EzLIB API
User Manual
(Version 4.3)

EzProg

ICP DAS CO., LTD.

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Table of Contents

1 Introduction

EzLib is a collection of reusable software components and assists software developers to write application programs for the Window CE platform. The library is written and optimized for the Microsoft Visual Studio 2008 IDE.

The ExLib library consists of four classes:

1. **CEzLIB class**
    a. String to number conversion and vice versa.
    b. Manipulation of data types
    c. Reading from and writing to file.
    d. Date and time functions
    e. FTP communication
    f. TCP/IP communication
    g. Open applet window

2. **CEzBMP class**
    a. Create a bitmap drawing
    b. Display a bitmap on dialog window
    c. Save a bitmap to file

3. **CTRENDA class**
    a. Creating a trend line graph

2 General APIs

This chapter describes API for the following actions:

- CString type conversions
- Manipulation of data types
- Reading from file / writing to file
- Retrieving current date and time
- Open programs in the control panel

2.1 String conversion

2.1.1 CString to float

```
float CString_To_Float(CString CStr);
```

This function converts a CString string to a floating-point value by interpreting the input characters as a number. The function stops reading the input string at the first character that it cannot recognize as part of a number. Space or tab characters will be ignored.

Parameter	Range	Description
CStr	Maximum 50 characters	CString to be converted

Return Value	Description
0.0	The return value is 0.0 if the input cannot be converted to a *float* value.
3.4E +/- 38	Floating point range

Example:

```
CEzLIB EzLIB;
      float fRet=0;
      CString fString_1(L"1.1");
      CString fString_2(L"1.12345678");
      CString fString_3(L"-1.12345678");
      CString fString_4(L"k1.3");
      CString fString_5(L"0");
```

```
fRet=EzLIB.CString_To_Float(fString_1); //--> 1.1
fRet=EzLIB.CString_To_Float(fString_2); //--> 1.1234568
fRet=EzLIB.CString_To_Float(fString_3); //--> -1.1234568
fRet=EzLIB.CString_To_Float(fString_4); //--> 0.0      →ERROR
fRet=EzLIB.CString_To_Float(fString_5); //--> 0.0
```

2.1.2 Float to CString

```
CString Float_To_CString(float fData, long DotNo);
```

This function converts the value of a float variable into a CString string.

Parameter	Range	Description
fData	3.4E +/- 38	Float value to be converted
DotNo	0 to 7	Specifies is the maximum number of digits to be printed after the decimal point. 0 – will not format the number of digits of the float value.

Return Value	Description
Character array	CString string displays the float value as a wide character array. Each digit of the double value is represented by one Unicode character.

Example:

```
CEzLIB EzLIB;
      float fData=3.1234567;
      CString fString(L"");

      fString=EzLIB.Float_To_CString(fData,0); //--> "3.12346"
      fString=EzLIB.Float_To_CString(fData,1); //--> "3.1"
      fString=EzLIB.Float_To_CString(fData,2); //--> "3.12"
      fString=EzLIB.Float_To_CString(fData,3); //--> "3.123"
      fString=EzLIB.Float_To_CString(fData,4); //--> "3.1235"
      fString=EzLIB.Float_To_CString(fData,5); //--> "3.12346"
      fString=EzLIB.Float_To_CString(fData,6); //--> "3.12357"
      fString=EzLIB.Float_To_CString(fData,7); //--> "3.12357"
```

2.1.3 CString to double

```
double CString_To_DOUBLE(CString CStr)
```

This function returns the double value produced by interpreting the CString string characters as a number. The function stops reading the input string at the first character that it cannot recognize as part of a number. Space or tab characters will be ignored.

Parameter	Range	Description
CStr	Maximum 50 characters	CString to be converted

Return Value	Description
0.0	The return value is 0.0 if the input cannot be converted to a *double* value.
1.7E +/- 308	Double value range

Example:

2.1.4 Double to CString

```
CString DOUBLE_To_CString (double DData, long DotNo):
```

This function converts the value of a double variable into a CString string.

Parameter	Range	Description
DData	1.7E +/- 308	Double value to be converted
DotNo	0 to 15	Specifies is the maximum number of digits to be printed after the decimal point. 0 – will not format the number of digits of the float value.

Return Value	Description
Unicode Character array	CString string displays the double value as a wide character array. Each digit of the double value is represented by one Unicode character.

2.2 Copying of memory blocks

The APIs in this section copies a bit field from the memory of a specific data type to a memory of another data type of the same size. The bit field is not altered during the copying process. Therefore not the value of a data type is copied but only the bit field data. No data conversion takes place.

2.2.1 DWORD to float

```
float DWORD_To_Float(DWORD dwData);
```

This function copies a DWORD bit field of four bytes to a float variable. The bit field of the entire DWORD memory is copied to the float memory without changing any bits.

Parameter	Range	Description
dwData	0 to 4,294,967,295	Bit field source

Return Value	Description
3.4E +/- 38	Floating point range

Example:

```
CEzLIB EzLIB;
DWORD dw_BitField=0;
float f_BitField=0;

dw_BitField = 0;
f_BitField = EzLIB.DWORD_To_Float(dw_BitField); //--> 0

dw_BitField = 1000000000;
f_BitField = EzLIB.DWORD_To_Float(dw_BitField); //--> 0.0047237873

dw_BitField = 123456789;
f_BitField = EzLIB.DWORD_To_Float(dw_BitField); //--> 1.6535997e-034
```

2.2.2 Float to DWORD

```
DWORD Float_To_DWORD(float fData);
```

This function copies the bit field of the float variable to the memory block of the DWORD variable. No data conversion takes place.

Parameter	Range	Description
fData	3.4E +/- 38	Source memory block

Return Value	Description
0 to 4,294,967,295	The copied bit field will be interpreted as a float type

Example:

```
CEzLIB EzLIB;
      DWORD dw_BitField = 0;
      float f_BitField = 0;


      f_BitField = 0;
      dw_BitField = EzLIB.Float_To_DWORD(f_BitField); //--> 0

      f_BitField = 100;
      dw_BitField = EzLIB.Float_To_DWORD(f_BitField); //--> 1120403456

      f_BitField = 1000;
      dw_BitField = EzLIB.Float_To_DWORD(f_BitField); //--> 1148846080
```

2.2.3 Double to DWORD array

```
void DOUBLE_To_DWORDS (DWORD dwData[2] ,
                       double DData);
```

This function copies an eight byte long bit field of a *double* variable to two *DWORD* variables with four bytes memory blocks each. The memory of the entire *double* variable is copied to the memory of two *DWORD* variables without changing the bit order.

Parameter	Range	Description
DData	1.7E +/- 308	Source memory
dwData[2]	Pointer to a DWORD array	Destination memory

Example:

```
CEzLIB EzLIB;
double Da=25245245.23525;
DWORD DArry[2]={0,0};

EzLIB.DOUBLE_To_DWORDS(DArry,Da);
```

2.2.4 DWORD array to double

```
double DWORDS_To_DOUBLE (DWORD dwData[2]);
```

This function copies the memory of an array of two *DWORDs* to the memory block of a *double* variable.

Parameter	Range	Description
dwData[2]	Pointer to DWORD array	Source memory block

Return Value	Description
1.7E +/- 308	The copied bit field will be interpreted as a *double* type

Example:

```
CEzLIB EzLIB;
double Da = 0;
DWORD DArry[2] = {20000,145525};

DaRET = EzLIB.DWORDS_To_DOUBLE(DArry);
```

2.2.5 Double to BYTE array

```
void DOUBLE_To_BYTES (BYTE BData[8] , double DData);
```

This function copies an eight byte long bit field of a *double* variable to a *BYTE* array with a length of eight elements. The memory of the entire *double* variable is copied to the memory of a BYTE array without changing the bit order.

Parameter	Range	Description
DData	1.7E +/- 308	Source memory
BData[8]	Pointer to an eight BYTE array	Destination memory Make sure that the BYTE array has at least eight elements.

Example:

```
CEzLIB EzLIB;
double Da = 25245245.23525;
BYTE BArry[8]={0,0,0,0,0,0,0,0};

EzLIB.DOUBLE_To_BYTES(BArry,Da);
```

2.2.6 BYTE array to double

```
double BYTES_To_DOUBLE ( BYTE  BData[8] );
```

This function copies the memory of a *BYTE* array with a length of eight elements to the memory block of a *double* variable.

Parameter	Range	Description
BData[8]	Pointer to BYTE array	Source memory block

Return Value	Description
1.7E +/- 308	The copied bit field will be interpreted as a *double* type

Example:

```
CEzLIB EzLIB;
double Da = 0;
BYTE BArry[8] = {12,33,87,56,11,45,0,100};

Da = EzLIB.BYTES_To_DOUBLE(BArry);
```

2.3 File system operations

2.3.1 Creating or opening a file

```
long Start_FileIO(LPCTSTR lpszFileName,
                  bool ReadWrite,
                  BYTE OpenMode );
```

This function creates a new file or opens an existing file. When you call this function it searches for a file in the directory that you specify. Depending on the `ReadWrite` parameter you can open an existing file or create a new file. When you open a file, you have to set the read/write access for that file.

Parameter	Range	Description
`lpszFileName`	Pointer to wide character array	Name of the file to open
`ReadWrite`	`true` `false`	true - write to file false - read from file
`OpenMode`	1 2 3	1- Creates and opens a new file. 2- Opens a file. If the file does not exist, the function creates a new file. 3 - Opens an existing file. The function fails if the file does not exist.

Return Value	Description
0	Execution was successful
Nonzero	Error: consult the error table at the appendix

Example:

2.3.2 Writing to a file

```
long Array_TO_File(LPCVOID lpBuffer,
                   DWORD nBytesToWrite,
                   bool Flag);
```

This function writes data to the specified file. It copies a specified number of bytes from the buffer that is pointed to by the ***nBytesToWrite*** parameter into the file specified by the **Start_FileIO** function. **Array_TO_File** does not perform any formatting on the data.

Parameter	Range	Description
lpBuffer	Pointer to an array	A pointer to the buffer containing the data to be written to the file.
nBytesToWrite	0 to 4,294,967,295	The number of bytes to write to the file.
Flag	`true` `false`	After the array has been written to the file, determine whether to • close the file – `true` or • leave file open - `false`

Return Value	Description
0	Execution was successful
Nonzero	Error: consult the error table at the appendix

Example:

```
typedef struct
{
      BYTE TYPE;
      long PARA;
      long BB;
      long WORK;
      BYTE ARRAY[100];
 }DEMO_Data;


//Define an array as buffer:
DEMO_Data DArray[100];
```

```
//file name:
TCHAR PATH[100]= TEXT("\\ArrayFile.dat");



void OnFillArrayData()
{

      int i,j;
      for (j=0; j<100; j++)
      {
            for (i=0; i<100; i++)
            DArray[j].ARRAY[i]= i;
      }
}
```

```
// Write data to a file:
void OnWriteArraytoFile()
{
      CEzLIB EzLIB;

      OnFillArrayData();

      // Create and open a new file for writing data:
      if (EzLIB.Start_FileIO(PATH,true,1) == 0)
      {
            //Write data to the file. Close the file after
            // the write operation has completed.
            EzLIB.Array_To_File(&DArray,sizeof(DArray),true);
      }
}
```

2.3.3 Reading from a file

```
long File_TO_Array (LPVOID lpBuffer,
                    DWORD nBytesToRead,
                    bool Flag)
```

This function reads data from a file. It copies a specified number of bytes from the file to the buffer pointed to by the ***lpBuffer*** parameter. Before using this function open the file with the **Start_FileIO** function. During the copying process no data is formatted; the data is read exactly as it exists in the file.

Parameter	Range	Description
lpBuffer	Pointer to an array	A pointer to the buffer that receives the data read from a file.
nBytesToWrite	0 to 4,294,967,295	The maximum number of bytes to read.
Flag	`true` `false`	After the file has been copied to the array, determine whether • to close the file – `true` • or to leave the file open - `false`

Return Value	Description
0	Execution was successful
Nonzero	Error: consult the error table at the appendix

Example:

```
typedef struct
{
      BYTE TYPE;
      long PARA;
      long BB;
      long WORK;
      BYTE ARRAY[100];
 }DEMO_Data;

//Define an array as buffer:
DEMO_Data DArray[100];
```

```
//file name:
TCHAR PATH[100]= TEXT("\\ArrayFile.dat");

-------------------------------------------------------------------------

// Read data from a file:
void CRW_ArrayFileDlg::OnReadArrayfromFile()
{
      CEzLIB EzLIB;

      //Open an existing file for reading data:
      if (EzLIB.Start_FileIO(PATH,false,3)==0)
      {
            //Copy data from the file to an array. Close the file after
            // the read operation has finished.
            EzLIB.File_To_Array(&DArray,sizeof(DArray),true);
      }
}
```

2.3.4 Get the file size

```
DWORD Get_File_Length(DWORD *HighDWORD);
```

This function retrieves the size of the specified file.

Parameter	Range	Description
HighDWORD	Pointer to an array	A pointer to the variable where the high-order double word of the file size is returned

Return Value	Description
0 to 4,294,967,295	File size in bytes.

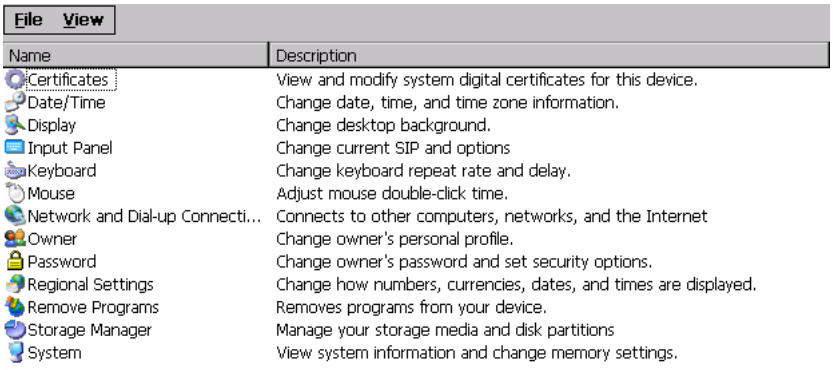
2.4 Programs in the control panel

The Control Panel is a part of the Microsoft Windows graphical user interface which allows users to view and manipulate basic system settings and controls via applets, such as network connection, adding and removing software, controlling user accounts, and changing accessibility options.

2.4.1 Open an applet window

```
void Call_Shell(WORD ShellNo);
```

This function allows you to open a component of the control panel, which allows users to define a range of settings for their PAC, such as display properties, keyboard properties, network configuration and regional settings. The program in the control panel can be accessed manually by clicking Start→Settings→Control Panel.

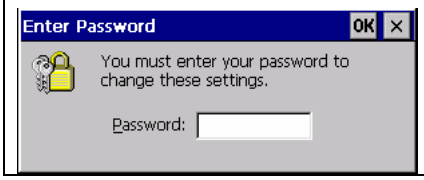


Parameter	Range	Description
ShellNo	0	-
	1	-
	2	Keyboard Properties
	3	Enter Password
	4	Enter Password
	5	-
	6	System Properties
	7	Display Properties

	8	Mouse Properties
	9	-
	10	-
	11	Input Panel Properties
	12	Remove Programs
	13	Date/Time Properties
	14	Certificates
	15	-
	16	-

Example:

```
// Open the password window:
CEzLIB EzLIB;
EzLIB.Call_Shell(3);
```



2.5 Date and Time

2.5.1 Get local date and time

```
void Get_DT(TCHAR tcDT[30],
            bool Year, bool Month, bool Week, bool Day,
            bool Hour, bool Minute, bool Second, bool mSecond);
```

This function retrieves the current date and time.

Parameter	Range	Description
tcDT[30]	Pointer to an UNICODE character array	A pointer to a 30 element array which stores the date and time Example: "2009/12/1/07 13:35:45.45265"
Year	true	Reads the year
	false	Ignores the year
Month	true	Retrieves the month, based on local time, in the range 1 through 12 (1 = January)
	false	Ignores the month
Week	true	Retrieves the day of the week based on local time
	false	Ignores the week number
Day	true	Retrieves the day of the month, based on local time, in the range 1 through 31
	false	Ignores the day
Hour	true	Retrieves the hour, based on local time, in the range 0 through 23
	false	Ignores the hour
Minute	true	Retrieves the minute, based on local time, in the range 0 through 59
	false	Ignores the year
Second	true	Retrieves the second, based on local time, in the range 0 through 59
	false	Ignores the year

mSecond	true	Reads the milliseconds
	false	Ignores the milliseconds

Example:

```
CEzLIB EzLIB;
TCHAR tcDT[30];

//Read the local date and time:
EzLIB.Get_DT(tcDT, true, true, true, true, true, true, true, true);


// Example output: "2009/12/1/07 13:35:45.45265"
```

2.5.2 Get local date

```
void Get_Date(TCHAR tcDate[15]);
```

This function retrieves the current date.

Parameter	Range	Description
tcDate[15]	Pointer to an UNICODE character array	A pointer to a 15 element array which stores the date. Example: **"2009/12/07"**

Example:

```
CEzLIB EzLIB;
TCHAR tcDate[15];

//Read the current date:
EzLIB.Get_Date(tcDate);

// Example output: "2009/12/07"
```

2.5.3 Get local time

```
void Get_Time(TCHAR tcTime[15]);
```

This function retrieves the current date.

Parameter	Range	Description
tcTime[15]	Pointer to an UNICODE character array	A pointer to a 15 element array which receives the time string. Example: **"14:32:59"**

Example:

```
CEzLIB EzLIB;
TCHAR tcTime[15];

//Read the current time:
EzLIB.Get_Time(tcTime);

// Example output: "14:32:59"
```

3 Context drawing

The device context (DC) enables the programmer to draw and write on the device context and to directly display, save and print its content independent of the hardware. MFC for Windows CE supports the following methods of the **CDC** class:

CDC::BitBlt	**CDC::GetMapMode**
CDC::DrawEdge	**CDC::MaskBlt**
CDC::DrawText	**CDC::Polygon**
CDC::ExtTextOut	**CDC::PolyPolygon**
CDC::GetDeviceCaps	**CDC::SelectStockObject**
CDC::GetHalftoneBrush	**CDC::StretchBlt**

The APIs provided by ICPDAS allows you to directly

- display the CDC on the screen,
- save the CDC to file or
- print the CDC.

Example:

```
// Define a bitmap object
CEzBMP m_BMP;
CDC WorkCDC;

CEzDEMO7_CDCDlg * th;
```

```
BOOL CEzDEMO7_CDCDlg::OnInitDialog()
{
	CDialog::OnInitDialog();

	// Set the icon for this dialog.  The framework does this automatically
	//  when the application's main window is not a dialog
	SetIcon(m_hIcon, TRUE);			// Set big icon
	SetIcon(m_hIcon, FALSE);		// Set small icon

	CenterWindow(GetDesktopWindow());	// center to the hpc screen

	// TODO: Add extra initialization here
	th = this;

	return TRUE;  // return TRUE  unless you set the focus to a control
}
```

```
// Draw to the screen
void Draw_Work()
{
	//===== Draw Lines ================
	WorkCDC.MoveTo(0,0);
	WorkCDC.LineTo(300,200);
	WorkCDC.MoveTo(300,0);
	WorkCDC.LineTo(0,200);

	//===== Select font ================
	CFont font;
	VERIFY(font.CreatePointFont(240, _T("Arial"), &WorkCDC));
	CFont* def_font = WorkCDC.SelectObject(&font);
	font.DeleteObject();

	//===== Set TEXT Color================
	WorkCDC.SetTextColor(RGB(0, 0, 0));


	//===== Draw TEXT ================
	WorkCDC.DrawText("ICPDAS Text Example",
			CRect(50, 300, 1200, 400), 0);

	WorkCDC.SelectObject(def_font);
}
```

3.1 BMP CDC interface

3.1.1 Load a BMP file

```
bool Open_BMP(LPCTSTR lpszFileName);
```

This function loads the image of a bitmap file into memory.

Parameter	Range	Description
lpszFileName	Pointer to an Unicode character array.	Bitmap file name

Return Value	Description
0	Execution was successful
Nonzero	Error: consult the error table at the appendix

Example:

```
//global variables:
CEzBMP m_BMP;
CDC WorkCDC;

-------------------------------------------------------------------------------
void CCDC_DEMODlg::OnGetBMPCDC()
{

      //== Select file and load file ==============
      CString strFilter (L"Bitmap Files (*.bmp)|*.bmp|All Files (*.*) |*.*||");

      CFileDialog dlg(TRUE, NULL, NULL, OFN_HIDEREADONLY|OFN_EXPLORER,
                        strFilter, NULL);

      if (dlg.DoModal() == IDOK)
      {
        if (m_BMP.Open_BMP(dlg.GetPathName()))
            {
                  BMP_OK=true;
                  Printer_OK=false;
                  Monitor_OK=false;
                  this->SetWindowText(dlg.GetPathName());
            }
        else
            {
                  BMP_OK=false;
                AfxMessageBox(_T("Unable to open bitmap file"));
                }
      }
      //== GET the BMP CDC ==============
      WorkCDC.Attach(*m_BMP.Get_BMP_DC(this->GetDC()));
}

-------------------------------------------------------------------------------
-------------------------------------------------------------------------------

//Draw the image of the bitmap file to the screen ==============
void CCDC_DEMODlg::OnBMPDraw()
{
      if (WorkCDC)
      {
            Draw_Work();
      }
}
```

```
void CCDC_DEMODlg::OnBMPSave()
{

      //== Select a file =======================================
      CString strFilter (L"Bitmap Files (*.bmp)|*.bmp|All Files (*.*)
|*.*||");

      CFileDialog dlg(false, NULL, NULL,
                        OFN_HIDEREADONLY|OFN_EXPLORER, strFilter, NULL);
      if (dlg.DoModal() == IDOK)
    {
            CString m_FileName= dlg.GetPathName();
            if (!m_FileName.IsEmpty())
                  //== Save BMP to file ============================
                  m_BMP.Save_BMP(m_FileName);
    }
}
```

```
void CCDC_DEMODlg::OnDrawBMP()
{
      // TODO: Add your control notification handler code here
      m_BMP.Draw_BMP(this->GetDC(), CPoint(0,0),0);
}
```

```
void CCDC_DEMODlg::OnDrawBMP()
{
      // TODO: Add your control notification handler code here
      m_BMP.Draw_BMP(this->GetDC(), CPoint(0,0),0);
}
```

```
void CCDC_DEMODlg::OnDrawBMPFit()
{
      // TODO: Add your control notification handler code here
      CRect rect(0, 0, 800, 550);
      m_BMP.Draw_BMP_Fit(this->GetDC(), CPoint(0,0), rect.Size(),0);
}
```

3.1.2 Save BMP image

```
bool Save_BMP(LPCTSTR lpszFileName);
```

This function saves the bitmap image.

Parameter	Range	Description
lpszFileName	Pointer to a Unicode character array.	Bitmap file name

Return Value	Description
0	Execution was successful
Nonzero	Error: consult the error table at the appendix

Example:

3.1.3 Height of BMP image

```
WORD Get_BMP_Height();
```

This function retrieves the height of the bitmap image in the memory.

Return Value	Description
0 to 65,535	Height in pixel

3.1.4 Width of BMP image

```
WORD Get_BMP_Width();
```

This function retrieves the width of the bitmap image in the memory.

Return Value	Description
0 to 65,535	Width in pixel

3.1.5 Width of BMP image

```
bool Get_BMP_OK();
```

This function checks whether the bitmap image was loaded successful from the file into memory.

Return Value	Description
`true`	Loading operation was successful.
`false`	Loading operation failed.

3.1.6 Load BMP to CDC

```
bool Draw_BMP_Fit(CDC* pDC,
                  CPoint ptDest,
                  CSize size,
                  BOOL bForceBackground);
```

This function first sets the size and location of the bitmap destination rectangle on the CDC and then copies the bitmap from the memory into the destination rectangle. The bitmap will be stretched or compressed to fit the dimensions of the destination rectangle.

Parameter	Range	Description
pDC	Pointer to the target CDC	The device context on which the bitmap should be drawn
ptDest		The xy-coordinates, in logical units, of the upper-left corner of the destination rectangle
size		Destination rectangle
bForceBackground	TRUE, FALSE	Show the bitmap in the foreground or background.

Return Value	Description
0	Execution was successful
Nonzero	Error: consult the error table at the appendix

3.1.7 BMP location on CDC

```
bool Draw_BMP(CDC* pDC,
              CPoint ptDest,
              BOOL bForceBackground);
```

This function copies the bitmap to the specified location on the CDC but will not change the dimension of the bitmap.

Parameter	Range	Description
pDC	Pointer to the target CDC	The device context on which the bitmap should be drawn
ptDest		The xy-coordinates, in logical units, of the upper-left corner of the bitmap rectangle
bForceBackground	TRUE, FALSE	Show the bitmap in the foreground or background.

Return Value	Description
0	Execution was successful
Nonzero	Error: consult the error table at the appendix

3.1.8 Retrieve the CDC of the BMP

```
CDC* Get_BMP_DC(CDC* pDC);
```

This function retrieves a pointer to the bitmaps device context CDC, so that the user can use the methods of the CDC to directly draw and write on the bitmaps device context. CDC methods are provided for drawing text, working with fonts, drawing lines and drawing simple shapes, ellipses, and polygons.

Parameter	Range	Description
pDC		Pointer to a CDC Use: *this->GetDC()*

Return Value	Description
	Pointer to a CDC

3.2 Monitor CDC interface

3.2.1 Retrieve the monitor CDC

```
CDC* Get_Monitor_DC(CDC* pDC);
```

This function returns a pointer to a device context which manages the display associated with the client area of a window.

Parameter	Range	Description
pDC		Pointer to a CDC. Use: *this->GetDC()*

Return Value	Description
	Pointer to a window CDC

Example:

```
CEzBMP m_BMP;
CDC WorkCDC;

void CCDC_DEMODlg::OnGetMonitorCDC()
{
	WorkCDC.Attach(*m_BMP.Get_Monitor_DC(this->GetDC()));
	if (WorkCDC)
	{
		Monitor_OK=true;
		BMP_OK=false;
		Printer_OK=false;
		MessageBox(_T("Get Monitor CDC OK !!"));
	}
	else
	{
		Monitor_OK=false;
		MessageBox(_T("Get Monitor CDC Error!!"));
	}
}
```

```
//Draw on the screen
void CCDC_DEMODlg::OnMonitorDraw()
{
	// TODO: Add your control notification handler code here
	if (WorkCDC && Monitor_OK)
		Invalidate();//update the screen
}



// Updates the screen
void CCDC_DEMODlg::OnPaint()
{
	CPaintDC dc(this); // device context for painting
	// TODO: Add your message handler code here
	if (WorkCDC && Monitor_OK)
	{
		Draw_Work();
	}
	// Do not call CDialog::OnPaint() for painting messages
}
```

4 Ethernet Connection

The chapter describes TCP/IP and FTP client functions which enable data exchange with an ftp or a TCP/IP server.

4.1 FTP internet connection

File Transfer Protocol (FTP) is a standard network protocol used to exchange and manipulate files over a TCP/IP based network, such as the Internet. The FTP is commonly used for copying files to and from other computers. These computers may be at the same site or at different sites thousands of miles apart.

The local computer (FTP client) refers to the computer which program calls the EzLib FTP function. The remote computer (FTP server) listens for incoming connections from clients. After a connection has been established with the server is responding to FTP commands from the client.

4.1.1 Connect to FTP server

```
long FtpInitial(LPCTSTR FtpAddress,
                long FtpPort,
                LPCTSTR UserName,
                LPCTSTR Password);
```

This function connects to the specified FTP server and attempts to automatically log the user in to the FTP server

Parameter	Range	Description
FtpAddress		FTP server IP address
FtpPort	0 ~ 65535	FTP sever port
UserName		Specifies a user name with which to log in to the remote computer.
Password		Specifies the password for user-name.

Return Value	Description

0	Execution was successful
Nonzero	Error: consult the error table at the appendix

Example:

```
CEzLIB EzLIB;
// ======================================================
void CEzLIB_TESTDlg::OnFTPTest()
{
	BOOL rec;
	rec= EzLIB.FtpInitial(_T("10.0.0.110"), 21,
				_T("Anonymous"), _T("0"));
	rec= EzLIB.FtpCwd(_T("\\Temp"));
	rec= EzLIB.FtpCld(_T("\\Temp"));
	rec= EzLIB.FtpPut(_T("test.BMP"), _T("test.BMP"));
	rec= EzLIB.FtpGet(_T("test.BMP"), _T("test.BMP"));
	EzLIB.FtpClose();
}
```

4.1.2 Close FTP server connection

```
void FtpClose();
```

This function closes the connection to the FTP server.

Example: see chapter 4.1.1.

4.1.3 Change remote directory

```
long FtpCwd(LPCTSTR Directory);
```

This function changes the directory on the *remote* computer.

Parameter	Range	Description
Directory		Specifies the directory on the remote computer to change to.

Return Value	Description
0	Execution was successful
Nonzero	Error: consult the error table at the appendix

Example: see chapter 4.1.1.

4.1.4 Change local directory

```
long FtpCld(LPCTSTR Directory);
```

This function changes the working directory on the *local* computer.

Parameter	Range	Description
Directory		Specifies the directory on the local computer to change to.

Return Value	Description
0	Execution was successful
Nonzero	Error: consult the error table at the appendix

Example: see chapter 4.1.1.

4.1.5 File transfer to FTP server

```
long FtpPut(LPCTSTR LocalFile, LPCTSTR RemoteFile);
```

This function copies one file from the local machine to the remote machine.

Parameter	Range	Description
LocalFile	Pointer to a Unicode character array	Specifies the name of the local file to copy.
RemoteFile	Pointer to a Unicode character array	Specifies the file name to use on the remote computer (ftp server)

Return Value	Description
0	Execution was successful
Nonzero	Error: consult the error table at the appendix

Example: see chapter 4.1.1.

4.1.6 File transfer to FTP client

```
long FtpGet(LPCTSTR RemoteFile, LPCTSTR LocalFile);
```

This function copies a remote file to the local computer (FTP client).

Parameter	Range	Description
RemoteFile	Pointer to a Unicode character array	Specifies the remote file to copy.
LocalFile	Pointer to a Unicode character array	Specifies the name to use on the local computer (FTP client).

Return Value	Description
0	Execution was successful
Nonzero	Error: consult the error table at the appendix

Example: see chapter 4.1.1.

4.2 TCP/IP connection

4.2.1 Initializing a TCP/IP socket

```
long SocketInitial(short SocketNumber,
                   LPCTSTR IpAddress,
                   long IpPort);
```

This function creates a TCP/IP socket and connects to a remote TCP/IP server.

Parameter	Range	Description
SocketNumber	0 ~ 15	Socket number
IpAddress		TCP server IP address
IpPort	0 ~ 65535	TCP/IP server port number

Return Value	Description
0	Execution was successful
Nonzero	Error: consult the error table at the appendix

Example: see chapter 4.2.4.

4.2.2 Close a TCP/IP connection

```
long SocketClose(short SocketNumber);
```

This function closes an existing socket and thereby terminates a TCP/IP connection.

Parameter	Range	Description

SocketNumber	0 ~ 15	Socket number

Return Value	Description
0	If no error occurs, this function returns zero
Nonzero	Error: consult the error table at the appendix

Example: see chapter 4.2.4.

4.2.3 Send data

```
long SocketSend(short SocketNumber, LPCTSTR String);
```

This function sends data to a remote TCP/IP server on a connected socket.

Parameter	Range	Description
SocketNumber	0 ~ 15	Socket number
String	Pointer to a Unicode character string	Buffer containing the data to be transmitted

Return Value	Description
0	If no error occurs, this function returns zero
Nonzero	Error: consult the error table at the appendix

Example: see chapter 4.2.4.

4.2.4 Receive data callback function

```
long SocketReceiveOn(short SocketNumber,
                     ptTSRFunc2 SRF);
```

This function triggers a call back function as soon as data is arriving.

Parameter	Range	Description
SocketNumber	0 ~ 15	Socket number
SRF		Callback function

Return Value	Description
0	If no error occurs, this function returns zero
Nonzero	Error: consult the error table at the appendix

Example:

```
CEzLIB EzLIB;

//User defined callback function
void SocketReceive0(CString AA,BYTE * Data,long Lenth)
{
      BYTE Re[5000]={0};
      memcpy( Re, Data,Lenth );
}

---

void OnEthernetTest()
{
      BOOL rec;
      rec= EzLIB.SocketInitial(0, _T("10.0.0.20"), 60000);
      rec= EzLIB.SocketSend(0, _T("WinCon_IP_10.0.0.26"));
      rec= EzLIB.SocketReceiveOn(0, &(ptTSRFunc2)SocketReceive0);
}

---

void OnEthernetClose()
{
      BOOL rec;
      rec= EzLIB.SocketReceiveOff(0);
      rec= EzLIB.SocketClose(0);
}
```

4.2.5 Receive data callback function

```
long SocketReceiveOff(short SocketNumber);
```

This function disables the triggering of the callback function.

Parameter	Range	Description
SocketNumber	0 ~ 15	Socket number

Return Value	Description
0	If no error occurs, this function returns zero
Nonzero	Error: consult the error table at the appendix

Example: see chapter 4.2.4.

5 Trend View

The trend view is graphical user interface to visualize process values or calculated values over time. The trend view is a line graph where time is measured on the horizontal axis and the variable being observed is measured on the vertical axis. It records process values for each time interval and joins these values by a line to visualize the change in data. It can show multiple curves simultaneously to allow processes data comparison. The TRENDA class does not support data recording and can only display a maximum of 1024 process values.

The class supports the following settings:

- Axis labels
- Gridlines: colors, width and style
- Trend line: colors, width, style and visibility
- Border line: colors, width and style
- Graph background colors
- Legend

5.1 Main configuration

The basic approach to creating a chart is as follows:

- Declare a CTRENDA object
- Determine the size and position of the graph frame
- Set the drawing area properties (background color, size, direction of the time axis)
- Assign the trend view graph a dialog window
- Set up labels, legends, grids,
- Set the line properties (style, width, color)
- Populate the chart object with your data
- Display data on the graph

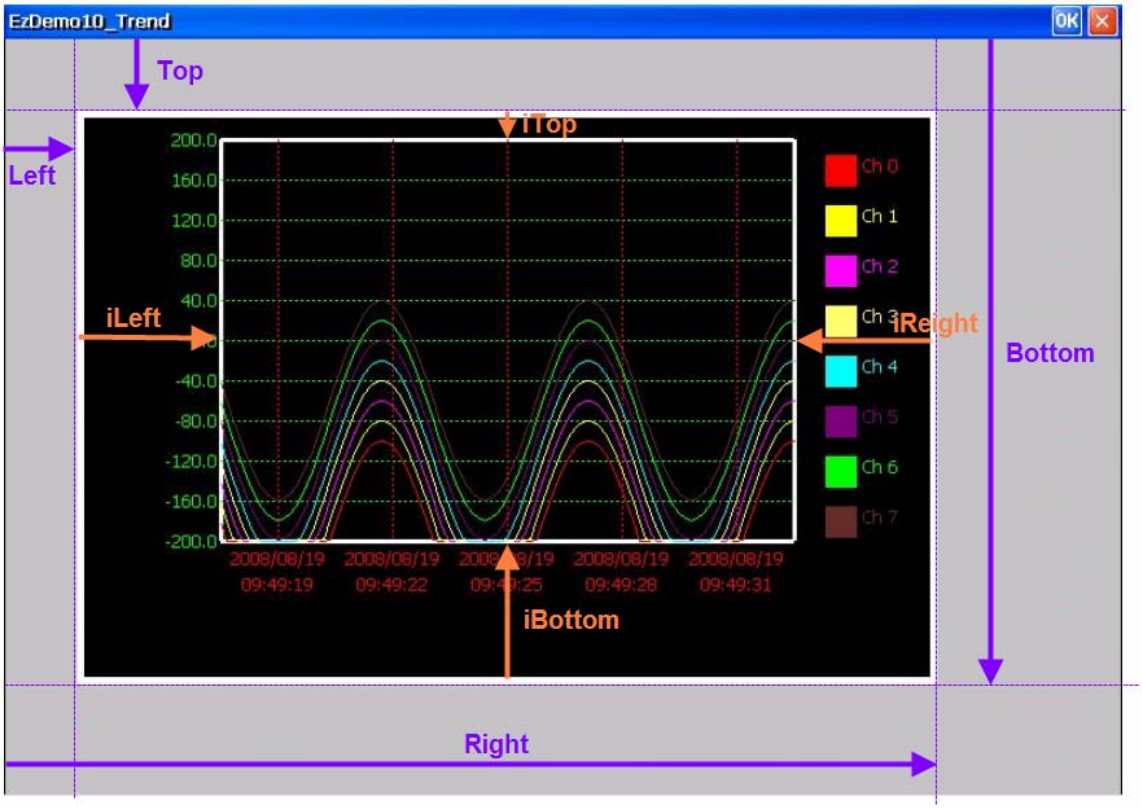
5.1.1 Creating a trend view object

```
Create(LPCRECT pRect,
       int iLeft,
       int iRight,
       int iTop,
       int iBottom,
       COLORREF RGB,
       WORD RecordDataNo,
       WORD XDir);
```

This function initializes the line chart object: sets its size, position and background color.

Parameter	Range	Description
pRect		The position of the main frame on the dialog window. Top left: • `LONG left;` • `LONG top;` Bottom right: • `LONG right;` • `LONG bottom;`
iLeft	1 ~ 200	Left position of the graph area relative to the left main frame position.
iRight	1 ~ 200	Right position of the graph area relative to the right main frame position.
iTop	1 ~ 200	Top position of the graph area relative to the top main frame position.
iBottom	1 ~ 200	Bottom position of the graph area relative to the bottom main frame position.
RGB		Background color
RecordDataNo	10 ~ 1024	Sets the scale (resolution) of the visible horizontal axis (time axis). It determines the number of divisions of the visible timeline in the graph. The `RecordDataNo` parameter basically specifies the maximum number of data points to be displayed on the visible time section.
XDir	XDir_Right_Lift =0	The direction of the horizontal axis.

	XDir_Lift_Right =1	Chart plotting direction • 0 – plotting of data points starts on the right and each new point will be added to the left of the previous point. • 1 – plotting of data points starts on the left and each new point will be added to the right of the previous point.



5.1.2 Assign a parent window

```
void SET_CDC (CDC* pDC);
```

This function puts the trend view bitmap to a device context (CDC) of a dialog window on which it will be displayed.

Parameter	Range	Description
pDC		Pointer to a device context of the parent window. Use the following expression to get the pointer to the dialog window CDC: `this->GetDC()`

Example:

```
CTRENDA MyTrend;

MyTrend.SET_CDC(this->GetDC());
```

5.1.3 Scaling, gridlines and labels

```
void Set_Rang(float fMin_X,
              float fMin_Y,
              float fMax_X,
              float fMax_Y,
              int iDevN_X,
              int iDevN_Y);
```

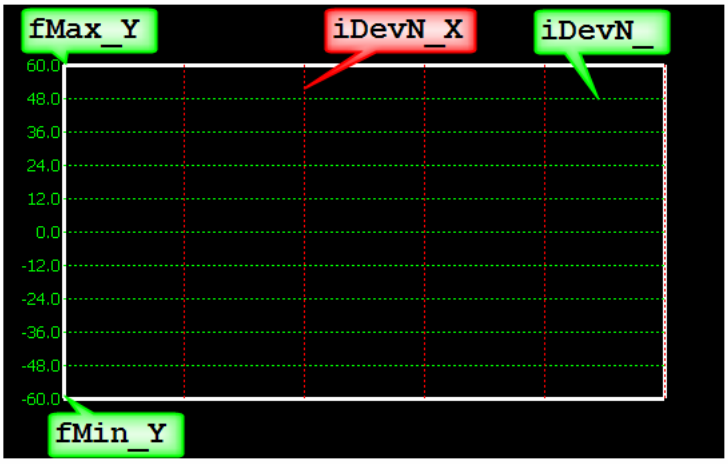
This function sets the upper and lower limit of the vertical axis. In addition it sets the number of vertical and horizontal gridlines for the visible section.
Data of the vertical axis is scaled according to the maximum and minimum axis values. So, for example, if **fMin_Y** = 10 and **fMax_Y** = 60, then a value of 10 will be at the bottom of the chart and 60 will be at the top. Axis labels are positioned according to the horizontal gridlines.

Parameter	Range	Description
fMin_X	3.4E +/- 38	Of no significance for the trend view object (use `fMin_X = 0`).
fMin_Y	3.4E +/- 38	Set the *minimum* value of the **vertical** axis.
fMax_X	3.4E +/- 38	Of no significance for the trend view object (use `fMax_X = 0`).
fMax_Y	3.4E +/- 38	Set the *maximum* value of the **vertical** axis.
iDevN_X	–2,147,483,648 to 2,147,483,647	Set the number of **vertical** gridlines.
iDevN_Y	–2,147,483,648 to 2,147,483,647	Set the number **horizontal** gridlines.

Example:

```
CTRENDA MyTrend;

MyTrend.Set_Range(0,-60, 0, 60, 5,10);
```



5.1.4 Legend setting

```
void SetLegend(bool ShowFlag, WORD XSpace);
```

This function enables the legend display and allows the user to set the distance of legends from the right border of the graph area.

Parameter	Range	Description
ShowFlag	– true – false	– Display legends – Hide legends
XSpace	1~200	– Distance from the right border

5.2 Line properties

5.2.1 Frame and gridline property setting

```
void SetFrameP(BYTE Target,
               int nPenStyle,
               int nWidth,
               COLORREF crColor);
```

This function sets the line style, width and color of the frame or the gridlines.

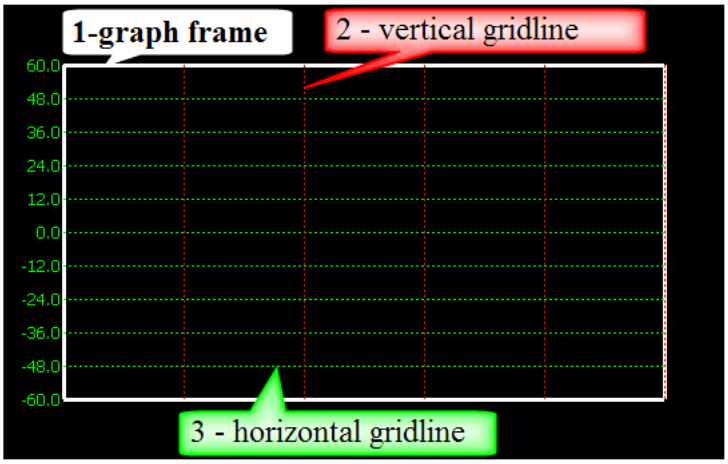
Parameter	Range	Description
Target	1 – graph frame 2 – vertical gridline 3 – horizontal gridline	Select a line.
nPenStyle	PS_SOLID PS_DASH	Select a solid or dash line type

nWidth	1 ~ 10	Line width
crColor		Line color

Example:

```
CTRENDA MyTrend;

MyTrend.SetFrameP(1,PS_SOLID, 3,RGB(255,255,255)); //white
MyTrend.SetFrameP(2,PS_DASH, 1, RGB(255,0,0));// red
MyTrend.SetFrameP(3,PS_DASH, 1, RGB(0,255,0));// green
```



5.2.2 Trend line property setting

```
void SetCurveP(BYTE Cno,
               int nPenStyle,
               int nWidth,
               COLORREF crColor,
               bool IS_Used);
```

This function sets the line style, width and color of the selected trend line.

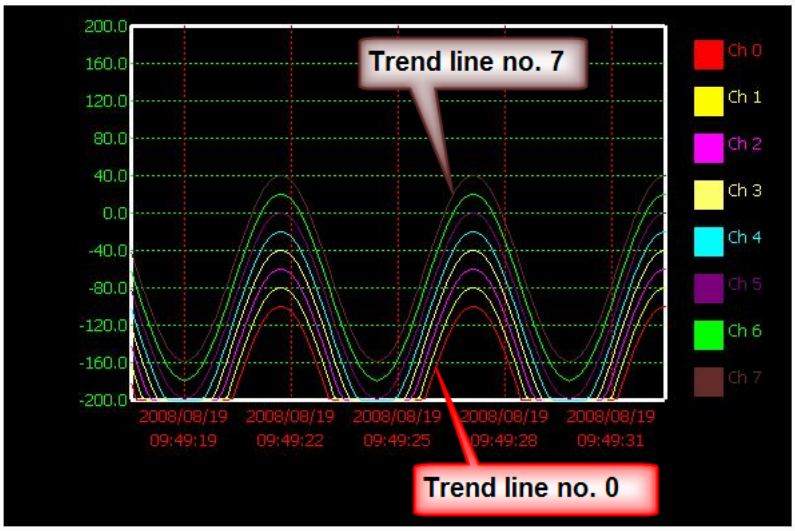
Parameter	Range	Description
Cno	0 ~ 7	Select a trend line. The CTRENDA class supports multiple lines that means up

		to eight trend lines (each representing a variable) can be plotted on the graph.
nPenStyle	PS_SOLID PS_DASH	Select a solid or dash line type
nWidth	1 ~ 5	Line width
crColor		Line color Example: `RGB(255,255,255)//white`
IS_Used	`true`, `false`	Indicate, whether the selected trend line should be displayed or disabled: `true` - display trend line `false` - disable trend line

Example:

```
CTRENDA MyTrend;

MyTrend.SetCurveP(0,PS_SOLID,1,RGB ( 255 , 0 , 0 ),true);   //red
MyTrend.SetCurveP(1,PS_SOLID,1,RGB ( 255 , 255 , 0 ),true); // yellow
MyTrend.SetCurveP(2,PS_SOLID,1,RGB ( 255 , 0 , 255 ),true); // pink
MyTrend.SetCurveP(3,PS_SOLID,1,RGB ( 255 , 255 ,111 ),true);// yellow
MyTrend.SetCurveP(4,PS_SOLID,1,RGB ( 0 , 255 , 255 ),true); // blue
MyTrend.SetCurveP(5,PS_SOLID,1,RGB ( 127 , 0 , 127 ),true); // purple
MyTrend.SetCurveP(6,PS_SOLID,1,RGB ( 0 , 255, 0 ),true);    // green
MyTrend.SetCurveP(7,PS_SOLID,1,RGB ( 100 , 44 , 44 ),true); // brown
```



5.3 Adding new data readings to the graph

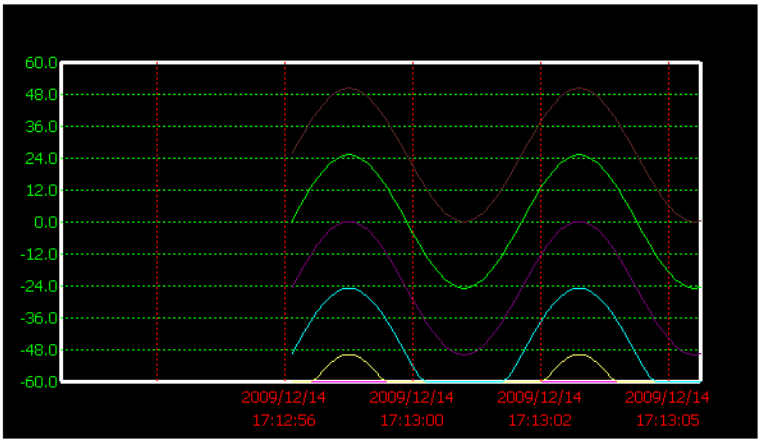
5.3.1 Method 1

```
void AddRecord(double fData[8],
               CString Dtime);
```

This function updates one or more trend lines to newest readings and automatically adds a new time label to the grid. The y-axis (vertical axis) in the line graph indicates a quantity (e.g., ampere, volt, liters) or percentage, while the horizontal x-axis represents the time. For multi lines trends the data in the fData array represents the y-values of different curves at a specific time (Dtime).
For example the new position of the trend line 0 is determined by the y-value stored in the variable fData[0] and the time (x-axis) stored in the variable Dtime.

Parameter	Range	Description
fData[8]	3.4E +/- 38	**Vertical axis:** Each of the eight array elements stores data for one of the eight trend lines at a specific time.
Dtime		**Horizontal axis (time axis):** The time at which the reading took place.

Example 1:



By calling the function `SinusCurve()` at fixed time interval a sinus curve will be displayed.

```
CTRENDA MyTrend;
CEzLIB EzLIB;

void CTrendViewDlg::SinusCurve()
{
	CString DataTime;
	wchar_t tcDate[15];
	wchar_t tcTime[15];
	int i;
	double fData[8];
	static const float DtoGrade=3.1415926535/180;
	static int Data_count=0;

	// Update the array with new data of a sinus curve
	for(i=0;i<8;i++)
	{

		fData[i]= 25 * sin(Data_count*DtoGrade*10)+25*i-150;
	}
	if (Data_count<360) Data_count++;
	else Data_count=1;

	// Read the current date and time:
	EzLIB.Get_Date(tcDate);
	EzLIB.Get_Time(tcTime);


	// Copy the date and time to the time CString
	DataTime.Format(L"%s\r\n%s", tcDate,tcTime);

	// Update the graph with the new data
	MyTrend.AddRecord(fData,DataTime);

	// Redraw the graph
	MyTrend.Paint();

}
```

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17:12:56

5.3.2 Method 2

```
void AddRecord(double fData0,
               double fData1,
               double fData2,
               double fData3,
               double fData4,
               double fData5,
               double fData6,
               double fData7 ,
               CString Dtime);
```

This function has the same properties as the function discussed under method 1, except that the values for the vertical axis are not stored in an array but in eight float variables.

Parameter	Range	Description
fData0 ~ fData7	3.4E +/- 38	Vertical axis: Each of the eight data types stores data for one of the eight trend lines at a specific time.
Dtime	1 ~ 5	Horizontal axis (time axis): The time at which the reading took place.

Example 2: Directly displaying analog input data.
This can be done by directly reading the analog input data from the analog channel by using the IN_AI function. This function is described in the EzCore manual.

```
CTRENDA MyTrend;
CEzLIB EzLIB;

void CTrendViewDlg::SinusCurve()
{
      CString DataTime;
      wchar_t tcDate[15];
      wchar_t tcTime[15];


      // Read the current date and time:
      EzLIB.Get_Date(tcDate);
      EzLIB.Get_Time(tcTime);
```

```
	// Copy the date and time to the time CString
	DataTime.Format(L"%s\r\n%s", tcDate,tcTime);

	// EzProg-I IN_AI()
	MyTrend.AddRecord(IN_AI(0), IN_AI(1), IN_AI(2), IN_AI(3),
			  IN_AI(4), IN_AI(5), IN_AI(6), IN_AI(7),
			  DataTime);

	MyTrend.Paint();
}
```

5.3.3 Delete all trend lines

```
void ClearRecord();
```

This function removes all trend lines and time labels from the graph.

5.3.4 Redraw graph

```
void Paint();
```

This function redraws the graph. Any changes made to the graph property, the line trend itself or other settings concerning the visual part of the graph requires a **`Paint()`** function call to display the changes.

Example: see previous examples.

5.4 Change the display status and range

5.4.1 Display or hide a trend line

```
void SetVisible(BYTE Cno, bool Visible);
```

This function enables you to select a trend line and make it visible or invisible during runtime.

Parameter	Range	Description
Cno	0 ~ 7	Select one trend line. The `CTRENDA` class supports multiple lines that means up to eight trend lines (each representing a variable) can be plotted on the graph.
`Visible`	`true`, `false`	Visible or invisible

Example:

```
CTRENDA MyTrend;

MyTrend.SetVisible(3,true); //display trend line no 3
MyTrend.SetVisible(4,false); // hide trend line no 4
MyTrend.SetVisible(5,true); //display trend line no 5

//Redraw the graph
MyTrend.Paint();
```

5.4.2 Modifying vertical axis range

```
void ChangeRangeY(double fMin_Y, double fMax_Y);
```

This function modifies the upper and lower limit of the vertical axis and therefore also the scale of the axis. In addition it resets the number of horizontal gridlines and the labels for the vertical axis.

Parameter	Range	Description
fMin_Y	3.4E +/- 38	Set the *minimum* value forthe **vertical** axis.
fMax_Y	3.4E +/- 38	Set the *maximum* value for the **vertical** axis.

5.4.3 Modifying horizontal axis range

```
void ChangeRangeX(int iDevN_X, WORD RecordDataNo);
```

This function modifies the number of vertical gridlines and the vertical gridline labels. In addition it modifies the resolution of the visible horizontal axis.

Parameter	Range	Description
iDevN_X	3 ~ 20	Set the *number of vertical gridlines*.
RecordDataNo	10 ~ 1024	Set the *number* of divisions for the **horizontal** axis. This variable sets the resolution of the horizontal axis. The higher the value the more data can be displayed on the visible graph.

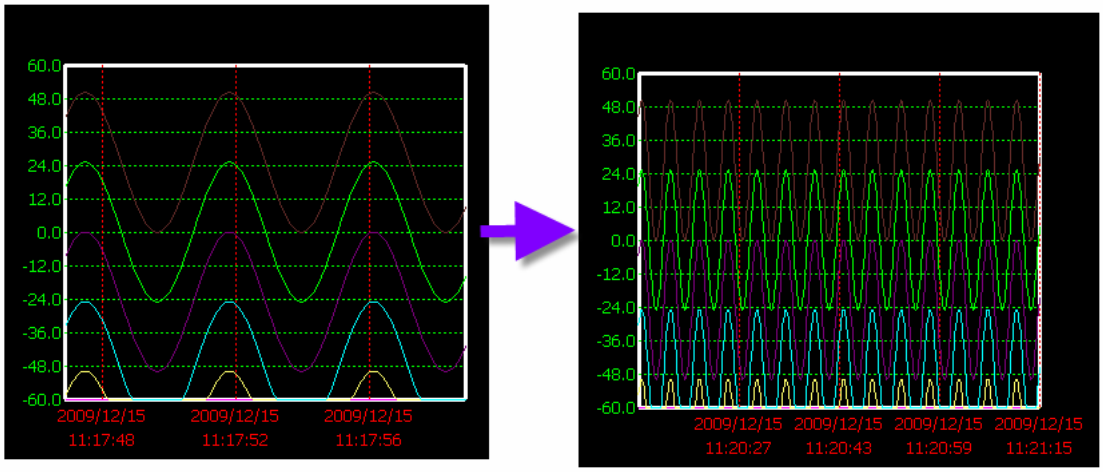
Example:

```
CTRENDA MyTrend;

MyTrend.ChangeRangeX(3, 100);
```

```
CTRENDA MyTrend;

MyTrend.ChangeRangeX(4, 500);
```

```
MyTrend.Paint();
//Redraw the graph
MyTrend.Paint();
```

```
MyTrend.Paint();
//Redraw the graph
MyTrend.Paint();
```



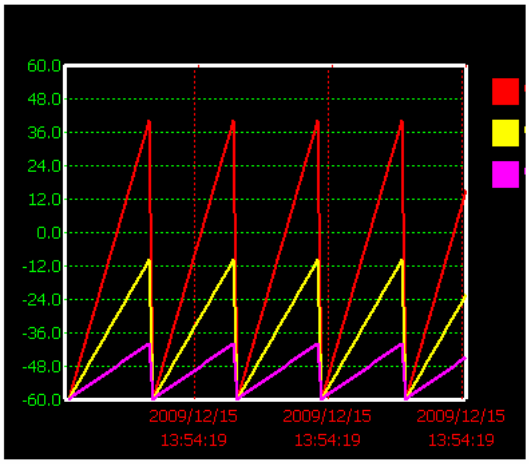
5.5 Example

The main purpose of this example is to demonstrate the sequence in which the CTRENDA member functions have to be called in order to display the trend graph correctly.

Example:

```
// STEP 1: Declare the following three global objects:
CTRENDA MyTrend;
CEzLIB EzLIB;
CDC WorkCDC;


void CTrendViewDlg::InitializeTrendView()
{
 // STEP 2:
 // Declare CRect object
 // Initilize the object with the position and size of the graph window
 CRect rect(0, 0, 400, 350);

 // STEP 3:
 // Set the general properties of the graph area like size and color
 MyTrend.Creat(rect,50,50,50,50,RGB(0,0,0),100,XDir_Right_Lift);

 // STEP 4:
 //Attach the trend graph and the global device context to the dialog
 // window
 WorkCDC.Attach(*this->GetDC());
 MyTrend.SET_CDC(this->GetDC());


 // STEP 5:
 //Set the line type, width and color of the frame and the grid lines
 MyTrend.SetFrameP(1,PS_SOLID, 3,RGB(255,255,255)); //white
 MyTrend.SetFrameP(2,PS_DASH, 1, RGB(255,0,0));// red
 MyTrend.SetFrameP(3,PS_DASH, 1, RGB(0,255,0));// green

 // STEP 6:
 // Set the lower and upper limit of the vertical axis. Determine the
 // number of gridlines for the veritcal and horizontal axis. A label
 // is automatically attached to each gridline.
 MyTrend.Set_Range(0.0,-60.0, 0.0, 60.0, 3,10);


 // STEP 7:
 //Set the line type, width and color of the trend lines
 MyTrend.SetCurveP(0,PS_SOLID,2,RGB ( 255 , 0 , 0 ),true);
 MyTrend.SetCurveP(1,PS_SOLID,2,RGB ( 255 , 255 , 0 ),true);
 MyTrend.SetCurveP(2,PS_SOLID,2,RGB ( 255 , 0 , 255 ),true);
 MyTrend.SetCurveP(3,PS_SOLID,1,RGB ( 255 , 255 ,111 ),false);
 MyTrend.SetCurveP(4,PS_SOLID,1,RGB ( 0 , 255 , 255 ), false);
 MyTrend.SetCurveP(5,PS_SOLID,1,RGB ( 127 , 0 , 127 ), false);
 MyTrend.SetCurveP(6,PS_SOLID,1,RGB ( 0 , 255, 0 ), false);
 MyTrend.SetCurveP(7,PS_SOLID,1,RGB ( 100 , 44 , 44 ), false);
```

```
 // STEP 8:
 // Draw the frame
 MyTrend.Paint();

}


void CTrendViewDlg::DrawTrendView()
{
  CString DataTime;
  wchar_t tcDate[15];
  wchar_t tcTime[15];
  int i;
  static double x = 0;
  double fData[8];

for(i=0; i<100; i++)
{
      // STEP 8:
      // Load the data for the y axis (vertical axis)
      fData[0]= 5.0 * x - 60.0 ;
      fData[1]= 2.5 * x - 60.0 ;
      fData[2]= x - 60.0 ;

      if (x <20.0) x++;
      else x=0.0;

      // STEP 9:
      // Load data for the vertical gridline labels.
      // Read the current date and time:
      EzLIB.Get_Date(tcDate);
      EzLIB.Get_Time(tcTime);
      // Copy the date and time to the time CString
      DataTime.Format(L"%s\r\n%s", tcDate,tcTime);

      // STEP 10:
      // Update the graph with the new data and labels
      MyTrend.AddRecord(fData,DataTime);

}

 // STEP 11:
 // Draw the graph
 MyTrend.Paint();
}
```


60.0
48.0
36.0
24.0
12.0
0.0
-12.0
-24.0
-36.0
-48.0
-60.0
2009/12/15
13:54:19
2009/12/15
13:54:19
2009/12/15
13:54:19

6 Appendix

6.1 Error Table

```
#define _NO_ERROR                          0
#define _EXEC_ERROR                        -1
#define _OPENFILE_ERROR                    -2
#define _SETUP_ERROR                       -3
#define _FRAM_INIT_ERROR                   -4
#define _REGISTER_ERROR                    -5
#define _NONE_MAOS_ERROR                   -6


#define _INCORECT_RUN_MODE                 -7


#define _DIVIDE_ZERO_ERROR                 -10

#define _SET_Interrupt_ERROR               -20

#define I8048_ERROR_NO_MODULE              -31
#define I8048_ERROR_OPEN_DEVICE            -32
#define I8048_ERROR_INVALID_PARAMETER      -33
#define I8048_ERROR_INVALID_HANDLE         -34
#define I8048_ERROR_CALL_IOCTL             -35
#define I8048_ERROR_GET_IST_EVENT          -36

#define _IN_USE_ERROR                      -50
#define _NO_USE_ERROR                      -51
#define _OUT_OF_RANGE_ERROR                -52

#define _AES_NOT_SETKEY_ERROR              -80
#define _AES_CHECK_ERROR                   -81

#define _CREATE_THREAD_ERROR               -90

#define _INOUT_ERROR                       -100


#define _STP_PARAMETER_ERROR               -150




#define _SYSTEM_VERSION_ERROR              -200
#define _DEVICE_CHECK_ERROR                -201
#define _DEVICE_NOT_INIT                   -202
```

```
#define _DEVICE_NOT_WinCon                      -203


#define _AES_REGCODE_LENTH_ERROR                -250
#define _AES_REGMSG_NO_ERROR                    -251

#define _FILE_NOT_OPEN                          -300
// the file not open Please open first
#define _READ_FILE_ERROR                        -310
// Read from file error
#define _WRITE_FILE_ERROR                       -320
// Write to file error


#define _ETHERNET_CONNECTION_ERROR              1


#define _ALREADY_RUN_WARNING                    10

#define _BATTERY1_LEVEL_WARNING                 21

#define _BATTERY2_LEVEL_WARNING                 22

//for i8094H/A
#define _I8094H_TIMEOUT_ERROR                   50

//for i8092/F i8094/F i8094H/A
#define _MOTION_NO_REG_ERROR                    51

//for i8094/F
#define _MOTION_OPENCONFIG_ERROR                52

//for i8092/F i8094/F i8094H/A
#define _NON_MOTION_ERROR                       53
#define _MOTION_INTP_ALREADY_RUN                54

#define _SYSTEM_NOT_READY                       100
```