to array. Returns actual read elements count. To get the detailed error information, call [GetLastError\(\)](#) function. **Note:** Before reading the data, array must be resized to a sufficient size.

#### Parameters

- handle** - File handle, returned by FileOpen() function.
- array[]** - Array where data will be stored.
- start** - Storing start position into array.
- count** - Count of elements to read.

#### Sample

```
int handle;
double varray[10];
handle=FileOpen("filename.dat", FILE_BIN|FILE_READ);
if(handle>0)
{
    FileReadArray(handle, varray, 0, 10);
    FileClose(handle);
}
```

**int FileReadInteger(int handle, int size=LONG\_VALUE)**

Read the integer from binary files from the current file position. Integer format size can be 1, 2 or 4 bytes length. If the format size is not specified system attempts to read 4 bytes length value. To get the detailed error information, call [GetLastError\(\)](#) function.

#### Parameters

- handle** - File handle, returned by FileOpen() function.
- size** - Format size. Can be CHAR\_VALUE(1 byte), SHORT\_VALUE(2 bytes) or LONG\_VALUE(4 bytes).

#### Sample

```
int handle;
int value;
```

```

handle=FileOpen("mydata.dat", FILE_BIN|FILE_READ);
if(handle>0)
{
    value=FileReadInteger(h1,2);
    FileClose(handle);
}

```

### **double FileReadNumber(int handle)**

Read the number from the current file position to the delimiter. Only for CSV files. To get the detailed error information, call [GetLastError\(\)](#) function.

#### **Parameters**

**handle** - File handle, returned by FileOpen() function.

#### **Sample**

```

int handle;
int value;
handle=FileOpen("filename.csv", FILE_CSV, ';');
if(handle>0)
{
    value=FileReadNumber(handle);
    FileClose(handle);
}

```

### **string FileReadString(int handle, int length=0)**

Read the string from the current file position. Applied to both CSV and binary files. For text files string will be read to the delimiter and for binary file string will be read for the count of characters indicated. To get the detailed error information, call [GetLastError\(\)](#) function.

#### **Parameters**

**handle** - File handle, returned by FileOpen() function.

**length** - Reading characters count.

#### **Sample**

```

int handle;
string str;
handle=FileOpen("filename.csv", FILE_CSV|FILE_READ);
if(handle>0)
{
    str=FileReadString(handle);
    FileClose(handle);
}

```

### **bool FileSeek(int handle, int offset, int origin)**

Moves the file pointer to a specified location. The FileSeek() function moves the file pointer associated with handle to a new location that is offset bytes from origin. The next operation on the file occurs at the new location. If successful, function returns TRUE. Otherwise, it returns FALSE. To get the detailed error information, call [GetLastError\(\)](#) function.

#### **Parameters**

**handle** - File handle, returned by FileOpen() functions.

**offset** - Offset in bytes from origin.

**origin** - Initial position. Value can be one of this constants:  
 SEEK\_CUR - from current position,  
 SEEK\_SET - from begin,  
 SEEK\_END - from end of file.

#### **Sample**

```

int handle=FileOpen("filename.csv", FILE_CSV|FILE_READ, ';');
if(handle>0)

```

```

{
    FileSeek(handle, 10, SEEK_SET);
    FileReadInteger(handle);
    FileClose(handle);
    handle=0;
}

```

### **int FileSize(int handle)**

Returns file size in bytes. To get the detailed error information, call [GetLastError\(\)](#) function.

#### **Parameters**

**handle** - File handle, returned by FileOpen() function.

#### **Sample**

```

int handle;
int size;
handle=FileOpen("my_table.dat", FILE_BIN|FILE_READ);
if(handle>0)
{
    size=FileSize(handle);
    Print("my_table.dat size is ", size, " bytes");
    FileClose(handle);
}

```

### **int FileSize(int handle)**

Returns file size in bytes. To get the detailed error information, call [GetLastError\(\)](#) function.

#### **Parameters**

**handle** - File handle, returned by FileOpen() function.

#### **Sample**

```

int handle;
int size;
handle=FileOpen("my_table.dat", FILE_BIN|FILE_READ);
if(handle>0)
{
    size=FileSize(handle);
    Print("my_table.dat size is ", size, " bytes");
    FileClose(handle);
}

```

### **int FileWrite(int handle, ... )**

Writes to the CSV file some values, delimiter inserted automatically. Returns the number of characters written, or a negative value if an error occurs. To get the detailed error information, call [GetLastError\(\)](#) function.

#### **Parameters**

**handle** - File handle, returned by FileOpen() function.

**...** - User data to write, separated with commas.

**Note:** int and double types automatically converted to string, but color, datetime and bool types does not automatically converted and will be written to file in it's as integers.

#### **Sample**

```

int handle;
datetime orderOpen=OrderOpenTime();
handle=FileOpen("filename", FILE_CSV|FILE_WRITE, ';');
if(handle>0)
{

```

```

    FileWrite(handle, Close[0], Open[0], High[0], Low[0], TimeToStr(orderOpen));
    FileClose(handle);
}

```

**int FileWriteArray(int handle, object array[], int start, int count)**

Writes array to the binary file. Arrays of type int, bool, datetime and color will be written as 4 bytes integers. Arrays of type double will be written as 8 bytes floating point numbers. Arrays of string will be written as one string where elements will be divided by Carriage return and Line feed symbols (0D 0A). Returns the number of elements wrote, or a negative value if an error occurs. To get the detailed error information, call [GetLastError\(\)](#) function.

#### Parameters

- handle** - File handle, returned by FileOpen() function.
- array[]** - Array to write.
- start** - Starting index into array to write.
- count** - Count of elements to write.

#### Sample

```

int handle;
double BarOpenValues[10];
// copy first ten bars to the array
for(int i=0;i<10; i++)
    BarOpenValues[i]=Open[i];
// writing array to the file
handle=FileOpen("mydata.dat", FILE_BIN|FILE_WRITE);
if(handle>0)
{
    FileWriteArray(handle, BarOpenValues, 3, 7); // writing last 7 elements
    FileClose(handle);
}

```

**int FileWriteDouble(int handle, double value, int size=DOUBLE\_VALUE)**

Writes double value to the binary file. If size is FLOAT\_VALUE, value will be written as 4 bytes floating point format, else will be written in 8 bytes floating point format. Returns actual written bytes count. To get the detailed error information, call [GetLastError\(\)](#) function.

#### Parameters

- handle** - File handle, returned by FileOpen() function.
- value** - Value to write.
- size** - Optional format flag. It can be any of the following values:  
DOUBLE\_VALUE (8 bytes, default)  
FLOAT\_VALUE (4 bytes).

#### Sample

```

int handle;
double var1=0.345;
handle=FileOpen("mydata.dat", FILE_BIN|FILE_WRITE);
if(handle<1)
{
    Print("can't open file error-",GetLastError());
    return(0);
}
FileWriteDouble(h1, var1, DOUBLE_VALUE);
//...
FileClose(handle);

```

**int FileWriteInteger(int handle, int value, int size=LONG\_VALUE)**

Writes integer value to the binary file. If size is SHORT\_VALUE, value will be written as 2 bytes integer, if size is CHAR\_VALUE,

value will be written as 1 bytes integer and if size is LONG\_VALUE, value will be written as 4 bytes integer. Returns actual written bytes count.

To get the detailed error information, call [GetLastError\(\)](#) function.

### Parameters

- handle** - File handle, returned by FileOpen() function.
- value** - Value to write.
- size** - Optional format flag. It can be any of the following values:
  - CHAR\_VALUE (1 byte),
  - SHORT\_VALUE (2 bytes),
  - LONG\_VALUE (4 bytes, default).

### Sample

```
int handle;
int value=10;
handle=FileOpen("filename.dat", FILE_BIN|FILE_WRITE);
if(handle<1)
{
    Print("can't open file error-",GetLastError());
    return(0);
}
FileWriteInteger(handle, value, SHORT_VALUE);
//...
FileClose(handle);
```

**int FileWriteString(int handle, string value, int length)**

Writes string to the binary file from current file position. Returns actual written bytes count. To get the detailed error information, call [GetLastError\(\)](#) function.

### Parameters

- handle** - File handle, returned by FileOpen() function.
- value** - Text to write.
- length** - Counts of characters to write.

### Sample

```
int handle;
string str="some string";
handle=FileOpen("filename.bin", FILE_BIN|FILE_WRITE);
if(handle<1)
{
    Print("can't open file error-",GetLastError());
    return(0);
}
FileWriteString(h1, str, 8);
FileClose(handle);
```

## Global Variables functions

[GlobalVariableCheck\(\)](#)  
[GlobalVariableDel\(\)](#)  
[GlobalVariableGet\(\)](#)  
[GlobalVariableSet\(\)](#)  
[GlobalVariableSetOnCondition\(\)](#)  
[GlobalVariablesDeleteAll\(\)](#)

**bool GlobalVariableCheck(string name)**

Return logical true if global variable exists, otherwise returns false. To get the detailed error information, call [GetLastError\(\)](#) function.



## Parameters

**name** - Global variable name.

## Sample

```
// check variable before use
if(!GlobalVariableCheck("g1"))
    GlobalVariableSet("g1",1);
```

**bool** GlobalVariableDel(**string** name)

Deletes global variable. If the function succeeds, the return value will be true. If the function fails, the return value is false. To get the detailed error information, call [GetLastError\(\)](#).

## Parameters

**name** - Global variable name.

## Sample

```
// deleting global variable with name "gvar_1"
GlobalVariableDel("gvar_1");
```

**double** GlobalVariableGet(**string** name)

Returns global variable value. To check function failure, check error information by calling [GetLastError\(\)](#).

## Parameters

**name** - Global variable name.

## Sample

```
double v1=GlobalVariableGet("g1");
//---- check function call result
if(GetLastError()!=0) return(false);
//---- continue processing
```

**datetime** GlobalVariableSet(**string** name, **double** value)

Sets global variable value. If it does not exist, the system creates a new variable. If the function succeeds, the return value is last access time. If the function fails, the return value is 0. To get the detailed error information, call [GetLastError\(\)](#).

## Parameters

**name** - Global variable name.

**value** - Numeric value to set.

## Sample

```
//---- try to set new value
if(GlobalVariableSet("BarsTotal",Bars)==0)
    return(false);
//---- continue processing
```

**bool** GlobalVariableSetOnCondition(**string** name, **double** value, **double** check\_value)

Sets the new value of the global variable if the current value equals to the third parameter *check\_value*. If there is no variable at all, the function will return false and set the value of ERR\_GLOBAL\_VARIABLE\_NOT\_FOUND constant to LastError. When successfully executed, the function returns true, otherwise it does false. To receive the information about the error, call [GetLastError\(\)](#) function.

The function can be used as a semaphore for the access to common resources.

## Parameters

**name** - Global variable name.

**value** - Numeric value to set.

**check\_value** - Value to compare with the current global variable value.

## Sample

```
int init()
{
    //---- create global variable
```

```

GlobalVariableSet("DATAFILE_SEM",0);
//...
}

int start()
{
    //---- try to lock common resource
    while(!IsStopped())
    {
        //---- locking
        if(GlobalVariableSetOnCondition("DATAFILE_SEM",1,0)==true) break;
        //---- may be variable deleted?
        if(GetLastError()==ERR_GLOBAL_VARIABLE_NOT_FOUND) return(0);
        //---- sleeping
        Sleep(500);
    }
    //---- resource locked
    // ... do some work
    //---- unlock resource
    GlobalVariableSet("DATAFILE_SEM",0);
}

```

**void GlobalVariablesDeleteAll()**

Deletes all global variables. This function never fails.

### Sample

```
GlobalVariablesDeleteAll();
```

## Math & Trig

[MathAbs\(\)](#)  
[MathArccos\(\)](#)  
[MathArcsin\(\)](#)  
[MathArctan\(\)](#)  
[MathCeil\(\)](#)  
[MathCos\(\)](#)  
[MathExp\(\)](#)  
[MathFloor\(\)](#)  
[MathLog\(\)](#)  
[MathMax\(\)](#)  
[MathMin\(\)](#)  
[MathMod\(\)](#)  
[MathPow\(\)](#)  
[MathRand\(\)](#)  
[MathRound\(\)](#)  
[MathSin\(\)](#)  
[MathSqrt\(\)](#)  
[MathSrand\(\)](#)  
[MathTan\(\)](#)

**double MathAbs(double value)**

Returns the absolute value (modulus) of the specified numeric value.

### Parameters

**value** - Numeric value.

### Sample

```
double dx=-3.141593, dy;  
// calc MathAbs  
dy=MathAbs(dx);  
Print("The absolute value of ",dx," is ",dy);  
// Output: The absolute value of -3.141593 is 3.141593
```

#### **double MathArccos(double x)**

The MathArccos function returns the arccosine of  $x$  in the range 0 to  $\pi$  radians. If  $x$  is less than -1 or greater than 1, MathArccos returns an indefinite (same as a quiet NaN).

##### **Parameters**

**x** - Value between -1 and 1 arc cosine of which should be calculated.

##### **Sample**

```
double x=0.32696, y;  
y=asin(x);  
Print("Arcsine of ",x," = ",y);  
y=acos(x);  
Print("Arccosine of ",x," = ",y);  
//Output: Arcsine of 0.326960=0.333085  
//Output: Arccosine of 0.326960=1.237711
```

#### **double MathArcsin(double x)**

The MathArcsin function returns the arcsine of  $x$  in the range  $-\pi/2$  to  $\pi/2$  radians. If  $x$  is less than -1 or greater than 1, arcsine returns an indefinite (same as a quiet NaN).

##### **Parameters**

**x** - Value the arcsine of which should be calculated

##### **Sample**

```
double x=0.32696, y;  
y=MathArcsin(x);  
Print("Arcsine of ",x," = ",y);  
y=acos(x);  
Print("Arccosine of ",x," = ",y);  
//Output: Arcsine of 0.326960=0.333085  
//Output: Arccosine of 0.326960=1.237711
```

#### **double MathArctan(double x)**

The MathArctan returns the arctangent of  $x$ . If  $x$  is 0, MathArctan returns 0. MathArctan returns a value in the range  $-\pi/2$  to  $\pi/2$  radians.

##### **Parameters**

**x** - A number representing a tangent.

##### **Sample**

```
double x=-862.42, y;  
y=MathArctan(x);  
Print("Arctangent of ",x," is ",y);  
//Output: Arctangent of -862.42 is -1.5696
```

#### **double MathCeil(double x)**

The MathCeil function returns a numeric value representing the smallest integer that is greater than or equal to  $x$ .

##### **Parameters**

**x** - Numeric value.

##### **Sample**

```
double y;
```

```
y=MathCeil(2.8);
Print("The ceil of 2.8 is ",y);
y=MathCeil(-2.8);
Print("The ceil of -2.8 is ",y);
/*Output:
    The ceil of 2.8 is 3
    The ceil of -2.8 is -2*/
```

### **double MathCos(double value)**

Returns the cosine of the specified angle.

#### **Parameters**

**value** - An angle, measured in radians.

#### **Sample**

```
double pi=3.1415926535;
double x, y;
x=pi/2;
y=MathSin(x);
Print("MathSin(",x,") = ",y);
y=MathCos(x);
Print("MathCos(",x,") = ",y);
//Output: MathSin(1.5708)=1
//          MathCos(1.5708)=0
```

### **double MathExp(double d)**

Returns value the number **e** raised to the power *d*. On overflow, the function returns INF (infinite) and on underflow, MathExp returns 0.

#### **Parameters**

**d** - A number specifying a power.

#### **Sample**

```
double x=2.302585093,y;
y=MathExp(x);
Print("MathExp(",x,") = ",y);
//Output: MathExp(2.3026)=10
```

### **double MathFloor(double x)**

The MathFloor function returns a numeric value representing the largest integer that is less than or equal to *x*.

#### **Parameters**

**x** - Numeric value.

#### **Sample**

```
double y;
y=MathFloor(2.8);
Print("The floor of 2.8 is ",y);
y=MathFloor(-2.8);
Print("The floor of -2.8 is ",y);
/*Output:
    The floor of 2.8 is 2
    The floor of -2.8 is -3*/
```

### **double MathLog(double x)**

The MathLog functions return the logarithm of *x* if successful. If *x* is negative, these functions return an indefinite (same as a

quiet NaN). If  $x$  is 0, they return INF (infinite).

### Parameters

**x** - Value whose logarithm is to be found.

### Sample

```
double x=9000.0,y;  
y=MathLog(x);  
Print("MathLog(",x,") = ", y);  
//Output: MathLog(9000)=9.10498
```

**double MathMax(double value1, double value2)**

Returns maximum value of two numeric values.

### Parameters

**value1** - First numeric value.

**value2** - Second numeric value.

### Sample

```
double result=MathMax(1.08,Bid);
```

**double MathMin(double value1, double value2)**

Returns minimum value of two numeric values.

### Parameters

**value1** - First numeric value.

**value2** - Second numeric value.

### Sample

```
double result=MathMin(1.08,Ask);
```

**double MathMod(double value, double value2)**

Divides two numbers and returns only the remainder.

### Parameters

**value** - Dividend value.

**value2** - Divider value.

### Sample

```
double x=-10.0,y=3.0,z;  
z=MathMod(x,y);  
Print("The remainder of ",x," / ",y," is ",z);  
//Output: The remainder of -10 / 3 is -1
```

**double MathPow(double base, double exponent)**

Returns the value of a base expression taken to a specified power.

### Parameters

**base** - Base value.

**exponent** - Exponent value.

### Sample

```
double x=2.0,y=3.0,z;  
z=MathPow(x,y);  
Printf(x," to the power of ",y," is ", z);  
//Output: 2 to the power of 3 is 8
```

### **int MathRand()**

The MathRand function returns a pseudorandom integer in the range 0 to 0x7fff (32767). Use the [MathSrand](#) function to seed the pseudorandom-number generator before calling rand.

#### **Sample**

```
MathSrand(LocalTime());
// Display 10 numbers.
for(int i=0;i<10;i++ )
    Print("random value ", MathRand());
```

### **double MathRound(double value)**

Returns value rounded to the nearest integer of the specified numeric value.

#### **Parameters**

**value** - Numeric value to round.

#### **Sample**

```
double y=MathRound(2.8);
Print("The round of 2.8 is ",y);
y=MathRound(2.4);
Print("The round of -2.4 is ",y);
//Output: The round of 2.8 is 3
//          The round of -2.4 is -2
```

### **double MathSin(double value)**

Returns the sine of the specified angle.

#### **Parameters**

**value** - An angle, measured in radians.

#### **Sample**

```
double pi=3.1415926535;
double x, y;
x=pi/2;
y=MathSin(x);
Print("MathSin(",x,") = ",y);
y=MathCos(x);
Print("MathCos(",x,") = ",y);
//Output: MathSin(1.5708)=1
//          MathCos(1.5708)=0
```

### **double MathSqrt(double x)**

The MathSqrt function returns the square-root of x. If x is negative, MathSqrt returns an indefinite (same as a quiet NaN).

#### **Parameters**

**x** - Positive numeric value.

#### **Sample**

```
double question=45.35, answer;
answer=MathSqrt(question);
if(question<0)
    Print("Error: MathSqrt returns ",answer," answer");
else
    Print("The square root of ",question," is ", answer);
//Output: The square root of 45.35 is 6.73
```

### **void MathSrand(int seed)**

The MathSrand() function sets the starting point for generating a series of pseudorandom integers. To reinitialize the generator, use 1 as the seed argument. Any other value for seed sets the generator to a random starting point. [MathRand](#) retrieves the

pseudorandom numbers that are generated. Calling MathRand before any call to MathSrand generates the same sequence as calling MathSrand with seed passed as 1.

### Parameters

**seed** - Seed for random-number generation.

### Sample

```
MathSrand(LocalTime());
// Display 10 numbers.
for(int i=0;i<10;i++ )
    Print("random value ", MathRand());
```

## **double MathTan(double x)**

MathTan returns the tangent of  $x$ . If  $x$  is greater than or equal to 263, or less than or equal to -263, a loss of significance in the result occurs, in which case the function returns an indefinite (same as a quiet NaN).

### Parameters

**x** - Angle in radians.

### Sample

```
double pi=3.1415926535;
double x,y;
x=MathTan(pi/4);
Print("MathTan(",pi/4," = ",x);
//Output: MathTan(0.7856)=1
```

## Object functions

[ObjectCreate\(\)](#)

[ObjectDelete\(\)](#)

[ObjectDescription\(\)](#)

[ObjectFind\(\)](#)

[ObjectGet\(\)](#)

[ObjectGetFiboDescription\(\)](#)

[ObjectGetShiftByValue\(\)](#)

[ObjectGetValueByShift\(\)](#)

[ObjectGetVisibility\(\)](#)

[ObjectMove\(\)](#)

[ObjectName\(\)](#)

[ObjectsDeleteAll\(\)](#)

[ObjectSet\(\)](#)

[ObjectSetFiboDescription\(\)](#)

[ObjectSetText\(\)](#)

[ObjectSetVisibility\(\)](#)

[ObjectsRedraw](#)

[ObjectsTotal\(\)](#)

[ObjectType\(\)](#)

```
bool      string name, int type, int window, datetime time1, double price1,
ObjectCreate(  datetime time2=0, double price2=0, datetime time3=0, double price3=0)
```

Create object with specified name, type and initial coordinates in the specified window. Count of coordinates related from object type (1-3). If the function succeeds, the return value will be true. If the function succeeds, the return value is true. If the function fails, the return value is false. To get the detailed error information, call [GetLastError\(\)](#). For objects with type OBJ\_LABEL first coordinate ignored. To set coordinate for label use [ObjectSet\(\)](#) function to set [OBJPROP\\_XDISTANCE](#) and [OBJPROP\\_YDISTANCE](#) properties.

**Note:** Coordinates must be passed with both part - time and price. For example: Object OBJ\_VLINE required 1 coordinate part *time*. But function wants also the seconds part of coordinate *price*.

### Parameters

- name** - Unique object name.
- type** - Object type. It can be any of the [Object type enumeration](#) values.
- window** - Window index where object will be added. Window index must be greater or equal to 0 and less than [WindowsTotal\(\)](#).
- time1** - Time part of first point.
- price1** - Price part of first point.
- time2** - Time part of second point.
- price2** - Price part of second point.
- time3** - Time part of third point.
- price3** - Price part of third point.

### Sample

```
// new text object
if(!ObjectCreate("text_object", OBJ_TEXT, 0, D'2004.02.20 12:30', 1.0045))
{
    Print("error: can't create text_object! code #", GetLastError());
    return(0);
}
// new label object
if(!ObjectCreate("label_object", OBJ_LABEL, 0, 0, 0))
{
    Print("error: can't create label_object! code #", GetLastError());
    return(0);
}
ObjectSet("label_object", OBJPROP_XDISTANCE, 200);
ObjectSet("label_object", OBJPROP_YDISTANCE, 100);
```

### **bool** ObjectDelete(**string** name)

Deletes object with specified name. If the function succeeds, the return value will be true. If the function fails, the return value is false. To get the detailed error information, call [GetLastError\(\)](#).

#### Parameters

- name** - Deleting object name.

### Sample

```
ObjectDelete("text_object");
```

### **string** ObjectDescription(**string** name)

Return object description. To get error information, call [GetLastError\(\)](#) function.

#### Parameters

- name** - Object name.

### Sample

```
// writing chart's object list to the file
int    handle, total;
string obj_name, fname;
// file name
fname="objlist_"+Symbol();
handle=FileOpen(fname, FILE_CSV|FILE_WRITE);
if(handle!=false)
{
    total=ObjectsTotal();
    for(int i=-; i<total; i++)
    {
        obj_name=ObjectName(i);
        FileWrite(handle, "Object "+obj_name+" description="
        "+ObjectDescription(obj_name));
    }
}
```



```
FileClose(handle);
}
```

### **int** ObjectFind(**string** name)

Return object owner's window index. If the function fails, the return value will be -1. To get the detailed error information, call [GetLastError\(\)](#) function.

#### **Parameters**

**name** - Object name to check.

#### **Sample**

```
if(ObjectFind("line_object2")!=win_idx) return(0);
```

### **double** ObjectGet(**string** name, **int** index)

Returns objects property value by index. To check errors, call [GetLastError\(\)](#) function.

#### **Parameters**

**name** - Object name.

**index** - Object property index. It can be any of the [Object properties enumeration](#) values.

#### **Sample**

```
color oldColor=ObjectGet("hline12", OBJPROP_COLOR);
```

### **string** ObjectGetFiboDescription(**string** name, **int** index)

Function returns description of Fibonacci level. The amount of Fibonacci levels depends on the [object type](#). The maximum amount of Fibonacci levels never exceeds 32. To get the detailed error information, call [GetLastError\(\) function](#).

#### **Parameters**

**name** - Object name.

**index** - Index of the Fibonacci level.

#### **Sample**

```
#include <stdlib.mqh>

...
string text;
for(int i=0;i<32;i++)
{
    text=ObjectGetFiboDescription(MyObjectName,i);
    //---- check. may be objects's level count less than 32
    if(GetLastError()!=ERR_NO_ERROR) break;
    Print(MyObjectName,"level: ",i," description: ",text);
}
```

### **int** ObjectGetShiftByValue(**string** name, **double** value)

Calculates and returns bar index for the indicated price. Calculated by first and second coordinate. Applied to trendlines. To get the detailed error information, call [GetLastError\(\)](#) function.

#### **Parameters**

**name** - Object name.

**value** - Price value.

#### **Sample**

```
int shift=ObjectGetShiftByValue("MyTrendLine#123", 1.34);
```

### **double** ObjectGetValueByShift(**string** name, **int** shift)

Calculates and returns price value for the indicated bar. Calculated by first and second coordinate. Applied to trendlines. To get the detailed error information, call [GetLastError\(\)](#) function.

### Parameters

- name** - Object name
- shift** - Bar index.

### Sample

```
double price=ObjectGetValueByShift("MyTrendLine#123", 11);
```

**int** ObjectGetVisibility(**string** name)

Function returns flags of the object visibility on the chart. Value can be single or combined (bitwise addition) of [object visibility constants](#).

### Parameters

- name** - Object name.

### Sample

```
// is object visible on the chart?
if((ObjectGetVisibility() & OBJ_PERIOD_M5) != 0 && Period() == PERIOD_M5)
{
    // working with object
}
```

**bool** ObjectMove(**string** name, **int** point, **datetime** time1, **double** price1)

Moves objects point on the chart. Objects can have from one to three points related to its [type](#). If the function succeeds, the return value will be true. If the function fails, the return value will be false. To get the detailed error information, call [GetLastError\(\)](#).

### Parameters

- name** - Object name.
- point** - Coordinate index.
- time1** - New time value.
- price1** - New price value.

### Sample

```
ObjectMove("MyTrend", 1, D'2005.02.25 12:30', 1.2345);
```

**string** ObjectName(**int** index)

Returns object name by index.

### Parameters

- index** - Object index on the chart. Object index must be greater or equal to 0 and less than [ObjectsTotal\(\)](#).

### Sample

```
int obj_total=ObjectsTotal();
string name;
for(int i=0;i<obj_total;i++)
{
    name=ObjectName(i);
    Print(i,"Object name is " + name);
}
```

**int** ObjectsDeleteAll(**int** window, **int** type=EMPTY)

Removes all objects with specified type and on the specified subwindow of the chart. Returns removed objects count.

### Parameters

- window** - Window index from objects will be deleted. Window index must be greater or equal to 0 and less than [WindowsTotal\(\)](#).
- type** - Optional object type to delete. It can be any of the [Object type enumeration](#) values or EMPTY constant to delete all objects with any types.

### Sample

```
ObjectsDeleteAll(2, OBJ_HLINE); // removes all horizontal line objects from window
3 (index 2).
```

**bool ObjectSet(string name, int index, double value)**

Changes named objects property with new value. If the function succeeds, the return value will be true. If the function fails, the return value will be false. To get the detailed error information, call [GetLastError\(\)](#).

#### Parameters

- name** - Object name.
- index** - Object value index. It can be any of [Object properties enumeration](#) values.
- value** - New value for property.

#### Sample

```
// moving first coord to last bar time
ObjectSet("MyTrend", OBJPROP_TIME1, Time[0]);
// setting second fibo level
ObjectSet("MyFibo", OBJPROP_FIRSTLEVEL+1, 1.234);
// setting object visibility. object will be shown only on 15 minute and 1 hour
charts
ObjectSet("MyObject", OBJPROP_TIMEFRAMES, OBJ_PERIOD_M15 | OBJ_PERIOD_H1);
```

**bool ObjectSetFiboDescription(string name, int index, string text)**

Function assigns a new description to a Fibonacci level. The amount of Fibonacci levels depends on the [object type](#). The maximum amount of Fibonacci levels never exceeds 32. To get the detailed error information, call [GetLastError\(\) function](#).

#### Parameters

- name** - Object name.
- index** - Index of the Fibonacci level (0-31).
- text** - New description to be assigned to the Fibonacci level.

#### Sample

```
ObjectSetFiboDescription("MyFiboObject,2,"Second line");
```

**bool ObjectSetText(string name, string text, int font\_size, string font=NULL, color text\_color=CLR\_NONE)**

Sets object description. If the function succeeds, the return value will be true. If the function fails, the return value will be false. To get the detailed error information, call [GetLastError\(\) function](#).

#### Parameters

- name** - Object name.
- text** - Some text.
- font\_size** - Font size in points.
- font** - Font name.
- text\_color** - Text color.

#### Sample

```
ObjectSetText("text_object", "Hello world!", 10, "Times New Roman", Green);
```

**int ObjectSetVisibility(string name, int flag)**

Function sets new value to the object visibility property. Function returns previous value.

#### Parameters

- name** - Object name.
- flag** - New value of the object visibility property. Value can be single or combined (bitwise addition) of [object visibility constants](#).

#### Sample

```
// The object will be shown on 1-hour charts only.
```

```
ObjectSetVisibility("MyObj1",OBJ_PERIOD_H1);
```

### **void ObjectsRedraw()**

Redraws all objects on the char.

#### **Sample**

```
ObjectsRedraw();
```

### **int ObjectsTotal()**

Returns total count of objects on the chart.

#### **Sample**

```
int    obj_total=ObjectsTotal();
string name;
for(int i=0;i<obj_total;i++)
{
    name=ObjectName(i);
    Print(i,"Object name is for object #",i," is " + name);
}
```

### **int ObjectType(string name)**

Returns [Object type enumeration](#) value.

#### **Parameters**

**name** - Object name.

#### **Sample**

```
if(ObjectType("line_object2")!=OBJ_HLINE) return(0);
```

### **Pre-defined Variables**

[Ask](#)  
[Bars](#)  
[Bid](#)  
[Close](#)  
[Digits](#)  
[High](#)  
[Low](#)  
[Open](#)  
[Point](#)  
[Time](#)  
[Volume](#)

### **double Ask**

Ask price (the Buyer's price).

```
if(iRSI(NULL,0,14,PRICE_CLOSE,0)<25)
{
    OrderSend(Symbol(),OP_BUY,Lots,Ask,3,Ask-StopLoss*Point,Ask+TakeProfit*Point,
        "My order #2",3,D'2005.10.10 12:30',Red);
    return;
}
```

## **int Bars**

Number of bars on the chart.

```
int counter=1;
for(int i=1;i<=Bars;i++)
{
    Print(Close[i-1]);
}
```

## **double Bid**

Bid price (the Seller's price).

```
if(iRSI(NULL,0,14,PRICE_CLOSE,0)>75)
{
    OrderSend("EURUSD",OP_SELL,Lots,Bid,3,Bid+StopLoss*Point,Bid-TakeProfit*Point,
        "My order #2",3,D'2005.10.10 12:30',Red);
    return(0);
}
```

## **double Close[]**

Returns the closing price of the bar being referenced.

```
int handle, bars=Bars;
handle=FileOpen("file.csv",FILE_CSV|FILE_WRITE,',' );
if(handle>0)
{
    // write table columns headers
    FileWrite(handle, "Time;Open;High;Low;Close;Volume");
    // write data
    for(int i=0; i<bars; i++)
        FileWrite(handle, Time[i], Open[i], High[i], Low[i], Close[i], Volume[i]);
    FileClose(handle);
}
```

## **int Digits**

Number of digits after decimal point for the current symbol.

```
Print(DoubleToStr(Close[i-1], Digits));
```

## **double High[]**

Returns the highest price of the bar referenced.

```
int handle, bars=Bars;
handle=fopen("file.csv", FILE_CSV|FILE_WRITE, ';');
if(handle>0)
{
    // write table columns headers
    FileWriter(handle, "Time;Open;High;Low;Close;Volume");
    // write data
    for(int i=0; i<bars; i++)
        FileWriter(handle, Time[i], Open[i], High[i], Low[i], Close[i], Volume[i]);
    FileClose(handle);
}
```

**double** Low[]

Returns the lowest price of the bar referenced.

```
int handle, bars=Bars;
handle=fopen("file.csv", FILE_CSV|FILE_WRITE, ";");
if(handle>0)
{
    // write table columns headers
    FileWriter(handle, "Time;Open;High;Low;Close;Volume");
    // write data
    for(int i=0; i<bars; i++)
        FileWriter(handle, Time[i], Open[i], High[i], Low[i], Close[i], Volume[i]);
    FileClose(handle);
}
```

**double** Open[]

Returns the opening price of the bar referenced.

```
int handle, bars=Bars;
handle=fopen("file.csv", FILE_CSV|FILE_WRITE, ';');
if(handle>0)
{
    // write table columns headers
    FileWriter(handle, "Time;Open;High;Low;Close;Volume");
    // write data
    for(int i=0; i<bars; i++)
        FileWriter(handle, Time[i], Open[i], High[i], Low[i], Close[i], Volume[i]);
    FileClose(handle);
}
```

**double** Point

Point value for the current chart.

```
OrderSend(Symbol(),OP_BUY,Lots,Ask,3,0,Ask+TakeProfit*Point,Red);
```

**datetime** Time[]

Open time of the bars. Datetime is the number of seconds elapsed from 00:00 January 1, 1970.

```
int handle, bars=Bars;
handle=FileOpen("file.csv", FILE_CSV|FILE_WRITE, ';');
if(handle>0)
{
    // write table columns headers
    FileWrite(handle, "Time;Open;High;Low;Close;Volume");
    // write data
    for(int i=0; i<bars; i++)
        FileWrite(handle, Time[i], Open[i], High[i], Low[i], Close[i], Volume[i]);
    FileClose(handle);
}
```

**double** Volume[]

Returns the ticks count for the referenced bar.

```
int handle, bars=Bars;
handle=FileOpen("file.csv", FILE_CSV|FILE_WRITE, ';');
if(handle>0)
{
    // write table columns headers
    FileWrite(handle, "Time;Open;High;Low;Close;Volume");
    // erite data
    for(int i=0; i<bars; i++)
        FileWrite(handle, Time[i], Open[i], High[i], Low[i], Close[i], Volume[i]);
    FileClose(handle);
}
```

## Standard Constants

[Applied price enumeration](#)

[Drawing shape style enumeration](#)

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[Web colors table](#)

### Applied price enumeration

Applied price constants. It can be any of the following values:

Constant	Value	Description
PRICE_CLOSE	0	Close price.
PRICE_OPEN	1	Open price.
PRICE_HIGH	2	High price.
PRICE_LOW	3	Low price.
PRICE_MEDIAN	4	Median price, (high+low)/2.
PRICE_TYPICAL	5	Typical price, (high+low+close)/3.
PRICE_WEIGHTED	6	Weighted close price, (high+low+close+close)/4.

### Drawing shape style enumeration

Drawing shape style enumeration for [SetIndexStyle\(\)](#) function.

It can be any of the following values:

Constant	Value	Description
DRAW_LINE	0	Drawing line.
DRAW_SECTION	1	Drawing sections.
DRAW_HISTOGRAM	2	Drawing histogram.
DRAW_ARROW	3	Drawing arrows (symbols).
DRAW_NONE	12	No drawing.

Drawing style. Valid when width=1. It can be any of the

following values:

Constant	Value	Description
STYLE_SOLID	0	The pen is solid.
STYLE_DASH	1	The pen is dashed.
STYLE_DOT	2	The pen is dotted.
STYLE_DASHDOT	3	The pen has alternating dashes and dots.
STYLE_DASHDOTDOT	4	The pen has alternating dashes and double dots.

### Error codes

The [GetLastError\(\)](#) function return codes. Error code constants defined at **stderror.mqh** file. To print text messages use *ErrorDescription()* function defined at **stdlib.mqh** file.

```
#include <stdlib.mqh>
void SendMyMessage(string text)
{
    int check;
    SendMail("some subject", text);
    check=GetLastError();
    if(check!=ERR_NO_MQLERROR) Print("Cannot send message, error:
",ErrorDescription(check));
}
```

Error codes returned from trade server.



Constant	Value	Description
ERR_NO_ERROR	0	No error returned.
ERR_NO_RESULT	1	No error returned, but the result is unknown.
ERR_COMMON_ERROR	2	Common error.
ERR_INVALID_TRADE_PARAMETERS	3	Invalid trade parameters.
ERR_SERVER_BUSY	4	Trade server is busy.
ERR_OLD_VERSION	5	Old version of the client terminal.
ERR_NO_CONNECTION	6	No connection with trade server.
ERR_NOT_ENOUGH_RIGHTS	7	Not enough rights.
ERR_TOO_FREQUENT_REQUESTS	8	Too frequent requests.
ERR_MALFUNCTIONAL_TRADE	9	Malfunctional trade operation.
ERR_ACCOUNT_DISABLED	64	Account disabled.
ERR_INVALID_ACCOUNT	65	Invalid account.
ERR_TRADE_TIMEOUT	128	Trade timeout.
ERR_INVALID_PRICE	129	Invalid price.
ERR_INVALID_STOPS	130	Invalid stops.
ERR_INVALID_TRADE_VOLUME	131	Invalid trade volume.
ERR_MARKET_CLOSED	132	Market is closed.
ERR_TRADE_DISABLED	133	Trade is disabled.
ERR_NOT_ENOUGH_MONEY	134	Not enough money.
ERR_PRICE_CHANGED	135	Price changed.
ERR_OFF_QUOTES	136	Off quotes.
ERR_BROKER_BUSY	137	Broker is busy.
ERR_REQUOTE	138	Requote.
ERR_ORDER_LOCKED	139	Order is locked.
ERR_LONG_POSITIONS_ONLY_ALLOWED	140	Long positions only allowed.
ERR_TOO_MANY_REQUESTS	141	Too many requests.
ERR_TRADE_MODIFY_DENIED	145	Modification denied because order too close to market.
ERR_TRADE_CONTEXT_BUSY	146	Trade context is busy.
MQL4 run time error codes		

Constant	Value	Description
ERR_NO_MQLERROR	4000	No error.
ERR_WRONG_FUNCTION_POINTER	4001	Wrong function pointer.
ERR_ARRAY_INDEX_OUT_OF_RANGE	4002	Array index is out of range.
ERR_NO_MEMORY_FOR_FUNCTION_CALL_STACK	4003	No memory for function call stack.
ERR_RECURSIVE_STACK_OVERFLOW	4004	Recursive stack overflow.
ERR_NOT_ENOUGH_STACK_FOR_PARAMETER	4005	Not enough stack for parameter.
ERR_NO_MEMORY_FOR_PARAMETER_STRING	4006	No memory for parameter string.
ERR_NO_MEMORY_FOR_TEMP_STRING	4007	No memory for temp string.
ERR_NOT_INITIALIZED_STRING	4008	Not initialized string.
ERR_NOT_INITIALIZED_ARRAYSTRING	4009	Not initialized string in array.
ERR_NO_MEMORY_FOR_ARRAYSTRING	4010	No memory for array string.
ERR_TOO_LONG_STRING	4011	Too long string.
ERR_REMAINDER_FROM_ZERO_DIVIDE	4012	Remainder from zero divide.
ERR_ZERO_DIVIDE	4013	Zero divide.
ERR_UNKNOWN_COMMAND	4014	Unknown command.
ERR_WRONG_JUMP	4015	Wrong jump (never generated error).
ERR_NOT_INITIALIZED_ARRAY	4016	Not initialized array.
ERR_DLL_CALLS_NOT_ALLOWED	4017	DLL calls are not allowed.
ERR_CANNOT_LOAD_LIBRARY	4018	Cannot load library.
ERR_CANNOT_CALL_FUNCTION	4019	Cannot call function.
ERR_EXTERNAL_EXPERT_CALLS_NOT_ALLOWED	4020	Expert function calls are not allowed.
ERR_NOT_ENOUGH_MEMORY_FOR_RETURNED_STRING	4021	Not enough memory for temp string returned from function.
ERR_SYSTEM_BUSY	4022	System is busy (never generated error).
ERR_INVALID_FUNCTION_PARAMETERS_COUNT	4050	Invalid function parameters count.
ERR_INVALID_FUNCTION_PARAMETER_VALUE	4051	Invalid function parameter value.
ERR_STRING_FUNCTION_INTERNAL_ERROR	4052	String function internal error.
ERR_SOME_ARRAY_ERROR	4053	Some array error.
ERR_INCORRECT_SERIES_ARRAY_USING	4054	Incorrect series array using.
ERR_CUSTOM_INDICATOR_ERROR	4055	Custom indicator error.
ERR_INCOMPATIBLE_ARRAYS	4056	Arrays are incompatible.
ERR_GLOBAL_VARIABLES_PROCESSING_ERROR	4057	Global variables processing error.
ERR_GLOBAL_VARIABLE_NOT_FOUND	4058	Global variable not found.
ERR_FUNCTION_NOT_ALLOWED_IN_TESTING_MODE	4059	Function is not allowed in testing mode.
ERR_FUNCTION_NOT_CONFIRMED	4060	Function is not confirmed.
ERR_SEND_MAIL_ERROR	4061	Send mail error.
ERR_STRING_PARAMETER_EXPECTED	4062	String parameter expected.
ERR_INTEGER_PARAMETER_EXPECTED	4063	Integer parameter expected.
ERR_DOUBLE_PARAMETER_EXPECTED	4064	Double parameter expected.
ERR_ARRAY_AS_PARAMETER_EXPECTED	4065	Array as parameter expected.
ERR_HISTORY_WILL_UPDATED	4066	Requested history data in updating state.
ERR_END_OF_FILE	4099	End of file.
ERR_SOME_FILE_ERROR	4100	Some file error.
ERR_WRONG_FILE_NAME	4101	Wrong file name.
ERR_TOO_MANY_OPENED_FILES	4102	Too many opened files.
ERR_CANNOT_OPEN_FILE	4103	Cannot open file.

### Ichimoku Kinko Hyo modes enumeration

Ichimoku Kinko Hyo source of data. Used in [iIchimoku\(\)](#) indicators. It can be one of the following values:

Constant	Value	Description
MODE_TENKANSEN	1	Tenkan-sen.
MODE_KIJUNSEN	2	Kijun-sen.
MODE_SENKOSPANB	3	Senkou Span A.
MODE_SENKOSPANB	4	Senkou Span B.
MODE_CHINKOSPAN	5	Chinkou Span.

### Indicators line identifiers

Indicator line identifiers used in [iMACD\(\)](#), [iRVI\(\)](#) and [iStochastic\(\)](#) indicators. It can be one of the following values:

Constant	Value	Description
MODE_MAIN	0	Base indicator line.
MODE_SIGNAL	1	Signal line.

Indicator line identifiers used in [iADX\(\)](#) indicator.

Constant	Value	Description
MODE_MAIN	0	Base indicator line.
MODE_PLUSDI	1	+DI indicator line.
MODE_MINUSDI	2	-DI indicator line.

Indicator line identifiers used in [iBands\(\)](#), [iEnvelopes\(\)](#), [iEnvelopesOnArray\(\)](#), [iFractals\(\)](#) and [iGator\(\)](#) indicators.

Constant	Value	Description
MODE_UPPER	1	Upper line.
MODE_LOWER	2	Lower line.

### Market information identifiers

Market information identifiers, used with [MarketInfo\(\)](#) function. It can be any of the following values:

Constant	Value	Description
MODE_LOW	1	Low day price.
MODE_HIGH	2	High day price.
MODE_TIME	5	The last incoming quotation time.
MODE_BID	9	Last incoming bid price.
MODE_ASK	10	Last incoming ask price.
MODE_POINT	11	Point size.
MODE_DIGITS	12	Digits after decimal point.
MODE_SPREAD	13	Spread value in points.
MODE_STOPLEVEL	14	Stop level in points.
MODE_LOTSIZE	15	Lot size in the base currency.
MODE_TICKVALUE	16	Tick value.
MODE_TICKSIZE	17	Tick size.
MODE_SWAPLONG	18	Swap of the long position.
MODE_SWAPSHORT	19	Swap of the short position.
MODE_STARTING	20	Market starting date (usually used for future markets).
MODE_EXPIRATION	21	Market expiration date (usually used for future markets).
MODE_TRADEALLOWED	22	Trade is allowed for the symbol.
MODE_MINLOT	22	The minimum lot size in points.
MODE_LOTSTEP	22	Step for changing lots in points.

### MessageBox return codes

The [MessageBox\(\)](#) function return codes.

If a message box has a **Cancel** button, the function returns the IDCANCEL value if either the ESC key is pressed or the **Cancel** button is selected. If the message box has no **Cancel** button, pressing ESC has no effect.

**Note:** MessageBox return codes defined in the WinUser32.mqh file

Constant	Value	Description
IDOK	1	<b>OK</b> button was selected.
IDCANCEL	2	<b>Cancel</b> button was selected.
IDABORT	3	<b>Abort</b> button was selected.
IDRETRY	4	<b>Retry</b> button was selected.
IDIGNORE	5	<b>Ignore</b> button was selected.
IDYES	6	<b>Yes</b> button was selected.
IDNO	7	<b>No</b> button was selected.
IDTRYAGAIN	10	<b>Try Again</b> button was selected.
IDCONTINUE	11	<b>Continue</b> button was selected.

### MessageBox behavior flags

The [MessageBox](#) function flags specify the contents and behavior of the dialog box. This value can be a combination of flags from the following groups of flags.

**Note:** MessageBox return codes defined in the WinUser32.mqh file

To indicate the buttons displayed in the message box, specify one of the following values.

Constant	Value	Description
MB_OK	0x00000000	The message box contains one push button: OK. This is the default.
MB_OKCANCEL	0x00000001	The message box contains two push buttons: OK and Cancel.
MB_ABORTRETRYIGNORE	0x00000002	The message box contains three push buttons: Abort, Retry, and Ignore.
MB_YESNOCANCEL	0x00000003	The message box contains three push buttons: Yes, No, and Cancel.
MB_YESNO	0x00000004	The message box contains two push buttons: Yes and No.
MB_RETRYCANCEL	0x00000005	The message box contains two push buttons: Retry and Cancel.
MB_CANCELTRYCONTINUE	0x00000006	Windows 2000: The message box contains three push buttons: Cancel, Try Again, Continue. Use this message box type instead of MB_ABORTRETRYIGNORE.

To display an icon in the message box, specify one of the following values.

Constant	Value	Description
MB_ICONSTOP, MB_ICONERROR, MB_ICONHAND	0x00000010	A stop-sign icon appears in the message box.
MB_ICONQUESTION	0x00000020	A question-mark icon appears in the message box.
MB_ICONEXCLAMATION, MB_ICONWARNING	0x00000030	An exclamation-point icon appears in the message box.
MB_ICONINFORMATION, MB_ICONASTERISK	0x00000040	An icon consisting of a lowercase letter i in a circle appears in the message box.

To indicate the default button, specify one of the following values.

Constant	Value	Description
MB_DEFBUTTON1	0x00000000	The first button is the default button. MB_DEFBUTTON1 is the default unless MB_DEFBUTTON2, MB_DEFBUTTON3, or MB_DEFBUTTON4 is specified.
MB_DEFBUTTON2	0x00000100	The second button is the default button.
MB_DEFBUTTON3	0x00000200	The third button is the default button.
MB_DEFBUTTON4	0x00000300	The fourth button is the default button.

### Moving Average method enumeration

Moving Average calculation method. used with [iAlligator\(\)](#), [iEnvelopes\(\)](#), [iEnvelopesOnArray](#), [iForce\(\)](#), [iGator\(\)](#), [iMA\(\)](#), [iMAOnArray\(\)](#), [iStdDev\(\)](#), [iStdDevOnArray\(\)](#), [iStochastic\(\)](#) indicators. It can be any of the following values:

Constant	Value	Description
MODE_SMA	0	Simple moving average,
MODE_EMA	1	Exponential moving average,
MODE_SMMA	2	Smoothed moving average,
MODE_LWMA	3	Linear weighted moving average.

### Object properties enumeration

Object value index used with [ObjectGet\(\)](#) and [ObjectSet\(\)](#) functions. It can be any of the following values:

Constant	Value	Description
OBJPROP_TIME1	0	Datetime value to set/get first coordinate time part.
OBJPROP_PRICE1	1	Double value to set/get first coordinate price part.
OBJPROP_TIME2	2	Datetime value to set/get second coordinate time part.
OBJPROP_PRICE2	3	Double value to set/get second coordinate price part.
OBJPROP_TIME3	4	Datetime value to set/get third coordinate time part.
OBJPROP_PRICE3	5	Double value to set/get third coordinate price part.
OBJPROP_COLOR	6	Color value to set/get object color.
OBJPROP_STYLE	7	Value is one of STYLE_SOLID, STYLE_DASH, STYLE_DOT, STYLE_DASHDOT, STYLE_DASHDOTDOT constants to set/get object line style.
OBJPROP_WIDTH	8	Integer value to set/get object line width. Can be from 1 to 5.
OBJPROP_BACK	9	Boolean value to set/get background drawing flag for object.
OBJPROP_RAY	10	Boolean value to set/get ray flag of object.
OBJPROP_ELLIPSE	11	Boolean value to set/get ellipse flag for fibo arcs.
OBJPROP_SCALE	12	Double value to set/get scale object property.
OBJPROP_ANGLE	13	Double value to set/get angle object property in degrees.
OBJPROP_ARROWCODE	14	Integer value or <a href="#">arrow enumeration</a> to set/get arrow code object property.
OBJPROP_TIMEFRAMES	15	Value can be one or combination (bitwise addition) of <a href="#">object visibility constants</a> to set/get timeframe object property.
OBJPROP_DEVIATION	16	Double value to set/get deviation property for Standard deviation objects.
OBJPROP_FONTSIZE	100	Integer value to set/get font size for text objects.
OBJPROP_CORNER	101	Integer value to set/get anchor corner property for label objects. Must be from 0-3.
OBJPROP_XDISTANCE	102	Integer value to set/get anchor X distance object property in pixels.
OBJPROP_YDISTANCE	103	Integer value is to set/get anchor Y distance object property in pixels.
OBJPROP_FIBOLEVELS	200	Integer value to set/get Fibonacci object level count. Can be from 0 to 32.
OBJPROP_FIRSTLEVEL+ <i>n</i>	210	Fibonacci object level index, where <i>n</i> is level index to set/get. Can be from 0 to 31.

### Object type enumeration

Object type identifier constants used with [ObjectCreate\(\)](#), [ObjectsDeleteAll\(\)](#) and [ObjectType\(\)](#) functions. It can be any of the following values:  
Objects can have 1-3 coordinates related to type.

Constant	Value	Description
OBJ_VLINE	0	Vertical line. Uses time part of first coordinate.
OBJ_HLINE	1	Horizontal line. Uses price part of first coordinate.
OBJ_TREND	2	Trend line. Uses 2 coordinates.
OBJ_TRENDBYANGLE	3	Trend by angle. Uses 1 coordinate. To set angle of line use <a href="#">ObjectSet()</a> function.
OBJ_REGRESSION	4	Regression. Uses time parts of first two coordinates.
OBJ_CHANNEL	5	Channel. Uses 3 coordinates.
OBJ_STDDEVCHANNEL	6	Standard deviation channel. Uses time parts of first two coordinates.
OBJ_GANNLINE	7	Gann line. Uses 2 coordinate, but price part of second coordinate ignored.
OBJ_GANNFAN	8	Gann fan. Uses 2 coordinate, but price part of second coordinate ignored.
OBJ_GANNGRID	9	Gann grid. Uses 2 coordinate, but price part of second coordinate ignored.
OBJ_FIBO	10	Fibonacci retracement. Uses 2 coordinates.
OBJ_FIBOTIMES	11	Fibonacci time zones. Uses 2 coordinates.
OBJ_FIBOFAN	12	Fibonacci fan. Uses 2 coordinates.
OBJ_FIBOARC	13	Fibonacci arcs. Uses 2 coordinates.
OBJ_EXPANSION	14	Fibonacci expansions. Uses 3 coordinates.
OBJ_FIBOCHANNEL	15	Fibonacci channel. Uses 3 coordinates.
OBJ_RECTANGLE	16	Rectangle. Uses 2 coordinates.
OBJ_TRIANGLE	17	Triangle. Uses 3 coordinates.
OBJ_ELLIPSE	18	Ellipse. Uses 2 coordinates.
OBJ_PITCHFORK	19	Andrews pitchfork. Uses 3 coordinates.
OBJ_CYCLES	20	Cycles. Uses 2 coordinates.
OBJ_TEXT	21	Text. Uses 1 coordinate.
OBJ_ARROW	22	Arrows. Uses 1 coordinate.
OBJ_LABEL	23	Text label. Uses 1 coordinate in pixels.

### Object visibility enumeration

Time frames where object may be shown. Used in [ObjectSet\(\)](#) function to set OBJPROP\_TIMEFRAMES property.

Constant	Value	Description
OBJ_PERIOD_M1	0x0001	Object shown is only on 1-minute charts.
OBJ_PERIOD_M5	0x0002	Object shown is only on 5-minute charts.
OBJ_PERIOD_M15	0x0004	Object shown is only on 15-minute charts.
OBJ_PERIOD_M30	0x0008	Object shown is only on 30-minute charts.
OBJ_PERIOD_H1	0x0010	Object shown is only on 1-hour charts.
OBJ_PERIOD_H4	0x0020	Object shown is only on 4-hour charts.
OBJ_PERIOD_D1	0x0040	Object shown is only on daily charts.
OBJ_PERIOD_W1	0x0080	Object shown is only on weekly charts.
OBJ_PERIOD_MN1	0x0100	Object shown is only on monthly charts.
OBJ_ALL_PERIODS	0x01FF	Object shown is on all timeframes.
NULL	0	Object shown is on all timeframes.
EMPTY	-1	Hidden object on all timeframes.

### Predefined Arrow codes enumeration

Predefined Arrow codes enumeration. Arrows code constants. It can be one of the following values:

Constant	Value	Description
SYMBOL_THUMBSUP	67	Thumb up symbol (👍).
SYMBOL_THUMBSDOWN	68	Thumb down symbol (👎).
SYMBOL_ARROWUP	241	Arrow up symbol (↑).
SYMBOL_ARROWDOWN	242	Arrow down symbol (↓).
SYMBOL_STOPSIGN	251	Stop sign symbol (✖).
SYMBOL_CHECKSIGN	252	Check sign symbol (✓).

Special Arrow codes that exactly points to price and time.

It can be one of the following values:

Constant	Value	Description
	1	Upwards arrow with tip rightwards (↗).
	2	Downwards arrow with tip rightwards (↘).
	3	Left pointing triangle (◀).
	4	En Dash symbol (–).
SYMBOL_LEFTPRICE	5	Left sided price label.
SYMBOL_RIGHTPRICE	6	Right sided price label.

**Series array identifier**

Series array identifier used with [ArrayCopySeries\(\)](#), [Highest\(\)](#) and [Lowest\(\)](#) functions. It can be any of the following values:

Constant	Value	Description
MODE_OPEN	0	Open price.
MODE_LOW	1	Low price.
MODE_HIGH	2	High price.
MODE_CLOSE	3	Close price.
MODE_VOLUME	4	Volume, used in Lowest() and Highest() functions.
MODE_TIME	5	Bar open time, used in ArrayCopySeries() function.

**Special constants**

Special constants used to indicate parameters and variables states. It can be one of the following values:

Constant	value	Description
NULL	0	Indicates empty state of the string.
EMPTY	-1	Indicates empty state of the parameter.
EMPTY_VALUE	0x7FFFFFFF	Default custom indicator empty value.
CLR_NONE	0xFFFFFFFF	Indicates empty state of colors.
WHOLE_ARRAY	0	Used with array functions. Indicates that all array elements will be processed.

**Time frame enumeration**

Time frame on the chart. It can be any of the following values:



Constant	Value	Description
PERIOD_M1	1	1 minute.
PERIOD_M5	5	5 minutes.
PERIOD_M15	15	15 minutes.
PERIOD_M30	30	30 minutes.
PERIOD_H1	60	1 hour.
PERIOD_H4	240	4 hour.
PERIOD_D1	1440	Daily.
PERIOD_W1	10080	Weekly.
PERIOD_MN1	43200	Monthly.
0 (zero)	0	Time frame used on the chart.

### Trade operation enumeration

Operation type for the [OrderSend\(\)](#) function. It can be any of the following values:

Constant	Value	Description
OP_BUY	0	Buying position.
OP_SELL	1	Selling position.
OP_BUYLIMIT	2	Buy limit pending position.
OP_SELLLIMIT	3	Sell limit pending position.
OP_BUYSTOP	4	Buy stop pending position.
OP_SELLSTOP	5	Sell stop pending position.

### Uninitialize reason codes

Uninitialize reason codes returned by [UninitializeReason\(\)](#) function. It can be any one of the following values:

Constant	Value	Description
REASON_REMOVE	1	Expert removed from chart.
REASON_RECOMPILE	2	Expert recompiled.
REASON_CHARTCHANGE	3	symbol or timeframe changed on the chart.
REASON_CHARTCLOSE	4	Chart closed.
REASON_PARAMETERS	5	Inputs parameters was changed by user.
REASON_ACCOUNT	6	Other account activated.

### Wingdings symbols

Wingdings font symbols used with Arrow objects.

32		33		34		35		36		37		38		39		40		41		42		43		44		45		46		47	
48		49		50		51		52		53		54		55		56		57		58		59		60		61		62		63	
64		65		66		67		68		69		70		71		72		73		74		75		76		77		78		79	
80		81		82		83		84		85		86		87		88		89		90		91		92		93		94		95	
96		97		98		99		100		101		102		103		104		105		106		107		108		109		110		111	
112		113		114		115		116		117		118		119		120		121		122		123		124		125		126		127	
128		129		130		131		132		133		134		135		136		137		138		139		140		141		142		143	
144		145		146		147		148		149		150		151		152		153		154		155		156		157		158		159	
160		161		162		163		164		165		166		167		168		169		170		171		172		173		174		175	
176		177		178		179		180		181		182		183		184		185		186		187		188		189		190		191	
192		193		194		195		196		197		198		199		200		201		202		203		204		205		206		207	
208		209		210		211		212		213		214		215		216		217		218		219		220		221		222		223	
224		225		226		227		228		229		230		231		232		233		234		235		236		237		238		239	
240		241		242		243		244		245		246		247		248		249		250		251		252		253		254		255	

## Web colors table

Black	DarkGreen	DarkSlateGray	Olive	Green	Teal	Navy	Purple
Maroon	Indigo	MidnightBlue	DarkBlue	DarkOliveGreen	SaddleBrown	ForestGreen	OliveDrab
SeaGreen	DarkGoldenrod	DarkSlateBlue	Sienna	MediumBlue	Brown	DarkTurquoise	DimGray
LightSeaGreen	DarkViolet	FireBrick	MediumVioletRed	MediumSeaGreen	Chocolate	Crimson	SteelBlue
Goldenrod	MediumSpringGreen	LawnGreen	CadetBlue	DarkOrchid	YellowGreen	LimeGreen	OrangeRed
DarkOrange	Orange	Gold	Yellow	Chartreuse	Lime	SpringGreen	Aqua
DeepSkyBlue	Blue	Magenta	Red	Gray	SlateGray	Peru	BlueViolet
LightSlateGray	DeepPink	MediumTurquoise	DodgerBlue	Turquoise	RoyalBlue	SlateBlue	DarkKhaki
IndianRed	MediumOrchid	GreenYellow	MediumAquaMarine	DarkSeaGreen	Tomato	RosyBrown	Orchid
MediumPurple	PaleVioletRed	Coral	CornflowerBlue	DarkGray	SandyBrown	MediumSlateBlue	Tan
DarkSalmon	BurlyWood	HotPink	Salmon	Violet	LightCoral	SkyBlue	LightSalmon
Plum	Khaki	LightGreen	Aquamarine	Silver	LightSkyBlue	LightSteelBlue	LightBlue
PaleGreen	Thistle	PowderBlue	PaleGoldenrod	PaleTurquoise	LightGray	Wheat	NavajoWhite
Moccasin	LightPink	Gainsboro	PeachPuff	Pink	Bisque	LightGoldenRod	BlanchedAlmond
LemonChiffon	Beige	AntiqueWhite	PapayaWhip	Cornsilk	LightYellow	LightCyan	Linen
Lavender	MistyRose	OldLace	WhiteSmoke	Seashell	Ivory	Honeydew	AliceBlue
LavenderBlush	MintCream	Snow	White				

## String functions

[StringConcatenate\(\)](#)  
[StringFind\(\)](#)  
[StringGetChar\(\)](#)  
[StringLen\(\)](#)  
[StringSetChar\(\)](#)  
[StringSubstr\(\)](#)  
[StringTrimLeft\(\)](#)  
[StringTrimRight\(\)](#)

**string** StringConcatenate(... )

Writes data to the string and returns it. Parameters can be of any type. Arrays cannot be passed to the StringConcatenate() function. Arrays should be printed elementwise. Data of double type printed with 4 decimal digits after point. To print with more precision use [DoubleToStr\(\)](#) function. Data of bool, datetime and color types will be printed as its numeric presentation. To print values of datetime type as string convert it by [TimeToStr\(\)](#) function. StringConcatenate() function work faster than concatenating strings by + operator.

**See also:** [Print\(\)](#), [Alert\(\)](#) and [Comment\(\)](#) functions.

### Parameters

... - Any values, separated by commas.

### Sample

```
string text;
text=StringConcatenate("Account free margin is ", AccountFreeMargin(), "Current
time is ", TimeToStr(CurTime()));
// slow text="Account free margin is " + AccountFreeMargin() + "Current time is " +
TimeToStr(CurTime())
Print(text);
```

**int** StringFind(**string** text, **string** matched\_text, **int** start=0)

Scans this string for the first match of a substring.

### Parameters

- text** - String to search for.
- matched\_text** - String to search for.
- start** - Starting index in the string.

### Sample

```
string text="The quick brown dog jumps over the lazy fox";
int index=StringFind(text, "dog jumps", 0);
if(index!=16)
    Print("oops!");
```

**int** StringGetChar(**string** text, **int** pos)

Returns character (code) from specified position in the string.

### Parameters

- text** - String where character will be retrieved.
- pos** - Char zero based position in the string.

### Sample

```
int char_code=StringGetChar("abcdefgh", 3);
// char code 'c' is 99
```

**int** StringLen(**string** text)

Returns character count of a string.

### Parameters

- text** - String to calculate length.

### Sample

```
string str="some text";
if(StringLen(str)<5) return(0);
```

**string** StringSetChar(**string** text, **int** pos, **int** value)

Returns string copy with changed character at the indicated position with new value.

### Parameters

- text** - String where character will be changed.
- pos** - Zero based character position in the string. Can be from 0 to StringLen()-1.
- value** - New char ASCII code.

### Sample

```
string str="abcdefgh";
string str1=StringSetChar(str, 3, 'D');
// str1 is "abcDefgh"
```

```
string StringSubstr(string text, int start, int count=EMPTY)
```

Extracts a substring from text string, starting at position (zero-based). The function returns a copy of the extracted substring if possible, otherwise returns empty string.

#### Parameters

- text** - String from substring will be extracted.
- start** - Substring starting index
- count** - Character count.

#### Sample

```
string text="The quick brown dog jumps over the lazy fox";
string substr=StringSubstr(text, 4, 5);
// subtracted string is "quick" word
```

```
string StringTrimLeft(string text)
```

Call the function to trim leading white space characters from the string. StringTrimLeft removes new line, space, and tab characters. The function returns a copy of the trimmed string if possible, otherwise returns empty string. Returns new string with changes.

#### Parameters

- text** - String to trim left.

#### Sample

```
string str1=" Hello world ";
string str2=StringTrimLeft(str);
// after trimming the str2 variable will be "Hello World "
```

```
string StringTrimRight(string text)
```

Call the function to trim leading white space characters from the string. StringTrimRight removes new line, space, and tab characters. The function returns a copy of the trimmed string if possible, otherwise return empty string.

#### Parameters

- text** - String to trim right.

#### Sample

```
string str1=" Hello world ";
string str2=StringTrimRight(str);
// after trimming the str2 variable will be " Hello World"
```

#### Technical Indicator calls

[Accelerator Oscillator - iAC\(\)](#)  
[Accumulation/Distribution - iAD\(\)](#)  
[Alligator - iAlligator\(\)](#)  
[Average Directional Movement Index - iADX\(\)](#)  
[Average True Range - iATR\(\)](#)  
[Awesome Oscillator - iAO\(\)](#)  
[Bears Power - iBearsPower\(\)](#)  
[Bollinger Bands - iBands\(\)](#)  
[Bollinger Bands on buffer - iBandsOnArray\(\)](#)  
[Bulls Power - iBullsPower\(\)](#)  
[Commodity Channel Index - iCCI\(\)](#)  
[Commodity Channel Index on buffer - iCCIOnArray\(\)](#)  
[Custom Indicator - iCustom\(\)](#)  
[DeMarker - iDeMarker\(\)](#)  
[Envelopes - iEnvelopes\(\)](#)  
[Envelopes on buffer - iEnvelopesOnArray\(\)](#)  
[Force Index - iForce\(\)](#)

[Fractals - iFractals\(\)](#)  
[Gator Oscillator - iGator\(\)](#)  
[Ichimoku Kinko Hyo - iIchimoku\(\)](#)  
[Market Facilitation Index \(Bill Williams\) - iBWMFI\(\)](#)  
[Momentum - iMomentum\(\)](#)  
[Momentum on buffer - iMomentumOnArray\(\)](#)  
[Money Flow Index - iMFI\(\)](#)  
[Moving Average - iMA\(\)](#)  
[Moving Average on buffer - iMAOnArray\(\)](#)  
[Moving Average of Oscillator - iOsMA\(\)](#)  
[Moving Averages Convergence/Divergence - iMACD\(\)](#)  
[On Balance Volume - iOBV\(\)](#)  
[Parabolic SAR - iSAR\(\)](#)  
[Relative Strength Index - iRSI\(\)](#)  
[Relative Strength Index on buffer - iRSIOnArray\(\)](#)  
[Relative Vigor Index - iRVI\(\)](#)  
[Standard Deviation - iStdDev\(\)](#)  
[Standard Deviation on buffer - iStdDevOnArray\(\)](#)  
[Stochastic Oscillator - iStochastic\(\)](#)  
[William's Percent Range - iWPR\(\)](#)  
[iBars\(\)](#)  
[iBarShift\(\)](#)  
[iClose\(\)](#)  
[iHigh\(\)](#)  
[iLow\(\)](#)  
[iOpen\(\)](#)  
[iTime\(\)](#)  
[iVolume\(\)](#)  
[Highest\(\)](#)  
[Lowest\(\)](#)

**double iAC(string symbol, int timeframe, int shift)**

Calculates the Bill Williams' Accelerator/Decelerator oscillator and returns its value.

#### Parameters

- symbol** - Symbol the data of which should be used to calculate indicator. NULL means the current symbol.
- timeframe** - Time frame. It can be any of [Time frame enumeration](#) values.
- shift** - Shift relative to the current bar (number of periods back), where the data should be taken from.

#### Sample

```
double result=iAC(NULL, 0, 1);
```

**double iAD(string symbol, int timeframe, int shift)**

Calculates the Accumulation/Distribution indicator and returns its value.

#### Parameters

- symbol** - Symbol the data of which should be used to calculate indicator. NULL means the current symbol.
- timeframe** - Time frame. It can be any of [Time frame enumeration](#) values.
- shift** - Shift relative to the current bar (number of periods back), where the data should be taken from.

#### Sample

```
double result=iAD(NULL, 0, 1);
```

**double iAlligator(string symbol, int timeframe, int jaw\_period, int jaw\_shift, int teeth\_period, int teeth\_shift, int lips\_period, int lips\_shift, int ma\_method, int applied\_price, int mode, int shift)**

Calculates the Bill Williams' Alligator and returns its value.

#### Parameters

- symbol** - Symbol the data of which should be used to calculate indicator. NULL means the current symbol.
- timeframe** - Time frame. It can be any of [Time frame enumeration](#) values.
- jaw\_period** - Jaw period.
- jaw\_shift** - Jaw line shift.
- teeth\_period** - Teeth period.
- teeth\_shift** - Teeth line shift.
- lips\_period** - Lips period.
- lips\_shift** - Lips line shift.
- ma\_method** - MA method. It can be any of [Moving Average method enumeration](#) value.
- applied\_price** - Applied price. It can be any of [Applied price enumeration](#) values.
- mode** - Source of data. It can be any of the following values:  
MODE\_GATORJAW - Gator Jaw (blue) balance line,  
MODE\_GATORTEETH - Gator Teeth (red) balance line,  
MODE\_GATORLIPS - Gator Lips (green) balance line.
- shift** - Shift relative to the current bar (number of periods back), where the data should be taken from.

#### Sample

```
double jaw_val=iAlligator(NULL, 0, 13, 8, 8, 5, 5, 3, MODE_SMMA, PRICE_MEDIAN,
MODE_GATORJAW, 1);
```

```
double iADX(string symbol, int timeframe, int period, int applied_price, int mode,
int shift)
```

Calculates the Movement directional index and returns its value.

#### Parameters

- symbol** - Symbol the data of which should be used to calculate indicator. NULL means the current symbol.
- timeframe** - Time frame. It can be any of [Time frame enumeration](#) values.
- period** - Number of periods for calculation.
- applied\_price** - Applied price. It can be any of [Applied price enumeration](#) values.
- mode** - Indicator line array index. It can be any of the [Indicators line identifiers enumeration](#) value.
- shift** - Shift relative to the current bar (number of periods back), where the data should be taken from.

#### Sample

```
if(iADX(NULL,0,14,PRICE_HIGH,MODE_MAIN,0)>iADX(NULL,0,14,PRICE_HIGH,MODE_PLUSDI,0))
return(0);
```

```
double iATR(string symbol, int timeframe, int period, int shift)
```

Calculates the Indicator of the average true range and returns its value.

#### Parameters

- symbol** - Symbol the data of which should be used to calculate indicator. NULL means the current symbol.
- timeframe** - Time frame. It can be any of [Time frame enumeration](#) values.
- period** - Number of periods for calculation.
- shift** - Shift relative to the current bar (number of periods back), where the data should be taken from.

#### Sample

```
if(iATR(NULL,0,12,0)>iATR(NULL,0,20,0)) return(0);
```

```
double iAO(string symbol, int timeframe, int shift)
```

Calculates the Bill Williams' Awesome oscillator and returns its value.

#### Parameters

- symbol** - Symbol the data of which should be used to calculate indicator. NULL means the current symbol.
- timeframe** - Time frame. It can be any of [Time frame enumeration](#) values.
- shift** - Shift relative to the current bar (number of periods back), where the data should be taken from.

#### Sample

```
double val=iAO(NULL, 0, 2);
```

```
double          string symbol, int timeframe, int period, int applied_price,
iBearsPower(    int shift)
```

Calculates the Bears Power indicator and returns its value.

### Parameters

- symbol** - Symbol the data of which should be used to calculate indicator. NULL means the current symbol.
- timeframe** - Time frame. It can be any of [Time frame enumeration](#) values.
- period** - Number of periods for calculation.
- applied\_price** - Applied price. It can be any of [Applied price enumeration](#) values.
- shift** - Shift relative to the current bar (number of periods back), where the data should be taken from.

### Sample

```
double val=iBearsPower(NULL, 0, 13,PRICE_CLOSE,0);
```

```
double          string symbol, int timeframe, int period, int deviation, int bands_shift,
iBands(         int applied_price, int mode, int shift)
```

Calculates the Bollinger bands indicator and returns its value.

### Parameters

- symbol** - Symbol the data of which should be used to calculate indicator. NULL means the current symbol.
- timeframe** - Time frame. It can be any of [Time frame enumeration](#) values.
- period** - Number of periods for calculation.
- deviation** - Deviation.
- bands\_shift** - Bands shift.
- applied\_price** - Applied price. It can be any of [Applied price enumeration](#) values.
- mode** - Indicator line array index. It can be any of the [Indicators line identifiers enumeration](#) value.
- shift** - Shift relative to the current bar (number of periods back), where the data should be taken from.

### Sample

```
if(iBands(NULL,0,20,2,0,PRICE_LOW,MODE_LOWER,0)>Low[0]) return(0);
```

```
double          double array[], int total, int period, double deviation,
iBandsOnArray(   int bands_shift, int mode, int shift)
```

Calculates the Bollinger bands indicator and returns its value.

### Parameters

- array[]** - Array with data.
- total** - The number of items to be counted.
- period** - Number of periods for calculation.
- deviation** - Deviation.
- bands\_shift** - Bands shift.
- mode** - Series array identifier. It can be any of the [Series array identifier enumeration](#) values.
- shift** - Shift relative to the current bar (number of periods back), where the data should be taken from.

### Sample

```
if(iBands(ExtBuffer,total,2,0,MODE_LOWER,0)>Low[0]) return(0);
```

```
double          string symbol, int timeframe, int period, int applied_price,
iBullsPower(     int shift)
```

Calculates the Bulls Power indicator and returns its value.

### Parameters

- symbol** - Symbol the data of which should be used to calculate indicator. NULL means the current symbol.
- timeframe** - Time frame. It can be any of [Time frame enumeration](#) values.
- period** - Number of periods for calculation.
- applied\_price** - Applied price. It can be any of [Applied price enumeration](#) values.
- shift** - Shift relative to the current bar (number of periods back), where the data should be taken from.

### Sample

```
double val=iBullsPower(NULL, 0, 13,PRICE_CLOSE,0);
```

```
double iCCI(string symbol, int timeframe, int period, int applied_price, int shift)
```

Calculates the Commodity channel index and returns its value.

#### Parameters

- symbol** - Symbol the data of which should be used to calculate indicator. NULL means the current symbol.
- timeframe** - Time frame. It can be any of [Time frame enumeration](#) values.
- period** - Number of periods for calculation.
- applied\_price** - Applied price. It can be any of [Applied price enumeration](#) values.
- shift** - Shift relative to the current bar (number of periods back), where the data should be taken from.

#### Sample

```
if(iCCI(NULL,0,12,0)>iCCI(NULL,0,20,0)) return(0);
```

```
double iCCIOnArray(double array[], int total, int period, int shift)
```

Calculates the Commodity channel index and returns its value.

#### Parameters

- array[]** - Array with data.
- total** - The number of items to be counted.
- period** - Number of periods for calculation.
- shift** - Shift relative to the current bar (number of periods back), where the data should be taken from.

#### Sample

```
if(iCCIOnArray(ExtBuffer,total,12,0)>iCCI(NULL,0,20,PRICE_OPEN, 0)) return(0);
```

```
double iCustom(string symbol, int timeframe, string name, ... , int mode, int shift)
```

Calculates the Custom indicator and returns its value.

#### Parameters

- symbol** - Symbol the data of which should be used to calculate indicator. NULL means current symbol.
- timeframe** - Time frame. It can be any of [Time frame enumeration](#) values.
- name** - Custom indicator compiled program name.
- ...** - Parameters set (if needed).
- mode** - Line index. Can be from 0 to 7.
- shift** - Shift relative to the current bar (number of periods back), where the data should be taken from.

#### Sample

```
double val=iCustom(NULL, 0, "SampleInd",13,1,0);
```

```
double iDeMarker(string symbol, int timeframe, int period, int shift)
```

Calculates the DeMarker indicator and returns its value.

#### Parameters

- symbol** - Symbol the data of which should be used to calculate indicator. NULL means the current symbol.
- timeframe** - Time frame. It can be any of [Time frame enumeration](#) values.
- period** - Number of periods for calculation.
- shift** - Shift relative to the current bar (number of periods back), where the data should be taken from.

#### Sample

```
double val=iDeMarker(NULL, 0, 13, 1);
```

```
double iEnvelopes(string symbol, int timeframe, int ma_period, int ma_method,  
int ma_shift, int applied_price, double deviation, int mode, int shift)
```

Calculates the Envelopes indicator and returns its value.

#### Parameters



- symbol** - Symbol the data of which should be used to calculate indicator. NULL means the current symbol.
- timeframe** - Time frame. It can be any of [Time frame enumeration](#) values.
- ma\_period** - Number of periods for calculation.
- ma\_method** - MA method. It can be any of [Moving Average method enumeration](#) value.
- ma\_shift** - MA shift. Indicator line offset relate to the chart by timeframe.
- applied\_price** - Applied price. It can be any of [Applied price enumeration](#) values.
- deviation** - Deviation.
- mode** - Indicator line array index. It can be any of [Indicators line identifiers enumeration](#) value.
- shift** - Shift relative to the current bar (number of periods back), where the data should be taken from.

### Sample

```
double val=iEnvelopes(NULL, 0, 13,MODE_SMA,10,PRICE_CLOSE,0.2,MODE_UPPER,0);
```

```
double iEnvelopesOnArray(double array[], int total, int ma_period, int ma_method,
int ma_shift, double deviation, int mode, int shift)
```

Calculates the Envelopes indicator counted on buffer and returns its value.

### Parameters

- array[]** - Array with data.
- total** - The number of items to be counted.
- ma\_period** - Number of periods for calculation.
- ma\_method** - MA method. It can be any of [Moving Average method enumeration](#) value.
- ma\_shift** - MA shift. Indicator line offset relate to the chart by timeframe.
- deviation** - Deviation.
- mode** - Indicator line array index. It can be any of [Indicators line identifiers enumeration](#) value.
- shift** - Shift relative to the current bar (number of periods back), where the data should be taken from.

### Sample

```
double val=iEnvelopesOnArray(ExtBuffer, 0, 13, MODE_SMA, 0.2, MODE_UPPER,0 );
```

```
double iForce(string symbol, int timeframe, int period, int ma_method,
int applied_price, int shift)
```

Calculates the Force index and returns its value.

### Parameters

- symbol** - Symbol the data of which should be used to calculate indicator. NULL means current symbol.
- timeframe** - Time frame. It can be any of [Time frame enumeration](#) values.
- period** - Number of periods for calculation.
- ma\_method** - MA method. It can be any of [Moving Average method enumeration](#) value.
- applied\_price** - Applied price. It can be any of [Applied price enumeration](#) values.
- shift** - Shift relative to the current bar (number of periods back), where the data should be taken from.

### Sample

```
double val=iForce(NULL, 0, 13,MODE_SMA,PRICE_CLOSE,0);
```

```
double iFractals(string symbol, int timeframe, int mode, int shift)
```

Calculates the Fractals and returns its value.

### Parameters

- symbol** - Symbol the data of which should be used to calculate indicator. NULL means the current symbol.
- timeframe** - Time frame. It can be any of [Time frame enumeration](#) values.
- mode** - Indicator line array index. It can be any of the [Indicators line identifiers enumeration](#) value.
- shift** - Shift relative to the current bar (number of periods back), where the data should be taken from.

### Sample

```
double val=iFractals(NULL, 0, MODE_UPPER,0);
```

```
double iGator(string symbol, int timeframe, int jaw_period, int jaw_shift,
int teeth_period, int teeth_shift, int lips_period, int lips_shift,
int ma_method, int applied_price, int mode, int shift)
```

Calculates the Gator Oscillator and returns its value.

### Parameters

- symbol** - Symbol the data of which should be used to calculate indicator. NULL means the current symbol.
- timeframe** - Time frame. It can be any of [Time frame enumeration](#) values.
- jaw\_period** - Jaw period.
- jaw\_shift** - Jaw line shift.
- teeth\_period** - Teeth period.
- teeth\_shift** - Teeth line shift.
- lips\_period** - Lips period.
- lips\_shift** - Lips line shift.
- ma\_method** - MA method. It can be any of [Moving Average method enumeration](#) value.
- applied\_price** - Applied price. It can be any of [Applied price enumeration](#) values.
- mode** - Indicator line array index. It can be any of [Indicators line identifiers enumeration](#) value.
- shift** - Shift relative to the current bar (number of periods back), where the data should be taken from.

### Sample

```
double jaw_val=iGator(NULL, 0, 13, 8, 8, 5, 5, 3, MODE_SMMA, PRICE_MEDIAN,
MODE_UPPER, 1);
```

```
double iIchimoku(string symbol, int timeframe, int tenkan_sen, int kijun_sen,
int senkou_span_b, int mode, int shift)
```

Calculates the Ichimoku Kinko Hyo and returns its value.

### Parameters

- symbol** - Symbol the data of which should be used to calculate indicator. NULL means the current symbol.
- timeframe** - Time frame. It can be any of [Time frame enumeration](#) values.
- tenkan\_sen** - Tenkan Sen.
- kijun\_sen** - Kijun Sen.
- senkou\_span\_b** - Senkou SpanB.
- mode** - Source of data. It can be one of the [Ichimoku Kinko Hyo mode enumeration](#).
- shift** - Shift relative to the current bar (number of periods back), where the data should be taken from.

### Sample

```
double tenkan_sen=iIchimoku(NULL, 0, 9, 26, 52, MODE_TENKANSEN, 1);
```

```
double iBWMFI(string symbol, int timeframe, int shift)
```

Calculates the Bill Williams Market Facilitation index and returns its value.

### Parameters

- symbol** - Symbol the data of which should be used to calculate indicator. NULL means the current symbol.
- timeframe** - Time frame. It can be any of [Time frame enumeration](#) values.
- shift** - Shift relative to the current bar (number of periods back), where the data should be taken from.

### Sample

```
double val=iBWMFI(NULL, 0, 0);
```

```
double iMomentum(string symbol, int timeframe, int period, int applied_price,
int shift)
```

Calculates the Momentum indicator and returns its value.

### Parameters

- symbol** - Symbol the data of which should be used to calculate indicator. NULL means the current symbol.
- timeframe** - Time frame. It can be any of [Time frame enumeration](#) values.
- period** - Number of periods for calculation.
- applied\_price** - Applied price. It can be any of [Applied price enumeration](#) values.
- shift** - Shift relative to the current bar (number of periods back), where the data should be taken from.

### Sample

```
if (iMomentum(NULL, 0, 12, PRICE_CLOSE, 0) > iMomentum(NULL, 0, 20, PRICE_CLOSE, 0))
```

```
return(0);
```

```
double iMomentumOnArray(double array[], int total, int period, int shift)
```

Calculates the Momentum indicator counted on buffer and returns its value.

#### Parameters

- array[]** - Array with data.
- total** - The number of items to be counted.
- period** - Number of periods for calculation.
- shift** - Shift relative to the current bar (number of periods back), where the data should be taken from.

#### Sample

```
if(iMomentumOnArray(mybuffer,100,12,0)>iMomentumOnArray(mubuffer,100,20,0))  
return(0);
```

```
double iMFI(string symbol, int timeframe, int period, int shift)
```

Calculates the Money flow index and returns its value.

#### Parameters

- symbol** - Symbol the data of which should be used to calculate indicator. NULL means the current symbol.
- timeframe** - Time frame. It can be any of [Time frame enumeration](#) values.
- period** - Number of periods for calculation.
- shift** - Shift relative to the current bar (number of periods back), where the data should be taken from.

#### Sample

```
if(iMFI(NULL,0,14,0)>iMFI(NULL,0,14,1)) return(0);
```

```
double string symbol, int timeframe, int period, int ma_shift, int ma_method,  
iMA(int applied_price, int shift)
```

Calculates the Moving average indicator and returns its value.

#### Parameters

- symbol** - Symbol the data of which should be used to calculate indicator. NULL means the current symbol.
- timeframe** - Time frame. It can be any of [Time frame enumeration](#) values.
- period** - Number of periods for calculation.
- ma\_shift** - MA shift. Indicators line offset relate to the chart by timeframe.
- ma\_method** - MA method. It can be any of the [Moving Average method enumeration](#) value.
- applied\_price** - Applied price. It can be any of [Applied price enumeration](#) values.
- shift** - Shift relative to the current bar (number of periods back), where the data should be taken from.

#### Sample

```
AlligatorJawsBuffer[i]=iMA(NULL,0,13,8,MODE_SMMA,PRICE_MEDIAN,i);
```

```
double double array[], int total, int period, int ma_shift, int ma_method,  
iMAOnArray(int shift)
```

Calculates the Moving average counted on buffer and returns its value.

#### Parameters

- array[]** - Array with data.
- total** - The number of items to be counted. 0 means whole array.
- period** - Number of periods for calculation.
- ma\_shift** - MA shift
- ma\_method** - MA method. It can be any of the [Moving Average method enumeration](#) value.
- shift** - Shift relative to the current bar (number of periods back), where the data should be taken from.

#### Sample

```
double macurrent=iMAOnArray(ExtBuffer,0,5,0,MODE_LWMA,0);  
double macurrentslow=iMAOnArray(ExtBuffer,0,10,0,MODE_LWMA,0);
```

```
double maprev=iMAOnArray(ExtBuffer,0,5,0,MODE_LWMA,1);
double maprevslow=iMAOnArray(ExtBuffer,0,10,0,MODE_LWMA,1);
//----
if(maprev<maprevslow && macurrent>=macurrentslow)
    Alert("crossing up");
```

```
double      string symbol, int timeframe, int fast_ema_period, int slow_ema_period,
iOsMA(      int signal_period, int applied_price, int shift)
```

Calculates the Moving Average of Oscillator and returns its value.

#### Parameters

- |                        |  |
|------------------------|--|
| <b>symbol</b>          | - Symbol the data of which should be used to calculate indicator. NULL means the current symbol.   |
| <b>timeframe</b>       | - Time frame. It can be any of <a href="#">Time frame enumeration</a> values.                      |
| <b>fast_ema_period</b> | - Number of periods for fast moving average calculation.   |
| <b>slow_ema_period</b> | - Number of periods for slow moving average calculation.   |
| <b>signal_period</b>   | - Number of periods for signal moving average calculation.   |
| <b>applied_price</b>   | - Applied price. It can be any of <a href="#">Applied price enumeration</a> values.                |
| <b>shift</b>           | - Shift relative to the current bar (number of periods back), where the data should be taken from. |

#### Sample

```
if(iOsMA(NULL,0,12,26,9,PRICE_OPEN,1)>iOsMA(NULL,0,12,26,9,PRICE_OPEN,0))
return(0);
```

```
double      string symbol, int timeframe, int fast_ema_period, int slow_ema_period,
iMACD(      int signal_period, int applied_price, int mode, int shift)
```

Calculates the Moving averages convergence/divergence and returns its value.

#### Parameters

- |                        |   |
|------------------------|---|
| <b>symbol</b>          | - Symbol the data of which should be used to calculate indicator. NULL means the current symbol.                  |
| <b>timeframe</b>       | - Time frame. It can be any of <a href="#">Time frame enumeration</a> values.                                     |
| <b>fast_ema_period</b> | - Number of periods for fast moving average calculation.  |
| <b>slow_ema_period</b> | - Number of periods for slow moving average calculation.  |
| <b>signal_period</b>   | - Number of periods for signal moving average calculation.  |
| <b>applied_price</b>   | - Applied price. It can be any of <a href="#">Applied price enumeration</a> values.                               |
| <b>mode</b>            | - Indicator line array index. It can be any of the <a href="#">Indicators line identifiers enumeration</a> value. |
| <b>shift</b>           | - Shift relative to the current bar (number of periods back), where the data should be taken from.                |

#### Sample

```
if(iMACD(NULL,0,12,26,9,PRICE_CLOSE,MODE_MAIN,0)>iMACD(NULL,0,12,26,9,PRICE_CLOSE,MODE_SIGNAL,0)) return(0);
```

```
double iOBV(string symbol, int timeframe, int applied_price, int shift)
```

Calculates the On Balance Volume indicator and returns its value.

#### Parameters

- |                      |  |
|----------------------|--|
| <b>symbol</b>        | - Symbol the data of which should be used to calculate indicator. NULL means the current symbol.   |
| <b>timeframe</b>     | - Time frame. It can be any of <a href="#">Time frame enumeration</a> values.                      |
| <b>applied_price</b> | - Applied price. It can be any of <a href="#">Applied price enumeration</a> values.                |
| <b>shift</b>         | - Shift relative to the current bar (number of periods back), where the data should be taken from. |

#### Sample

```
double val=iOBV(NULL, 0, PRICE_CLOSE, 1);
```

```
double iSAR(string symbol, int timeframe, double step, double maximum, int shift)
```

Calculates the Parabolic Sell and Reverse system and returns its value.

#### Parameters

- symbol** - Symbol the data of which should be used to calculate indicator. NULL means the current symbol.
- timeframe** - Time frame. It can be any of [Time frame enumeration](#) values.
- step** - Increment, usually 0.02.
- maximum** - Maximum value, usually 0.2.
- shift** - Shift relative to the current bar (number of periods back), where the data should be taken from.

#### Sample

```
if (iSAR(NULL, 0, 0.02, 0.2, 0) > Close[0]) return(0);
```

**double iRSI(string symbol, void timeframe, int period, int applied\_price, int shift)**

Calculates the Relative strength index and returns its value.

#### Parameters

- symbol** - Symbol the data of which should be used to calculate indicator. NULL means the current symbol.
- timeframe** - Time frame. It can be any of [Time frame enumeration](#) values.
- period** - Number of periods for calculation.
- applied\_price** - Applied price. It can be any of [Applied price enumeration](#) values.
- shift** - Shift relative to the current bar (number of periods back), where the data should be taken from.

#### Sample

```
if (iRSI(NULL, 0, 14, PRICE_CLOSE, 0) > iRSI(NULL, 0, 14, PRICE_CLOSE, 1)) return(0);
```

**double iRSIOnArray(double array[], int total, int period, int shift)**

Calculates the Relative strength index counted on buffer and returns its value.

#### Parameters

- array[]** - Array with data.
- total** - The number of items to be counted.
- period** - Number of periods for calculation.
- shift** - Shift relative to the current bar (number of periods back), where the data should be taken from.

#### Sample

```
if (iRSIOnBuffer(ExtBuffer, 1000, 14, 0) > iRSI(NULL, 0, 14, PRICE_CLOSE, 1)) return(0);
```

**double iRVI(string symbol, int timeframe, int period, int mode, int shift)**

Calculates the Relative Vigor index and returns its value.

#### Parameters

- symbol** - Symbol the data of which should be used to calculate indicator. NULL means the current symbol.
- timeframe** - Time frame. It can be any of [Time frame enumeration](#) values.
- period** - Number of periods for calculation.
- mode** - Indicator line array index. It can be any of [Indicators line identifiers enumeration](#) value.
- shift** - Shift relative to the current bar (number of periods back), where the data should be taken from.

#### Sample

```
double val=iRVI(NULL, 0, 10, MODE_MAIN, 0);
```

**double iStdDev(string symbol, int timeframe, int ma\_period, int ma\_method, int ma\_shift, int applied\_price, int shift)**

Calculates the Standard Deviation indicator and returns its value.

#### Parameters

- symbol** - Symbol the data of which should be used to calculate indicator. NULL means the current symbol.
- timeframe** - Time frame. It can be any of [Time frame enumeration](#) values.
- ma\_period** - MA period.
- ma\_method** - MA method. It can be any of [Moving Average method enumeration](#) value.
- ma\_shift** - MA shift.
- applied\_price** - Applied price. It can be any of [Applied price enumeration](#) values.
- shift** - Shift relative to the current bar (number of periods back), where the data should be taken from.

#### Sample

```
double val=iStdDev(NULL,0,10,MODE_EMA,0,PRICE_CLOSE,0);
```

```
double iStdDevOnArray(double array[], int total, int ma_period, int ma_method,
int ma_shift, int shift)
```

Calculates the Standard Deviation counted on buffer and returns its value.

#### Parameters

- array[]** - Array with data.
- total** - The number of items to be counted.
- ma\_period** - MA period.
- ma\_method** - MA method. It can be any of [Moving Average method enumeration](#) value.
- ma\_shift** - iMA shift.
- shift** - Shift relative to the current bar (number of periods back), where the data should be taken from.

#### Sample

```
double val=iStdDevOnArray(ExtBuffer,100,10,MODE_EMA,0,0);
```

```
double iStochastic(string symbol, int timeframe, int %Kperiod, int %Dperiod, int slowing,
int method, int price_field, int mode, int shift)
```

Calculates the Stochastic oscillator and returns its value.

#### Parameters

- symbol** - Symbol the data of which should be used to calculate indicator. NULL means the current symbol.
- timeframe** - Time frame. It can be any of [Time frame enumeration](#) values.
- %Kperiod** - %K line period.
- %Dperiod** - %D line period.
- slowing** - Slowing value.
- method** - MA method. It can be any of [Moving Average method enumeration](#) value.
- price\_field** - Price field parameter. Can be one of this values: 0 - Low/High or 1 - Close/Close.
- mode** - Indicator line array index. It can be any of the [Indicators line identifiers enumeration](#) value.
- shift** - Shift relative to the current bar (number of periods back), where the data should be taken from.

#### Sample

```
if(iStochastic(NULL,0,5,3,3,MODE_SMA,0,MODE_MAIN,0)>iStochastic(NULL,0,5,3,3,MODE_S
MA,0,MODE_SIGNAL,0))
return(0);
```

```
double iWPR(string symbol, int timeframe, int period, int shift)
```

Calculates the Larry William's percent range indicator and returns its value.

#### Parameters

- symbol** - Symbol the data of which should be used to calculate indicator. NULL means the current symbol.
- timeframe** - Time frame. It can be any of [Time frame enumeration](#) values.
- period** - Number of periods for calculation.
- shift** - Shift relative to the current bar (number of periods back), where the data should be taken from.

#### Sample

```
if(iWPR(NULL,0,14,0)>iWPR(NULL,0,14,1)) return(0);
```

```
int iBars(string symbol, int timeframe)
```

Returns the number of bars on the specified chart.

### Parameters

- symbol** - Symbol the data of which should be used to calculate indicator. NULL means the current symbol.
- timeframe** - Time frame. It can be any of [Time frame enumeration](#) values.

### Sample

```
Print("Bar count on the 'EUROUSD' symbol with PERIOD_H1  
is", iBars("EUROUSD", PERIOD_H1));
```

```
int iBarShift(string symbol, int timeframe, datetime time, bool exact=false)
```

Search for bar by open time. The function returns bar shift with the open time specified. If the bar having the specified open time is absent the function will return, depending on the *exact* parameter, -1 or the nearest bar shift.

### Parameters

- symbol** - Symbol the data of which should be used to calculate indicator. NULL means the current symbol.
- timeframe** - Time frame. It can be any of [Time frame enumeration](#) values.
- time** - value to find (bar's open time).
- exact** - Return mode when bar not found. false - iBarShift returns nearest. true - iBarShift returns -1.

### Sample

```
datetime some_time=D'2004.03.21 12:00';  
int shift=iBarShift("EUROUSD", PERIOD_M1, some_time);  
Print("shift of bar with open time ", TimeToStr(some_time), " is ", shift);
```

```
double iClose(string symbol, int timeframe, int shift)
```

Returns **Close** value for the bar of indicated *symbol* with *timeframe* and *shift*. If local history is empty (not loaded), function returns 0.

### Parameters

- symbol** - Symbol the data of which should be used to calculate indicator. NULL means the current symbol.
- timeframe** - Time frame. It can be any of [Time frame enumeration](#) values.
- shift** - Shift relative to the current bar (number of periods back), where the data should be taken from.

### Sample

```
Print("Current bar for USDCHF H1: ", iTime("USDCHF", PERIOD_H1, i), ", ",  
iOpen("USDCHF", PERIOD_H1, i), ", ",  
iHigh("USDCHF", PERIOD_H1, i), ", ",  
iLow("USDCHF", PERIOD_H1, i), ", ",  
iClose("USDCHF", PERIOD_H1, i), ", ",  
iVolume("USDCHF", PERIOD_H1, i));
```

```
double iHigh(string symbol, int timeframe, int shift)
```

Returns **High** value for the bar of indicated *symbol* with *timeframe* and *shift*. If local history is empty (not loaded), function returns 0.

### Parameters

- symbol** - Symbol on that data need to calculate indicator. NULL means current symbol.
- timeframe** - Time frame. It can be any of [Time frame enumeration](#) values.
- shift** - Shift relative to the current bar (number of periods back), where the data should be taken from.

### Sample

```
Print("Current bar for USDCHF H1: ", iTime("USDCHF", PERIOD_H1, i), ", ",  
iOpen("USDCHF", PERIOD_H1, i), ", ",  
iHigh("USDCHF", PERIOD_H1, i), ", ",  
iLow("USDCHF", PERIOD_H1, i), ", ",  
iClose("USDCHF", PERIOD_H1, i), ", ",  
iVolume("USDCHF", PERIOD_H1, i));
```

**double** iLow(**string** symbol, **int** timeframe, **int** shift)

Returns **Low** value for the bar of indicated *symbol* with *timeframe* and *shift*. If local history is empty (not loaded), function returns 0.

#### Parameters

- symbol** - Symbol the data of which should be used to calculate indicator. NULL means the current symbol.
- timeframe** - Time frame. It can be any of [Time frame enumeration](#) values.
- shift** - Shift relative to the current bar (number of periods back), where the data should be taken from.

#### Sample

```
Print("Current bar for USDCHF H1: ", iTime("USDCHF", PERIOD_H1, i), ", ",  
iOpen("USDCHF", PERIOD_H1, i), ", ",  
iHigh("USDCHF", PERIOD_H1, i), ", ",  
iLow("USDCHF", PERIOD_H1, i), ", ",  
iClose("USDCHF", PERIOD_H1, i), ", ",  
iVolume("USDCHF", PERIOD_H1, i));
```

**double** iOpen(**string** symbol, **int** timeframe, **int** shift)

Returns **Open** value for the bar of indicated *symbol* with *timeframe* and *shift*. If local history is empty (not loaded), function returns 0.

#### Parameters

- symbol** - Symbol the data of which should be used to calculate indicator. NULL means the current symbol.
- timeframe** - Time frame. It can be any of [Time frame enumeration](#) values.
- shift** - Shift relative to the current bar (number of periods back), where the data should be taken from.

#### Sample

```
Print("Current bar for USDCHF H1: ", iTime("USDCHF", PERIOD_H1, i), ", ",  
iOpen("USDCHF", PERIOD_H1, i), ", ",  
iHigh("USDCHF", PERIOD_H1, i), ", ",  
iLow("USDCHF", PERIOD_H1, i), ", ",  
iClose("USDCHF", PERIOD_H1, i), ", ",  
iVolume("USDCHF", PERIOD_H1, i));
```

**datetime** iTime(**string** symbol, **int** timeframe, **int** shift)

Returns **Time** value for the bar of indicated *symbol* with *timeframe* and *shift*. If local history is empty (not loaded), function returns 0.

#### Parameters

- symbol** - Symbol the data of which should be used to calculate indicator. NULL means the current symbol.
- timeframe** - Time frame. It can be any of [Time frame enumeration](#) values.
- shift** - Shift relative to the current bar (number of periods back), where the data should be taken from.

#### Sample

```
Print("Current bar for USDCHF H1: ", iTime("USDCHF", PERIOD_H1, i), ", ",  
iOpen("USDCHF", PERIOD_H1, i), ", ",  
iHigh("USDCHF", PERIOD_H1, i), ", ",  
iLow("USDCHF", PERIOD_H1, i), ", ",  
iClose("USDCHF", PERIOD_H1, i), ", ",  
iVolume("USDCHF", PERIOD_H1, i));
```

**double** iVolume(**string** symbol, **int** timeframe, **int** shift)

Returns **Volume** value for the bar of indicated *symbol* with *timeframe* and *shift*. If local history is empty (not loaded), function returns 0.

#### Parameters

- symbol** - Symbol the data of which should be used to calculate indicator. NULL means the current symbol.
- timeframe** - Time frame. It can be any of [Time frame enumeration](#) values.
- shift** - Shift relative to the current bar (number of periods back), where the data should be taken from.



### Sample

```
Print("Current bar for USDCHF H1: ", iTime("USDCHF", PERIOD_H1, i), ", ",  
iOpen("USDCHF", PERIOD_H1, i), ", ",  
iHigh("USDCHF", PERIOD_H1, i), ", ",  
iLow("USDCHF", PERIOD_H1, i), ", ",  
iClose("USDCHF", PERIOD_H1, i), ", ",  
iVolume("USDCHF", PERIOD_H1, i));
```

**int Highest(string symbol, int timeframe, int type, int count=WHOLE\_ARRAY, int start=0)**

Returns the shift of the maximum value over a specific number of periods depending on type.

### Parameters

- symbol** - Symbol the data of which should be used to calculate indicator. NULL means the current symbol.
- timeframe** - Time frame. It can be any of [Time frame enumeration](#) values.
- type** - Series array identifier. It can be any of the [Series array identifier enumeration](#) values.
- count** - Number of periods (in direction from the start bar to the back one) on which the calculation is carried out.
- start** - Shift showing the bar, relative to the current bar, that the data should be taken from.

### Sample

```
double val;  
// calculating the highest value in the range from 5 element to 25 element  
// indicator charts symbol and indicator charts time frame  
val=High[Highest(NULL, 0, MODE_HIGH, 20, 4)];
```

**int Lowest(string symbol, int timeframe, int type, int count=WHOLE\_ARRAY, int start=0)**

Returns the shift of the least value over a specific number of periods depending on type.

### Parameters

- symbol** - Symbol the data of which should be used to calculate indicator. NULL means the current symbol.
- timeframe** - Time frame. It can be any of [Time frame enumeration](#) values.
- type** - Series array identifier. It can be any of the [Series array identifier enumeration](#) values.
- count** - Number of periods (in direction from the start bar to the back one) on which the calculation is carried out.
- start** - Shift showing the bar, relative to the current bar, that the data should be taken from.

### Sample

```
double val=Low[Lowest(NULL, 0, MODE_LOW, 10, 10)];
```

## Trading functions

[HistoryTotal\(\)](#)  
[OrderClose\(\)](#)  
[OrderCloseBy\(\)](#)  
[OrderClosePrice\(\)](#)  
[OrderCloseTime\(\)](#)  
[OrderComment\(\)](#)  
[OrderCommission\(\)](#)  
[OrderDelete\(\)](#)  
[OrderExpiration\(\)](#)  
[OrderLots\(\)](#)  
[OrderMagicNumber\(\)](#)  
[OrderModify\(\)](#)  
[OrderOpenPrice\(\)](#)  
[OrderOpenTime\(\)](#)  
[OrderPrint\(\)](#)  
[OrderProfit\(\)](#)  
[OrderSelect\(\)](#)  
[OrderSend\(\)](#)  
[OrderStopLoss\(\)](#)

[OrdersTotal\(\)](#)  
[OrderSwap\(\)](#)  
[OrderSymbol\(\)](#)  
[OrderTakeProfit\(\)](#)  
[OrderTicket\(\)](#)  
[OrderType\(\)](#)

#### **int HistoryTotal()**

Returns the number of closed orders in the account history loaded into the terminal. To get the detailed error information, call [GetLastError\(\)](#) function.

##### **Sample**

```
// retrieving info from trade history
int i,hstTotal=HistoryTotal();
for(i=0;i<hstTotal;i++)
{
    //---- check selection result
    if(OrderSelect(i,SELECT_BY_POS,MODE_HISTORY)==false)
    {
        Print("Access to history failed with error (",GetLastError(),")");
        break;
    }
    // some work with order
}
```

**bool OrderClose(int ticket, double lots, double price, int slippage, color Color=CLR\_NONE)**

Closes opened order. If the function succeeds, the return value is true. If the function fails, the return value is false. To get the detailed error information, call [GetLastError\(\)](#).

##### **Parameters**

- ticket** - Unique number of the order ticket.
- lots** - Number of lots.
- price** - Preferred closing price.
- slippage** - Value of the maximum price slippage in points.
- Color** - Color of the closing arrow on the chart.If the parameter is absent or has CLR\_NONE value closing arrow will not be drawn on the chart.

##### **Sample**

```
if(iRSI(NULL,0,14,PRICE_CLOSE,0)>75)
{
    OrderClose(order_id,1,Ask,3,Red);
    return(0);
}
```

**bool OrderCloseBy(int ticket, int opposite, color Color=CLR\_NONE)**

Closes opened order by another opposite opened order. If the function succeeds, the return value is true. If the function fails, the return value is false. To get the detailed error information, call [GetLastError\(\)](#).

##### **Parameters**

- ticket** - Unique number of the order ticket.
- opposite** - Unique number of the opposite order ticket.
- Color** - Color of the closing arrow on the chart.If the parameter is absent or has CLR\_NONE value closing arrow will not be drawn on the chart.

##### **Sample**

```
if(iRSI(NULL,0,14,PRICE_CLOSE,0)>75)
{
```

```
OrderCloseBy(order_id,opposite_id);
return(0);
}
```

#### **double** OrderClosePrice()

Returns close price for the currently selected order.

**Note:** Order must be selected by [OrderSelect\(\)](#) function.

##### **Sample**

```
if(OrderSelect(ticket,SELECT_BY_POS)==true)
    Print("Close price for the order ",ticket," = ",OrderClosePrice());
else
    Print("OrderSelect failed error code is",GetLastError());
```

#### **datetime** OrderCloseTime()

Returns close time for the currently selected order. If order close time is not 0 then the order selected and has been closed and retrieved from the account history.

**Note:** Order must be selected by [OrderSelect\(\)](#) function.

##### **Sample**

```
if(OrderSelect(10,SELECT_BY_POS,MODE_HISTORY)==true)
{
    datetime ctm=OrderOpenTime();
    if(ctm>0) Print("Open time for the order 10 ", ctm);
    ctm=OrderCloseTime();
    if(ctm>0) Print("Close time for the order 10 ", ctm);
}
else
    Print("OrderSelect failed error code is",GetLastError());
```

#### **string** OrderComment()

Returns comment for the selected order.

**Note:** Order must be selected by [OrderSelect\(\)](#) function.

##### **Sample**

```
string comment;
if(OrderSelect(10,SELECT_BY_TICKET)==false)
{
    Print("OrderSelect failed error code is",GetLastError());
    return(0);
}
comment = OrderComment();
// ...
```

#### **double** OrderCommission()

Returns calculated commission for the currently selected order.

**Note:** Order must be selected by [OrderSelect\(\)](#) function.

##### **Sample**

```
if(OrderSelect(10,SELECT_BY_POS)==true)
    Print("Commission for the order 10 ",OrderCommission());
else
    Print("OrderSelect failed error code is",GetLastError());
```

### **bool** OrderDelete(**int** ticket)

Deletes previously opened pending order. If the function succeeds, the return value is true. If the function fails, the return value is false. To get the detailed error information, call [GetLastError\(\)](#).

#### **Parameters**

**ticket** - Unique number of the order ticket.

#### **Sample**

```
if (Ask>var1)
{
    OrderDelete(order_ticket);
    return(0);
}
```

### **datetime** OrderExpiration()

Returns expiration date for the selected pending order.

**Note:** Order must be selected by [OrderSelect\(\)](#) function.

#### **Sample**

```
if (OrderSelect(10, SELECT_BY_TICKET)==true)
    Print("Order expiration for the order #10 is ",OrderExpiration());
else
    Print("OrderSelect failed error code is",GetLastError());
```

### **double** OrderLots()

Returns lots value for the selected order.

**Note:** Order must be selected by [OrderSelect\(\)](#) function.

#### **Sample**

```
if (OrderSelect(10,SELECT_BY_POS)==true)
    Print("lots for the order 10 ",OrderLots());
else
    Print("OrderSelect failed error code is",GetLastError());
```

### **int** OrderMagicNumber()

Returns magic number for the currently selected order.

**Note:** Order must be selected by [OrderSelect\(\)](#) function.

#### **Sample**

```
if (OrderSelect(10,SELECT_BY_POS)==true)
    Print("Magic number for the order 10 ", OrderMagicNumber());
else
    Print("OrderSelect failed error code is",GetLastError());
```

### **bool** OrderModify(**int** ticket, **double** price, **double** stoploss, **double** takeprofit, **datetime** expiration, **color** arrow\_color=CLR\_NONE)

Modification of characteristics for the previously opened position or a pending order. If the function succeeds, the return value is true. If the function fails, the return value is false. To get the detailed error information, call [GetLastError\(\)](#).

#### **Parameters**

- ticket** - Unique number of the order ticket.
- price** - New price (for pending orders only).
- stoploss** - New stoploss level.
- takeprofit** - New profit-taking level.
- expiration** - Order expiration server date/time (for pending orders only).
- arrow\_color** - Arrow color of the pictogram on the chart.If the parameter is absent or has CLR\_NONE value arrow will not be drawn on the chart.

### Sample

```
if(TrailingStop>0)
{
    SelectOrder(12345,SELECT_BY_TICKET);
    if(Bid-OrderOpenPrice()>Point*TrailingStop)
    {
        if(OrderStopLoss()<Bid-Point*TrailingStop)
        {
            OrderModify(OrderTicket(),Ask-10*Point,Ask-
35*Point,OrderTakeProfit(),0,Blue);
            return(0);
        }
    }
}
```

### **double** OrderOpenPrice()

Returns open price for the currently selected order.

**Note:** Order must be selected by [OrderSelect\(\)](#) function.

### Sample

```
if(OrderSelect(10, SELECT_BY_POS)==true)
    Print("open price for the order 10 ",OrderOpenPrice());
else
    Print("OrderSelect failed error code is",GetLastError());
```

### **datetime** OrderOpenTime()

Returns open time for the currently selected order.

**Note:** Order must be selected by [OrderSelect\(\)](#) function.

### Sample

```
if(OrderSelect(10, SELECT_BY_POS)==true)
    Print("open time for the order 10 ",OrderOpenTime());
else
    Print("OrderSelect failed error code is",GetLastError());
```

### **void** OrderPrint()

Prints selected order data to the log for the selected order.

**Note:** Order must be selected by [OrderSelect\(\)](#) function.

### Sample

```
if(OrderSelect(10, SELECT_BY_TICKET)==true)
    OrderPrint();
else
    Print("OrderSelect failed error code is",GetLastError());
```

### **double** OrderProfit()

Returns profit for the currently selected order.

**Note:** Order must be selected by [OrderSelect\(\)](#) function.

### Sample

```
if(OrderSelect(10, SELECT_BY_POS)==true)
    Print("Profit for the order 10 ",OrderProfit());
else
    Print("OrderSelect failed error code is",GetLastError());
```

**bool** OrderSelect(**int** index, **int** select, **int** pool=MODE\_TRADES)

Selects order by index or ticket to further processing. If the function fails, the return value will be false. To get the extended error information, call [GetLastError\(\)](#).

### Parameters

- index** - Order index or order ticket depending from second parameter.
- select** - Selecting flags. It can be any of the following values:  
SELECT\_BY\_POS - index in the order pool,  
SELECT\_BY\_TICKET - index is order ticket.
- pool** - Optional order pool index. Used when select parameter is SELECT\_BY\_POS. It can be any of the following values:  
MODE\_TRADES (default)- order selected from trading pool(opened and pending orders),  
MODE\_HISTORY - order selected from history pool (closed and canceled order).

### Sample

```
if(OrderSelect(12470, SELECT_BY_TICKET)==true)
{
    Print("order #12470 open price is ", OrderOpenPrice());
    Print("order #12470 close price is ", OrderClosePrice());
}
else
    Print("OrderSelect failed error code is",GetLastError());
```

**int** OrderSend(**string** symbol, **int** cmd, **double** volume, **double** price, **int** slippage, **double** stoploss, **double** takeprofit, **string** comment=NULL, **int** magic=0, **datetime** expiration=0, **color** arrow\_color=CLR\_NONE)

Main function used to open a position or set a pending order. Returns ticket of the placed order or -1 if failed. To check error code use [GetLastError\(\)](#) function.

### Parameters

- symbol** - Symbol for trading.
- cmd** - Operation type. It can be any of the [Trade operation enumeration](#).
- volume** - Number of lots.
- price** - Preferred price of the trade.
- slippage** - Maximum price slippage for buy or sell orders.
- stoploss** - Stop loss level.
- takeprofit** - Take profit level.
- comment** - Order comment text. Last part of the comment may be changed by server.
- magic** - Order magic number. May be used as user defined identifier.
- expiration** - Order expiration time (for pending orders only).
- arrow\_color** - Color of the opening arrow on the chart. If parameter is absent or has CLR\_NONE value opening arrow is not drawn on the chart.

### Sample

```
int ticket;
if(iRSI(NULL,0,14,PRICE_CLOSE,0)<25)
{
    ticket=OrderSend(Symbol(),OP_BUY,1,Ask,3,Ask-25*Point,Ask+25*Point,"My order #2",16384,0,Green);
    if(ticket<0)
    {
        Print("OrderSend failed with error #",GetLastError());
        return(0);
    }
}
```

```

    }
}

```

### **double OrderStopLoss()**

Returns stop loss value for the currently selected order.

**Note:** Order must be selected by [OrderSelect\(\)](#) function.

#### **Sample**

```

if(OrderSelect(ticket,SELECT_BY_POS)==true)
    Print("Stop loss value for the order 10 ", OrderStopLoss());
else
    Print("OrderSelect failed error code is",GetLastError());

```

### **int OrdersTotal()**

Returns market and pending orders count.

#### **Sample**

```

int handle=FileOpen("OrdersReport.csv",FILE_WRITE|FILE_CSV,"\t");
if(handle<0) return(0);
// write header
FileWrite(handle,"#", "open price", "open time", "symbol", "lots");
int total=OrdersTotal();
// write open orders
for(int pos=0;pos<total;pos++)
{
    if(OrderSelect(pos,SELECT_BY_POS)==false) continue;
    FileWrite(handle,OrderTicket(),OrderOpenPrice(),OrderOpenTime(),OrderSymbol(),OrderLots());
}
FileClose(handle);

```

### **double OrderSwap()**

Returns swap value for the currently selected order.

**Note:** Order must be selected by [OrderSelect\(\)](#) function.

#### **Sample**

```

if(OrderSelect(order_id, SELECT_BY_TICKET)==true)
    Print("Swap for the order #", order_id, " ",OrderSwap());
else
    Print("OrderSelect failed error code is",GetLastError());

```

### **string OrderSymbol()**

Returns the order symbol value for selected order.

**Note:** Order must be selected by [OrderSelect\(\)](#) function.

#### **Sample**

```

if(OrderSelect(12, SELECT_BY_POS)==true)
    Print("symbol of order #", OrderTicket(), " is ", OrderSymbol());
else
    Print("OrderSelect failed error code is",GetLastError());

```

### **double OrderTakeProfit()**

Returns take profit value for the currently selected order.

**Note:** Order must be selected by [OrderSelect\(\)](#) function.

### Sample

```
if(OrderSelect(12, SELECT_BY_POS)==true)
    Print("Order #",OrderTicket()," profit: ", OrderTakeProfit());
else
    Print("OrderSelect() error - ",GetLastError());
```

### **int** OrderTicket()

Returns ticket number for the currently selected order.

**Note:** Order must be selected by [OrderSelect\(\)](#) function.

### Sample

```
if(OrderSelect(12, SELECT_BY_POS)==true)
    order=OrderTicket();
else
    Print("OrderSelect failed error code is",GetLastError());
```

### **int** OrderType()

Returns order operation type for the currently selected order. It can be any of the following values:

OP_BUY	-			buying	position,
OP_SELL	-			selling	position,
OP_BUYLIMIT	-	buy	limit		position,
OP_BUYSTOP	-	buy	stop		position,
OP_SELLLIMIT	-	sell	limit	pending	position,
OP_SELLSTOP	-	sell	stop	pending	position.

**Note:** Order must be selected by [OrderSelect\(\)](#) function.

### Sample

```
int order_type;
if(OrderSelect(12, SELECT_BY_POS)==true)
{
    order_type=OrderType();
    // ...
}
else
    Print("OrderSelect() returned error - ",GetLastError());
```

## Window functions

[BarsPerWindow\(\)](#)  
[FirstVisibleBar\(\)](#)  
[PriceOnDropped\(\)](#)  
[TimeOnDropped\(\)](#)  
[WindowFind\(\)](#)  
[WindowHandle\(\)](#)  
[WindowIsVisible](#)  
[WindowOnDropped\(\)](#)  
[WindowsTotal\(\)](#)  
[WindowXOnDropped\(\)](#)  
[WindowYOnDropped\(\)](#)

### **int** BarsPerWindow()

Function returns the amount of bars visible on the chart.

### Sample



```
// work with visible bars.
int bars_count=BarsPerWindow();
int bar=FirstVisibleBar();
for(int i=0; i<bars_count; i++,bar--)
{
    // ...
}
```

#### **int FirstVisibleBar()**

Function returns index of the first visible bar.

##### **Sample**

```
// work with visible bars.
int bars_count=BarsPerWindow();
int bar=FirstVisibleBar();
for(int i=0; i<bars_count; i++,bar--)
{
    // ...
}
```

#### **int FirstVisibleBar()**

Function returns index of the first visible bar.

##### **Sample**

```
// work with visible bars.
int bars_count=BarsPerWindow();
int bar=FirstVisibleBar();
for(int i=0; i<bars_count; i++,bar--)
{
    // ...
}
```

#### **datetime TimeOnDropped()**

Returns time part of dropped point where expert or script was dropped. This value is valid when expert or script dropped by mouse.

**Note:** For custom indicators this value is undefined.

##### **Sample**

```
double drop_price=PriceOnDropped();
datetime drop_time=TimeOnDropped();
//---- may be undefined (zero)
if(drop_time>0)
{
    ObjectCreate("Dropped price line", OBJ_HLINE, 0, drop_price);
    ObjectCreate("Dropped time line", OBJ_VLINE, 0, drop_time);
}
```

#### **int WindowFind(string name)**

If indicator with *name* found returns the window index containing specified indicator, otherwise returns -1.

**Note:** WindowFind() returns -1 if custom indicator searches itself when *init()* function works.

##### **Parameters**

**name** - Indicator short name.

##### **Sample**

```
int win_idx=WindowFind("MACD(12,26,9)");
```

**int WindowHandle(string symbol, int timeframe)**

If chart of *symbol* and *timeframe* is currently opened returns the window handle, otherwise returns 0.

#### Parameters

- symbol** - symbol name.
- timeframe** - Time frame. It can be any of [Time frame enumeration](#) values.

#### Sample

```
int win_handle=WindowHandle("USDx",PERIOD_H1);
if(win_handle!=0)
    Print("Window with USDx,H1 detected. Rates array will be copied immediately.");
```

**bool WindowIsVisible(int index)**

Returns true if the chart subwindow is visible, otherwise returns false.

#### Parameters

- index** - Chart subwindow index.

#### Sample

```
int maywin=WindowFind("MyMACD");
if(maywin>-1 && WindowIsVisible(maywin)==true)
    Print("window of MyMACD is visible");
else
    Print("window of MyMACD not found or is not visible");
```

**int WindowOnDropped()**

Returns window index where expert, custom indicator or script was dropped. This value is valid when expert, custom indicator or script dropped by mouse.

**Note:** For custom indicators this index is undefined when *init()* function works and returning index is window index where custom indicator works (may be different from dropping window index, because custom indicator can create its own new window). **See also** [WindowXOnDropped\(\)](#), [WindowYOnDropped\(\)](#)

#### Sample

```
if(WindowOnDropped()!=0)
{
    Print("Indicator 'MyIndicator' must be applied to main chart window!");
    return(false);
}
```

**int WindowsTotal()**

Returns count of indicator windows on the chart (including main chart).

#### Sample

```
Print("Windows count = ", WindowsTotal());
```

**int WindowXOnDropped()**

Returns x-axis coordinate in pixels were expert or script dropped to the chart. **See also** [WindowYOnDropped\(\)](#), [WindowOnDropped\(\)](#)

#### Sample

```
Print("Expert dropped point x=",WindowXOnDropped()," y=",WindowYOnDropped());
```

**int WindowYOnDropped()**

Returns y-axis coordinate in pixels were expert or script dropped to the chart. **See also** [WindowYOnDropped\(\)](#), [WindowOnDropped\(\)](#)

### Sample

```
Print("Expert dropped point x=",WindowXOnDropped()," y=",WindowYOnDropped());
```

## Include Files

```
//+-----+
//|                                     stderr.mqh |
//|      Copyright © 2004-2005, MetaQuotes Software Corp. |
//|      http://www.mql4.com/ |
//+-----+
//---- errors returned from trade server
#define ERR_NO_ERROR 0
#define ERR_NO_RESULT 1
#define ERR_COMMON_ERROR 2
#define ERR_INVALID_TRADE_PARAMETERS 3
#define ERR_SERVER_BUSY 4
#define ERR_OLD_VERSION 5
#define ERR_NO_CONNECTION 6
#define ERR_NOT_ENOUGH_RIGHTS 7
#define ERR_TOO_FREQUENT_REQUESTS 8
#define ERR_MALFUNCTIONAL_TRADE 9
#define ERR_ACCOUNT_DISABLED 64
#define ERR_INVALID_ACCOUNT 65
#define ERR_TRADE_TIMEOUT 128
#define ERR_INVALID_PRICE 129
#define ERR_INVALID_STOPS 130
#define ERR_INVALID_TRADE_VOLUME 131
#define ERR_MARKET_CLOSED 132
#define ERR_TRADE_DISABLED 133
#define ERR_NOT_ENOUGH_MONEY 134
#define ERR_PRICE_CHANGED 135
#define ERR_OFF_QUOTES 136
#define ERR_BROKER_BUSY 137
#define ERR_REQUOTE 138
#define ERR_ORDER_LOCKED 139
#define ERR_LONG_POSITIONS_ONLY_ALLOWED 140
#define ERR_TOO_MANY_REQUESTS 141
#define ERR_TRADE_MODIFY_DENIED 145
#define ERR_TRADE_CONTEXT_BUSY 146
//---- mql4 run time errors
#define ERR_NO_MQLERROR 4000
#define ERR_WRONG_FUNCTION_POINTER 4001
#define ERR_ARRAY_INDEX_OUT_OF_RANGE 4002
#define ERR_NO_MEMORY_FOR_FUNCTION_CALL_STACK 4003
#define ERR_RECURSIVE_STACK_OVERFLOW 4004
#define ERR_NOT_ENOUGH_STACK_FOR_PARAMETER 4005
#define ERR_NO_MEMORY_FOR_PARAMETER_STRING 4006
#define ERR_NO_MEMORY_FOR_TEMP_STRING 4007
#define ERR_NOT_INITIALIZED_STRING 4008
#define ERR_NOT_INITIALIZED_ARRAYSTRING 4009
#define ERR_NO_MEMORY_FOR_ARRAYSTRING 4010
#define ERR_TOO_LONG_STRING 4011
#define ERR_REMAINDER_FROM_ZERO_DIVIDE 4012
#define ERR_ZERO_DIVIDE 4013
#define ERR_UNKNOWN_COMMAND 4014
#define ERR_WRONG_JUMP 4015
#define ERR_NOT_INITIALIZED_ARRAY 4016
#define ERR_DLL_CALLS_NOT_ALLOWED 4017
#define ERR_CANNOT_LOAD_LIBRARY 4018
#define ERR_CANNOT_CALL_FUNCTION 4019
```

```

#define ERR_EXTERNAL_EXPERT_CALLS_NOT_ALLOWED 4020
#define ERR_NOT_ENOUGH_MEMORY_FOR_RETURNED_STRING 4021
#define ERR_SYSTEM_BUSY 4022
#define ERR_INVALID_FUNCTION_PARAMETERS_COUNT 4050
#define ERR_INVALID_FUNCTION_PARAMETER_VALUE 4051
#define ERR_STRING_FUNCTION_INTERNAL_ERROR 4052
#define ERR_SOME_ARRAY_ERROR 4053
#define ERR_INCORRECT_SERIES_ARRAY_USING 4054
#define ERR_CUSTOM_INDICATOR_ERROR 4055
#define ERR_INCOMPATIBLE_ARRAYS 4056
#define ERR_GLOBAL_VARIABLES_PROCESSING_ERROR 4057
#define ERR_GLOBAL_VARIABLE_NOT_FOUND 4058
#define ERR_FUNCTION_NOT_ALLOWED_IN_TESTING_MODE 4059
#define ERR_FUNCTION_NOT_CONFIRMED 4060
#define ERR_SEND_MAIL_ERROR 4061
#define ERR_STRING_PARAMETER_EXPECTED 4062
#define ERR_INTEGER_PARAMETER_EXPECTED 4063
#define ERR_DOUBLE_PARAMETER_EXPECTED 4064
#define ERR_ARRAY_AS_PARAMETER_EXPECTED 4065
#define ERR_HISTORY_WILL_UPDATED 4066
#define ERR_END_OF_FILE 4099
#define ERR_SOME_FILE_ERROR 4100
#define ERR_WRONG_FILE_NAME 4101
#define ERR_TOO_MANY_OPENED_FILES 4102
#define ERR_CANNOT_OPEN_FILE 4103
#define ERR_INCOMPATIBLE_ACCESS_TO_FILE 4104
#define ERR_NO_ORDER_SELECTED 4105
#define ERR_UNKNOWN_SYMBOL 4106
#define ERR_INVALID_PRICE_PARAM 4107
#define ERR_INVALID_TICKET 4108
#define ERR_TRADE_NOT_ALLOWED 4109
#define ERR_LONGS_NOT_ALLOWED 4110
#define ERR_SHORTS_NOT_ALLOWED 4111
#define ERR_OBJECT_ALREADY_EXISTS 4200
#define ERR_UNKNOWN_OBJECT_PROPERTY 4201
#define ERR_OBJECT_DOES_NOT_EXIST 4202
#define ERR_UNKNOWN_OBJECT_TYPE 4203
#define ERR_NO_OBJECT_NAME 4204
#define ERR_OBJECT_COORDINATES_ERROR 4205
#define ERR_NO_SPECIFIED_SUBWINDOW 4206

```

```

//+-----+
//|                                     stdlib.mqh |
//|                                     Copyright © 2004, MetaQuotes Software Corp. |
//|                                     http://www.metaquotes.net/ |
//+-----+
#import "stdlib.ex4"

string ErrorDescription(int error_code);
int    RGB(int red_value,int green_value,int blue_value);
bool   CompareDoubles(double number1,double number2);
string DoubleToStrMorePrecision(double number,int precision);
string IntegerToHexString(int integer_number);

```

```

//+-----+
//|                                     WinUser32.mqh |
//|                                     Copyright © 2004, MetaQuotes Software Corp. |
//|                                     http://www.metaquotes.net/ |
//+-----+
#define   copyright "Copyright © 2004, MetaQuotes Software Corp."
#define   link      "http://www.metaquotes.net/"

#import "user32.dll"
//---- messages

```

```

int      SendMessageA(int hWnd,int Msg,int wParam,int lParam);
int      SendNotifyMessageA(int hWnd,int Msg,int wParam,int lParam);
int      PostMessageA(int hWnd,int Msg,int wParam,int lParam);
void     keybd_event(int bVk,int bScan,int dwFlags,int dwExtraInfo);
void     mouse_event(int dwFlags,int dx,int dy,int dwData,int dwExtraInfo);
//---- windows
int      FindWindowA(string lpClassName ,string lpWindowName);
int      SetWindowTextA(int hWnd,string lpString);
int      GetWindowTextA(int hWnd,string lpString,int nMaxCount);
int      GetWindowTextLengthA(int hWnd);
int      GetWindow(int hWnd,int uCmd);

int      UpdateWindow(int hWnd);
int      EnableWindow(int hWnd,int bEnable);
int      DestroyWindow(int hWnd);
int      ShowWindow(int hWnd,int nCmdShow);
int      SetActiveWindow(int hWnd);
int      AnimateWindow(int hWnd,int dwTime,int dwFlags);
int      FlashWindow(int hWnd,int dwFlags /*bInvert*/);
int      CloseWindow(int hWnd);
int      MoveWindow(int hWnd,int X,int Y,int nWidth,int nHeight,int bRepaint);
int      SetWindowPos(int hWnd,int hWndInsertAfter ,int X,int Y,int cx,int cy,int
uFlags);
int      IsWindowVisible(int hWnd);
int      IsIconic(int hWnd);
int      IsZoomed(int hWnd);
int      SetFocus(int hWnd);
int      GetFocus();
int      GetActiveWindow();
int      IsWindowEnabled(int hWnd);
//---- miscelaneous
int      MessageBoxA(int hWnd ,string lpText,string lpCaption,int uType);
int      MessageBoxExA(int hWnd ,string lpText,string lpCaption,int uType,int
wLanguageId);
int      MessageBeep(int uType);
int      GetSystemMetrics(int nIndex);
int      ExitWindowsEx(int uFlags,int dwReserved);
int      SwapMouseButton(int fSwap);
#import

//---- Window Messages
#define WM_NULL 0x0000
#define WM_CREATE 0x0001
#define WM_DESTROY 0x0002
#define WM_MOVE 0x0003
#define WM_SIZE 0x0005
#define WM_ACTIVATE 0x0006
#define WM_SETFOCUS 0x0007
#define WM_KILLFOCUS 0x0008
#define WM_ENABLE 0x000A
#define WM_SETREDRAW 0x000B
#define WM_SETTEXT 0x000C
#define WM_GETTEXT 0x000D
#define WM_GETTEXTLENGTH 0x000E
#define WM_PAINT 0x000F
#define WM_CLOSE 0x0010
#define WM_QUERYENDSESSION 0x0011
#define WM_QUIT 0x0012
#define WM_QUERYOPEN 0x0013
#define WM_ERASEBKGND 0x0014
#define WM_SYSCOLORCHANGE 0x0015
#define WM_ENDSESSION 0x0016
#define WM_SHOWWINDOW 0x0018
#define WM_WININICHANGE 0x001A
#define WM_SETTINGCHANGE 0x001A // WM_WININICHANGE
#define WM_DEVMODECHANGE 0x001B
#define WM_ACTIVATEAPP 0x001C

```

```

#define WM_FONTCHANGE 0x001D
#define WM_TIMECHANGE 0x001E
#define WM_CANCELMODE 0x001F
#define WM_SETCursor 0x0020
#define WM_MOUSEACTIVATE 0x0021
#define WM_CHILDACTIVATE 0x0022
#define WM_QUEUESYNC 0x0023
#define WM_GETMINMAXINFO 0x0024
#define WM_PAINTICON 0x0026
#define WM_ICONERASEBKGD 0x0027
#define WM_NEXTDLGCTL 0x0028
#define WM_SPOOLERSTATUS 0x002A
#define WM_DRAWITEM 0x002B
#define WM_MEASUREITEM 0x002C
#define WM_DELETEITEM 0x002D
#define WM_VKEYTOITEM 0x002E
#define WM_CHARTOITEM 0x002F
#define WM_SETFONT 0x0030
#define WM_GETFONT 0x0031
#define WM_SETHOTKEY 0x0032
#define WM_GETHOTKEY 0x0033
#define WM_QUERYDRAGICON 0x0037
#define WM_COMPAREITEM 0x0039
#define WM_GETOBJECT 0x003D
#define WM_COMPACTING 0x0041
#define WM_WINDOWPOSCHANGING 0x0046
#define WM_WINDOWPOSCHANGED 0x0047
#define WM_COPYDATA 0x004A
#define WM_CANCELJOURNAL 0x004B
#define WM_NOTIFY 0x004E
#define WM_INPUTLANGCHANGEREQUEST 0x0050
#define WM_INPUTLANGCHANGE 0x0051
#define WM_TCARD 0x0052
#define WM_HELP 0x0053
#define WM_USERCHANGED 0x0054
#define WM_NOTIFYFORMAT 0x0055
#define WM_CONTEXTMENU 0x007B
#define WM_STYLECHANGING 0x007C
#define WM_STYLECHANGED 0x007D
#define WM_DISPLAYCHANGE 0x007E
#define WM_GETICON 0x007F
#define WM_SETICON 0x0080
#define WM_NCCREATE 0x0081
#define WM_NCDESTROY 0x0082
#define WM_NCCALCSIZE 0x0083
#define WM_NCHITTEST 0x0084
#define WM_NCPAINT 0x0085
#define WM_NCACTIVATE 0x0086
#define WM_GETDLGCODE 0x0087
#define WM_SYNCPAINT 0x0088
#define WM_NCMOUSEMOVE 0x00A0
#define WM_NCLBUTTONDOWN 0x00A1
#define WM_NCLBUTTONUP 0x00A2
#define WM_NCLBUTTONDBLCLK 0x00A3
#define WM_NCRBUTTONDOWN 0x00A4
#define WM_NCRBUTTONUP 0x00A5
#define WM_NCRBUTTONDBLCLK 0x00A6
#define WM_NCMBUTTONDOWN 0x00A7
#define WM_NCMBUTTONUP 0x00A8
#define WM_NCMBUTTONDBLCLK 0x00A9
#define WM_KEYFIRST 0x0100
#define WM_KEYDOWN 0x0100
#define WM_KEYUP 0x0101
#define WM_CHAR 0x0102
#define WM_DEADCHAR 0x0103
#define WM_SYSKEYDOWN 0x0104
#define WM_SYSKEYUP 0x0105

```

#define WM_SYSCHAR	0x0106
#define WM_SYSDEADCHAR	0x0107
#define WM_KEYLAST	0x0108
#define WM_INITDIALOG	0x0110
#define WM_COMMAND	0x0111
#define WM_SYSCOMMAND	0x0112
#define WM_TIMER	0x0113
#define WM_HSCROLL	0x0114
#define WM_VSCROLL	0x0115
#define WM_INITMENU	0x0116
#define WM_INITMENUPOPUP	0x0117
#define WM_MENUSELECT	0x011F
#define WM_MENUCHAR	0x0120
#define WM_ENTERIDLE	0x0121
#define WM_MENURBUTTONUP	0x0122
#define WM_MENUDRAG	0x0123
#define WM_MENUGETOBJECT	0x0124
#define WM_UNINITMENUPOPUP	0x0125
#define WM_MENUCOMMAND	0x0126
#define WM_CTLCOLORMSGBOX	0x0132
#define WM_CTLCOLOREDIT	0x0133
#define WM_CTLCOLORLISTBOX	0x0134
#define WM_CTLCOLORBTN	0x0135
#define WM_CTLCOLORDLG	0x0136
#define WM_CTLCOLORSCROLLBAR	0x0137
#define WM_CTLCOLORSTATIC	0x0138
#define WM_MOUSEFIRST	0x0200
#define WM_MOUSEMOVE	0x0200
#define WM_LBUTTONDOWN	0x0201
#define WM_LBUTTONUP	0x0202
#define WM_LBUTTONDBLCLK	0x0203
#define WM_RBUTTONDOWN	0x0204
#define WM_RBUTTONUP	0x0205
#define WM_RBUTTONDBLCLK	0x0206
#define WM_MBUTTONDOWN	0x0207
#define WM_MBUTTONUP	0x0208
#define WM_MBUTTONDBLCLK	0x0209
#define WM_PARENTNOTIFY	0x0210
#define WM_ENTERMENULOOP	0x0211
#define WM_EXITMENULOOP	0x0212
#define WM_NEXTMENU	0x0213
#define WM_SIZING	0x0214
#define WM_CAPTURECHANGED	0x0215
#define WM_MOVING	0x0216
#define WM_DEVICECHANGE	0x0219
#define WM_MDICREATE	0x0220
#define WM_MDIDESTROY	0x0221
#define WM_MDIACTIVATE	0x0222
#define WM_MDIRESTORE	0x0223
#define WM_MDINEXT	0x0224
#define WM_MDIMAXIMIZE	0x0225
#define WM_MDI TILE	0x0226
#define WM_MDI CASCADE	0x0227
#define WM_MDIICONARRANGE	0x0228
#define WM_MDI GETACTIVE	0x0229
#define WM_MDI SETMENU	0x0230
#define WM_ENTER SIZE MOVE	0x0231
#define WM_EXIT SIZE MOVE	0x0232
#define WM_DROPFILES	0x0233
#define WM_MDI REFRESH MENU	0x0234
#define WM_MOUSE HOVER	0x02A1
#define WM_MOUSE LEAVE	0x02A3
#define WM_CUT	0x0300
#define WM_COPY	0x0301
#define WM_PASTE	0x0302
#define WM_CLEAR	0x0303
#define WM_UNDO	0x0304

```

#define WM_RENDERFORMAT 0x0305
#define WM_RENDERALLFORMATS 0x0306
#define WM_DESTROYCLIPBOARD 0x0307
#define WM_DRAWCLIPBOARD 0x0308
#define WM_PAINTCLIPBOARD 0x0309
#define WM_VSCROLLCLIPBOARD 0x030A
#define WM_SIZECLIPBOARD 0x030B
#define WM_ASKCBFORMATNAME 0x030C
#define WM_CHANGECBCHAIN 0x030D
#define WM_HSCROLLCLIPBOARD 0x030E
#define WM_QUERYNEWPALETTE 0x030F
#define WM_PALETTEISCHANGING 0x0310
#define WM_PALETTECHANGED 0x0311
#define WM_HOTKEY 0x0312
#define WM_PRINT 0x0317
#define WM_PRINTCLIENT 0x0318
#define WM_HANDHELDFIRST 0x0358
#define WM_HANDHELDLAST 0x035F
#define WM_AFXFIRST 0x0360
#define WM_AFXLAST 0x037F
#define WM_PENWINFIRST 0x0380
#define WM_PENWINLAST 0x038F
#define WM_APP 0x8000

//---- keybd_event routines
#define KEYEVENTF_EXTENDEDKEY 0x0001
#define KEYEVENTF_KEYUP 0x0002
//---- mouse_event routines
#define MOUSEEVENTF_MOVE 0x0001 // mouse move
#define MOUSEEVENTF_LEFTDOWN 0x0002 // left button down
#define MOUSEEVENTF_LEFTUP 0x0004 // left button up
#define MOUSEEVENTF_RIGHTDOWN 0x0008 // right button down
#define MOUSEEVENTF_RIGHTUP 0x0010 // right button up
#define MOUSEEVENTF_MIDDLEDOWN 0x0020 // middle button down
#define MOUSEEVENTF_MIDDLEUP 0x0040 // middle button up
#define MOUSEEVENTF_WHEEL 0x0800 // wheel button rolled
#define MOUSEEVENTF_ABSOLUTE 0x8000 // absolute move

//---- GetSystemMetrics() codes
#define SM_CXSCREEN 0
#define SM_CYSCREEN 1
#define SM_CXVSCROLL 2
#define SM_CYHSCROLL 3
#define SM_CYCAPTION 4
#define SM_CXBORDER 5
#define SM_CYBORDER 6
#define SM_CXDLGFRAME 7
#define SM_CYDLGFRAME 8
#define SM_CYVTHUMB 9
#define SM_CXHTHUMB 10
#define SM_CXICON 11
#define SM_CYICON 12
#define SM_CXCURSOR 13
#define SM_CYCURSOR 14
#define SM_CYMENU 15
#define SM_CXFULLSCREEN 16
#define SM_CYFULLSCREEN 17
#define SM_CYKANJIWINDOW 18
#define SM_MOUSEPRESENT 19
#define SM_CYVSCROLL 20
#define SM_CXHSCROLL 21
#define SM_DEBUG 22
#define SM_SWAPBUTTON 23
#define SM_RESERVED1 24
#define SM_RESERVED2 25
#define SM_RESERVED3 26
#define SM_RESERVED4 27

```



```

#define SM_CXMIN 28
#define SM_CYMIN 29
#define SM_CXSIZE 30
#define SM_CYSIZE 31
#define SM_CXFRAME 32
#define SM_CYFRAME 33
#define SM_CXMINTRACK 34
#define SM_CYMINTRACK 35
#define SM_CXDOUBLECLK 36
#define SM_CYDOUBLECLK 37
#define SM_CXICONSPACING 38
#define SM_CYICONSPACING 39
#define SM_MENUDROPALIGNMENT 40
#define SM_PENWINDOWS 41
#define SM_DBCSENABLED 42
#define SM_CMOUSEBUTTONS 43
#define SM_SECURE 44
#define SM_CXEDGE 45
#define SM_CYEDGE 46
#define SM_CXMINSPACING 47
#define SM_CYMINSPACING 48
#define SM_CXSMICON 49
#define SM_CYSMICON 50
#define SM_CYSMCAPTION 51
#define SM_CXSMSIZE 52
#define SM_CYSMSIZE 53
#define SM_CXMENUSIZE 54
#define SM_CYMENUSIZE 55
#define SM_ARRANGE 56
#define SM_CXMINIMIZED 57
#define SM_CYMINIMIZED 58
#define SM_CXMAXTRACK 59
#define SM_CYMAXTRACK 60
#define SM_CXMAXIMIZED 61
#define SM_CYMAXIMIZED 62
#define SM_NETWORK 63
#define SM_CLEANBOOT 67
#define SM_CXDRAG 68
#define SM_CYDRAG 69
#define SM_SHOWSOUNDS 70
#define SM_CXMENUCHECK 71 // Use instead of
GetMenuCheckMarkDimensions() !
#define SM_CYMENUCHECK 72
#define SM_SLOWMACHINE 73
#define SM_MIDEASTENABLED 74
#define SM_MOUSEWHEELPRESENT 75
#define SM_XVIRTUALSCREEN 76
#define SM_YVIRTUALSCREEN 77
#define SM_CXVIRTUALSCREEN 78
#define SM_CYVIRTUALSCREEN 79
#define SM_CMONITORS 80
#define SM_SAMEDISPLAYFORMAT 81

//---- GetWindow() Constants
#define GW_HWNDFIRST 0
#define GW_HWNDLAST 1
#define GW_HWNDNEXT 2
#define GW_HWNDPREV 3
#define GW_OWNER 4
#define GW_CHILD 5

//---- AnimateWindow() Commands
#define AW_HOR_POSITIVE 0x00000001
#define AW_HOR_NEGATIVE 0x00000002
#define AW_VER_POSITIVE 0x00000004
#define AW_VER_NEGATIVE 0x00000008
#define AW_CENTER 0x00000010

```

```

#define AW_HIDE 0x00010000
#define AW_ACTIVATE 0x00020000
#define AW_SLIDE 0x00040000
#define AW_BLEND 0x00080000

//---- MessageBox() Flags
#define MB_OK 0x00000000
#define MB_OKCANCEL 0x00000001
#define MB_ABORTRETRYIGNORE 0x00000002
#define MB_YESNOCANCEL 0x00000003
#define MB_YESNO 0x00000004
#define MB_RETRYCANCEL 0x00000005
#define MB_ICONHAND 0x00000010
#define MB_ICONQUESTION 0x00000020
#define MB_ICONEXCLAMATION 0x00000030
#define MB_ICONASTERISK 0x00000040
#define MB_USERICON 0x00000080
#define MB_ICONWARNING MB_ICONEXCLAMATION
#define MB_ICONERROR MB_ICONHAND
#define MB_ICONINFORMATION MB_ICONASTERISK
#define MB_ICONSTOP MB_ICONHAND
#define MB_DEFBUTTON1 0x00000000
#define MB_DEFBUTTON2 0x00000100
#define MB_DEFBUTTON3 0x00000200
#define MB_DEFBUTTON4 0x00000300
#define MB_APPLMODAL 0x00000000
#define MB_SYSTEMMODAL 0x00001000
#define MB_TASKMODAL 0x00002000
#define MB_HELP 0x00004000 // Help Button
#define MB_NOFOCUS 0x00008000
#define MB_SETFOREGROUND 0x00010000
#define MB_DEFAULT_DESKTOP_ONLY 0x00020000
#define MB_TOPMOST 0x00040000
#define MB_RIGHT 0x00080000
#define MBRTLREADING 0x00100000

//---- Dialog Box Command IDs
#define IDOK 1
#define IDCANCEL 2
#define IDABORT 3
#define IDRETRY 4
#define IDIGNORE 5
#define IDYES 6
#define IDNO 7
#define IDCLOSE 8
#define IDHELP 9

//+-----+

```

## Scripts

```

//+-----+
//|                                     Period_Converter.mq4 |
//|                                     Copyright © 2005, MetaQuotes Software Corp. |
//|                                     http://www.metaquotes.net |
//+-----+
#property copyright "Copyright © 2005, MetaQuotes Software Corp."
#property link      "http://www.metaquotes.net"
#property show_inputs
#include <WinUser32.mqh>

extern int ExtPeriodMultiplier=3; // new period multiplier factor
int      ExtHandle=-1;
//+-----+
//| script program start function |
//+-----+

```

```

int start()
{
    int    i, start_pos, i_time, time0, last_fpos, periodseconds;
    double d_open, d_low, d_high, d_close, d_volume, last_volume;
    int    hwnd=0, cnt=0;
//---- History header
    int    version=400;
    string c_copyright;
    string c_symbol=Symbol();
    int    i_period=Period()*ExtPeriodMultiplier;
    int    i_digits=Digits;
    int    i_unused[13];
//----
    ExtHandle=FileOpenHistory(c_symbol+i_period+".hst", FILE_BIN|FILE_WRITE);
    if(ExtHandle < 0) return(-1);
//---- write history file header
    c_copyright="(C)opyright 2003, MetaQuotes Software Corp.";
    FileWriteInteger(ExtHandle, version, LONG_VALUE);
    FileWriteString(ExtHandle, c_copyright, 64);
    FileWriteString(ExtHandle, c_symbol, 12);
    FileWriteInteger(ExtHandle, i_period, LONG_VALUE);
    FileWriteInteger(ExtHandle, i_digits, LONG_VALUE);
    FileWriteInteger(ExtHandle, 0, LONG_VALUE);          //timesign
    FileWriteInteger(ExtHandle, 0, LONG_VALUE);          //last_sync
    FileWriteArray(ExtHandle, i_unused, 0, 13);
//---- write history file
    periodseconds=i_period*60;
    start_pos=Bars-1;
    d_open=Open[start_pos];
    d_low=Low[start_pos];
    d_high=High[start_pos];
    d_volume=Volume[start_pos];
//---- normalize open time
    i_time=Time[start_pos]/periodseconds;
    i_time*=periodseconds;
    for(i=start_pos-1; i>=0; i--)
    {
        time0=Time[i];
        if(time0>=i_time+periodseconds || i==0)
        {
            if(i==0 && time0<i_time+periodseconds)
            {
                d_volume+=Volume[0];
                if (Low[0]<d_low) d_low=Low[0];
                if (High[0]>d_high) d_high=High[0];
                d_close=Close[0];
            }
            last_fpos=FileTell(ExtHandle);
            last_volume=Volume[i];
            FileWriteInteger(ExtHandle, i_time, LONG_VALUE);
            FileWriteDouble(ExtHandle, d_open, DOUBLE_VALUE);
            FileWriteDouble(ExtHandle, d_low, DOUBLE_VALUE);
            FileWriteDouble(ExtHandle, d_high, DOUBLE_VALUE);
            FileWriteDouble(ExtHandle, d_close, DOUBLE_VALUE);
            FileWriteDouble(ExtHandle, d_volume, DOUBLE_VALUE);
            FileFlush(ExtHandle);
            cnt++;
            if(time0>=i_time+periodseconds)
            {
                i_time=time0/periodseconds;
                i_time*=periodseconds;
                d_open=Open[i];
                d_low=Low[i];
                d_high=High[i];
                d_close=Close[i];
                d_volume=last_volume;
            }
        }
    }
}

```

```

    }
    else
    {
        d_volume+=Volume[i];
        if (Low[i]<d_low) d_low=Low[i];
        if (High[i]>d_high) d_high=High[i];
        d_close=Close[i];
    }
}
FileFlush(ExtHandle);
Print(cnt," record(s) written");
//---- collect incoming ticks
int last_time=LocalTime()-5;
while(true)
{
    int cur_time=LocalTime();
    //---- check for new rates
    if(RefreshRates())
    {
        time0=Time[0];
        FileSeek(ExtHandle,last_fpos,SEEK_SET);
        //---- is there current bar?
        if(time0<i_time+periodseconds)
        {
            d_volume+=Volume[0]-last_volume;
            last_volume=Volume[0];
            if (Low[0]<d_low) d_low=Low[0];
            if (High[0]>d_high) d_high=High[0];
            d_close=Close[0];
        }
        else
        {
            //---- no, there is new bar
            d_volume+=Volume[1]-last_volume;
            if (Low[1]<d_low) d_low=Low[1];
            if (High[1]>d_high) d_high=High[1];
            //---- write previous bar remains
            FileWriteInteger(ExtHandle, i_time, LONG_VALUE);
            FileWriteDouble(ExtHandle, d_open, DOUBLE_VALUE);
            FileWriteDouble(ExtHandle, d_low, DOUBLE_VALUE);
            FileWriteDouble(ExtHandle, d_high, DOUBLE_VALUE);
            FileWriteDouble(ExtHandle, d_close, DOUBLE_VALUE);
            FileWriteDouble(ExtHandle, d_volume, DOUBLE_VALUE);
            last_fpos=FileTell(ExtHandle);
            //----
            i_time=time0/periodseconds;
            i_time*=periodseconds;
            d_open=Open[0];
            d_low=Low[0];
            d_high=High[0];
            d_close=Close[0];
            d_volume=Volume[0];
            last_volume=d_volume;
        }
        //----
        FileWriteInteger(ExtHandle, i_time, LONG_VALUE);
        FileWriteDouble(ExtHandle, d_open, DOUBLE_VALUE);
        FileWriteDouble(ExtHandle, d_low, DOUBLE_VALUE);
        FileWriteDouble(ExtHandle, d_high, DOUBLE_VALUE);
        FileWriteDouble(ExtHandle, d_close, DOUBLE_VALUE);
        FileWriteDouble(ExtHandle, d_volume, DOUBLE_VALUE);
        FileFlush(ExtHandle);
        //----
        if(hwnd==0)
        {
            hwnd=WindowHandle(Symbol(),i_period);
            if(hwnd!=0) Print("Chart window detected");

```

```

    }
    //---- refresh window not frequently than 1 time in 2 seconds
    if(hwnd!=0 && cur_time-last_time>=2)
    {
        PostMessageA(hwnd,WM_COMMAND,33324,0);
        last_time=cur_time;
    }
}
}
//----
return(0);
}
//+-----+
//|
//+-----+
void deinit()
{
    if(ExtHandle>=0) { FileClose(ExtHandle); ExtHandle=-1; }
}
//+-----+

```

```

//+-----+
//| rotate_text.mq4 |
//| Copyright © 2004, MetaQuotes Software Corp. |
//| http://www.metaquotes.net/ |
//+-----+
#property copyright "Copyright © 2004, MetaQuotes Software Corp."
#property link "http://www.metaquotes.net/"
#include <stdlib.mqh>

string line_name="rotating_line";
string object_name1="rotating_text";

void init()
{
    Print("point = ", Point," bars=",Bars);
}
//+-----+
//|
//+-----+
void deinit()
{
    ObjectDelete(line_name);
    ObjectDelete(object_name1);
    ObjectsRedraw();
}
//+-----+
//| script program start function |
//+-----+
int start()
{
    int time2;
    int error,index,fontsize=10;
    double price,price1,price2;
    double angle=0.0;
//----
    price2=High[10]+Point*10;
    ObjectCreate(line_name, OBJ_TRENDBYANGLE, 0, Time[10], price2);
    index=20;
    ObjectCreate(object_name1, OBJ_TEXT, 0, Time[index], Low[index]-Point*100);
    ObjectSetText(object_name1, "rotating_text", fontsize);
    while(IsStopped()==false)
    {
        index++;
        price=ObjectGet(object_name1, OBJPROP_PRICE1)+Point;
        error=GetLastError();
        if(error!=0)

```

```

        {
            Print(object_name1," : ",ErrorDescription(error));
            break;
        }
        ObjectMove(object_name1, 0, Time[index], price);
        ObjectSet(object_name1, OBJPROP_ANGLE, angle*2);
        ObjectSet(object_name1, OBJPROP_FONTSIZE, fontsize);
        ObjectSet(line_name, OBJPROP_WIDTH, angle/18.0);
        double line_angle=360.0-angle;
        if(line_angle==90.0) ObjectSet(line_name, OBJPROP_PRICE2, price2+Point*50);
        if(line_angle==270.0) ObjectSet(line_name, OBJPROP_PRICE2, price2-Point*50);
        time2=ObjectGet(line_name,OBJPROP_TIME2);
        if(line_angle>90.0 && line_angle<270.0) time2=Time[index+10];
        else time2=Time[0];
        ObjectSet(line_name, OBJPROP_TIME2, time2);
        ObjectSet(line_name, OBJPROP_ANGLE, line_angle);
        ObjectsRedraw();
        angle+=3.0;
        if(angle>=360.0) angle=360.0-angle;
        fontsize++;
        if(fontsize>48) fontsize=6;
        Sleep(500);
        price1=ObjectGetValueByShift(line_name, index);
        if(GetLastError()==0)
        {
            if(MathAbs(price1-price) < Point*50)
            {
                Print("price=",price," price1=", price1);
                ObjectSetText(object_name1, "REMOVED", 48, "Arial", RGB(255,215,0));
                ObjectsRedraw();
                Sleep(5000);
                ObjectDelete(object_name1);
            }
        }
        return(0);
    }
}
//+-----+

```

```

//+-----+
//|                                     trade.mq4 |
//|                                     Copyright © 2004, MetaQuotes Software Corp. |
//|                                     http://www.metaquotes.net/ |
//+-----+
#property copyright "Copyright © 2004, MetaQuotes Software Corp."
#property link      "http://www.metaquotes.net/"

#include <stdlib.mqh>
#include <WinUser32.mqh>
//+-----+
//| script "trading for all money" |
//+-----+
int start()
{
    //----
    if(MessageBox("Do you really want to BUY 1.00 "+Symbol()+" at ASK price?      ",
        "Script",MB_YESNO|MB_ICONQUESTION)!=IDYES) return(1);
    //----
    int ticket=OrderSend(Symbol(),OP_BUY,1.0,Ask,3,0,0,"expert comment",255,0,CLR_NONE);
    if(ticket<1)
    {
        int error=GetLastError();
        Print("Error = ",ErrorDescription(error));
        return;
    }
    //----
    OrderPrint();
}

```

```

    return(0);
}
//+-----+

```

## Templates

```

<expert>
type=INDICATOR_ADVISOR
description=Accelerator Oscillator
separate_window=1
used_buffers=4
</ind>
color=Green
type=DRAW_HISTOGRAM
</ind>
</ind>
color=Red
type=DRAW_HISTOGRAM
</ind>
</expert>
#header#
#property copyright "#copyright#"
#property link      "#link#"

#indicator_properties#
#extern_variables#
#mapping_buffers#
//---- indicator buffers
double ExtGreenBuffer[];
double ExtRedBuffer[];
double ExtMABuffer[];
double ExtBuffer[];
//+-----+
//| Custom indicator initialization function |
//+-----+
int init()
{
    #buffers_used#;
//---- indicator buffers mapping
    SetIndexBuffer(0, ExtGreenBuffer);
    SetIndexBuffer(1, ExtRedBuffer);
    SetIndexBuffer(2, ExtMABuffer);
    SetIndexBuffer(3, ExtBuffer);
//---- drawing settings
    #indicators_init#
//----
    IndicatorDigits(6);
    SetIndexDrawBegin(0,38);
    SetIndexDrawBegin(1,38);
//---- name for DataWindow and indicator subwindow label
    IndicatorShortName("AC");
//---- initialization done
    return(0);
}
//+-----+
//| Accelerator/Decelerator Oscillator |
//+-----+
int start()
{
    int    limit;
    int    counted_bars=IndicatorCounted();
    double prev,current;
//---- check for possible errors
    if(counted_bars<0) return(-1);
//---- last counted bar will be recounted
    if(counted_bars>0) counted_bars--;

```

```

    limit=Bars-counted_bars;
    //---- macd counted in the 1-st additional buffer
    for(int i=0; i<limit; i++)
        ExtMABuffer[i]=iMA(NULL,0,5,0,MODE_SMA,PRICE_MEDIAN,i)-
iMA(NULL,0,34,0,MODE_SMA,PRICE_MEDIAN,i);
    //---- signal line counted in the 2-nd additional buffer
    for(i=0; i<limit; i++)
        ExtBuffer[i]=iMAOnArray(ExtMABuffer,Bars,5,0,MODE_SMA,i);
    //---- dispatch values between 2 buffers
    bool up=true;
    for(i=limit-1; i>=0; i--)
    {
        current=ExtMABuffer[i]-ExtBuffer[i];
        prev=ExtMABuffer[i+1]-ExtBuffer[i+1];
        if(current>prev) up=true;
        if(current<prev) up=false;
        if(!up)
        {
            ExtRedBuffer[i]=current;
            ExtGreenBuffer[i]=0.0;
        }
        else
        {
            ExtGreenBuffer[i]=current;
            ExtRedBuffer[i]=0.0;
        }
    }
    //---- done
    return(0);
}
//+-----+

```

```

<expert>
type=INDICATOR_ADVISOR
description=
used_buffers=3
<param>
name=JawsPeriod
type=int
value=13
</param>
<param>
name=JawsShift
type=int
value=8
</param>
<param>
name=TeethPeriod
type=int
value=8
</param>
<param>
name=TeethShift
type=int
value=5
</param>
<param>
name=LipsPeriod
type=int
value=5
</param>
<param>
name=LipsShift
type=int
value=3
</param>
<ind>

```



```

color=Blue
</ind>
<ind>
color=Red
</ind>
<ind>
color=Lime
</ind>
</expert>
#header#
#property copyright "#copyright#"
#property link      "#link#"

#indicator_properties#
#extern_variables#
#mapping_buffers#
//---- indicator buffers
double ExtBlueBuffer[];
double ExtRedBuffer[];
double ExtLimeBuffer[];

//+-----+
//| Custom indicator initialization function |
//+-----+
int init()
{
    #buffers_used#
//---- line shifts when drawing
    SetIndexShift(0,JawsShift);
    SetIndexShift(1,TeethShift);
    SetIndexShift(2,LipsShift);
//---- first positions skipped when drawing
    SetIndexDrawBegin(0,JawsShift+JawsPeriod);
    SetIndexDrawBegin(1,TeethShift+TeethPeriod);
    SetIndexDrawBegin(2,LipsShift+LipsPeriod);
//---- 3 indicator buffers mapping
    SetIndexBuffer(0,ExtBlueBuffer);
    SetIndexBuffer(1,ExtRedBuffer);
    SetIndexBuffer(2,ExtLimeBuffer);
//---- drawing settings
    #indicators_init#
//---- initialization done
    return(0);
}
//+-----+
//| Bill Williams' Alligator |
//+-----+
int start()
{
    int limit;
    int counted_bars=IndicatorCounted();
//---- check for possible errors
    if(counted_bars<0) return(-1);
//---- last counted bar will be recounted
    if(counted_bars>0) counted_bars--;
    limit=Bars-counted_bars;
//---- main loop
    for(int i=0; i<limit; i++)
    {
        //---- ma_shift set to 0 because SetIndexShift called above
        ExtBlueBuffer[i]=iMA(NULL,0,JawsPeriod,0,MODE_SMA,PRICE_MEDIAN,i);
        ExtRedBuffer[i]=iMA(NULL,0,TeethPeriod,0,MODE_SMA,PRICE_MEDIAN,i);
        ExtLimeBuffer[i]=iMA(NULL,0,LipsPeriod,0,MODE_SMA,PRICE_MEDIAN,i);
    }
//---- done
    return(0);
}

```

```
//+-----+
```

```
<expert>
type=INDICATOR_ADVISOR
description=Awesome Oscillator
separate_window=1
used_buffers=3;
<ind>
color=Green
type=DRAW_HISTOGRAM
</ind>
<ind>
color=Red
type=DRAW_HISTOGRAM
</ind>
</expert>
#header#
#property copyright "#copyright#"
#property link      "#link#"

#indicator_properties#
#extern_variables#
#mapping_buffers#
//---- indicator buffers
double ExtGreenBuffer[];
double ExtRedBuffer[];
double ExtMABuffer[];
//+-----+
//| Custom indicator initialization function |
//+-----+
int init()
{
    #buffers_used#
//---- drawing settings
    #indicators_init#
    IndicatorDigits(5);
    SetIndexDrawBegin(0,34);
    SetIndexDrawBegin(1,34);
//---- indicator buffers mapping
    SetIndexBuffer(0, ExtGreenBuffer);
    SetIndexBuffer(1, ExtRedBuffer);
    SetIndexBuffer(2, ExtMABuffer);
//---- name for DataWindow and indicator subwindow label
    IndicatorShortName("AO");
//---- initialization done
    return(0);
}
//+-----+
//| Awesome Oscillator |
//+-----+
int start()
{
    int    limit;
    int    countedBars=IndicatorCounted();
    double prev,current;
//---- check for possible errors
    if(countedBars<0) return(-1);
    //---- last counted bar will be recounted
    if(countedBars>0) countedBars--;
    limit=Bars-countedBars;
//---- macd counted in the 1-st additional buffer
    for(int i=0; i<limit; i++)
        ExtMABuffer[i]=iMA(NULL,0,5,0,MODE_SMA,PRICE_MEDIAN,i)-
iMA(NULL,0,34,0,MODE_SMA,PRICE_MEDIAN,i);
//---- dispatch values between 2 buffers
    bool up=true;
    for(i=limit-1; i>=0; i--)
```

```

    {
        current=ExtMABuffer[i];
        prev=ExtMABuffer[i+1];
        if(current>prev) up=true;
        if(current<prev) up=false;
        if(!up)
        {
            ExtRedBuffer[i]=current;
            ExtGreenBuffer[i]=0.0;
        }
        else
        {
            ExtGreenBuffer[i]=current;
            ExtRedBuffer[i]=0.0;
        }
    }
//---- done
    return(0);
}
//+-----+

```

```

<expert>
    type=EXPERT_ADVISOR
</expert>
#header#
#property copyright "#copyright#"
#property link      "#link#"

#extern_variables#
//+-----+
//| expert initialization function |
//+-----+
int init()
{
//----

//----
    return(0);
}
//+-----+
//| expert deinitialization function |
//+-----+
int deinit()
{
//----

//----
    return(0);
}
//+-----+
//| expert start function |
//+-----+
int start()
{
//----

//----
    return(0);
}
//+-----+

```

```

<expert>
type=INDICATOR_ADVISOR
</expert>
#header#
#property copyright "#copyright#"
#property link      "#link#"

```

```

#indicator_properties#
#extern_variables#
#mapping_buffers#
//+-----+
//| Custom indicator initialization function |
//+-----+
int init()
{
    #buffers_used#
//---- indicators
    #indicators_init#
//----
    return(0);
}
//+-----+
//| Custor indicator deinitialization function |
//+-----+
int deinit()
{
//----

//----
    return(0);
}
//+-----+
//| Custom indicator iteration function |
//+-----+
int start()
{
    int    counted_bars=IndicatorCounted();
//----

//----
    return(0);
}
//+-----+

```

```

<expert>
type=INDICATOR_ADVISOR
separate_window=1
used_buffers=2
<param>
type=int
name=FastEMA
value=12
</param>
<param>
type=int
name=SlowEMA
value=26
</param>
<param>
type=int
name=SignalSMA
value=9
</param>
<ind>
color=Silver
type=DRAW_HISTOGRAM
</ind>
<ind>
color=Red
</ind>
</expert>
#header#
#property copyright "#copyright#"

```

```

#property link      "#link#"

#indicator_properties#
#extern_variables#
#mapping_buffers#
//---- indicator buffers
double ExtSilverBuffer[];
double ExtRedBuffer[];

//+-----+
//| Custom indicator initialization function |
//+-----+
int init()
{
    #buffers_used#;
//---- drawing settings
    #indicators_init#
//----
    SetIndexDrawBegin(1,SignalSMA);
    IndicatorDigits(5);
//---- indicator buffers mapping
    SetIndexBuffer(0, ExtSilverBuffer);
    SetIndexBuffer(1, ExtRedBuffer);
//---- name for DataWindow and indicator subwindow label
    IndicatorShortName("MACD("+FastEMA+", "+SlowEMA+", "+SignalSMA+")");
//---- initialization done
    return(0);
}
//+-----+
//| Moving Averages Convergence/Divergence |
//+-----+
int start()
{
    int limit;
    int countedBars=IndicatorCounted();
//---- check for possible errors
    if(countedBars<0) return(-1);
//---- last counted bar will be recounted
    if(countedBars>0) countedBars--;
    limit=Bars-countedBars;
//---- macd counted in the 1-st buffer
    for(int i=0; i<limit; i++)
        ExtSilverBuffer[i]=iMA(NULL,0,FastEMA,0,MODE_EMA,PRICE_CLOSE,i)-
iMA(NULL,0,SlowEMA,0,MODE_EMA,PRICE_CLOSE,i);
//---- signal line counted in the 2-nd buffer
    for(i=0; i<limit; i++)
        ExtRedBuffer[i]=iMAOnArray(ExtSilverBuffer,Bars,SignalSMA,0,MODE_SMA,i);
//---- done
    return(0);
}
//+-----+

```

```

<expert>
type=INDICATOR_ADVISOR
separate_window=1
used_buffers=3
<param>
name=FastEMA
type=int
value=12
</param>
<param>
name=SlowEMA
type=int
value=26
</param>
<param>

```

```

name=SignalSMA
type=int
value=9
</param>
<ind>
type=DRAW_HISTOGRAM
color=Silver
</ind>
</expert>
#header#
#property copyright "#copyright#"
#property link      "#link#"

#indicator_properties#
#extern_variables#
#mapping_buffers#
//---- indicator buffers
double ExtSilverBuffer[];
double ExtMABuffer[];
double ExtBuffer[];
//+-----+
//| Custom indicator initialization function |
//+-----+
int init()
{
    #buffers_used#;
//---- drawing settings
    #indicators_init#
//----
    SetIndexDrawBegin(0,SignalSMA);
    IndicatorDigits(6);
//---- indicator buffers mapping
    SetIndexBuffer(0,ExtSilverBuffer);
    SetIndexBuffer(1,ExtMABuffer);
    SetIndexBuffer(2,ExtBuffer);
//---- name for DataWindow and indicator subwindow label
    IndicatorShortName("OsMA("+FastEMA+", "+SlowEMA+", "+SignalSMA+""));
//---- initialization done
    return(0);
}
//+-----+
//| Moving Average of Oscillator |
//+-----+
int start()
{
    int limit;
    int counted_bars=IndicatorCounted();
//---- check for possible errors
    if(counted_bars<0) return(-1);
//---- last counted bar will be recounted
    if(counted_bars>0) counted_bars--;
    limit=Bars-counted_bars;
//---- macd counted in the 1-st additional buffer
    for(int i=0; i<limit; i++)
        ExtMABuffer[i]=iMA(NULL,0,FastEMA,0,MODE_EMA,PRICE_CLOSE,i)-
iMA(NULL,0,SlowEMA,0,MODE_EMA,PRICE_CLOSE,i);
//---- signal line counted in the 2-nd additional buffer
    for(i=0; i<limit; i++)
        ExtBuffer[i]=iMAOnArray(ExtMABuffer,Bars,SignalSMA,0,MODE_SMA,i);
//---- main loop
    for(i=0; i<limit; i++)
        ExtSilverBuffer[i]=ExtMABuffer[i]-ExtBuffer[i];
//---- done
    return(0);
}
//+-----+

```

```

<expert>
type=SCRIPT_ADVISOR
</expert>
#header#
#property copyright "#copyright#"
#property link      "#link#"

#extern_variables#
//+-----+
//| script program start function |
//+-----+
int start()
{
//----

//----
    return(0);
}
//+-----+

```

## Library

```

//+-----+
//|                                     stdlib.mq4 |
//|                                     Copyright © 2004, MetaQuotes Software Corp. |
//|                                     http://www.metaquotes.net/ |
//+-----+
#property copyright "Copyright © 2004, MetaQuotes Software Corp."
#property link      "http://www.metaquotes.net/"
#property library
/*
int init()
{
    Print("Init function defined as feature sample");
}
int deinit()
{
    Print("Deinit function defined as feature sample too");
}
*/
//+-----+
//| return error description |
//+-----+
string ErrorDescription(int error_code)
{
    string error_string;
//----
    switch(error_code)
    {
        //---- codes returned from trade server
        case 0:
        case 1:    error_string="no error";
break;
        case 2:    error_string="common error";
break;
        case 3:    error_string="invalid trade parameters";
break;
        case 4:    error_string="trade server is busy";
break;
        case 5:    error_string="old version of the client terminal";
break;
        case 6:    error_string="no connection with trade server";
break;
        case 7:    error_string="not enough rights";
break;
        case 8:    error_string="too frequent requests";

```

```
break;
    case 9:    error_string="malfunctional trade operation";
break;
    case 64:   error_string="account disabled";
break;
    case 65:   error_string="invalid account";
break;
    case 128:  error_string="trade timeout";
break;
    case 129:  error_string="invalid price";
break;
    case 130:  error_string="invalid stops";
break;
    case 131:  error_string="invalid trade volume";
break;
    case 132:  error_string="market is closed";
break;
    case 133:  error_string="trade is disabled";
break;
    case 134:  error_string="not enough money";
break;
    case 135:  error_string="price changed";
break;
    case 136:  error_string="off quotes";
break;
    case 137:  error_string="broker is busy";
break;
    case 138:  error_string="requote";
break;
    case 139:  error_string="order is locked";
break;
    case 140:  error_string="long positions only allowed";
break;
    case 141:  error_string="too many requests";
break;
    case 145:  error_string="modification denied because order too close to market";
break;
    case 146:  error_string="trade context is busy";
break;
    //---- mql4 errors
    case 4000: error_string="no error";
break;
    case 4001: error_string="wrong function pointer";
break;
    case 4002: error_string="array index is out of range";
break;
    case 4003: error_string="no memory for function call stack";
break;
    case 4004: error_string="recursive stack overflow";
break;
    case 4005: error_string="not enough stack for parameter";
break;
    case 4006: error_string="no memory for parameter string";
break;
    case 4007: error_string="no memory for temp string";
break;
    case 4008: error_string="not initialized string";
break;
    case 4009: error_string="not initialized string in array";
break;
    case 4010: error_string="no memory for array\' string";
break;
    case 4011: error_string="too long string";
break;
    case 4012: error_string="remainder from zero divide";
break;
    case 4013: error_string="zero divide";
```



```
break;
    case 4014: error_string="unknown command";
break;
    case 4015: error_string="wrong jump (never generated error)";
break;
    case 4016: error_string="not initialized array";
break;
    case 4017: error_string="dll calls are not allowed";
break;
    case 4018: error_string="cannot load library";
break;
    case 4019: error_string="cannot call function";
break;
    case 4020: error_string="expert function calls are not allowed";
break;
    case 4021: error_string="not enough memory for temp string returned from
function"; break;
    case 4022: error_string="system is busy (never generated error)";
break;
    case 4050: error_string="invalid function parameters count";
break;
    case 4051: error_string="invalid function parameter value";
break;
    case 4052: error_string="string function internal error";
break;
    case 4053: error_string="some array error";
break;
    case 4054: error_string="incorrect series array using";
break;
    case 4055: error_string="custom indicator error";
break;
    case 4056: error_string="arrays are incompatible";
break;
    case 4057: error_string="global variables processing error";
break;
    case 4058: error_string="global variable not found";
break;
    case 4059: error_string="function is not allowed in testing mode";
break;
    case 4060: error_string="function is not confirmed";
break;
    case 4061: error_string="send mail error";
break;
    case 4062: error_string="string parameter expected";
break;
    case 4063: error_string="integer parameter expected";
break;
    case 4064: error_string="double parameter expected";
break;
    case 4065: error_string="array as parameter expected";
break;
    case 4066: error_string="requested history data in update state";
break;
    case 4099: error_string="end of file";
break;
    case 4100: error_string="some file error";
break;
    case 4101: error_string="wrong file name";
break;
    case 4102: error_string="too many opened files";
break;
    case 4103: error_string="cannot open file";
break;
    case 4104: error_string="incompatible access to a file";
break;
    case 4105: error_string="no order selected";
break;
```

```

        case 4106: error_string="unknown symbol";
break;
        case 4107: error_string="invalid price parameter for trade function";
break;
        case 4108: error_string="invalid ticket";
break;
        case 4109: error_string="trade is not allowed";
break;
        case 4110: error_string="longs are not allowed";
break;
        case 4111: error_string="shorts are not allowed";
break;
        case 4200: error_string="object is already exist";
break;
        case 4201: error_string="unknown object property";
break;
        case 4202: error_string="object is not exist";
break;
        case 4203: error_string="unknown object type";
break;
        case 4204: error_string="no object name";
break;
        case 4205: error_string="object coordinates error";
break;
        case 4206: error_string="no specified subwindow";
break;
        default:   error_string="unknown error";
    }
}
//-----
return(error_string);
}
//+-----+
//| convert red, green and blue values to color |
//+-----+
int RGB(int red_value,int green_value,int blue_value)
{
//---- check parameters
if(red_value<0)      red_value=0;
if(red_value>255)    red_value=255;
if(green_value<0)    green_value=0;
if(green_value>255)  green_value=255;
if(blue_value<0)     blue_value=0;
if(blue_value>255)   blue_value=255;
//----
green_value<=&8;
blue_value<=&16;
return(red_value+green_value+blue_value);
}
//+-----+
//| right comparison of 2 doubles |
//+-----+
bool CompareDoubles(double number1,double number2)
{
if(NormalizeDouble(number1-number2,8)==0) return(true);
else return(false);
}
//+-----+
//| up to 16 digits after decimal point |
//+-----+
string DoubleToStrMorePrecision(double number,int precision)
{
double rem,integer,integer2;
double DecimalArray[17]={ 1.0, 10.0, 100.0, 1000.0, 10000.0, 100000.0, 1000000.0,
10000000.0, 100000000.0,
1000000000.0, 10000000000.0, 100000000000.0, 1000000000000.0,
10000000000000.0, 100000000000000.0,
1000000000000000.0, 10000000000000000.0,
100000000000000000.0, 1000000000000000000.0,
10000000000000000000.0};
integer=int(number);
integer2=floor((number-integer)*10.0);
rem=(number-integer)-integer2/10.0;
for(int i=precision;i>0;i--)
{
integer2*=10.0;
integer+=integer2/1000000000000000000.0;
integer2-=integer*1000000000000000000.0;
}
return(strstr(integer)+DecimalArray[precision]);
}

```

```

10000000000000000.0 };
    string intstring,remstring,retstring;
    bool    isnegative=false;
    int     rem2;
//----
    if(precision<0)    precision=0;
    if(precision>16)    precision=16;
//----
    double p=DecimalArray[precision];
    if(number<0.0) { isnegative=true; number=-number; }
    integer=MathFloor(number);
    rem=MathRound((number-integer)*p);
    remstring="";
    for(int i=0; i<precision; i++)
    {
        integer2=MathFloor(rem/10);
        rem2=NormalizeDouble(rem-integer2*10,0);
        remstring=rem2+remstring;
        rem=integer2;
    }
//----
    intstring=DoubleToStr(integer,0);
    if(isnegative)    retstring="-"+intstring;
    else                retstring=intstring;
    if(precision>0)    retstring=retstring+"."+remstring;
    return(retstring);
}
//+-----+
//| convert integer to string contained input's hexadecimal notation |
//+-----+
string IntegerToHexString(int integer_number)
{
    string hex_string="00000000";
    int     value, shift=28;
//    Print("Parameter for IntegerHexToString is ",integer_number);
//----
    for(int i=0; i<8; i++)
    {
        value=(integer_number>>shift)&0x0F;
        if(value<10)    hex_string=StringSetChar(hex_string, i, value+'0');
        else                hex_string=StringSetChar(hex_string, i, (value-10)+'A');
        shift-=4;
    }
//----
    return(hex_string);
}

```

## Indicators

```

//+-----+
//|                                     CCI.mq4 |
//|                                     Copyright © 2004, MetaQuotes Software Corp. |
//|                                     http://www.metaquotes.net/ |
//+-----+
#property copyright "Copyright © 2004, MetaQuotes Software Corp."
#property link      "http://www.metaquotes.net/"

#property indicator_separate_window
#property indicator_buffers 1
#property indicator_color1 LightSeaGreen
//---- input parameters
extern int CCIPeriod=14;
//---- buffers
double CCIBuffer[];
double RelBuffer[];
double DevBuffer[];

```

```

double MovBuffer[];
//+-----+
//| Custom indicator initialization function |
//+-----+
int init()
{
    string short_name;
//---- 3 additional buffers are used for counting.
    IndicatorBuffers(4);
    SetIndexBuffer(1, RelBuffer);
    SetIndexBuffer(2, DevBuffer);
    SetIndexBuffer(3, MovBuffer);
//---- indicator lines
    SetIndexStyle(0, DRAW_LINE);
    SetIndexBuffer(0, CCIBuffer);
//---- name for DataWindow and indicator subwindow label
    short_name="CCI (" + CCIPeriod + ")";
    IndicatorShortName(short_name);
    SetIndexLabel(0, short_name);
//----
    SetIndexDrawBegin(0, CCIPeriod);
//----
    return(0);
}
//+-----+
//| Commodity Channel Index |
//+-----+
int start()
{
    int i, k, counted_bars=IndicatorCounted();
    double price, sum, mul;
    if(Bars<=CCIPeriod) return(0);
//---- initial zero
    if(counted_bars<1)
    {
        for(i=1; i<=CCIPeriod; i++) CCIBuffer[Bars-i]=0.0;
        for(i=1; i<=CCIPeriod; i++) DevBuffer[Bars-i]=0.0;
        for(i=1; i<=CCIPeriod; i++) MovBuffer[Bars-i]=0.0;
    }
//---- last counted bar will be recounted
    int limit=Bars-counted_bars;
    if(counted_bars>0) limit++;
//---- moving average
    for(i=0; i<limit; i++)
        MovBuffer[i]=iMA(NULL, 0, CCIPeriod, 0, MODE_SMA, PRICE_TYPICAL, i);
//---- standard deviations
    i=Bars-CCIPeriod+1;
    if(counted_bars>CCIPeriod-1) i=Bars-counted_bars-1;
    mul=0.015/CCIPeriod;
    while(i>=0)
    {
        sum=0.0;
        k=i+CCIPeriod-1;
        while(k>=i)
        {
            price=(High[k]+Low[k]+Close[k])/3;
            sum+=MathAbs(price-MovBuffer[i]);
            k--;
        }
        DevBuffer[i]=sum*mul;
        i--;
    }
    i=Bars-CCIPeriod+1;
    if(counted_bars>CCIPeriod-1) i=Bars-counted_bars-1;
    while(i>=0)
    {
        price=(High[i]+Low[i]+Close[i])/3;

```

```

        RelBuffer[i]=price-MovBuffer[i];
        i--;
    }
//---- cci counting
    i=Bars-CCIPeriod+1;
    if(counted_bars>CCIPeriod-1) i=Bars-counted_bars-1;
    while(i>=0)
    {
        if(DevBuffer[i]==0.0) CCIBuffer[i]=0.0;
        else CCIBuffer[i]=RelBuffer[i]/DevBuffer[i];
        i--;
    }
//----
    return(0);
}
//+-----+

```

```

//+-----+
//|                                     Ichimoku.mq4 |
//|                                     Copyright © 2004, MetaQuotes Software Corp. |
//|                                     http://www.metaquotes.net/ |
//+-----+
#property copyright "Copyright © 2004, MetaQuotes Software Corp."
#property link      "http://www.metaquotes.net/"

#property indicator_chart_window
#property indicator_buffers 7
#property indicator_color1 Red
#property indicator_color2 Blue
#property indicator_color3 SandyBrown
#property indicator_color4 Thistle
#property indicator_color5 Lime
#property indicator_color6 SandyBrown
#property indicator_color7 Thistle
//---- input parameters
extern int Tenkan=9;
extern int Kijun=26;
extern int Senkou=52;
//---- buffers
double Tenkan_Buffer[];
double Kijun_Buffer[];
double SpanA_Buffer[];
double SpanB_Buffer[];
double Chinkou_Buffer[];
double SpanA2_Buffer[];
double SpanB2_Buffer[];
//----
int a_begin;
//+-----+
//| Custom indicator initialization function |
//+-----+
int init()
{
//----
    SetIndexStyle(0,DRAW_LINE);
    SetIndexBuffer(0,Tenkan_Buffer);
    SetIndexDrawBegin(0,Tenkan-1);
    SetIndexLabel(0,"Tenkan Sen");
//----
    SetIndexStyle(1,DRAW_LINE);
    SetIndexBuffer(1,Kijun_Buffer);
    SetIndexDrawBegin(1,Kijun-1);
    SetIndexLabel(1,"Kijun Sen");
//----
    a_begin=Kijun; if(a_begin<Tenkan) a_begin=Tenkan;
    SetIndexStyle(2,DRAW_HISTOGRAM,STYLE_DOT);
    SetIndexBuffer(2,SpanA_Buffer);

```

```

SetIndexDrawBegin(2,Kijun+a_begin-1);
SetIndexShift(2,Kijun);
SetIndexLabel(2,NULL);
SetIndexStyle(5,DRAW_LINE,STYLE_DOT);
SetIndexBuffer(5,SpanA2_Buffer);
SetIndexDrawBegin(5,Kijun+a_begin-1);
SetIndexShift(5,Kijun);
SetIndexLabel(5,"Senkou Span A");
//----
SetIndexStyle(3,DRAW_HISTOGRAM,STYLE_DOT);
SetIndexBuffer(3,SpanB_Buffer);
SetIndexDrawBegin(3,Kijun+Senkou-1);
SetIndexShift(3,Kijun);
SetIndexLabel(3,NULL);
SetIndexStyle(6,DRAW_LINE,STYLE_DOT);
SetIndexBuffer(6,SpanB2_Buffer);
SetIndexDrawBegin(6,Kijun+Senkou-1);
SetIndexShift(6,Kijun);
SetIndexLabel(6,"Senkou Span B");
//----
SetIndexStyle(4,DRAW_LINE);
SetIndexBuffer(4,Chinkou_Buffer);
SetIndexShift(4,-Kijun);
SetIndexLabel(4,"Chinkou Span");
//----
return(0);
}
//+-----+
//| Ichimoku Kinko Hyo |
//+-----+
int start()
{
    int i,k;
    int counted_bars=IndicatorCounted();
    double high,low,price;
//----
    if(Bars<=Tenkan || Bars<=Kijun || Bars<=Senkou) return(0);
//---- initial zero
    if(counted_bars<1)
    {
        for(i=1;i<=Tenkan;i++) Tenkan_Buffer[Bars-i]=0;
        for(i=1;i<=Kijun;i++) Kijun_Buffer[Bars-i]=0;
        for(i=1;i<=a_begin;i++) { SpanA_Buffer[Bars-i]=0; SpanA2_Buffer[Bars-i]=0; }
        for(i=1;i<=Senkou;i++) { SpanB_Buffer[Bars-i]=0; SpanB2_Buffer[Bars-i]=0; }
    }
//---- Tenkan Sen
    i=Bars-Tenkan;
    if(counted_bars>Tenkan) i=Bars-counted_bars-1;
    while(i>=0)
    {
        high=High[i]; low=Low[i]; k=i-1+Tenkan;
        while(k>=i)
        {
            price=High[k];
            if(high<price) high=price;
            price=Low[k];
            if(low>price) low=price;
            k--;
        }
        Tenkan_Buffer[i]=(high+low)/2;
        i--;
    }
//---- Kijun Sen
    i=Bars-Kijun;
    if(counted_bars>Kijun) i=Bars-counted_bars-1;
    while(i>=0)
    {

```

```

        high=High[i]; low=Low[i]; k=i-1+Kijun;
        while(k>=i)
        {
            price=High[k];
            if(high<price) high=price;
            price=Low[k];
            if(low>price) low=price;
            k--;
        }
        Kijun_Buffer[i]=(high+low)/2;
        i--;
    }
//---- Senkou Span A
    i=Bars-a_begin+1;
    if(countedBars>a_begin-1) i=Bars-countedBars-1;
    while(i>=0)
    {
        price=(Kijun_Buffer[i]+Tenkan_Buffer[i])/2;
        SpanA_Buffer[i]=price;
        SpanA2_Buffer[i]=price;
        i--;
    }
//---- Senkou Span B
    i=Bars-Senkou;
    if(countedBars>Senkou) i=Bars-countedBars-1;
    while(i>=0)
    {
        high=High[i]; low=Low[i]; k=i-1+Senkou;
        while(k>=i)
        {
            price=High[k];
            if(high<price) high=price;
            price=Low[k];
            if(low>price) low=price;
            k--;
        }
        price=(high+low)/2;
        SpanB_Buffer[i]=price;
        SpanB2_Buffer[i]=price;
        i--;
    }
//---- Chinkou Span
    i=Bars-1;
    if(countedBars>1) i=Bars-countedBars-1;
    while(i>=0) { Chinkou_Buffer[i]=Close[i]; i--; }
//----
    return(0);
}
//+-----+

```

```

//+-----+
//|
//|                                     Custom MACD.mq4 |
//|                                     Copyright © 2004, MetaQuotes Software Corp. |
//|                                     http://www.metaquotes.net/ |
//+-----+
#property copyright "Copyright © 2004, MetaQuotes Software Corp."
#property link      "http://www.metaquotes.net/"
//---- indicator settings
#property indicator_separate_window
#property indicator_buffers 2
#property indicator_color1 Silver
#property indicator_color2 Red
//---- indicator parameters
extern int FastEMA=12;
extern int SlowEMA=26;
extern int SignalSMA=9;
//---- indicator buffers

```

```

double      ind_buffer1[];
double      ind_buffer2[];

//+-----+
//| Custom indicator initialization function |
//+-----+
int init()
{
//---- drawing settings
    SetIndexStyle(0,DRAW_HISTOGRAM,STYLE_SOLID,3);
    SetIndexDrawBegin(1,SignalSMA);
    IndicatorDigits(MarketInfo(Symbol(),MODE_DIGITS)+1);
//---- indicator buffers mapping
    if(!SetIndexBuffer(0,ind_buffer1) && !SetIndexBuffer(1,ind_buffer2))
        Print("cannot set indicator buffers!");
//---- name for DataWindow and indicator subwindow label
    IndicatorShortName("MACD("+FastEMA+", "+SlowEMA+", "+SignalSMA+"");
    SetIndexLabel(0,"MACD");
    SetIndexLabel(1,"Signal");
//---- initialization done
    return(0);
}

//+-----+
//| Moving Averages Convergence/Divergence |
//+-----+
int start()
{
    int limit;
    int counted_bars=IndicatorCounted();
//---- check for possible errors
    if(counted_bars<0) return(-1);
//---- last counted bar will be recounted
    if(counted_bars>0) counted_bars--;
    limit=Bars-counted_bars;
//---- macd counted in the 1-st buffer
    for(int i=0; i<limit; i++)
        ind_buffer1[i]=IMA(NULL,0,FastEMA,0,MODE_EMA,PRICE_CLOSE,i)-
        IMA(NULL,0,SlowEMA,0,MODE_EMA,PRICE_CLOSE,i);
//---- signal line counted in the 2-nd buffer
    for(i=0; i<limit; i++)
        ind_buffer2[i]=IMAOnArray(ind_buffer1,Bars,SignalSMA,0,MODE_SMA,i);
//---- done
    return(0);
}

```

```

//+-----+
//|                                     Momentum.mq4 |
//|                                     Copyright © 2004, MetaQuotes Software Corp. |
//|                                     http://www.metaquotes.net/ |
//+-----+
#property copyright "Copyright © 2004, MetaQuotes Software Corp."
#property link      "http://www.metaquotes.net/"

#property indicator_separate_window
#property indicator_buffers 1
#property indicator_color1 DodgerBlue
//---- input parameters
extern int MomPeriod=14;
//---- buffers
double MomBuffer[];
//+-----+
//| Custom indicator initialization function |
//+-----+
int init()
{
    string short_name;
//---- indicator line

```



```

    SetIndexStyle(0,DRAW_LINE);
    SetIndexBuffer(0,MomBuffer);
//---- name for DataWindow and indicator subwindow label
    short_name="Mom("+MomPeriod+")";
    IndicatorShortName(short_name);
    SetIndexLabel(0,short_name);
//----
    SetIndexDrawBegin(0,MomPeriod);
//----
    return(0);
}
//+-----+
//| Momentum |
//+-----+
int start()
{
    int i,counted_bars=IndicatorCounted();
//----
    if(Bars<=MomPeriod) return(0);
//---- initial zero
    if(counted_bars<1)
        for(i=1;i<=MomPeriod;i++) MomBuffer[Bars-i]=0.0;
//----
    i=Bars-MomPeriod-1;
    if(counted_bars>=MomPeriod) i=Bars-counted_bars-1;
    while(i>=0)
    {
        MomBuffer[i]=Close[i]*100/Close[i+MomPeriod];
        i--;
    }
    return(0);
}
//+-----+

```

```

//+-----+
//|                                     Custom Moving Average.mq4 |
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//+-----+
#property copyright "Copyright © 2004, MetaQuotes Software Corp."
#property link      "http://www.metaquotes.net/"

#property indicator_chart_window
#property indicator_buffers 1
#property indicator_color1 Red
//---- indicator parameters
extern int MA_Period=13;
extern int MA_Shift=0;
extern int MA_Method=0;
//---- indicator buffers
double ExtMapBuffer[];
//----
int ExtCountedBars=0;
//+-----+
//| Custom indicator initialization function |
//+-----+
int init()
{
    int draw_begin;
    string short_name;
//---- drawing settings
    SetIndexStyle(0,DRAW_LINE);
    SetIndexShift(0,MA_Shift);
    IndicatorDigits(MarketInfo(Symbol(),MODE_DIGITS));
    if(MA_Period<2) MA_Period=13;
    draw_begin=MA_Period-1;
//---- indicator short name

```

```

switch(MA_Method)
{
    case 1 : short_name="EMA("; draw_begin=0; break;
    case 2 : short_name="SMMA("; break;
    case 3 : short_name="LWMA("; break;
    default :
        MA_Method=0;
        short_name="SMA(";
}
IndicatorShortName(short_name+MA_Period+"");
SetIndexDrawBegin(0,draw_begin);
//---- indicator buffers mapping
SetIndexBuffer(0,ExtMapBuffer);
//---- initialization done
return(0);
}
//+-----+
//|
//+-----+
int start()
{
    if(Bars<=MA_Period) return(0);
    ExtCountedBars=IndicatorCounted();
//---- check for possible errors
    if (ExtCountedBars<0) return(-1);
//---- last counted bar will be recounted
    if (ExtCountedBars>0) ExtCountedBars--;
//----
    switch(MA_Method)
    {
        case 0 : sma(); break;
        case 1 : ema(); break;
        case 2 : smma(); break;
        case 3 : lwma();
    }
//---- done
    return(0);
}
//+-----+
//| Simple Moving Average
//+-----+
void sma()
{
    double sum=0;
    int i,pos=Bars-ExtCountedBars-1;
//---- initial accumulation
    if(pos<MA_Period) pos=MA_Period;
    for(i=1;i<MA_Period;i++,pos--)
        sum+=Close[pos];
//---- main calculation loop
    while(pos>=0)
    {
        sum+=Close[pos];
        ExtMapBuffer[pos]=sum/MA_Period;
        sum-=Close[pos+MA_Period-1];
        pos--;
    }
//---- zero initial bars
    if(ExtCountedBars<1)
        for(i=1;i<MA_Period;i++) ExtMapBuffer[Bars-i]=0;
}
//+-----+
//| Exponential Moving Average
//+-----+
void ema()
{
    double pr=2.0/(MA_Period+1);

```

```

    int    pos=Bars-2;
    if(ExtCountedBars>2) pos=Bars-ExtCountedBars-1;
//---- main calculation loop
    while(pos>=0)
    {
        if(pos==Bars-2) ExtMapBuffer[pos+1]=Close[pos+1];
        ExtMapBuffer[pos]=Close[pos]*pr+ExtMapBuffer[pos+1]*(1-pr);
        pos--;
    }
}
//+-----+
//| Smoothed Moving Average |
//+-----+
void smma()
{
    double sum=0;
    int    i,k,pos=Bars-ExtCountedBars+1;
//---- main calculation loop
    pos=Bars-MA_Period;
    if(pos>Bars-ExtCountedBars) pos=Bars-ExtCountedBars;
    while(pos>=0)
    {
        if(pos==Bars-MA_Period)
        {
            //---- initial accumulation
            for(i=0,k=pos;i<MA_Period;i++,k++)
            {
                sum+=Close[k];
                //---- zero initial bars
                ExtMapBuffer[k]=0;
            }
        }
        else sum=ExtMapBuffer[pos+1]*(MA_Period-1)+Close[pos];
        ExtMapBuffer[pos]=sum/MA_Period;
        pos--;
    }
}
//+-----+
//| Linear Weighted Moving Average |
//+-----+
void lwma()
{
    double sum=0.0,lsum=0.0;
    double price;
    int    i,weight=0,pos=Bars-ExtCountedBars-1;
//---- initial accumulation
    if(pos<MA_Period) pos=MA_Period;
    for(i=1;i<=MA_Period;i++,pos--)
    {
        price=Close[pos];
        sum+=price*i;
        lsum+=price;
        weight+=i;
    }
//---- main calculation loop
    pos++;
    i=pos+MA_Period;
    while(pos>=0)
    {
        ExtMapBuffer[pos]=sum/weight;
        if(pos==0) break;
        pos--;
        i--;
        price=Close[pos];
        sum=sum-lsum+price*MA_Period;
        lsum-=Close[i];
        lsum+=price;
    }
}

```

```

    }
    //---- zero initial bars
    if(ExtCountedBars<1)
        for(i=1;i<MA_Period;i++) ExtMapBuffer[Bars-i]=0;
    }
    //+-----+

```

```

//+-----+
//|                                     OsMA.mq4 |
//|                                     Copyright © 2004, MetaQuotes Software Corp. |
//|                                     http://www.metaquotes.net/ |
//+-----+
#property copyright "Copyright © 2004, MetaQuotes Software Corp."
#property link      "http://www.metaquotes.net/"
//---- indicator settings
#property indicator_separate_window
#property indicator_buffers 1
#property indicator_color1 Silver
//---- indicator parameters
extern int FastEMA=12;
extern int SlowEMA=26;
extern int SignalSMA=9;
//---- indicator buffers
double    ind_buffer1[];
double    ind_buffer2[];
double    ind_buffer3[];

//+-----+
//| Custom indicator initialization function |
//+-----+
int init()
{
    //---- 2 additional buffers are used for counting.
    IndicatorBuffers(3);
    //---- drawing settings
    SetIndexStyle(0,DRAW_HISTOGRAM,STYLE_SOLID,3);
    SetIndexDrawBegin(0,SignalSMA);
    IndicatorDigits(MarketInfo(Symbol(),MODE_DIGITS)+2);
    //---- 3 indicator buffers mapping
    if(!SetIndexBuffer(0,ind_buffer1) &&
        !SetIndexBuffer(1,ind_buffer2) &&
        !SetIndexBuffer(2,ind_buffer3))
        Print("cannot set indicator buffers!");
    //---- name for DataWindow and indicator subwindow label
    IndicatorShortName("OsMA("+FastEMA+", "+SlowEMA+", "+SignalSMA+")");
    //---- initialization done
    return(0);
}
//+-----+
//| Moving Average of Oscillator |
//+-----+
int start()
{
    int limit;
    int counted_bars=IndicatorCounted();
    //---- check for possible errors
    if(counted_bars<0) return(-1);
    //---- last counted bar will be recounted
    if(counted_bars>0) counted_bars--;
    limit=Bars-counted_bars;
    //---- macd counted in the 1-st additional buffer
    for(int i=0; i<limit; i++)
        ind_buffer2[i]=iMA(NULL,0,FastEMA,0,MODE_EMA,PRICE_CLOSE,i)-
        iMA(NULL,0,SlowEMA,0,MODE_EMA,PRICE_CLOSE,i);
    //---- signal line counted in the 2-nd additional buffer
    for(i=0; i<limit; i++)
        ind_buffer3[i]=iMAOnArray(ind_buffer2,Bars,SignalSMA,0,MODE_SMA,i);
}

```

```
//---- main loop
    for(i=0; i<limit; i++)
        ind_buffer1[i]=ind_buffer2[i]-ind_buffer3[i];
//---- done
    return(0);
}
//+-----+
```

```
//+-----+
//|                                     Parabolic.mq4 |
//|                                     Copyright © 2004, MetaQuotes Software Corp. |
//|                                     http://www.metaquotes.net/ |
//+-----+
#property copyright "Copyright © 2004, MetaQuotes Software Corp."
#property link      "http://www.metaquotes.net/"

#property indicator_chart_window
#property indicator_buffers 1
#property indicator_color1 Lime
//---- input parameters
extern double      Step=0.02;
extern double      Maximum=0.2;
//---- buffers
double SarBuffer[];
//----
int      save_lastreverse;
bool     save_dirlong;
double   save_start;
double   save_last_high;
double   save_last_low;
double   save_ep;
double   save_sar;
//+-----+
//| Custom indicator initialization function |
//+-----+
int init()
{
//---- indicators
    IndicatorDigits(Digits);
    SetIndexStyle(0,DRAW_ARROW);
    SetIndexArrow(0,159);
    SetIndexBuffer(0,SarBuffer);
//----
    return(0);
}
//+-----+
//|                                     |
//+-----+
void SaveLastReverse(int last,int dir,double start,double low,double high,double
ep,double sar)
{
    save_lastreverse=last;
    save_dirlong=dir;
    save_start=start;
    save_last_low=low;
    save_last_high=high;
    save_ep=ep;
    save_sar=sar;
}
//+-----+
//| Parabolic Sell And Reverse system |
//+-----+
int start()
{
    static bool first=true;
    bool     dirlong;
    double   start,last_high,last_low;
```

```

double ep,sar,price_low,price_high,price;
int i,counted_bars=IndicatorCounted();
//----
if(Bars<3) return(0);
//---- initial settings
i=Bars-2;
if(counted_bars==0 || first)
{
first=false;
dirlong=true;
start=Step;
last_high=-10000000.0;
last_low=10000000.0;
while(i>0)
{
save_lastreverse=i;
price_low=Low[i];
if(last_low>price_low) last_low=price_low;
price_high=High[i];
if(last_high<price_high) last_high=price_high;
if(price_high>High[i+1] && price_low>Low[i+1]) break;
if(price_high<High[i+1] && price_low<Low[i+1]) { dirlong=false; break; }
i--;
}
//---- initial zero
int k=i;
while(k<Bars)
{
SarBuffer[k]=0.0;
k++;
}
//---- check further
if(dirlong) { SarBuffer[i]=Low[i+1]; ep=High[i]; }
else { SarBuffer[i]=High[i+1]; ep=Low[i]; }
i--;
}
else
{
i=save_lastreverse+1;
start=save_start;
dirlong=save_dirlong;
last_high=save_last_high;
last_low=save_last_low;
ep=save_ep;
sar=save_sar;
}
//----
while(i>=0)
{
price_low=Low[i];
price_high=High[i];
//--- check for reverse
if(dirlong && price_low<SarBuffer[i+1])
{
SaveLastReverse(i,true,start,price_low,last_high,ep,sar);
start=Step; dirlong=false;
ep=price_low; last_low=price_low;
SarBuffer[i]=last_high;
i--;
continue;
}
if(!dirlong && price_high>SarBuffer[i+1])
{
SaveLastReverse(i,false,start,last_low,price_high,ep,sar);
start=Step; dirlong=true;
ep=price_high; last_high=price_high;
SarBuffer[i]=last_low;
}
}

```

```

        i--;
        continue;
    }
    //---
    price=SarBuffer[i+1];
    sar=price+start*(ep-price);
    if(dirlong)
    {
        if(ep<price_high && (start+Step)<=Maximum) start+=Step;
        if(price_high<High[i+1] && i==Bars-2) sar=SarBuffer[i+1];

        price=Low[i+1];
        if(sar>price) sar=price;
        price=Low[i+2];
        if(sar>price) sar=price;
        if(sar>price_low)
        {
            SaveLastReverse(i,true,start,price_low,last_high,ep,sar);
            start=Step; dirlong=false; ep=price_low;
            last_low=price_low;
            SarBuffer[i]=last_high;
            i--;
            continue;
        }
        if(ep<price_high) { last_high=price_high; ep=price_high; }
    }
    else
    {
        if(ep>price_low && (start+Step)<=Maximum) start+=Step;
        if(price_low<Low[i+1] && i==Bars-2) sar=SarBuffer[i+1];

        price=High[i+1];
        if(sar<price) sar=price;
        price=High[i+2];
        if(sar<price) sar=price;
        if(sar<price_high)
        {
            SaveLastReverse(i,false,start,last_low,price_high,ep,sar);
            start=Step; dirlong=true; ep=price_high;
            last_high=price_high;
            SarBuffer[i]=last_low;
            i--;
            continue;
        }
        if(ep>price_low) { last_low=price_low; ep=price_low; }
    }
    SarBuffer[i]=sar;
    i--;
}
// sar=SarBuffer[0];
// price=iSAR(NULL,0,Step,Maximum,0);
// if(sar!=price) Print("custom=",sar," SAR=",price," counted=",countedBars);
// if(sar==price) Print("custom=",sar," SAR=",price," counted=",countedBars);
//----
return(0);
}
//+-----+

```

```

//+-----+
//|
//|                                     RSI.mq4 |
//|                                     Copyright © 2004, MetaQuotes Software Corp. |
//|                                     http://www.metaquotes.net/ |
//+-----+
#property copyright "Copyright © 2004, MetaQuotes Software Corp."
#property link      "http://www.metaquotes.net/"

#property indicator_separate_window

```

```

#property indicator_minimum 0
#property indicator_maximum 100
#property indicator_buffers 1
#property indicator_color1 DodgerBlue
//---- input parameters
extern int RSIPeriod=14;
//---- buffers
double RSIBuffer[];
double PosBuffer[];
double NegBuffer[];
//+-----+
//| Custom indicator initialization function |
//+-----+
int init()
{
    string short_name;
//---- 2 additional buffers are used for counting.
    IndicatorBuffers(3);
    SetIndexBuffer(1,PosBuffer);
    SetIndexBuffer(2,NegBuffer);
//---- indicator line
    SetIndexStyle(0,DRAW_LINE);
    SetIndexBuffer(0,RSIBuffer);
//---- name for DataWindow and indicator subwindow label
    short_name="RSI("+RSIPeriod+")";
    IndicatorShortName(short_name);
    SetIndexLabel(0,short_name);
//----
    SetIndexDrawBegin(0,RSIPeriod);
//----
    return(0);
}
//+-----+
//| Relative Strength Index |
//+-----+
int start()
{
    int i,counted_bars=IndicatorCounted();
    double rel,negative,positive;
//----
    if(Bars<=RSIPeriod) return(0);
//---- initial zero
    if(counted_bars<1)
        for(i=1;i<=RSIPeriod;i++) RSIBuffer[Bars-i]=0.0;
//----
    i=Bars-RSIPeriod-1;
    if(counted_bars>=RSIPeriod) i=Bars-counted_bars-1;
    while(i>=0)
    {
        double sumn=0.0,sump=0.0;
        if(i==Bars-RSIPeriod-1)
        {
            int k=Bars-2;
            //---- initial accumulation
            while(k>=i)
            {
                rel=Close[k]-Close[k+1];
                if(rel>0) sump+=rel;
                else sumn-=rel;
                k--;
            }
            positive=sump/RSIPeriod;
            negative=sumn/RSIPeriod;
        }
        else
        {
            //---- smoothed moving average

```



```

        rel=Close[i]-Close[i+1];
        if(rel>0) sump=rel;
        else      sumn=-rel;
        positive=(PosBuffer[i+1]*(RSIPeriod-1)+sump)/RSIPeriod;
        negative=(NegBuffer[i+1]*(RSIPeriod-1)+sumn)/RSIPeriod;
    }
    PosBuffer[i]=positive;
    NegBuffer[i]=negative;
    if(negative==0.0) RSIBuffer[i]=0.0;
    else RSIBuffer[i]=100.0-100.0/(1+positive/negative);
    i--;
}
//----
return(0);
}
//+-----+

```

```

//+-----+
//|                                     Stochastic.mq4 |
//|                                     Copyright © 2004, MetaQuotes Software Corp. |
//|                                     http://www.metaquotes.net/ |
//+-----+
#property copyright "Copyright © 2004, MetaQuotes Software Corp."
#property link      "http://www.metaquotes.net/"

#property indicator_separate_window
#property indicator_minimum 0
#property indicator_maximum 100
#property indicator_buffers 2
#property indicator_color1 LightSeaGreen
#property indicator_color2 Red
//---- input parameters
extern int KPeriod=5;
extern int DPeriod=3;
extern int Slowing=3;
//---- buffers
double MainBuffer[];
double SignalBuffer[];
double HighesBuffer[];
double LowesBuffer[];
//----
int draw_begin1=0;
int draw_begin2=0;
//+-----+
//| Custom indicator initialization function |
//+-----+
int init()
{
    string short_name;
    //---- 2 additional buffers are used for counting.
    IndicatorBuffers(4);
    SetIndexBuffer(2, HighesBuffer);
    SetIndexBuffer(3, LowesBuffer);
    //---- indicator lines
    SetIndexStyle(0,DRAW_LINE);
    SetIndexBuffer(0, MainBuffer);
    SetIndexStyle(1,DRAW_LINE);
    SetIndexBuffer(1, SignalBuffer);
    //---- name for DataWindow and indicator subwindow label
    short_name="Sto("+KPeriod+", "+DPeriod+", "+Slowing+")";
    IndicatorShortName(short_name);
    SetIndexLabel(0,short_name);
    SetIndexLabel(1,"Signal");
    //----
    draw_begin1=KPeriod+Slowing;
    draw_begin2=draw_begin1+DPeriod;
    SetIndexDrawBegin(0,draw_begin1);
}

```

```

    SetIndexDrawBegin(1,draw_begin2);
//----
    return(0);
}
//+-----+
//| Stochastic oscillator |
//+-----+
int start()
{
    int i,k;
    int counted_bars=IndicatorCounted();
    double price;
//----
    if(Bars<=draw_begin2) return(0);
//---- initial zero
    if(counted_bars<1)
    {
        for(i=1;i<=draw_begin1;i++) MainBuffer[Bars-i]=0;
        for(i=1;i<=draw_begin2;i++) SignalBuffer[Bars-i]=0;
    }
//---- minimums counting
    i=Bars-KPeriod;
    if(counted_bars>KPeriod) i=Bars-counted_bars-1;
    while(i>=0)
    {
        double min=1000000;
        k=i+KPeriod-1;
        while(k>=i)
        {
            price=Low[k];
            if(min>price) min=price;
            k--;
        }
        LowesBuffer[i]=min;
        i--;
    }
//---- maximums counting
    i=Bars-KPeriod;
    if(counted_bars>KPeriod) i=Bars-counted_bars-1;
    while(i>=0)
    {
        double max=-1000000;
        k=i+KPeriod-1;
        while(k>=i)
        {
            price=High[k];
            if(max<price) max=price;
            k--;
        }
        HighesBuffer[i]=max;
        i--;
    }
//---- %K line
    i=Bars-draw_begin1;
    if(counted_bars>draw_begin1) i=Bars-counted_bars-1;
    while(i>=0)
    {
        double sumlow=0.0;
        double sumhigh=0.0;
        for(k=(i+Slowing-1);k>=i;k--)
        {
            sumlow+=Close[k]-LowesBuffer[k];
            sumhigh+=HighesBuffer[k]-LowesBuffer[k];
        }
        if(sumhigh==0.0) MainBuffer[i]=100.0;
        else MainBuffer[i]=sumlow/sumhigh*100;
        i--;
    }
}

```

```

    }
    //---- last counted bar will be recounted
    if(counted_bars>0) counted_bars--;
    int limit=Bars-counted_bars;
    //---- signal line is simple moving average
    for(i=0; i<limit; i++)
        SignalBuffer[i]=iMAOnArray(MainBuffer,Bars,DPeriod,0,MODE_SMA,i);
    //----
    return(0);
}
//+-----+

```

```

//+-----+
//|                                     Custom Moving Average.mq4 |
//|                                     Copyright © 2005, MetaQuotes Software Corp. |
//|                                     http://www.metaquotes.net/ |
//+-----+
#property copyright "Copyright © 2005, MetaQuotes Software Corp."
#property link      "http://www.metaquotes.net/"

#property indicator_chart_window
#property indicator_buffers 1
#property indicator_color1 Red
//---- indicator parameters
extern int ExtDepth=12;
extern int ExtDeviation=5;
extern int ExtBackstep=3;
//---- indicator buffers
double ExtMapBuffer[];
double ExtMapBuffer2[];

//+-----+
//| Custom indicator initialization function |
//+-----+
int init()
{
    IndicatorBuffers(2);
    //---- drawing settings
    SetIndexStyle(0,DRAW_SECTION);
    //---- indicator buffers mapping
    SetIndexBuffer(0,ExtMapBuffer);
    SetIndexBuffer(1,ExtMapBuffer2);
    SetIndexEmptyValue(0,0.0);
    ArraySetAsSeries(ExtMapBuffer,true);
    ArraySetAsSeries(ExtMapBuffer2,true);
    //---- indicator short name
    IndicatorShortName("ZigZag("+ExtDepth+", "+ExtDeviation+", "+ExtBackstep+")");
    //---- initialization done
    return(0);
}
//+-----+
//|                                     |
//+-----+
int start()
{
    int shift, back, lasthighpos, lastlowpos;
    double val, res;
    double curlow, curhigh, lasthigh, lastlow;

    for(shift=Bars-ExtDepth; shift>=0; shift--)
    {
        val=Low[Lowest(NULL,0,MODE_LOW,ExtDepth,shift)];
        if(val==lastlow) val=0.0;
        else
        {
            lastlow=val;
            if((Low[shift]-val)>(ExtDeviation*Point)) val=0.0;

```

```

        else
        {
            for(back=1; back<=ExtBackstep; back++)
            {
                res=ExtMapBuffer[shift+back];
                if((res!=0)&&(res>val)) ExtMapBuffer[shift+back]=0.0;
            }
        }
    }
    ExtMapBuffer[shift]=val;
    //--- high
    val=High[Highest(NULL,0,MODE_HIGH,ExtDepth,shift)];
    if(val==lasthigh) val=0.0;
    else
    {
        lasthigh=val;
        if((val-High[shift])>(ExtDeviation*Point)) val=0.0;
        else
        {
            for(back=1; back<=ExtBackstep; back++)
            {
                res=ExtMapBuffer2[shift+back];
                if((res!=0)&&(res<val)) ExtMapBuffer2[shift+back]=0.0;
            }
        }
    }
    ExtMapBuffer2[shift]=val;
}

// final cutting
lasthigh=-1; lasthighpos=-1;
lastlow=-1; lastlowpos=-1;

for(shift=Bars-ExtDepth; shift>=0; shift--)
{
    curlow=ExtMapBuffer[shift];
    curhigh=ExtMapBuffer2[shift];
    if((curlow==0)&&(curhigh==0)) continue;
    //---
    if(curhigh!=0)
    {
        if(lasthigh>0)
        {
            if(lasthigh<curhigh) ExtMapBuffer2[lasthighpos]=0;
            else ExtMapBuffer2[shift]=0;
        }
        //---
        if(lasthigh<curhigh || lasthigh<0)
        {
            lasthigh=curhigh;
            lasthighpos=shift;
        }
        lastlow=-1;
    }
    //----
    if(curlow!=0)
    {
        if(lastlow>0)
        {
            if(lastlow>curlow) ExtMapBuffer[lastlowpos]=0;
            else ExtMapBuffer[shift]=0;
        }
        //---
        if((curlow<lastlow) || (lastlow<0))
        {
            lastlow=curlow;
            lastlowpos=shift;
        }
    }
}

```

```

    }
    lasthigh=-1;
}

}

for(shift=Bars-1; shift>=0; shift--)
{
    if(shift>=Bars-ExtDepth) ExtMapBuffer[shift]=0.0;
    else
    {
        res=ExtMapBuffer2[shift];
        if(res!=0.0) ExtMapBuffer[shift]=res;
    }
}
}

```

```

//+-----+
//|                                     Accelerator.mq4 |
//|                                     Copyright © 2005, MetaQuotes Software Corp. |
//|                                     http://www.metaquotes.net/ |
//+-----+
#property copyright "Copyright © 2005, MetaQuotes Software Corp."
#property link      "http://www.metaquotes.net/"
//---- indicator settings
#property indicator_separate_window
#property indicator_buffers 3
#property indicator_color1 Black
#property indicator_color2 Green
#property indicator_color3 Red
//---- indicator buffers
double ExtBuffer0[];
double ExtBuffer1[];
double ExtBuffer2[];
double ExtBuffer3[];
double ExtBuffer4[];
//+-----+
//| Custom indicator initialization function |
//+-----+
int init()
{
//---- 2 additional buffers are used for counting.
    IndicatorBuffers(5);
//---- drawing settings
    SetIndexStyle(0,DRAW_NONE);
    SetIndexStyle(1,DRAW_HISTOGRAM);
    SetIndexStyle(2,DRAW_HISTOGRAM);
    IndicatorDigits(Digits+2);
    SetIndexDrawBegin(0,38);
    SetIndexDrawBegin(1,38);
    SetIndexDrawBegin(2,38);
//---- 4 indicator buffers mapping
    SetIndexBuffer(0,ExtBuffer0);
    SetIndexBuffer(1,ExtBuffer1);
    SetIndexBuffer(2,ExtBuffer2);
    SetIndexBuffer(3,ExtBuffer3);
    SetIndexBuffer(4,ExtBuffer4);
//---- name for DataWindow and indicator subwindow label
    IndicatorShortName("AC");
    SetIndexLabel(1,NULL);
    SetIndexLabel(2,NULL);
//---- initialization done
    return(0);
}
//+-----+
//| Accelerator/Decelerator Oscillator |
//+-----+
int start()

```

```

{
    int    limit;
    int    counted_bars=IndicatorCounted();
    double prev,current;
    //---- last counted bar will be recounted
    if(counted_bars>0) counted_bars--;
    limit=Bars-counted_bars;
    //---- macd counted in the 1-st additional buffer
    for(int i=0; i<limit; i++)
        ExtBuffer3[i]=iMA(NULL,0,5,0,MODE_SMA,PRICE_MEDIAN,i)-
iMA(NULL,0,34,0,MODE_SMA,PRICE_MEDIAN,i);
    //---- signal line counted in the 2-nd additional buffer
    for(i=0; i<limit; i++)
        ExtBuffer4[i]=iMAOnArray(ExtBuffer3,Bars,5,0,MODE_SMA,i);
    //---- dispatch values between 2 buffers
    bool up=true;
    for(i=limit-1; i>=0; i--)
    {
        current=ExtBuffer3[i]-ExtBuffer4[i];
        prev=ExtBuffer3[i+1]-ExtBuffer4[i+1];
        if(current>prev) up=true;
        if(current<prev) up=false;
        if(!up)
        {
            ExtBuffer2[i]=current;
            ExtBuffer1[i]=0.0;
        }
        else
        {
            ExtBuffer1[i]=current;
            ExtBuffer2[i]=0.0;
        }
        ExtBuffer0[i]=current;
    }
    //---- done
    return(0);
}

```

```

//+-----+
//|                                     ADX.mq4 |
//|                                     Copyright © 2004, MetaQuotes Software Corp. |
//|                                     http://www.metaquotes.net/ |
//+-----+
#property copyright "Copyright © 2004, MetaQuotes Software Corp."
#property link      "http://www.metaquotes.net/"

#property indicator_separate_window
#property indicator_buffers 3
#property indicator_color1 LightSeaGreen
#property indicator_color2 YellowGreen
#property indicator_color3 Wheat
//---- input parameters
extern int ADXPeriod=14;
//---- buffers
double ADXBuffer[];
double PlusDiBuffer[];
double MinusDiBuffer[];
double PlusSdiBuffer[];
double MinusSdiBuffer[];
double TempBuffer[];
//+-----+
//| Custom indicator initialization function |
//+-----+
int init()
{
    //---- 3 additional buffers are used for counting.
    IndicatorBuffers(6);
}

```

```

//---- indicator buffers
SetIndexBuffer(0,ADXBuffer);
SetIndexBuffer(1,PlusDiBuffer);
SetIndexBuffer(2,MinusDiBuffer);
SetIndexBuffer(3,PlusSdiBuffer);
SetIndexBuffer(4,MinusSdiBuffer);
SetIndexBuffer(5,TempBuffer);
//---- name for DataWindow and indicator subwindow label
IndicatorShortName("ADX("+ADXPeriod+"");
SetIndexLabel(0,"ADX");
SetIndexLabel(1,"+DI");
SetIndexLabel(2,"-DI");
//----
SetIndexDrawBegin(0,ADXPeriod);
SetIndexDrawBegin(1,ADXPeriod);
SetIndexDrawBegin(2,ADXPeriod);
//----
return(0);
}
//+-----+
//| Average Directional Movement Index |
//+-----+
int start()
{
double pdm,mdm,tr;
double price_high,price_low;
int starti,i,counted_bars=IndicatorCounted();
//----
i=Bars-2;
PlusSdiBuffer[i+1]=0;
MinusSdiBuffer[i+1]=0;
if(counted_bars>=i) i=Bars-counted_bars-1;
starti=i;
//----
while(i>=0)
{
price_low=Low[i];
price_high=High[i];
//----
pdm=price_high-High[i+1];
mdm=Low[i+1]-price_low;
if(pdm<0) pdm=0; // +DM
if(mdm<0) mdm=0; // -DM
if(pdm==mdm) { pdm=0; mdm=0; }
else if(pdm<mdm) pdm=0;
else if(mdm<pdm) mdm=0;
//---- âû÷èñëÿâì èñòëííüé èíòâðââè
double num1=MathAbs(price_high-price_low);
double num2=MathAbs(price_high-Close[i+1]);
double num3=MathAbs(price_low-Close[i+1]);
tr=MathMax(num1,num2);
tr=MathMax(tr,num3);
//---- counting plus/minus direction
if(tr==0) { PlusSdiBuffer[i]=0; MinusSdiBuffer[i]=0; }
else { PlusSdiBuffer[i]=100.0*pdm/tr; MinusSdiBuffer[i]=100.0*mdm/tr; }
//----
i--;
}
//---- last counted bar will be recounted
if(counted_bars>0) counted_bars--;
int limit=Bars-counted_bars;
//---- apply EMA to +DI
for(i=0; i<=limit; i++)
PlusDiBuffer[i]=iMAOnArray(PlusSdiBuffer,Bars,ADXPeriod,0,MODE_EMA,i);
//---- apply EMA to -DI
for(i=0; i<=limit; i++)
MinusDiBuffer[i]=iMAOnArray(MinusSdiBuffer,Bars,ADXPeriod,0,MODE_EMA,i);

```

```

//---- Directional Movement (DX)
i=Bars-2;
TempBuffer[i+1]=0;
i=starti;
while(i>=0)
{
    double div=MathAbs(PlusDiBuffer[i]+MinusDiBuffer[i]);
    if(div==0.00) TempBuffer[i]=0;
    else TempBuffer[i]=100*(MathAbs(PlusDiBuffer[i]-MinusDiBuffer[i])/div);
    i--;
}
//---- ADX is exponential moving average on DX
for(i=0; i<limit; i++)
    ADXBuffer[i]=iMAOnArray(TempBuffer,Bars,ADXPeriod,0,MODE_EMA,i);
//----
return(0);
}
//+-----+

```

```

//+-----+
//|
//| Alligator.mq4 |
//| Copyright © 2004, MetaQuotes Software Corp. |
//| http://www.metaquotes.net/ |
//+-----+
#property copyright "Copyright © 2004, MetaQuotes Software Corp."
#property link "http://www.metaquotes.net/"

#property indicator_chart_window
#property indicator_buffers 3
#property indicator_color1 Blue
#property indicator_color2 Red
#property indicator_color3 Lime
//---- input parameters
extern int JawsPeriod=13;
extern int JawsShift=8;
extern int TeethPeriod=8;
extern int TeethShift=5;
extern int LipsPeriod=5;
extern int LipsShift=3;
//---- indicator buffers
double ExtBlueBuffer[];
double ExtRedBuffer[];
double ExtLimeBuffer[];

//+-----+
//| Custom indicator initialization function |
//+-----+
int init()
{
    //---- line shifts when drawing
    SetIndexShift(0,JawsShift);
    SetIndexShift(1,TeethShift);
    SetIndexShift(2,LipsShift);
    //---- first positions skipped when drawing
    SetIndexDrawBegin(0,JawsShift+JawsPeriod);
    SetIndexDrawBegin(1,TeethShift+TeethPeriod);
    SetIndexDrawBegin(2,LipsShift+LipsPeriod);
    //---- 3 indicator buffers mapping
    SetIndexBuffer(0,ExtBlueBuffer);
    SetIndexBuffer(1,ExtRedBuffer);
    SetIndexBuffer(2,ExtLimeBuffer);
    //---- drawing settings
    SetIndexStyle(0,DRAW_LINE);
    SetIndexStyle(1,DRAW_LINE);
    SetIndexStyle(2,DRAW_LINE);
    //---- index labels
    SetIndexLabel(0,"Gator Jaws");
}

```



```

    SetIndexLabel(1,"Gator Teeth");
    SetIndexLabel(2,"Gator Lips");
//---- initialization done
    return(0);
}
//+-----+
//| Bill Williams' Alligator |
//+-----+
int start()
{
    int limit;
    int counted_bars=IndicatorCounted();
//---- check for possible errors
    if(counted_bars<0) return(-1);
//---- last counted bar will be recounted
    if(counted_bars>0) counted_bars--;
    limit=Bars-counted_bars;
//---- main loop
    for(int i=0; i<limit; i++)
    {
        //---- ma_shift set to 0 because SetIndexShift called above
        ExtBlueBuffer[i]=iMA(NULL,0,JawsPeriod,0,MODE_SMMA,PRICE_MEDIAN,i);
        ExtRedBuffer[i]=iMA(NULL,0,TeethPeriod,0,MODE_SMMA,PRICE_MEDIAN,i);
        ExtLimeBuffer[i]=iMA(NULL,0,LipsPeriod,0,MODE_SMMA,PRICE_MEDIAN,i);
    }
//---- done
    return(0);
}
//+-----+

```

```

//+-----+
//|                                     Awesome.mq4 |
//|                                     Copyright © 2005, MetaQuotes Software Corp. |
//|                                     http://www.metaquotes.net/ |
//+-----+
#property copyright "Copyright © 2005, MetaQuotes Software Corp."
#property link      "http://www.metaquotes.net/"
//---- indicator settings
#property indicator_separate_window
#property indicator_buffers 3
#property indicator_color1  Black
#property indicator_color2  Green
#property indicator_color3  Red

//---- indicator buffers
double      ExtBuffer0[];
double      ExtBuffer1[];
double      ExtBuffer2[];

//+-----+
//| Custom indicator initialization function |
//+-----+
int init()
{
    //---- drawing settings
    SetIndexStyle(0,DRAW_NONE);
    SetIndexStyle(1,DRAW_HISTOGRAM);
    SetIndexStyle(2,DRAW_HISTOGRAM);
    IndicatorDigits(Digits+1);
    SetIndexDrawBegin(0,34);
    SetIndexDrawBegin(1,34);
    SetIndexDrawBegin(2,34);
//---- 3 indicator buffers mapping
    SetIndexBuffer(0,ExtBuffer0);
    SetIndexBuffer(1,ExtBuffer1);
    SetIndexBuffer(2,ExtBuffer2);
//---- name for DataWindow and indicator subwindow label

```

```

IndicatorShortName("AO");
SetIndexLabel(1,NULL);
SetIndexLabel(2,NULL);
//---- initialization done
return(0);
}
//+-----+
//| Awesome Oscillator |
//+-----+
int start()
{
int limit;
int counted_bars=IndicatorCounted();
double prev,current;
//---- last counted bar will be recounted
if(counted_bars>0) counted_bars--;
limit=Bars-counted_bars;
//---- macd
for(int i=0; i<limit; i++)
ExtBuffer0[i]=IMA(NULL,0,5,0,MODE_SMA,PRICE_MEDIAN,i)-
IMA(NULL,0,34,0,MODE_SMA,PRICE_MEDIAN,i);
//---- dispatch values between 2 buffers
bool up=true;
for(i=limit-1; i>=0; i--)
{
current=ExtBuffer0[i];
prev=ExtBuffer0[i+1];
if(current>prev) up=true;
if(current<prev) up=false;
if(!up)
{
ExtBuffer2[i]=current;
ExtBuffer1[i]=0.0;
}
else
{
ExtBuffer1[i]=current;
ExtBuffer2[i]=0.0;
}
}
//---- done
return(0);
}

```

## Samples Includes

```

#import "ExpertSample.dll"
int GetIntValue(int);
double GetDoubleValue(double);
string GetStringValue(string);
double GetArrayItemValue(double arr[],int,int);
bool SetArrayItemValue(double& arr[],int,int,double);
double GetRatesItemValue(double rates[][6],int,int,int);
int SortStringArray(string& arr[],int);
int ProcessStringArray(string& arr[],int);

```

## Samples Indicators

```

//+-----+
//| ATR.mq4 |
//| Copyright © 2005, MetaQuotes Software Corp. |
//| http://www.metaquotes.net/ |
//+-----+
#property copyright "Copyright © 2005, MetaQuotes Software Corp."

```

```

#property link      "http://www.metaquotes.net/"

#property indicator_separate_window
#property indicator_buffers 1
#property indicator_color1 DodgerBlue
//---- input parameters
extern int AtrPeriod=14;
//---- buffers
double AtrBuffer[];
double TempBuffer[];
//+-----+
//| Custom indicator initialization function |
//+-----+
int init()
{
    string short_name;
//---- 1 additional buffer used for counting.
    IndicatorBuffers(2);
//---- indicator line
    SetIndexStyle(0,DRAW_LINE);
    SetIndexBuffer(0,AtrBuffer);
    SetIndexBuffer(1,TempBuffer);
//---- name for DataWindow and indicator subwindow label
    short_name="ATR("+AtrPeriod+")";
    IndicatorShortName(short_name);
    SetIndexLabel(0,short_name);
//----
    SetIndexDrawBegin(0,AtrPeriod);
//----
    return(0);
}
//+-----+
//| Average True Range |
//+-----+
int start()
{
    int i,countedBars=IndicatorCounted();
//----
    if(Bars<=AtrPeriod) return(0);
//---- initial zero
    if(countedBars<1)
        for(i=1;i<=AtrPeriod;i++) AtrBuffer[Bars-i]=0.0;
//----
    i=Bars-countedBars-1;
    while(i>=0)
    {
        double high=High[i];
        double low =Low[i];
        if(i==Bars-1) TempBuffer[i]=high-low;
        else
        {
            double prevclose=Close[i+1];
            TempBuffer[i]=MathMax(high,prevclose)-MathMin(low,prevclose);
        }
        i--;
    }
//----
    if(countedBars>0) countedBars--;
    int limit=Bars-countedBars;
    for(i=0; i<limit; i++)
        AtrBuffer[i]=iMAOnArray(TempBuffer,Bars,AtrPeriod,0,MODE_SMA,i);
//----
    return(0);
}
//+-----+

```

```

//+-----+

```

```

//|                                     Bands.mq4 |
//|                                     Copyright © 2005, MetaQuotes Software Corp. |
//|                                     http://www.metaquotes.net/ |
//+-----+
#property copyright "Copyright © 2005, MetaQuotes Software Corp."
#property link      "http://www.metaquotes.net/"

#property indicator_chart_window
#property indicator_buffers 3
#property indicator_color1 LightSeaGreen
#property indicator_color2 LightSeaGreen
#property indicator_color3 LightSeaGreen
//---- indicator parameters
extern int      BandsPeriod=20;
extern int      BandsShift=0;
extern double   BandsDeviations=2.0;
//---- buffers
double MovingBuffer[];
double UpperBuffer[];
double LowerBuffer[];
//+-----+
//| Custom indicator initialization function |
//+-----+
int init()
{
//---- indicators
    SetIndexStyle(0,DRAW_LINE);
    SetIndexBuffer(0,MovingBuffer);
    SetIndexStyle(1,DRAW_LINE);
    SetIndexBuffer(1,UpperBuffer);
    SetIndexStyle(2,DRAW_LINE);
    SetIndexBuffer(2,LowerBuffer);
//----
    SetIndexDrawBegin(0,BandsPeriod+BandsShift);
    SetIndexDrawBegin(1,BandsPeriod+BandsShift);
    SetIndexDrawBegin(2,BandsPeriod+BandsShift);
//----
    return(0);
}
//+-----+
//| Bollinger Bands |
//+-----+
int start()
{
    int      i,k,counted_bars=IndicatorCounted();
    double deviation;
    double sum,oldval,newres;
//----
    if(Bars<=BandsPeriod) return(0);
//---- initial zero
    if(counted_bars<1)
        for(i=1;i<=BandsPeriod;i++)
        {
            MovingBuffer[Bars-i]=EMPTY_VALUE;
            UpperBuffer[Bars-i]=EMPTY_VALUE;
            LowerBuffer[Bars-i]=EMPTY_VALUE;
        }
//----
    int limit=Bars-counted_bars;
    if(counted_bars>0) limit++;
    for(i=0; i<limit; i++)
        MovingBuffer[i]=iMA(NULL,0,BandsPeriod,BandsShift,MODE_SMA,PRICE_CLOSE,i);
//----
    i=Bars-BandsPeriod+1;
    if(counted_bars>BandsPeriod-1) i=Bars-counted_bars-1;
    while(i>=0)
    {

```

```

        sum=0.0;
        k=i+BandsPeriod-1;
        oldval=MovingBuffer[i];
        while(k>=i)
        {
            newres=Close[k]-oldval;
            sum+=newres*newres;
            k--;
        }
        deviation=BandsDeviations*MathSqrt(sum/BandsPeriod);;
        UpperBuffer[i]=oldval+deviation;
        LowerBuffer[i]=oldval-deviation;
        i--;
    }
//----
    return(0);
}
//+-----+

```

```

//+-----+
//|                                     Bears.mq4 |
//|                                     Copyright © 2005, MetaQuotes Software Corp. |
//|                                     http://www.metaquotes.net/ |
//+-----+
#property copyright "Copyright © 2005, MetaQuotes Software Corp."
#property link      "http://www.metaquotes.net/"

#property indicator_separate_window
#property indicator_buffers 1
#property indicator_color1 Silver
//---- input parameters
extern int BearsPeriod=13;
//---- buffers
double BearsBuffer[];
double TempBuffer[];
//+-----+
//| Custom indicator initialization function |
//+-----+
int init()
{
    string short_name;
//---- 1 additional buffer used for counting.
    IndicatorBuffers(2);
    IndicatorDigits(Digits);
//---- indicator line
    SetIndexStyle(0,DRAW_HISTOGRAM);
    SetIndexBuffer(0,BearsBuffer);
    SetIndexBuffer(1,TempBuffer);
//---- name for DataWindow and indicator subwindow label
    short_name="Bears("+BearsPeriod+")";
    IndicatorShortName(short_name);
    SetIndexLabel(0,short_name);
//----
    return(0);
}
//+-----+
//| Bears Power |
//+-----+
int start()
{
    int i,countedBars=IndicatorCounted();
//----
    if(Bars<=BearsPeriod) return(0);
//----
    int limit=Bars-countedBars;
    if(countedBars>0) limit++;
    for(i=0; i<limit; i++)

```

```

TempBuffer[i]=iMA(NULL,0,BearsPeriod,0,MODE_EMA,PRICE_CLOSE,i);
//----
i=Bars-counted_bars-1;
while(i>=0)
{
    BearsBuffer[i]=Low[i]-TempBuffer[i];
    i--;
}
//----
return(0);
}
//+-----+

```

```

//+-----+
//|
//| Bulls.mq4 |
//| Copyright © 2005, MetaQuotes Software Corp. |
//| http://www.metaquotes.net/ |
//+-----+
#property copyright "Copyright © 2005, MetaQuotes Software Corp."
#property link "http://www.metaquotes.net/"

#property indicator_separate_window
#property indicator_buffers 1
#property indicator_color1 Silver
//---- input parameters
extern int BullsPeriod=13;
//---- buffers
double BullsBuffer[];
double TempBuffer[];
//+-----+
//| Custom indicator initialization function |
//+-----+
int init()
{
    string short_name;
//---- 1 additional buffer used for counting.
    IndicatorBuffers(2);
    IndicatorDigits(Digits);
//---- indicator line
    SetIndexStyle(0,DRAW_HISTOGRAM);
    SetIndexBuffer(0,BullsBuffer);
    SetIndexBuffer(1,TempBuffer);
//---- name for DataWindow and indicator subwindow label
    short_name="Bulls("+BullsPeriod+")";
    IndicatorShortName(short_name);
    SetIndexLabel(0,short_name);
//----
    return(0);
}
//+-----+
//| Bulls Power |
//+-----+
int start()
{
    int i,counted_bars=IndicatorCounted();
//----
    if(Bars<=BullsPeriod) return(0);
//----
    int limit=Bars-counted_bars;
    if(counted_bars>0) limit++;
    for(i=0; i<limit; i++)
        TempBuffer[i]=iMA(NULL,0,BullsPeriod,0,MODE_EMA,PRICE_CLOSE,i);
//----
    i=Bars-counted_bars-1;
    while(i>=0)
    {
        BullsBuffer[i]=High[i]-TempBuffer[i];
    }
}

```

```

        i--;
    }
    //----
    return(0);
}
//+-----+

```

```

//+-----+
//|                                     Heiken Ashi.mq4 |
//|                                     Copyright c 2004, MetaQuotes Software Corp. |
//|                                     http://www.metaquotes.net |
//+-----+
//| For Heiken Ashi we recommend next chart settings ( press F8 or |
//| select on menu 'Charts'->'Properties...'): |
//| - On 'Color' Tab select 'Black' for 'Line Graph' |
//| - On 'Common' Tab disable 'Chart on Foreground' checkbox and |
//| select 'Line Chart' radiobutton |
//+-----+
#property copyright "Copyright © 2004, MetaQuotes Software Corp."
#property link      "http://www.metaquotes.net"

#property indicator_chart_window
#property indicator_buffers 4
#property indicator_color1 Red
#property indicator_color2 White
#property indicator_color3 Red
#property indicator_color4 White
//---- buffers
double ExtMapBuffer1[];
double ExtMapBuffer2[];
double ExtMapBuffer3[];
double ExtMapBuffer4[];
//----
int ExtCountedBars=0;
//+-----+
//| Custom indicator initialization function |
//|-----|
int init()
{
//---- indicators
    SetIndexStyle(0,DRAW_HISTOGRAM, 0, 1, Red);
    SetIndexBuffer(0, ExtMapBuffer1);
    SetIndexStyle(1,DRAW_HISTOGRAM, 0, 1, White);
    SetIndexBuffer(1, ExtMapBuffer2);
    SetIndexStyle(2,DRAW_HISTOGRAM, 0, 3, Red);
    SetIndexBuffer(2, ExtMapBuffer3);
    SetIndexStyle(3,DRAW_HISTOGRAM, 0, 3, White);
    SetIndexBuffer(3, ExtMapBuffer4);
//----
    SetIndexDrawBegin(0,10);
    SetIndexDrawBegin(1,10);
    SetIndexDrawBegin(2,10);
    SetIndexDrawBegin(3,10);
//---- indicator buffers mapping
    SetIndexBuffer(0,ExtMapBuffer1);
    SetIndexBuffer(1,ExtMapBuffer2);
    SetIndexBuffer(2,ExtMapBuffer3);
    SetIndexBuffer(3,ExtMapBuffer4);
//---- initialization done
    return(0);
}
//+-----+
//| Custom indicator deinitialization function |
//+-----+
int deinit()
{
//---- TODO: add your code here

```

```

//----
    return(0);
}
//+-----+
//| Custom indicator iteration function |
//+-----+
int start()
{
    double haOpen, haHigh, haLow, haClose;
    if(Bars<=10) return(0);
    ExtCountedBars=IndicatorCounted();
//---- check for possible errors
    if (ExtCountedBars<0) return(-1);
//---- last counted bar will be recounted
    if (ExtCountedBars>0) ExtCountedBars--;
    int pos=Bars-ExtCountedBars-1;
    while(pos>=0)
    {
        haOpen=(ExtMapBuffer3[pos+1]+ExtMapBuffer4[pos+1])/2;
        haClose=(Open[pos]+High[pos]+Low[pos]+Close[pos])/4;
        haHigh=MathMax(High[pos], MathMax(haOpen, haClose));
        haLow=MathMin(Low[pos], MathMin(haOpen, haClose));
        if (haOpen<haClose)
        {
            ExtMapBuffer1[pos]=haLow;
            ExtMapBuffer2[pos]=haHigh;
        }
        else
        {
            ExtMapBuffer1[pos]=haHigh;
            ExtMapBuffer2[pos]=haLow;
        }
        ExtMapBuffer3[pos]=haOpen;
        ExtMapBuffer4[pos]=haClose;
        pos--;
    }
//----
    return(0);
}
//+-----+

```

## Samples Scripts

```

//+-----+
//|                                     close.mq4 |
//|                                     Copyright © 2004, MetaQuotes Software Corp. |
//|                                     http://www.metaquotes.net/ |
//+-----+
#property copyright "Copyright © 2004, MetaQuotes Software Corp."
#property link      "http://www.metaquotes.net/"
#property show_confirm

//+-----+
//| script "close first market order if it is first in the list" |
//+-----+
int start()
{
    bool    result;
    double price;
    int     cmd,error;
//----
    if(OrderSelect(0,SELECT_BY_POS,MODE_TRADES))
    {
        cmd=OrderType();
//---- first order is buy or sell
    }
}

```



```

        if(cmd==OP_BUY || cmd==OP_SELL)
        {
            while(true)
            {
                if(cmd==OP_BUY) price=Bid;
                else price=Ask;
                result=OrderClose(OrderTicket(),OrderLots(),price,3,CLR_NONE);
                if(result!=TRUE) { error=GetLastError(); Print("LastError = ",error); }
                else error=0;
                if(error==135) RefreshRates();
                else break;
            }
        }
    }
    else Print( "Error when order select ", GetLastError());
//----
    return(0);
}
//+-----+

```

```

//+-----+
//|                                     delete_pending.mq4 |
//|                                     Copyright © 2004, MetaQuotes Software Corp. |
//|                                     http://www.metaquotes.net/ |
//+-----+
#property copyright "Copyright © 2004, MetaQuotes Software Corp."
#property link      "http://www.metaquotes.net/"
#property show_confirm

//+-----+
//| script "delete first pending order" |
//+-----+
int start()
{
    bool    result;
    int     cmd,total;
//----
    total=OrdersTotal();
//----
    for(int i=0; i<total; i++)
    {
        if(OrderSelect(i,SELECT_BY_POS,MODE_TRADES))
        {
            cmd=OrderType();
            //---- pending orders only are considered
            if(cmd!=OP_BUY && cmd!=OP_SELL)
            {
                //---- print selected order
                OrderPrint();
                //---- delete first pending order
                result=OrderDelete(OrderTicket());
                if(result!=TRUE) Print("LastError = ", GetLastError());
                break;
            }
        }
        else { Print( "Error when order select ", GetLastError()); break; }
    }
//----
    return(0);
}
//+-----+

```

```

//+-----+
//|                                     modify.mq4 |
//|                                     Copyright © 2004, MetaQuotes Software Corp. |
//|                                     http://www.metaquotes.net/ |
//+-----+

```

```

#property copyright "Copyright © 2004, MetaQuotes Software Corp."
#property link      "http://www.metaquotes.net/"
#property show_confirm

//+-----+
//| script "modify first market order" |
//+-----+
int start()
{
    bool    result;
    double  stop_loss,point;
    int     cmd,total;
//----
    total=OrdersTotal();
    point=MarketInfo(Symbol(),MODE_POINT);
//----
    for(int i=0; i<total; i++)
    {
        if(OrderSelect(i,SELECT_BY_POS,MODE_TRADES))
        {
            //---- print selected order
            OrderPrint();
            cmd=OrderType();
            //---- buy or sell orders are considered
            if(cmd==OP_BUY || cmd==OP_SELL)
            {
                //---- modify first market order
                while(true)
                {
                    if(cmd==OP_BUY) stop_loss=Bid-20*point;
                    else            stop_loss=Ask+20*point;
                    result=OrderModify(OrderTicket(),0,stop_loss,0,0,CLR_NONE);
                    if(result!=TRUE) Print("LastError = ", GetLastError());
                    if(result==135) RefreshRates();
                    else break;
                }
                //---- print modified order (it still selected after modify)
                OrderPrint();
                break;
            }
        }
        else { Print( "Error when order select ", GetLastError()); break; }
    }
//----
    return(0);
}
//+-----+

```

```

//+-----+
//|                                     modify_pending.mq4 |
//|                                     Copyright © 2004, MetaQuotes Software Corp. |
//|                                     http://www.metaquotes.net/ |
//+-----+
#property copyright "Copyright © 2004, MetaQuotes Software Corp."
#property link      "http://www.metaquotes.net/"
#property show_confirm

//+-----+
//| script "modify first pending order" |
//+-----+
int start()
{
    bool    result;
    double  price,point;
    int     cmd,total;
    int     expiration;
//----

```

```

total=OrdersTotal();
point=MarketInfo(Symbol(),MODE_POINT);
//----
for(int i=0; i<total; i++)
{
    if(OrderSelect(i,SELECT_BY_POS,MODE_TRADES))
    {
        cmd=OrderType();
        //---- pending orders only are considered
        if(cmd!=OP_BUY && cmd!=OP_SELL)
        {
            //---- print selected order
            OrderPrint();
            //---- modify first pending order
            price=OrderOpenPrice()-10*point;
            expiration=OrderExpiration();
            result=OrderModify(OrderTicket(),price,0,0,expiration,CLR_NONE);
            if(result!=TRUE) Print("LastError = ", GetLastError());
            //---- print modified order (it still selected after modify)
            else OrderPrint();
            break;
        }
    }
    else { Print( "Error when order select ", GetLastError()); break; }
}
//----
return(0);
}
//+-----+

```

```

//+-----+
//|
//| rotate_text.mq4 |
//| Copyright © 2004, MetaQuotes Software Corp. |
//| http://www.metaquotes.net/ |
//+-----+
#property copyright "Copyright © 2004, MetaQuotes Software Corp."
#property link "http://www.metaquotes.net/"
#include <stdlib.mqh>

string line_name="rotating_line";
string object_name1="rotating_text";

void init()
{
    Print("point = ", Point," bars=",Bars);
}
//+-----+
//|
//+-----+
void deinit()
{
    ObjectDelete(line_name);
    ObjectDelete(object_name1);
    ObjectsRedraw();
}
//+-----+
//| script program start function |
//+-----+
int start()
{
    int time2;
    int error,index,fontsize=10;
    double price,price1,price2;
    double angle=0.0;
    //----
    price2=High[10]+Point*10;
    ObjectCreate(line_name, OBJ_TRENDBYANGLE, 0, Time[10], price2);
}

```

```

index=20;
ObjectCreate(object_name1, OBJ_TEXT, 0, Time[index], Low[index]-Point*100);
ObjectSetText(object_name1, "rotating_text", fontsize);
while(IsStopped()==false)
{
    index++;
    price=ObjectGet(object_name1, OBJPROP_PRICE1)+Point;
    error=GetLastError();
    if(error!=0)
    {
        Print(object_name1," : ",ErrorDescription(error));
        break;
    }
    ObjectMove(object_name1, 0, Time[index], price);
    ObjectSet(object_name1, OBJPROP_ANGLE, angle*2);
    ObjectSet(object_name1, OBJPROP_FONTSIZE, fontsize);
    ObjectSet(line_name, OBJPROP_WIDTH, angle/18.0);
    double line_angle=360.0-angle;
    if(line_angle==90.0) ObjectSet(line_name, OBJPROP_PRICE2, price2+Point*50);
    if(line_angle==270.0) ObjectSet(line_name, OBJPROP_PRICE2, price2-Point*50);
    time2=ObjectGet(line_name,OBJPROP_TIME2);
    if(line_angle>90.0 && line_angle<270.0) time2=Time[index+10];
    else time2=Time[0];
    ObjectSet(line_name, OBJPROP_TIME2, time2);
    ObjectSet(line_name, OBJPROP_ANGLE, line_angle);
    ObjectsRedraw();
    angle+=3.0;
    if(angle>=360.0) angle=360.0-angle;
    fontsize++;
    if(fontsize>48) fontsize=6;
    Sleep(500);
    price1=ObjectGetValueByShift(line_name, index);
    if(GetLastError()==0)
    {
        if(MathAbs(price1-price) < Point*50)
        {
            Print("price=",price," price1=", price1);
            ObjectSetText(object_name1, "REMOVED", 48, "Arial", RGB(255,215,0));
            ObjectsRedraw();
            Sleep(5000);
            ObjectDelete(object_name1);
        }
    }
    return(0);
}
//+-----+

```

```

//+-----+
//|                                     send_pending.mq4 |
//|                                     Copyright © 2004, MetaQuotes Software Corp. |
//|                                     http://www.metaquotes.net/ |
//+-----+
#property copyright "Copyright © 2004, MetaQuotes Software Corp."
#property link      "http://www.metaquotes.net/"
#property show_confirm

//+-----+
//| script "send pending order with expiration data" |
//+-----+
int start()
{
    int    ticket,expiration;
    double point;
//----
    point=MarketInfo(Symbol(),MODE_POINT);
    expiration=CurTime()+PERIOD_D1*60;
}

```

```
//----
while(true)
{
    ticket=OrderSend(Symbol(),OP_SELLSTOP,1.0,Bid-100*point,0,0,0,"some
comment",16384,expiration,Green);
    if(ticket<=0) Print("Error = ",GetLastError());
    else { Print("ticket = ",ticket); break; }
    //---- 10 seconds wait
    Sleep(10000);
}
//----
return(0);
}
//+-----+
```

```
//+-----+
//|                                     trade.mq4 |
//|                                     Copyright © 2004, MetaQuotes Software Corp. |
//|                                     http://www.metaquotes.net/ |
//+-----+
#property copyright "Copyright © 2004, MetaQuotes Software Corp."
#property link      "http://www.metaquotes.net/"

#include <stdlib.mqh>
#include <WinUser32.mqh>
//+-----+
//| script "trading for all money" |
//+-----+
int start()
{
    //----
    if(MessageBox("Do you really want to BUY 1.00 "+Symbol()+" at ASK price?      ",
        "Script",MB_YESNO|MB_ICONQUESTION)!=IDYES) return(1);
    //----
    int ticket=OrderSend(Symbol(),OP_BUY,1.0,Ask,3,0,0,"expert comment",255,0,CLR_NONE);
    if(ticket<1)
    {
        int error=GetLastError();
        Print("Error = ",ErrorDescription(error));
        return;
    }
    //----
    OrderPrint();
    return(0);
}
//+-----+
```

## Samples Program

```
//+-----+
//|                                     ExportFunctions.mq4 |
//|                                     Copyright © 2005, MetaQuotes Software Corp. |
//|                                     http://www.metaquotes.net/ |
//+-----+
#property copyright "Copyright © 2005, MetaQuotes Software Corp."
#property link      "http://www.metaquotes.net/"
#include <sampld11.mqh>

#define TIME_INDEX    0
#define OPEN_INDEX    1
#define LOW_INDEX     2
#define HIGH_INDEX    3
#define CLOSE_INDEX   4
#define VOLUME_INDEX  5
//+-----+
```

```

//| expert initialization function |
//+-----+
int init()
{
    double ret,some_value=10.5;
    string sret;
    int cnt;
    string strarray[6]={ "first", "second", "third", "fourth", "fifth" };
//---- simple dll-functions call
    cnt=GetIntValue(some_value);
    Print("Returned value is ",cnt);
    ret=GetDoubleValue(some_value);
    Print("Returned value is ",ret);
    sret=GetStringValue("some string");
    Print("Returned value is ",sret);
//----
    cnt=SortStringArray(strarray,ArraySize(strarray));
    for(int i=0; i<cnt; i++) Print(i," - ",strarray[i]);
    cnt=ProcessStringArray(strarray,ArraySize(strarray));
    for(i=0; i<cnt; i++) Print(i," - ",strarray[i]);
//----
    return(0);
}
//+-----+
//| array functions call |
//+-----+
int start()
{
    double price;
    double arr[5]={1.5, 2.6, 3.7, 4.8, 5.9 };
    double rates[][6];
//---- get first item from passed array
    price=GetArrayItemValue(arr,5,0);
    Print("Returned from arr[0] ",price);
//---- change second item in the passed array
    if(SetArrayItemValue(arr,5,1,1234.5)==true)
        Print("Changed to ",arr[1]);
//---- get current close
    ArrayCopyRates(rates);
    price=GetRatesItemValue(rates,Bars,0,CLOSE_INDEX);
    Print("Returned from Close ",price);
//----
    return(0);
}
//+-----+

```

```

//+-----+
//|
//| MACD Sample.mq4 |
//| Copyright © 2005, MetaQuotes Software Corp. |
//| http://www.metaquotes.net/ |
//+-----+

extern double TakeProfit = 50;
extern double Lots = 0.1;
extern double TrailingStop = 30;
extern double MACDOpenLevel=3;
extern double MACDCloseLevel=2;
extern double MATrendPeriod=26;

//+-----+
//|
//+-----+
int start()
{
    double MacdCurrent, MacdPrevious, SignalCurrent;
    double SignalPrevious, MaCurrent, MaPrevious;
    int cnt, ticket, total;

```

```

// initial data checks
// it is important to make sure that the expert works with a normal
// chart and the user did not make any mistakes setting external
// variables (Lots, StopLoss, TakeProfit,
// TrailingStop) in our case, we check TakeProfit
// on a chart of less than 100 bars
if(Bars<100)
{
    Print("bars less than 100");
    return(0);
}
if(TakeProfit<10)
{
    Print("TakeProfit less than 10");
    return(0); // check TakeProfit
}
// to simplify the coding and speed up access
// data are put into internal variables
MacdCurrent=iMACD(NULL,0,12,26,9,PRICE_CLOSE,MODE_MAIN,0);
MacdPrevious=iMACD(NULL,0,12,26,9,PRICE_CLOSE,MODE_MAIN,1);
SignalCurrent=iMACD(NULL,0,12,26,9,PRICE_CLOSE,MODE_SIGNAL,0);
SignalPrevious=iMACD(NULL,0,12,26,9,PRICE_CLOSE,MODE_SIGNAL,1);
MaCurrent=iMA(NULL,0,MATrendPeriod,0,MODE_EMA,PRICE_CLOSE,0);
MaPrevious=iMA(NULL,0,MATrendPeriod,0,MODE_EMA,PRICE_CLOSE,1);

total=OrdersTotal();
if(total<1)
{
    // no opened orders identified
    if(AccountFreeMargin()<(1000*Lots))
    {
        Print("We have no money. Free Margin = ", AccountFreeMargin());
        return(0);
    }
    // check for long position (BUY) possibility
    if(MacdCurrent<0 && MacdCurrent>SignalCurrent && MacdPrevious<SignalPrevious &&
        MathAbs(MacdCurrent)>(MACDOpenLevel*Point) && MaCurrent>MaPrevious)
    {
        ticket=OrderSend(Symbol(),OP_BUY,Lots,Ask,3,0,Ask+TakeProfit*Point,"macd
sample",16384,0,Green);
        if(ticket>0)
        {
            if(OrderSelect(ticket,SELECT_BY_TICKET,MODE_TRADES)) Print("BUY order
opened : ",OrderOpenPrice());
        }
        else Print("Error opening BUY order : ",GetLastError());
        return(0);
    }
    // check for short position (SELL) possibility
    if(MacdCurrent>0 && MacdCurrent<SignalCurrent && MacdPrevious>SignalPrevious &&
        MacdCurrent>(MACDOpenLevel*Point) && MaCurrent<MaPrevious)
    {
        ticket=OrderSend(Symbol(),OP_SELL,Lots,Bid,3,0,Bid-TakeProfit*Point,"macd
sample",16384,0,Red);
        if(ticket>0)
        {
            if(OrderSelect(ticket,SELECT_BY_TICKET,MODE_TRADES)) Print("SELL order
opened : ",OrderOpenPrice());
        }
        else Print("Error opening SELL order : ",GetLastError());
        return(0);
    }
    return(0);
}
// it is important to enter the market correctly,
// but it is more important to exit it correctly...
for(cnt=0;cnt<total;cnt++)

```

```

{
    OrderSelect(cnt, SELECT_BY_POS, MODE_TRADES);
    if(OrderType()<=OP_SELL &&    // check for opened position
        OrderSymbol()==Symbol()) // check for symbol
    {
        if(OrderType()==OP_BUY)    // long position is opened
        {
            // should it be closed?
            if(MacdCurrent>0 && MacdCurrent<SignalCurrent &&
MacdPrevious>SignalPrevious &&
                MacdCurrent>(MACDCloseLevel*Point))
            {
                OrderClose(OrderTicket(),OrderLots(),Bid,3,Violet); // close position
                return(0); // exit
            }
            // check for trailing stop
            if(TrailingStop>0)
            {
                if(Bid-OrderOpenPrice()>Point*TrailingStop)
                {
                    if(OrderStopLoss()<Bid-Point*TrailingStop)
                    {
                        OrderModify(OrderTicket(),OrderOpenPrice(),Bid-
Point*TrailingStop,OrderTakeProfit(),0,Green);
                        return(0);
                    }
                }
            }
        }
        else // go to short position
        {
            // should it be closed?
            if(MacdCurrent<0 && MacdCurrent>SignalCurrent &&
MacdPrevious<SignalPrevious &&
MathAbs(MacdCurrent)>(MACDCloseLevel*Point))
            {
                OrderClose(OrderTicket(),OrderLots(),Ask,3,Violet); // close position
                return(0); // exit
            }
            // check for trailing stop
            if(TrailingStop>0)
            {
                if((OrderOpenPrice()-Ask)>(Point*TrailingStop))
                {
                    if((OrderStopLoss()>(Ask+Point*TrailingStop)) ||
(OrderStopLoss()==0))
                    {
                        OrderModify(OrderTicket(),OrderOpenPrice(),Ask+Point*TrailingStop,
OrderTakeProfit(),0,Red);
                        return(0);
                    }
                }
            }
        }
    }
}
return(0);
}
// the end.

```

```

//+-----+
//|                                     Moving Average.mq4 |
//|                                     Copyright © 2005, MetaQuotes Software Corp. |
//|                                     http://www.metaquotes.net/ |
//+-----+
#define MAGICMA 20050610

```



```

extern double Lots                = 0.1;
extern double MaximumRisk         = 0.02;
extern double DecreaseFactor      = 3;
extern double MovingPeriod        = 12;
extern double MovingShift         = 6;
//+-----+
//| Calculate open positions |
//+-----+
int CalculateCurrentOrders(string symbol)
{
    int buys=0,sells=0;
//----
    for(int i=0;i<OrdersTotal();i++)
    {
        if(OrderSelect(i,SELECT_BY_POS,MODE_TRADES)==false) break;
        if(OrderSymbol()==Symbol() && OrderMagicNumber()==MAGICMA)
        {
            if(OrderType()==OP_BUY)    buys++;
            if(OrderType()==OP_SELL)   sells++;
        }
    }
//---- return orders volume
    if(buys>0) return(buys);
    else      return(-sells);
}
//+-----+
//| Calculate optimal lot size |
//+-----+
double LotsOptimized()
{
    double lot=Lots;
    int    orders=HistoryTotal();    // history orders total
    int    losses=0;                 // number of losses orders without a break
//---- select lot size
    lot=NormalizeDouble(AccountFreeMargin()*MaximumRisk/1000.0,1);
//---- calcuulate number of losses orders without a break
    if(DecreaseFactor>0)
    {
        for(int i=orders-1;i>=0;i--)
        {
            if(OrderSelect(i,SELECT_BY_POS,MODE_HISTORY)==false) { Print("Error in
history!"); break; }
            if(OrderSymbol()!=Symbol() || OrderType()>OP_SELL) continue;
//----
            if(OrderProfit()>0) break;
            if(OrderProfit()<0) losses++;
        }
        if(losses>1) lot=NormalizeDouble(lot-lot*losses/DecreaseFactor,1);
    }
//---- return lot size
    if(lot<0.1) lot=0.1;
    return(lot);
}
//+-----+
//| Check for open order conditions |
//+-----+
void CheckForOpen()
{
    double ma;
    int    res;
//---- go trading only for first tiks of new bar
    if(Volume[0]>1) return;
//---- get Moving Average
    ma=iMA(NULL,0,MovingPeriod,MovingShift,MODE_SMA,PRICE_CLOSE,0);
//---- sell conditions
    if(Open[1]>ma && Close[1]<ma)
    {

```

```

        res=OrderSend(Symbol(),OP_SELL,LotsOptimized(),Bid,3,0,0,"",MAGICMA,0,Red);
        return;
    }
//---- buy conditions
    if(Open[1]<ma && Close[1]>ma)
    {
        res=OrderSend(Symbol(),OP_BUY,LotsOptimized(),Ask,3,0,0,"",MAGICMA,0,Blue);
        return;
    }
//----
    }
//+-----+
//| Check for close order conditions |
//+-----+
void CheckForClose()
{
    double ma;
//---- go trading only for first tiks of new bar
    if(Volume[0]>1) return;
//---- get Moving Average
    ma=iMA(NULL,0,MovingPeriod,MovingShift,MODE_SMA,PRICE_CLOSE,0);
//----
    for(int i=0;i<OrdersTotal();i++)
    {
        if(OrderSelect(i,SELECT_BY_POS,MODE_TRADES)==false) break;
        if(OrderMagicNumber()!=MAGICMA || OrderSymbol()!=Symbol()) continue;
        //---- check order type
        if(OrderType()==OP_BUY)
        {
            if(Open[1]>ma && Close[1]<ma)
OrderClose(OrderTicket(),OrderLots(),Bid,3,White);
            break;
        }
        if(OrderType()==OP_SELL)
        {
            if(Open[1]<ma && Close[1]>ma)
OrderClose(OrderTicket(),OrderLots(),Ask,3,White);
            break;
        }
    }
//----
    }
//+-----+
//| Start function |
//+-----+
void start()
{
//---- check for history and trading
    if(Bars<100 || IsTradeAllowed()==false) return;
//---- calculate open orders by current symbol
    if(CalculateCurrentOrders(Symbol())==0) CheckForOpen();
    else CheckForClose();
//----
    }
//+-----+

```