User's Manual

Model 707713
WVF File Access Toolkit for MATLAB

YOKOGAWA
Yokogawa Meters & Instruments Corporation

IM 707713-61E
1st Edition

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Foreword

Thank you for purchasing the WVF File Access Toolkit for MATLAB (Model 707713).
This user's manual describes the installation procedure, the program model, and the functions of the WVF File Access Toolkit for MATLAB. Read this manual along with the Model 707712 WVF File Access API User's Manual (IM 707712-61E), and the Model 707741 WE Control API User's Manual (IM 707741-61E).
After reading the manual, keep it in a convenient location for quick reference whenever a question arises during operation.

Notes

- **The contents of this manual describe the WVF File Access Toolkit for MATLAB Ver. 1.01. If you are using another version of the WVF File Access Toolkit for MATLAB, the information given in this manual may differ from the version that you are using.**
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How to Read This Manual

This manual covers only the settings that are specific to the software and functions for MATLAB. The manual has been prepared with the premise that it be read along with the Model 707712 WVF File Access API User's Manual (IM 707712-61E), and the Model 707741 WE Control API User's Manual (IM 707741-61E).
For details on the settings of functions and settings of ASCII commands, see the Model 707712 WVF File Access API User's Manual (IM 707712-61E), and the WE Control API User's Manual (IM 707761-61E).

Contents

1. Overview

This user's manual describes the interface functions (WVF File Access Toolkit for MATLAB) used to access the waveform data files (WVF files).
The WVF File Access Toolkit for MATLAB is used to access from MATLAB the waveform data file (.wvf extension) measured using the WE7000, DL Series Oscilloscopes, and other instruments. Using this toolkit allows you to read/write measured data and header information on MATLAB by The MathWorks, Inc. without being conscious of the internal structure of the file. It also allows you to perform advanced data analysis using the extensive computation, analysis, and display functions provided by MATLAB.

There is a one-to-one relationship between the mex functions of the WVF File Access Toolkit for MATLAB and the functions of the WVF File Access API.

Supported OSs
Microsoft Windows 95/98/Me, Windows NT 4.0, Windows 2000 Pro or Windows XP Professional/Home Edition

Supported Development Platforms
The MathWorks, Inc. MATLAB 6.1 (R12.1) or 6.5 (R13)

Note
The WVF File Access API (707712) or the WE Control API (707741) sold separately is required for using this software.

Applicable Models
WE7000
DL708, DL708E, DL716, and DL750
DL1720 and DL1740
DL1600 Series
DL1500 Series
DL7100 and DL7200
DL7400 Series

Installed Files
When you install the WVF File Access Toolkit for MATLAB, the directory \YOKOGAWA\WE7000 is created under the directory where MATLAB is saved (the default directory for MATLAB 6.5 is C:\MATLAB6p5\toolbox), and the following files are copied to the directory.

IM707713-61J.pdf	User's manual
*.dll	mex functions for WVF File Access
*.m	Sample programs
WVFreadme*.txt	Description of the sample programs

Note
If MATLAB is installed to a directory other than the default directory, change the directory in which the toolkit is installed accordingly.

2. Installation

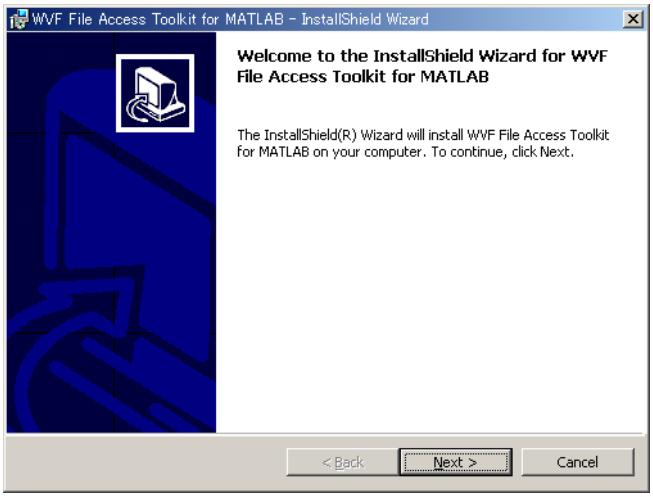
This chapter explains the procedure for installing the WVF File Access Toolkit for MATLAB.
WVF File Access API (Model 707712) or WE Control API (Model 707741) must be installed before you install the WVF File Access Toolkit for MATLAB.

1. Start Windows.

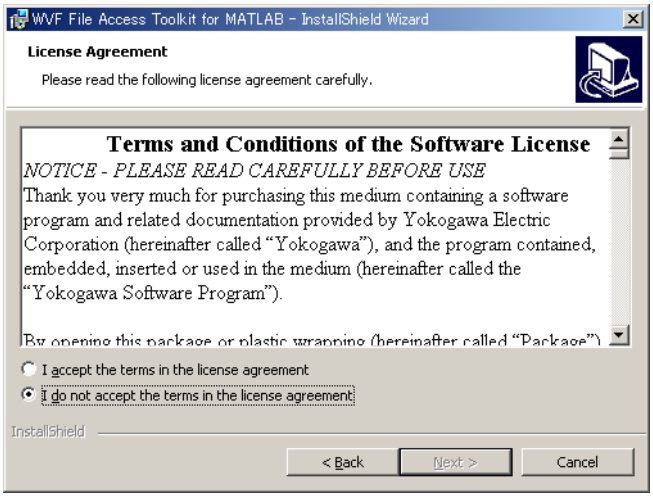
Note

When installing the toolkit on Windows NT 4.0, Widows 2000 Pro, or Windows XP, log onto Windows using the user name “Administrator” or a user name with administrator privileges and then install the toolkit.

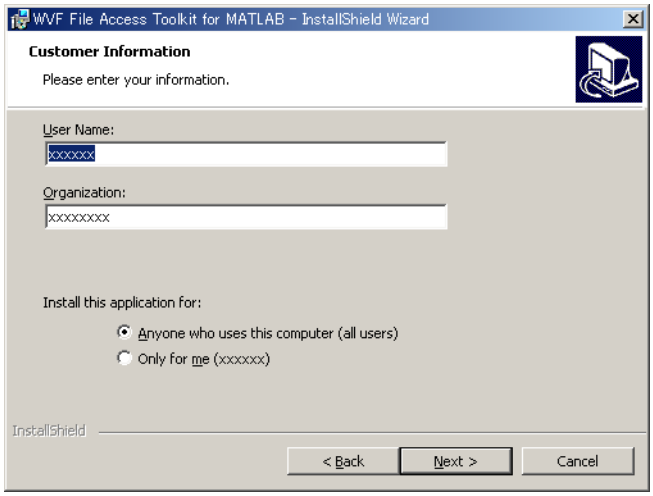
2. Insert the “WVF File Access toolkit for MATLAB” setup disk into the CD-ROM drive. An installer automatically starts and the following dialog box opens. If the program does not start automatically, choose Start > Run, then specify setup.exe in the disk1 directory of CD-ROM to Name and click **OK**. The following dialog box appears. Click **Next**.



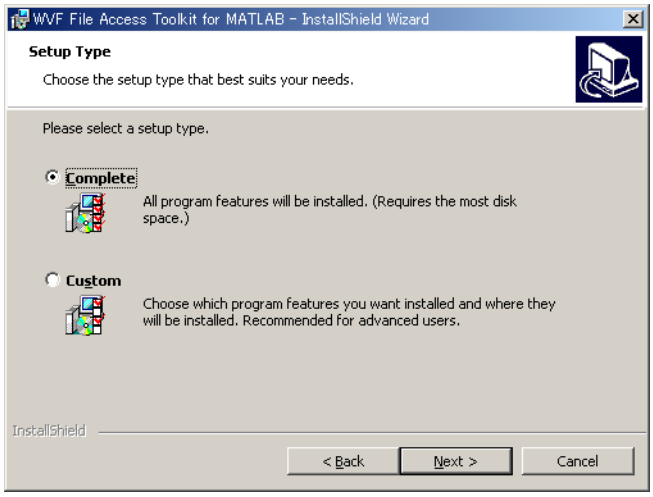
3. The following dialog box appears containing license agreement information. Confirm the license agreement, click the I accept the terms in the license agreement option button, and click **Next**.



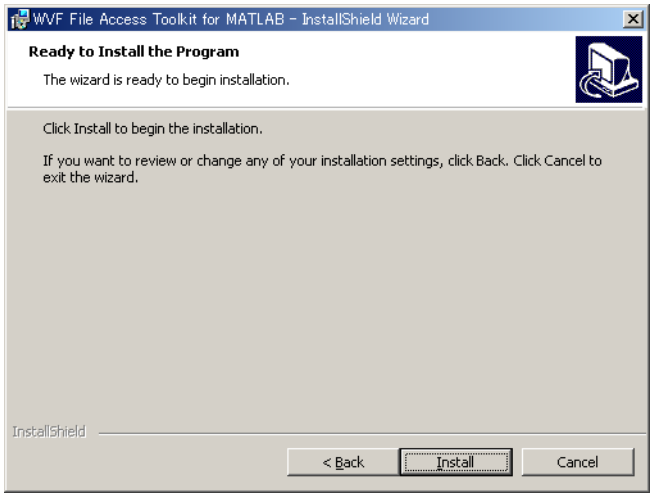
4. The following dialog box appears for registering the name and the organization of the user. After entering the appropriate information into each box, click **Next**.



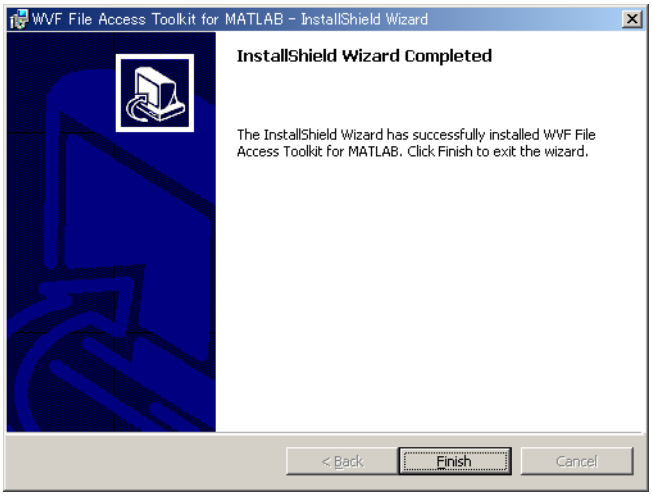
5. A dialog box appears for you to confirm the start of the installation. To proceed with the default installation (Complete), click **Next**. To select which components to install, or to change the installation destination, choose the Custom option then click **Next**.



6. A dialog box appears confirming that you wish to begin installation. Click **Install**.



7. The installation starts and a dialog box appears indicating the progress of the installation. A dialog box appears notifying you that the installation has been completed. Click **Finish**.



Note

If you installed MATLAB to a directory other than the default directory, change the installation directory of the WVF File Access Toolkit for MATLAB.

Installed Files

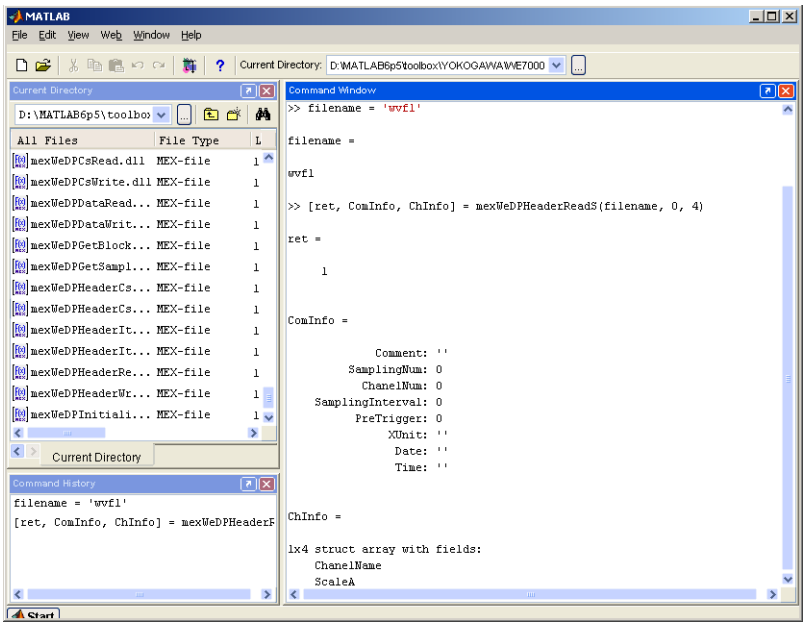
The installed files are in toolbox\YOKOGAWA\WE7000 in the directory of MATLAB.

IM707713-61E	User's Manual
*.dll	Mex function for WVF file access
*.m	Sample Program
WVFreadme*.txt	Information about the sample programs

3. Executing the WVF File Access Toolkit for MATLAB

On the WVF File Access Toolkit for MATLAB, programming is done interactively, which is a feature of MATLAB. Below is an example of function usage on the MATLAB command window and M-files.

MATLAB Screen



Execution Example on the Command Window

```
>> filename = 'wvf1'
filename =
wvf1
>> [ret, ComInfo, ChInfo] = mexWeDPHeaderReadS(filename, 0, 4)
ret =
    0

ComInfo =

          Comment: ''
       SamplingNum: 1000
        ChanelNum: 4
   SamplingInterval: 0.0010
       PreTrigger: 0
           XUnit: 's'
            Date: '2003/05/23'
            Time: '13:17:12'

ChInfo =

1x4 struct array with fields:
   ChanelName
   ScaleA
   ScaleB
   Unit

>> [ret, data] = mexWeDPDataRead(filename, 0, -1, 50, 1000*4);
>> filename = 'wvf1_2'
```

```
filename =
wvf1_2
>> [ret, AcqInfo] = mexWeDPInitializeAcqInfo(2, -2, 1000, 0.001, 4)
ret =
     0

AcqInfo =

1x4 struct array with fields:
    channel
    dataType
    blockNum
    startBit
    effectiveBit
    trigActive
    record
    recordLen
    trigPosition
    time
    interval
    vResolution
    vOffset
    trigLevel
    trigWidth
    plusOverData
    minusOverData
    nonData
    dispMaxData
    dispMinData

>> ret = mexWeDPHeaderWriteS(filename, 0, ComInfo, 4, ChInfo, AcqInfo)
ret =
     0
>> ret = mexWeDPDataWrite(filename, 0, 1000, 4, AcqInfo, 50, data)
ret =
     0
>>
```

M-file Example

```
sourceFilename = 'wvf1';
destinationFilename = 'wvf1_dup';
blockNo = 0;
ch = -1;            % All channel
dataForm = 50;      % WE_DOUBLE
maxData = -Inf;
minData = Inf;

[ret, SampleNum, ChNum] = mexWeDPGetSampleChNum(sourceFilename, blockNo)
SampleNum = double(SampleNum);
ChNum = double(ChNum);
% Read the header file
[ret, ComInfo, ChInfo] = mexWeDPHeaderReadS(sourceFilename, blockNo, ChNum)
samplingInterval = ComInfo.SamplingInterval
% read the data file
[ret, data] = mexWeDPDataRead(sourceFilename, blockNo, ch, dataForm, SampleNum * ChNum);
for ch=1 : ChNum
```

```
    [ret, value] = mexWeDPHeaderItemRead(sourceFilename, 'VResolution', ch, blockNo)
    VRes = str2num(value)
    [ret, value] = mexWeDPHeaderItemRead(sourceFilename, 'VOffset', ch, blockNo)
    VOfs = str2num(value)
    for i=(ch-1)*SampleNum+1 : ch*SampleNum
      data(i) = data(i) * VRes + VOfs;    % Convert to the voltage values from the file values.
    end
    [ret, value] = mexWeDPHeaderItemRead(sourceFilename, 'VMaxData', ch, blockNo)
    work = str2num(value) * VRes + VOfs;
    if maxData < work
      maxData = work
    end
    [ret, value] = mexWeDPHeaderItemRead(sourceFilename, 'VMinData', ch, blockNo)
    work = str2num(value) * VRes + VOfs;
    if minData > work
      minData = work
    end
end
plot(data(1:SampleNum))     % Display on graph
[ret, AcqInfo] = mexWeDPInitializeAcqInfo(maxData, minData, SampleNum, samplingInterval, ChNum)
AcqInfo(1)
% Write the header file
ret = mexWeDPHeaderWriteS(destinationFilename, blockNo, ComInfo, ChNum, ChInfo, AcqInfo)
for ch=1 : ChNum
    [ret, VUnit] = mexWeDPHeaderItemRead(sourceFilename, 'VUnit', ch, blockNo)
    ret = mexWeDPHeaderItemWrite(destinationFilename, 'VUnit', ch, blockNo, VUnit)
end
% Write the data file
ret = mexWeDPDataWrite(destinationFilename, blockNo, SampleNum, ChNum, AcqInfo, dataForm,
data)
```

4. File Operation Functions

The function names obtained by removing “mex” from the mex function names correspond to the WVF File Access API functions.
For details on mex functions, see chapter 3, “File Operation Function” in the WVF File Access API User’s Manual (IM 707712-61E) or chapter 9, “File Operation Functions” in the WE Control API User’s Manual (IM 707741-61E).

4.1 The List of Functions

Single File Access

mex Function Name	API Function Name	Description	Page
mexWeDPHeaderReadS	WeDPHeaderReadS	Read the header file of the single file.	4-2
mexWeDPDataRead	WeDPDataRead	Read the data file of the single file.	4-2
mexWeDPHeaderWriteS	WeDPHeaderWriteS	Write the header file of the single file.	4-3
mexWeDPDataWrite	WeDPDataWrite	Write the data file of the single file.	4-3

Sequential File Access

mex Function Name	API Function Name	Description	Page
mexWeDPHeaderCsReadS	WeDPHeaderCsReadS	Read the header file of the sequential file.	4-4
mexWeDPCsRead	WeDPCsRead	Read the data file of the sequential file.	4-4
mexWeDPHeaderCsWriteS	WeDPHeaderCsWriteS	Write the header file of the sequential file.	4-5
mexWeDPCsWrite	WeDPCsWrite	Write the data file of the sequential file.	4-5

Access the Specified Item of the Header File

mex Function Name	API Function Name	Description	Page
mexWeDPHeaderItemRead	WeDPHeaderItemRead	Read the data of the specified item.	4-6
mexWeDPHeaderItemWrite	WeDPHeaderItemWrite	Write the data of the specified item.	4-6

Data Operation

mex Function Name	API Function Name	Description	Page
mexWeDPGetSampleChNum	WeDPGetSampleChNum	Get the number of samples and number of channels.	4-7
mexWeDPGetBlockNum	WeDPGetBlockNum	Get the number of blocks.	4-7
mexWeDPInitializeAcqInfo	WeDPInitializeAcqInfo	Store the required data in the data information structure.	4-7

4.2 Single File Access

mexWeDPHeaderReadS

Description

Reads the data from the header file by specifying the block number.

Syntax

[ret, ComInfo, ChInfo] = mexWeDPHeaderReadS(filename, blockNo, ChNum)

Output Parameters

ret: Returns 0 if successful. Returns an error code if unsuccessful.
ComInfo: Structure of the read information (ComInfo)
ChInfo: Structure of the read information (ChInfo)

Input Parameters

filename: Name of the file to be read without the extension
blockNo: Block number to be read (0 origin)
ChNum: Number of channels to be read (number of ChInfo structures)

mexWeDPDataRead

Description

Reads the data from the data file by specifying the block number.

Syntax

[ret, data] = mexWeDPDataRead(filename, blockNo, ch, dataForm, dataNum)

Output Parameters

ret: Returns 0 if successful. Returns an error code if unsuccessful.
data: Read data

Input Parameters

filename: Name of the file to be read without the extension
blockNo: Number of the block to be read
ch: Number of the channel to be read
dataForm: Type of data to be read
1=WE_UBYTE
17=WE_SWORD
33=WE_SLONG
34=WE_FLOAT
50=WE_DOUBLE
dataNum: Number of data points to be read

Note

The parameter dataNum does not exist in the WVF File Access API or the WE Control API function, but is required in the mex function.

mexWeDPHeaderWriteS

Description

Writes the header information at once to the header file by specifying the block.

Syntax

ret = mexWeDPHeaderWriteS(filename, blockNo, ComInfo, ChNum, ChInfo, AcqInfo)

Output Parameters

ret: Returns 0 if successful. Returns an error code if unsuccessful.

Input Parameters

filename: Name of the file to be written without the extension
blockNo: Block number to be written (0 origin)
ComInfo: Structure of the written information (ComInfo)
ChNum: Number of channels to be written (number of ChInfo structures)
ChInfo: Structure of the written information (ChInfo)
AcqInfo: Data information structure to be written

mexWeDPDataWrite

Description

Writes the data to the data file in units of blocks.

Syntax

ret = mexWeDPDataWrite(filename, blockNo, sampleNum, ChNum, AcqInfo, dataForm, data)

Output Parameters

ret: Returns 0 if successful. Returns an error code if unsuccessful.

Input Parameters

filename: Name of the file to be written without the extension
blockNo: Number of the block to be written
sampleNum: Number of samples to be written
ChNum: Number of channels to be written
AcqInfo: Data information structure to be written
dataForm: Type of data to be written
1=WE_UBYTE
17=WE_SWORD
33=WE_SLONG
34=WE_FLOAT
50=WE_DOUBLE
data: Data to be written

4.3 Sequential File Access

mexWeDPHeaderCsReadS

Description

Collectively reads the header information from a header file.

Syntax

[ret, ComInfo, ChInfo] = mexWeDPHeaderCsReadS(filename, seriesNo, ChNum)

Output Parameters

ret: Returns 0 if successful. Returns an error code if unsuccessful.
ComInfo: Structure of the read information (ComInfo)
ChInfo: Structure of the read information (ChInfo)

Input Parameters

filename: Name of the file to be read without the extension
seriesNo: First sequence number of the file to be read
ChNum: Number of channels to be read (number of ChInfo structures)

mexWeDPCsRead

Description

Reads the data from the data files (sequential files) by specifying the number of samples.

Syntax

[ret, data] = mexWeDPCsRead(filename, seriesNo, start, length, ch, dataForm, dataNum)

Output Parameters

ret: Returns 0 if successful. Returns an error code if unsuccessful.
data: Read data

Input Parameters

filename: Name of the file to be read without the extension
seriesNo: First sequence number of the file to be read
start: Start point of the data to be read
length: Number of data points to be read
ch: Number of the channel to be read
dataForm: Type of data to be read
1=WE_UBYTE
17=WE_SWORD
33=WE_SLONG
34=WE_FLOAT
50=WE_DOUBLE
dataNum: Number of data points to be read

Note

The parameter dataNum does not exist in the WVF File Access API or the WE Control API function, but is required in the mex function.

mexWeDPHeaderCsWriteS

Description

Collectively writes the header information to the header file.

Syntax

ret = mexWeDPHeaderCsWriteS(filename, seriesNo, ComInfo, ChNum, ChInfo, AcqInfo)

Output Parameters

ret: Returns 0 if successful. Returns an error code if unsuccessful.

Input Parameters

filename: Name of the file to be written without the extension
seriesNo: First sequence number of the file to be written
ComInfo: Structure of the written information (ComInfo)
ChNum: Number of channels to be written (number of ChInfo structures)
ChInfo: Structure of the written information (ChInfo)
AcqInfo: Data information structure to be written

mexWeDPCsWrite

Description

Write data to a sequence file.

Syntax

ret = mexWeDPCsWrite(filename, seriesNo, sampleNum, ChNum, AcqInfo, dataForm, data)

Output Parameters

ret: Returns 0 if successful. Returns an error code if unsuccessful.

Input Parameters

filename: Name of the file to be written without the extension
blockNo: Number of the block to be written
sampleNum: Number of samples to be written
ChNum: Number of channels to be written
AcqInfo: Data information structure to be written
dataForm: Type of data to be written
1= WE_UBYTE
17=WE_SWORD
33=WE_SLONG
34=WE_FLOAT
50=WE_DOUBLE
data: Data to be written

4.4 Access the Specified Item of the Header File

mexWeDPHeaderItemRead

Description

Reads the information of the specified item name and specified channel from the header information of the header file.

Syntax

[ret, data] = mexWeDPHeaderItemRead(filename, itemName, ch, blockNo)

Output Parameters

ret: Returns 0 if successful. Returns an error code if unsuccessful.
data: Read data

Input Parameters

filename: Name of the file to be read without the extension
itemName: Name of the item to be read
ch: Number of the channel to be read
blockNo: Number of the block to be read

mexWeDPHeaderItemWrite

Description

Writes data to the specified item name and specified channel in the header information of the header file.

Syntax

ret = mexWeDPHeaderItemWrite(filename, itemName, ch, blockNo, data)

Output Parameters

ret: Returns 0 if successful. Returns an error code if unsuccessful.

Input Parameters

filename: Name of the file to be written without the extension
itemName: Name of the item to be written
ch: Number of the channel to be written
blockNo: Number of the block to be written
data: Data to be written

4.5 Data Operation

mexWeDPGetSampleChNum

Description

Gets the number of samples and number of channels of the specified file.

Syntax

[ret, SampleNum, ChNum] = mexWeDPGetSampleChNum(filename, blockNo)

Output Parameters

ret: Returns 0 if successful. Returns an error code if unsuccessful.
SampleNum: Number of data points read
ChNum: Number of channels read

Input Parameters

filename: Name of the file to be read without the extension
blockNo: Number of the block to be read

mexWeDPGetBlockNum

Description

Gets the number of blocks of the specified file.

Syntax

[ret, blockNum] = mexWeDPGetBlockNum(filename)

Output Parameters

ret: Returns 0 if successful. Returns an error code if unsuccessful.
blockNum: Number of block read

Input Parameters

filename: Name of the file to be read without the extension

mexWeDPInitializeAcqInfo

Description

Stores the required data in the data information structure.

Syntax

[ret, AcqInfo] = mexWeDPInitializeAcqInfo(VMaxData, VMinData, sampleNum, sampInterval, infoNum)

Output Parameters

ret: Returns 0 if successful. Returns an error code if unsuccessful.
AcqInfo: Data information structure

Input Parameters

VMaxData: Max data
VMinData: Min data
sampleNum: Number of data samples
sampInterval: Sampling frequency of the data
infoNum: Number of data information structures

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