

ADwin Driver

Driver for Python



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Typographical Conventions



"Warning" stands for information, which indicate damages of hardware or software, test setup or injury to persons caused by incorrect handling.



You find a "note" next to

- information, which absolutely have to be considered in order to guarantee an error free operation.
- advice for efficient operation.



"Information" refers to further information in this documentation or to other sources such as manuals, data sheets, literature, etc.

<C:\ADwin\ ...>

File names and paths are placed in <angle brackets> and characterized in the font *Courier New*.

Program text

Program instructions and user inputs are characterized by the font *Courier New*.

Var_1

ADbasic source code elements such as instructions, variables, comments and other text are characterized by the font *Courier New* and are printed in color (see also the editor of the *ADbasic* development environment).

Bits in data (here: 16 bit) are referred to as follows:

Bit No.	15	14	13	...	01	00
Bit value	2^{15}	2^{14}	2^{13}	...	$2^1=2$	$2^0=1$
Synonym	MSB	-	-	-	-	LSB

1 Information about this Manual

This manual contains comprehensive information about the **ADwin** driver for Python.

Additional information is available in:

- the manual "**ADwin** Installation", which describes all interface installations for the **ADwin** systems.

Begin your installation with this manual.

- the manual "**ADbasic**", which contains all instructions for the compiler **ADbasic**. With this comfortable real-time development tool you are programming your **ADwin** system.
- the hardware manuals for the **ADwin** systems you are using.

It is assumed that you are familiar with your Python environment.

Please note:

For **ADwin** systems to function correctly, adhere strictly to the information provided in this documentation and in other mentioned manuals.

Programming, start-up and operation, as well as the modification of program parameters must be performed only by appropriately qualified personnel.

Qualified personnel are persons who, due to their education, experience and training as well as their knowledge of applicable technical standards, guidelines, accident prevention regulations and operating conditions, have been authorized by a quality assurance representative at the site to perform the necessary activities, while recognizing and avoiding any possible dangers.

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Qualified personnel

Availability of the documents



Legal information

Subject to change.

2 ADwin-Python driver

The **ADwin** system consists of an independent on-board CPU, which executes measurement and control tasks very fast and reliably, as well as of an interface under Windows, Linux or Mac OS in order to control the **ADwin** system with Python.

Consequently you transfer all time-critical processes to the **ADwin** system, but with Python you still have control of the processes and data processing.

Please note: You need a Python interpreter version 2.4 or higher. Older versions have not been tested.

How to program the ADwin system

ADwin systems are fast, reliable and flexible. You apply the easy-to-learn programming language **ADbasic** in order to use all these advantages.

Before you can apply the here described Python instructions, we recommend to familiarize yourself with **ADbasic**. Please use the **ADbasic** manual and the programming instructions as help. The descriptions will help you to understand the **ADwin** system more easily.

Controlling the ADwin systems with Python

Now it's time to start working with this manual.

The sections 2.1 and 2.2 explain how Python and **ADwin** communicate with each other and deepen your knowledge for the **ADwin** concept.

In chapter 3 the installation and the integration of the new commands are described.

The general use of the Python driver is explained in chapter 4, its functions in chapter 5 which can also be used as a kind of reference documentation.

2.1 Interface for the development environment

The **ADwin**-Python driver is the interface for the Python development environment for the communication with **ADwin** systems.

The combination of Python with an **ADwin** system offers you totally new possibilities. The intelligence and computing power of an **ADwin** system on the one hand and the various Python functions for managing, analysis and documentation of measuring values on the other hand join into a powerful concept.

Typical applications are:

- Control of test stands
- Generating signals
- Measuring with intelligence, collecting data with complex trigger conditions
- Open-loop and closed-loop control
- Online processing, data reduction
- Hardware-in-the-loop, simulation of sensor signals

2.2 Communication with the ADwin system

With the development environment you can control processes in the **ADwin**-system, as well as getting data from there or sending data. You are programming processes with the real-time development tool **ADbasic**, create a binary file and transfer it to the **ADwin** system (see **ADbasic** manual or online help).



Data and instructions between Python and the **ADwin** system are processed according to the following illustration.

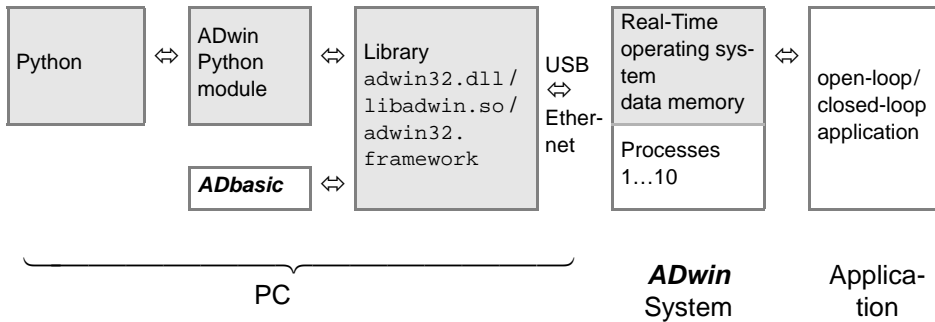


Fig. 1 – **ADwin**-Python Interface

The library (Windows: `adwin32.dll`, Linux: `libadwin.so`, Mac OS: `adwin32.framework`) is the main interface to the **ADwin** system for all applications and is therefore used by the **ADwin**-Python driver, too. With this interface several programs can communicate with the **ADwin** system at the same time: Thus, various development environments, under Windows for example Python, **ADbasic** and **ADtools** can work with the **ADwin** system simultaneously.

The library functions communicate with the real-time operating system of the **ADwin** system. Therefore you must load the operating system (e.g. the file `<adwin9.btl>`) after each power-up. After a successful loading the system will be able to receive and execute processes, receive instructions from the PC and exchange data with it. The processes programmed in **ADbasic**, include the program code for measurement, open-loop or closed-loop control of your application.

The real-time operating system performs the following tasks:

- Management of up to 10 real-time processes with low or high priority (selectable). Processes with low priority can be interrupted by processes with high priority, the latter cannot be interrupted by other processes.
- Providing global variables:
 - 80 integer variables (`Par_1` ... `Par_80`), predefined.
 - 80 float variables (`FPar_1` ... `FPar_80`), predefined.
 - 200 data arrays (`DATA_1` ... `DATA_200`), length and data type can be set individually.

You can read and change the values of these variables or data arrays at any time.

- Communication between **ADwin** system and PC (via program library).

The communication process is running with medium priority on the **ADwin** system and can interrupt low-priority processes for a short time. It interprets and processes all instructions, which you send from the PC to the **ADwin** system: Control instructions and instructions for data exchange.

adwin32.dll

Real-time operating system

10 processes

Data memory

Communication

The following table shows examples for each group.

Control instructions, for example:	
Load_Process	transfers a process to the system.
Start_Process	starts a process.
Instructions for data exchange, for example:	
Get_Par	provides the current value of a parameter.
Set_Par	changes the value of a parameter.
GetData_Long	provides the value from a DATA array.



The communication process never sends data to the PC without being asked to do so. This assures that data are transferred to the PC only if you have requested these data.

3 Installing the ADwin Driver for Python

3.1 Installing ADwin

For the installation you need an up-to-date **ADwin** CDROM.

3.1.1 Installation under Linux or Mac OS

Please follow the installation guide in the manual "ADwin Linux / Mac".

After successful installation you will find the files in the folders below
</opt/adwin/share> (standard installation):

Driver and examples for Python	<code>./python</code>
Documentation for the ADwin module	<code>./doc/python</code>
Examples for ADbasic	<code>./examples/samples_ADwin</code>

Continue with chapter 3.2 "Installing the ADwin module".

3.1.2 Installation under Windows

If you have already installed an **ADwin** system and software skip this section and continue with chapter 3.2.

Else, if an **ADwin** system is to be newly installed, please start the installation with the manual "**ADwin** installation" which is delivered with the **ADwin** hardware. It describes how to

- install the software from the **ADwin** CDROM.
- install the communication driver under Windows.
- install the hardware in the PC (if necessary) and set up the hardware connections between PC and **ADwin** system.

After successful installation you will find the files in folders below <C:\ADwin> (standard installation):

Driver and examples for Python	<code>.\Developer\Python\...</code>
Examples for ADbasic	<code>.\ADbasic\samples_ADwin</code>
Test program for ADwin-Gold , ADwin-light-16 and plug-in boards	<code>.\Tools\Test\ADtest.exe</code>
Test program for ADwin-Pro	<code>.\Tools\Test\ADpro.exe</code>

Continue with the next section "Installing the ADwin module".

3.2 Installing the ADwin module

If you want to work with Python and the **ADwin** system you have to install the **ADwin** module.

Follow these steps:

- Enter the following in the command line:
 - Windows: `$> python setup.py install`
 - Linux / Mac: `$> python ./setup.py install`

Now the **ADwin** module is copied into the folder `site-packages` of the Python installation.

- The **ADwin** module can be used now.

With `import ADwin` you include the **ADwin** module and with `adw = ADwin.ADwin()` you create a new instance of the **ADwin** class with the name `adw`.

If **ADwin** is installed

Else: New installation



The functions of the driver are described in chapter 5. A list of functions in alphabetical order can be found in section A.3.

3.3 Accessing the **ADwin** system

During installation of hardware and software you have successfully checked the access to the **ADwin** system. Please use an example program from chapter A.1 in the annex to check the communication from Python to the **ADwin** system.

If the example program runs correctly all driver functions will operate properly with the **ADwin** system

3.4 Accessing an **ADwin** system via other PCs

If an **ADwin** system is connected to a host PC, but is not accessible within an Ethernet network directly, you can nevertheless get a connection using the program `ADwinTcpipServer`.

Detailed information about the use of `ADwinTcpipServer` is given on the program's online help.

4 General information about **ADwin** functions

4.1 Locating errors

There are 3 possibilities to locate errors upon execution of an **ADwin** function:

- Raising an exception upon run-time errors (exception handling)
Each error provides an exception, which will be described in a separate program part.
We recommend to process errors with this method.
- Explicitly querying error codes with `Get_Last_Error` (see next page)
To handle each error get the error number after each access to the **ADwin** system.
This method is recommended when you do not use any exceptions.
- Using the return value of functions (see next page)
When using certain commands the return value contains an error code. It helps to make case differentiation in the program sequence.
Since not all instructions return an error code, a complete error handling is not possible.

4.1.1 Raising an exception

You can configure the **ADwin**-Python module so that an exception is raised with the name `ADwinError` when run-time errors occur. Structure the program as follows:

```
# Provide ADwin functions and error routines
from ADwin import ADwin, ADwinError

# make an instance of the ADwin class, raise exception
RAISE_EXCEPTIONS = 1
adw = ADwin(0x150, RAISE_EXCEPTIONS)

# error handling with try / except
try:
    ...                                # the Python program

except ADwinError, e:
    print '***', e                    # error handling
```

The class attribute `raiseExceptions` determines the action of the module during a run-time error. With the value 1 the module generates an exception when a run-time error occurs. If you prevent exceptions using the value 0, you have to query explicitly the error code after each access to the **ADwin** system (see below).

In the program section `try` you enter the Python program that also contains the accesses to the **ADwin** system. If an error occurs this part of the program will be executed with the exception attribute `ADwinError`.

4.1.2 Explicitly querying error codes

If you configure the class attribute `raiseExceptions` in such a way that it does not raise any exceptions during run-time errors, you have to query the error number with the function `Get_Last_Error` after each access to the **ADwin** system.

For each error number you will get the text with the functions `Get_Last_Error_Text`. A list of all error messages is in section A.2 in the annex.

The functions `Get_Last_Error` and `Get_Last_Error_Text` are described from page 32 onward.

In the following example the undefined array `DATA_1` is accessed; the occurring error does not raise an exception (due to the setting of `raiseExceptions = 0`). Instead, the error is queried with `Get_Last_Error`:

```
>>> import ADwin
>>> adw=ADwin.ADwin()
>>> adw.raiseExceptions = 0
>>> a = adw.GetData_Long(1,1,10)
>>> adw.Get_Last_Error_Text(adw.Get_Last_Error())
'The Data is too small.'
```

4.1.3 Using the return value of functions

The return value of some functions contains an error code, which you can use to differentiate in the program sequence.

Important:

- If run-time errors raise an exception (see chapter 4.1.1), the functions do not return an error code (type `noneType`).
- The functions use different values to indicate an error.
- The returned error code has nothing to do with the list of error messages in the annex.
- The return value is not always unambiguous. If for instance `Get_Processdelay` returns the value 255, it is not quite clear if an error has occurred or if the parameter `Processdelay` contains the value 255.

The return value of the following functions is not unambiguous, that means it can be understood as error or as value:

- `Fifo_Empty`
- `Fifo_Full`
- `Get_Par`
- `Get_FPar`
- `Get_Processdelay`
- `Free_Mem`

For an explicit error handling you have to raise an exception or to query error codes (see above).

4.2 The "DeviceNo."

A "Device No." is the number of a specified **ADwin** system connected to a PC. An **ADwin** system is always accessed via the "Device No."

The "Device No." for the **ADwin** system is generated with the program *ADconfig*. You will find more information about the program's usage in the online help of *ADconfig*. Under Windows an online help is available, under Linux you call the help with:

```
adconfig --help or
man /opt/adwin/share/man/man8/adconfig.8
```

You indicate the DeviceNo when you generate an instance of an **ADwin** class; the default value is 336 (0x150 in hexadecimal notation). That is, you generate an instance for each **ADwin** system.

4.3 Data types

The functions and parameters of the **ADwin**-Python driver use the following data types:

Data type	Definition
str	unsigned integer 16 Bit
int	signed integer 32 Bit
float	float ≥32 Bit

From Python versions 3 and higher `int` corresponds to the formerly used `long` and thus allows any possible high numbers.

In contrast to Python, **ADbasic** uses the following data types:

Data type	Definition
String	unsigned integer 32 Bit
Long	signed integer 32 Bit
Float	float 32 Bit

4.4 2-dimensional arrays

In **ADbasic** global **DATA** arrays can be declared 2-dimensional (2D). But the functions of the **ADwin**-Python driver here use only one-dimensional arrays.

In general there the following rule applies for the relation of an element in a 2D-array from **ADbasic** to an element in a 1D-array from Python:

ADbasic	Python
<code>DATA_n[i][j]</code>	<code>array(s·(i-1)+j-1)</code>

Here `s` is the second dimension of `DATA_n` when declared in **ADbasic**.

As an example a 2D-array may be declared in **ADbasic** as follows

```
DIM DATA_8[7][3] AS FLOAT 'i.e. s=3
```

The 7×3 elements of the array are read in Python with `GetData_Float`:

```
# transfer elements 1...21 from DATA_8 into array
array = adw.GetData_Float(8,1,21)
```



The data are transferred in the following order: Please note, that in Python array indexes begin at 0, but in **ADbasic** at 1:

Index of <code>DATA_8</code>	[1][1]	[1][2]	[1][3]	[2][1]	...	[7][1]	[7][2]	[7][3]
Index of array	[0]	[1]	[2]	[3]	...	[18]	[19]	[20]

Thus, the function `GetData_Float` returns element `DATA_8[7][2]` in `array[19]`.

With `s=3` the general rule results to:

ADbasic	Python
<code>DATA_n[1][1]</code>	<code>array[3·(1-1)+1-1] = array[0]</code>
<code>DATA_n[1][2]</code>	<code>array[3·(1-1)+2-1] = array[1]</code>
...	...
<code>DATA_n[7][2]</code>	<code>array[3·(7-1)+2-1] = array[19]</code>
<code>DATA_n[7][3]</code>	<code>array[3·(7-1)+3-1] = array[20]</code>

5 Description of the ADwin functions

The description of the functions is divided into the following sections:

- System control and system information, page 12
- Process control, page 15
- Transfer of global variables, page 19
- Transfer of data arrays, page 23
- Querying the error code, page 32

In annex A.3 you find an overview of all functions.

Please pay attention to chapter 4, where general aspects for the use of **ADwin** functions are described.

Instructions for accessing analog and digital inputs and outputs are not included in the **ADwin**-Python driver. These applications can be programmed in **ADbasic**.

The following program structure belongs to each Python program:

```
# Provide ADwin functions and error routines
from ADwin import ADwin, ADwinError

# Generate an instance of the ADwin class, raise exceptions
adw = ADwin(0x150, 1)

# Error handling with try / except (see chapter 4.1)
try:
    ...                                # program section to be monitored

except ADwinError, e:
    print '***', e                    # error handling
```

It is assumed that with `adw` an instance of the **ADwin** class has already been generated when using the examples of the **ADwin** functions.



Program structure

Boot



5.1 System control and system information

Initialization of the **ADwin** system and information about the operating status.

`Boot` initializes the **ADwin** system and loads the operating system.

```
Boot(str Filename)
```

Parameters

`Filename` Path and file name of the operating system file (see table below)

Notes

The initialization deletes all processes on the system and sets all global variables to 0.

The operating system file to be loaded depends on the processor type of the system you want to communicate with. The following table shows the file names for the different processors.

The files are located in the directory <C:\ADwin\> or /opt/adwin/share/btl/, which can be called with the class attribute `adw.ADwindir`.

ADwin type	Processor	Operating system file
ADwin-9	T9	ADwin9.btl
		ADwin9s.btl ¹
ADwin-10	T10	ADwin10.btl
ADwin-11	T11	ADwin11.btl

You can also use the processors T2...T8; in this case call our support (address on the back of the cover page).

The computer will only be able to communicate with the **ADwin** system after the operating system has been loaded. Load the operating system again after each power up of the **ADwin** system.

Loading the operating system with `Boot` takes about one second. As an alternative you can also load the operating system via **ADbasic** development environment. (Icon **B**).

Example

Please note the advice about the program structure on page 11.

```
# Load operating system for T10 processor
adw.Boot(adw.ADwindir + '\\ADwin10.btl')
```

1. Optimized operating system with a slightly smaller memory requirement.

Test_Version tests, if the right operating system is loaded for the processor and if the processor can be accessed.

```
int Test_Version()
```

Parameters

Return value 0: OK
 ≠0:error.

Example

```
print 'Test_Version:', adw.Test_Version()
```

Processor_Type returns the processor type of the system.

```
int Processor_Type()
```

Parameters

Return value Parameter for the processor of the system.

0: Error	8: T8
2: T2	9: T9
4: T4	1010: T10
5: T5	1011: T11

Example

```
print 'Processor_Type:', adw.Processor_Type()
```

Workload returns the average processor workload since the last call of **Workload**.

```
int Workload()
```

Parameters

Return value 0...100: Processor workload (in percent)
 255: Error

Notes

The processor workload is evaluated for the period between the last and the current call of **Workload**. If you need the current processor workload, you must call the function twice and in a short time interval (approx. 1 ms).

Example

```
print 'Workload:', adw.Workload()
```

Test_Version

Processor_Type

Workload

Free_Mem

Free_Mem returns the free memory of the system for the different memory types.

```
int Free_Mem(int Mem_Spec)
```

Parameters

Mem_Spec	Memory type: 0 : all memory types (T2, T4, T5, T8 only) 1 : internal program memory (PM_LOCAL); up from T9 2 : extra program memory (EM_LOCAL); T11 only 3 : internal data memory (DM_LOCAL); up from T9 4 : external DRAM memory (DRAM_EXTERN); up from T9
----------	--

Return value	≠255: Usable free memory 255: Error
--------------	--

Example

```
# Query the free memory in the external DRAM  
print 'Free_Mem:', adw.Free_Mem(1), 'Bytes'
```

5.2 Process control

Instructions for the control of single processes on the **ADwin** system.

There are the processes 1...10 and 15. The processes have the following functions:

- 1...10: You write the process in **ADbasic** yourself.
- 15: Controls flashing of the LED on **ADwin-Gold** or **ADwin-Pro**.

Process 15 is part of the operating system and is started automatically after booting. For detailed information see manual **ADbasic**, chapter "Process Management".

`Load_Process` loads the binary file of process to the **ADwin** system.

```
Load_Process(str Filename)
```

Parameters

`Filename` Path and file name of the binary file to be loaded.

Notes

You generate binary files in **ADbasic** with "Build ► Make Bin file".

If you switch off your **ADwin** system all processes are deleted: Load the necessary processes again after power-up

You may load up to 10 processes to an **ADwin** system. Running processes are not influenced by loading additional processes (with different process numbers).

Example

```
# Load the Testprg.T91 file: Processor T9, Process no. 1
# The file Testprg.T91 can be found in the current
directory
adw.Load_Process('Testprg.T91')
```

`Start_Process` starts a process.

```
Start_Process(int ProcessNo)
```

Parameters

`ProcessNo` Process number (1...10, 15).

Notes

`Start_Process` has no effect, if you indicate the number of a process, which

- is already running or
- has the same number as the calling processor or
- has not yet been loaded to the **ADwin** system.

Example

```
adw.Start_Process(1)# start Process 1
```

Load_Process



Start_Process

Stop_Process

Stop_Process stops a process.

```
Stop_Process(int ProcessNo)
```

Parameters

`ProcessNo` Process number (1...10, 15).

Notes

The function has no effect, if you indicate the number of a process, which

- has already been stopped or
- has not yet been loaded to the **ADwin** systemt.

Example

```
adw.Stop_Process(2)# stops process 2
```

Clear_Process

Clear_Process deletes a process from memory.

```
Clear_Process(int ProcessNo)
```

Parameters

`ProcessNo` Process number (1...10, 15).

Notes

Loaded processes need memory space in the system. With `Clear_Process` you can delete processes from the program memory to get more space for other processes.

If you want to delete a process, proceed as follows:

- Stop the running process with `Stop_Process`. A running process cannot be deleted.
- Check with `Process_Status`, if the process has really stopped.
- Delete the process from the memory with `Clear_Process`.

Process 15 in Gold and Pro systems is responsible for flashing the LED; after deleting this process the LED does not flash any more.

Please note, that clearing processes can lead to memory fragmentation. You find more information in the **ADbasic** manual, section "Memory fragmentation".

Example

```
# Delete process 2 from memory.
# Declared DATA and FIFO arrays remain.
adw.Stop_Process(2)
while adw.Process_Status(2) <> 0:
    pass
adw.Clear_Process(2)
```



`Process_Status` returns the status of a process.

```
int Process_Status(int ProcessNo)
```

Parameters

ProcessNo Process number (1...10, 15).

Return value Status of the process:
 1 : Process is running.
 0 : Process is not running, that means, it has not been loaded, started or stopped.
 <0: Process is being stopped, that means, it has received `Stop_Process`, but still waits for the last event.

Example

```
# Return the status of process 2
print 'Process_Status 2:', adw.Process_Status(2)
```

`Set_Processdelay` sets the parameter `Processdelay` for a process.

```
Set_Processdelay(int ProcessNo, int Processdelay)
```

Parameters

ProcessNo Process number (1...10).

Processdelay Value ($1 \dots 2^{31}-1$) to be set for the parameter `Processdelay` of the process (see table below).

Notes

The parameter `Processdelay` controls the time interval between two events of a time-controlled process (see manual or online help **ADbasic**).

For each process there is a minimum time interval: If you fall below the minimum time interval you will get an overload of the **ADwin** processor and communication will fail.

The time interval is specified in a time unit that depends on processor type and process priority:

Processor type	Process priority	
	high	low
T9	25ns	100µs
T10	25ns	50µs
T11	3.3ns	0.003µs = 3.3ns

Example

```
# Set Processdelay 2000 of process 1.
adw.Set_Processdelay(1,2000)
```

If process 1 is time-controlled, has high priority and runs on a T9 processor, process cycles are called every 50 µs (=2000*25ns).

Process_Status

Set_Processdelay

Get_Processdelay

Get_Processdelay returns the parameter Processdelay for a process.

```
int Get_Processdelay(int ProcessNo)
```

Parameters

ProcessNo Process number (1...10).

Return value ≠255: The currently set value ($1 \dots 2^{31}-1$) for the parameter **Processdelay** of a process.
255: Error or value of **Processdelay**.
Please note chapter 4.1.3.

Notes

The parameter **Processdelay** controls the time interval between two events of a time-controlled process (see Set_Processdelay as well as the manual or online help of **ADbasic**).

The parameter **Processdelay** replaces the former parameter **Globaldelay**.

Example

```
# Get Processdelay of the ADbasic process 1
print 'Processdelay 1:', adw.Get_Processdelay(1)
```

5.3 Transfer of global variables

Instructions for data transfer between PC and **ADwin** system with the pre-defined global variables `PAR_1 ... PAR_80` and `FPAR_1 ... FPAR_80`.

5.3.1 Global LONG variables (`Par_1 ... Par_80`)

There are 80 global LONG variables. They have the following range of values:

`Par_1 ... Par_80`: $-2147483648 \dots +2147483647$
 $= -2^{31} \dots +2^{31}-1$

`Set_Par` sets a global LONG variable to the specified value.

```
Set_Par(int Index, int Value)
```

Parameters

<code>Index</code>	Number (1 ... 80) of a global LONG variable <code>Par_1 ... Par_80</code> .
<code>Value</code>	Value to be set for the LONG variable.

Example

```
# Set values of all LONG variables
for i in range(1, 81): adw.Set_Par(i, i)
```

`Get_Par` returns the value of a global LONG variable.

```
int Get_Par(int Index)
```

Parameters

<code>Index</code>	Number (1 ... 80) of a global LONG variable <code>Par_1 ... Par_80</code> .
Return value	$\neq 255$: Current value of the variable. 255: Error or value the variable. Please note chapter 4.1.3.

Example

```
# Read the values of the LONG variables Par_1...Par_10
print 'Get_Par:',
for i in range(1,11): print adw.Get_Par(i),
```

Set_Par

Get_Par

Get_Par_Block

Get_Par_Block transfers a specified number of global LONG variables into an array.

```
ctypes.c_long_Array Get_Par_Block(int StartIndex,  
int Count)
```

Parameters

StartIndex Number (1 ... 80) of the global LONG variable `Par_1` ... `Par_80`, to be transferred first.

Count Number (≥ 1) of LONG variables to be transferred.

Return value Destination array for the values of the LONG variables. The array is created anew.

Example

Read the values of the variables `Par_10` ... `Par_39` and store in `ArrayLong` starting from element 0:

```
ArrayLong = adw.Get_Par_Block(10,30)
```

Get_Par_All

Get_Par_All transfers all 80 global LONG variables into an array.

```
ctypes.c_long_Array Get_Par_All()
```

Parameters

Return value Destination array for the values of the LONG variables. The array is created anew.

Example

Read the values of the variables `PAR_1` ... `PAR_80` and store in `ArrayLong`

```
ArrayLong = adw.Get_Par_All()
```

Note: Since the indexing of Python arrays begins at 0 `Par_9` for instance is found in `ArrayLong[8]`.

5.3.2 Global FLOAT variables (FPar_1 ... FPar_80)

There are 80 global FLOAT variables. They have the following range of values:

FPar_1 ... FPar_80: negative: $-3.402823 \cdot 10^{+38} \dots -1.175494 \cdot 10^{-38}$
 zero
 positive: $+1.175494 \cdot 10^{-38} \dots +3.402823 \cdot 10^{+38}$

Set_FPar sets a global FLOAT variable to the specified value.

```
Set_FPar(int Index, float Value)
```

Parameters

Index	Number (1 ... 80) of a global FLOAT variable FPar_1 ... FPar_80.
Value	Value to be set for the FLOAT variable.

Example

```
# Set Float variable FPar_6 to 34.7
adw.Set_FPar(6, 34.7)
```

Get_Par returns the value of a global FLOAT variable.

```
float Get_FPar(int Index)
```

Parameters

Index	Number (1 ... 80) of a global FLOAT variable FPar_1 ... FPar_80.
Return value	≠255.0: Current value of the variable. 255.0: Error or value of the variable. Please note chapter 4.1.3.

Example

```
# Read the value of the FLOAT variable FPAR_56
print 'FPar_56:', adw.Get_FPar(56)
```

Set_FPar

Get_FPar

Get_FPar_Block

Get_FPar_Block transfers the specified number of global FLOAT variables into an array

```
ctypes.c_float_Array Get_FPar_Block(int StartIndex,  
                                     int Count)
```

Parameters

StartIndex Number (1 ... 80) of the first global FLOAT variable FPar_1 ... FPar_80 to be transferred.

Count Number (≥ 1) of FLOAT variables to be transferred.

Return value Destination array for the values of the FLOAT variables.

Example

Read the values of the variables PAR_10 ... PAR_34 and store in ArrayFloat starting from element 0:

```
ArrayFloat = adw.Get_FPar_Block(10,25)
```

Get_FPar_All

Get_FPar_All transfers all 80 global FLOAT variables into an array.

```
ctypes.c_float_Array Get_FPar_All()
```

Parameters

Return value Destination array for the values of the FLOAT variables.

Example

Read the values of the variables PAR_1 ... PAR_80 and store in ArrayFloat starting from element 1:

```
ArrayFloat = adw.Get_FPar_All()
```

5.4 Transfer of data arrays

Instructions for data transfer between PC and **ADwin** system with global **DATA** arrays (**DATA_1...DATA_200**):

- Data arrays
- FIFO arrays
- Data arrays with string data

You have to declare each array before using it in **ADbasic** (see **ADbasic** manual).

5.4.1 Data arrays

Declare each array before using it in **ADbasic** with

DIM DATA_n AS LONG/FLOAT

The value range of an array element depends on the data type:

- **LONG**: -2147483648 ... +2147483647
- **FLOAT**: negative: $-3.402823 \cdot 10^{+38}$... $-1.175494 \cdot 10^{-38}$
 zero
 positive: $+1.175494 \cdot 10^{-38}$... $+3.402823 \cdot 10^{+38}$

Data_Length returns the length of a **LONG**, **FLOAT** or **STRING** array, declared in **ADbasic**, that means the number of elements.

```
int Data_Length(int DataNo)
```

Parameters

- | | |
|---------------|---|
| DataNo | Number (1...200) of an array Data_1...Data_200 . |
| Return value | >0: Declared length of the array (= number of elements)
0: Error, array is not declared
-1: Other error |

Notes

To determine the length of a string in a **STRING DATA** array you use the instruction **String_Length**.

Example

In **ADbasic** **DATA_2** is dimensioned as:

```
DIM DATA_2[2000] AS LONG
```

In Python the length of the array **DATA_2** is determined as follows:

```
print 'length Data_2:', adw.Data_Length(2)
```



Data_Length

SetData_Long

SetData_Long transfers LONG data from the PC into a [DATA](#) array of the **ADwin** system.

```
SetData_Long(list|array|ctypes.c_long_Array
             PC_Array, int DataNo, int Startindex, int Count)
```

Parameters

PC_Array	Source array from which data are transferred.
DataNo	Number (1...200) of destination array DATA_1 ... DATA_200 .
StartIndex	Number (≥ 1) of the first element in the destination array into which data is transferred.
Count	Number (≥ 1) of LONG data to be transferred.

Example

Transfer first 100 elements of the source array [ArrayLong](#) into the elements 30...129 of the destination array [DATA_3](#):

```
dataType = ctypes.c_long * 100
ArrayLong = dataType(0)
for i in range(100): ArrayLong[i] = i+100
adw.SetData_Long(ArrayLong, 3, 1, 100)
```

GetData_Long

GetData_Long transfers LONG data from a [DATA](#) array of the **ADwin** system into an array

```
ctypes.c_long_Array GetData_Long(int DataNo,
                                 int Startindex, int Count)
```

Parameters

DataNo	Number (1...200) of source array DATA_1 ... DATA_200 .
StartIndex	Number (≥ 1) of the first element in the source array to be transferred.
Count	Number (≥ 1) of LONG data to be transferred.
Return value	Newly created destination array that contains the transferred values.

Example

Transfer elements 1...100 from source array [DATA_2](#) into the destination array [ArrayLong](#) starting from index 0:

```
ArrayLong = adw.GetData_Long(2,1,100)
```

`SetData_Float` transfers FLOAT data from the PC into a `DATA` array of the **ADwin** system.

```
SetData_Float(list|array|ctypes.c_float_Array PC_Array, int DataNo, int Startindex, int Count)
```

Parameters

<code>PC_Array</code>	Source array from which data are transferred.
<code>DataNo</code>	Number (1...200) of destination array <code>DATA_1</code> ... <code>DATA_200</code> .
<code>StartIndex</code>	Number (≥ 1) of the first element in the destination array, into which data is transferred.
<code>Count</code>	Number (≥ 1) of FLOAT data to be transferred.

Example

Transfer first 80 elements of the source array `ArrayFloat` into the elements 20...99 of the destination array `DATA_3`:

```
dataType = ctypes.c_float * 80
ArrayFloat = dataType(0)
for i in range(80): ArrayFloat[i] = i+100.1234
adw.SetData_Float(ArrayFloat, 3, 20, 80)
```

`GetData_Float` transfers FLOAT data from a `DATA` array of **ADwin** system into an array.

```
ctypes.c_float_Array GetData_Float(int DataNo, int Startindex, int Count)
```

Parameters

<code>DataNo</code>	Number (1...200) of source array <code>DATA_1</code> ... <code>DATA_200</code> .
<code>StartIndex</code>	Number (≥ 1) of the first element in the source array to be transferred.
<code>Count</code>	Number (≥ 1) of FLOAT data to be transferred.
Return value	Newly created destination array that contains the transferred values.

Example

Transfer elements 1...100 from source array `DATA_2` into the destination array `ArrayFloat` starting from index 0:

```
ArrayFloat =adw.GetData_Float(2,1,100)
```

SetData_Float

GetData_Float



5.4.2 FIFO arrays

Instructions for data transfer between PC and **ADwin** system with global **DATA** arrays (**DATA_1...DATA_200**), which are declared as FIFO.

You must declare each FIFO array before using it in ADbasic (see "**ADbasic**" manual): **DIM DATA_x[n] AS TYPE AS FIFO**

The value range of a FIFO array element depends on the data type:

- LONG: -2147483648 ... +2147483647
- FLOAT: negativ: $-3.402823 \cdot 10^{+38}$... $-1.175494 \cdot 10^{-38}$
 zero
 positiv: $+1.175494 \cdot 10^{-38}$... $+3.402823 \cdot 10^{+38}$

To ensure that the FIFO is not full, the **FIFO_EMPTY** function should be used before writing into it. Similarly, the **FIFO_FULL** function should be used to check if there are values which have not yet been read, before reading from the FIFO.

Fifo_Empty

Fifo_Empty returns the number of empty elements in a FIFO array.

```
int Fifo_Empty(int FifoNo)
```

Parameters

- | | |
|---------------|--|
| FifoNo | Number (1...200) of FIFO array DATA_1 ... DATA_200 . |
| Return value | ≠255: Number of empty elements in the FIFO array.
255: Error or number of empty elements.
Please note chapter 4.1.3. |

Example

In **ADbasic** **DATA_5** is dimensioned as:

```
DIM DATA_5[100] AS LONG AS FIFO
```

In Python you will get the number of empty elements (≤ 100) in

DATA_5:

```
print 'Fifo_Empty 5:', adw.Fifo_Empty(5)
```

Fifo_Full

Fifo_Full returns the number of used elements in a FIFO array.

```
int Fifo_Full(int FifoNo)
```

Parameters

- | | |
|---------------|--|
| FifoNo | Number (1...200) of FIFO array DATA_1 ... DATA_200 . |
| Return value | ≠255: Number of the used elements in the FIFO array.
255: Error or number of used elements.
Please note chapter 4.1.3. |

Example

In **ADbasic** **DATA_12** is dimensioned as:

```
DIM DATA_12[2500] AS FLOAT AS FIFO
```

In Python you will get the number of used elements (≤ 2500) in **DATA_12**:

```
print 'Fifo_Full 12:', adw.Fifo_Full(12)
```

`Fifo_Clear` initializes the write and read pointers of a FIFO array. Afterwards, the data in the FIFO array are no longer available.

```
Fifo_Clear(int FifoNo)
```

Parameters

`FifoNo` Number (1...200) of FIFO array `DATA_1 ... DATA_200`.

Notes

During start-up of an **ADbasic** program the FIFO pointers of an array are not initialized automatically. We therefore recommend to call `Fifo_Clear` at the beginning of your **ADbasic** program.

Initializing the FIFO pointers during program run is useful, if you want to clear all data of the array (because of a measurement error for instance).

Example

```
# Clear data in the FIFO array DATA_45
adw.Fifo_Clear(45)
```

`SetFifo_Long` transfers LONG data from the PC into a FIFO array of the **ADwin** system.

```
SetFifo_Long(int FifoNo,
              list|array|ctypes.c_long_Array PC_Array, int Count)
```

Parameters

`FifoNo` Number (1...200) of FIFO array `DATA_1 ... DATA_200`.
`PC_Array` Source array, from which data are transferred.
`Count` Number (≥ 1) of elements to be transferred.

Example

Check FIFO destination array `DATA_12` for enough free elements and transfer 1000 elements from the source array `ArrayLong`:

```
dataType = ctypes.c_long * 1000
ArrayLong = dataType(0)
for i in range(1000): ArrayLong[i] = i
if adw.Fifo_Empty(12) >= 1000:
    adw.SetFifo_Long(12, ArrayLong, 1000)
```

Fifo_Clear

SetFifo_Long

GetFifo_Long

GetFifo_Long transfers LONG data from a FIFO array into an array on the PC.

```
ctypes.c_long_Array GetFifo_Long(int FifoNo,
int Count)
```

Parameters

<code>FifoNo</code>	Number (1...200) of FIFO array <code>DATA_1 ... DATA_200</code> .
<code>Count</code>	Number (≥ 1) of the elements to be transferred.
Return value	Generated destination array that contains the transferred values.

Example

Check FIFO source array `DATA_2` for enough used elements and transfer 3000 elements of `DATA_2` into `ArrayLong` starting from index 0:

```
if adw.Fifo_Full(2) >= 3000:
    ArrayLong = adw.GefFifo_Long(2,3000)
```

SetFifo_Float

SetFifo_Float transfers FLOAT data from the PC into a FIFO array of the **ADwin** sytem.

```
SetFifo_Float(int FifoNo,
list|array|ctypes.c_float_Array PC_Array, int Count)
```

Parameters

<code>FifoNo</code>	Number (1...200) of FIFO array <code>DATA_1 ... DATA_200</code> .
<code>PC_Array</code>	Pointer to the source array, from which data are transferred.
<code>Count</code>	Number (≥ 1) of the elements to be transferred.

Example

Check FIFO destination array `DATA_12` for enough free elements and transfer 1000 elements of the source array `ArrayFloat`:

```
dataType = ctypes.c_float * 1000
ArrayFloat = dataType(0)
for i in range(1000): ArrayFloat[i] = i+0.1234
if adw.Fifo_Empty(12) >= 1000:
    adw.SetFifo_Float(12, ArrayFloat, 1000)
```


GetFifo_Float transfers FLOAT data from a FIFO array of the **ADwin** system into an array of the PC.

```
ctypes.c_float_Array GetFifo_Float(int FifoNo, int  
Count)
```

Parameters

<code>FifoNo</code>	Number (1...200) of FIFO array <code>DATA_1</code> ... <code>DATA_200</code> .
<code>Count</code>	Number (≥ 1) of elements to be transferred.
Return value	Generated destination array that contains the transferred values.

Example

Check FIFO source array `DATA_2` for enough used elements and transfer 200 elements of `DATA_2` into `ArrayFloat` starting from index 0:

```
if adw.Fifo_Full(2) >= 200:  
    ArrayFloat = adw.GetFifo_Float(2, 200)
```

GetFifo_Float



String_Length

5.4.3 Data arrays with string data

Instructions for data transfer between PC and **ADwin** system with global **DATA** arrays (**DATA_1...DATA_200**) that contain string data.

You must declare each **DATA** array before using it in **ADbasic** (see manual "**ADbasic**"): **DIM DATA_x[n] AS STRING**.

An element in the **DATA** array of type **STRING** may contain a character with ASCII value 0 ... 127. The ASCII value 0 (termination char or NULL) marks the end of a string in a **DATA** array.

String_Length returns the length of a data string in a **DATA** array.

```
int String_Length(int DataNo)
```

Parameters

DataNo Number (1...200) of array **DATA_1 ... DATA_200**.

Return value ≠-1: String length = number of characters.
 -1: Error

Notes

String_Length counts the characters in a **DATA** array up to the termination char (NULL). The termination char is not counted as character.

To determine the declared length of a **DATA** array you use the instruction **Data_Length**.

Example

In **ADbasic** **DATA_2** is dimensioned as:

```
DIM DATA_2[2000] AS STRING
DATA_2 = 'Hello World'
```

In Python the length of the array **DATA_2** is determined as:

```
adw.String_Length(2)# returns 11
```

SetData_String

SetData_String transfers a string into a **DATA** array.

```
SetData_String(int DataNo, str String)
```

Parameters

DataNo Number (1...200) of destination array **DATA_1 ... DATA_200**.

String String to be transferred..

Notes

SetData_String appends the termination char (NULL) to each transferred string.

Example

```
adw.SetData_String(2, 'Hello World')
```

The string "Hello World" is written into the array **DATA_2** and the termination char is added.

GetData_String transfers a string from a [DATA](#)-array to the PC.

```
(ctypes.c_char_Array, int) GetData_String(  
    int DataNo, int MaxCount)
```

Parameters

- | | |
|--------------------------|---|
| DataNo | Number (1...200) of source array DATA_1 ... DATA_200 . |
| MaxCount | Max. number (≥ 1) of the transferred characters without termination char. |
| Return value | Tuple with 2 elements: <ul style="list-style-type: none">– Array with the transferred string from the source array.– Status:<ul style="list-style-type: none">$\neq -1$: Number of transferred characters (without termination char).-1: Error |

Notes

If the string in the [DATA](#) array contains a termination char (NULL), the transfer stops exactly there, that is the termination char will not be transferred. The number of read characters without termination char is the return value.

If [MaxCount](#) is greater than the number of string chars defined in **ADbasic**, you will receive the error "Data too small" via `Get_Last_Error()`.

If you set [MaxCount](#) to a high value, the function will have an appropriately long execution time, even if the transferred string is short. For time-critical applications with large strings, it may be faster to proceed as follows:

- You determine the actual number of chars in the string using `String_Length()`.
- You read the string with `Getdata_String()` and pass the actual number of chars as [MaxCount](#).

Example

```
Get the current string from DATA\_2 and copy it to ArrayString:  
count = adw.String_Length(2)  
ArrayString, recv = adw.GetData_String(2,count)
```

GetData_String

5.5 Querying the error code

The following instructions are only useful in certain circumstances. Therefore pay attention to chapter 4.1 "Locating errors".

Get_Last_Error

`Get_Last_Error` returns the number of the error that occurred at last in the **ADwin** program library.

```
int Get_Last_Error()
```

Notes

The function is only useful when you do not use any exceptions for error handling (see chapter 4.1 on page 7). In this case you have to query the error number after each access to the **ADwin** system and act accordingly; after a successful access the error number is automatically set to 0.

Even if several errors occur, `Get_Last_Error` will only return the number of the error that occurred last.

To each error number you will get the text with the function `Get_Last_Error_Text`. You will find a list of all error messages in section A.2 in the annex.

The call of `Get_Last_Error` itself does not influence the error number.

Example

```
# raiseExceptions = 0: In case of a run-time error
# no exception is raised
adw.raiseExceptions = 0
Status = adw.Process_Status(2)
# read error number after each access
# to the ADwin system
ErrNum = Get_Last_Error()
if ErrNum: print 'error: ', \
    adw.Get_Last_Error_Text(ErrNum)
```

Get_Last_Error_Text

`Get_Last_Error_Text` returns the error text to a given error number.

```
str Get_Last_Error_Text(int Last_Error)
```

Parameters

`Last_Error` Error number = return value of the function `Get_Last_Error`.

Return value Error text.

Notes

The function can be called in combination with `Get_Last_Error`.

Example

```
# raiseExceptions = 0
adw.raiseExceptions = 0
Status = adw.Process_Status(2)
ErrNum = Get_Last_Error()
print 'error: ', adw.Get_Last_Error_Text(ErrNum)
```

Annex

A.1 Example programs

The **ADwin** driver for Python contains simple example programs that describe the interaction between Python and the **ADwin** system. All examples contain both the executable files and the source codes.

The Python examples use the Qt-Toolkit, version 4, and the Python module PyQt4. Toolkit and module are available in the internet from Riverbank:

<http://www.riverbankcomputing.co.uk/software/pyqt/download>.

A complete example consists of a Python and an **ADbasic** program. Both programs characteristically perform the following different tasks:

- The Python program starts, monitors and stops a process on the **ADwin** system and displays the transferred data.

Files can be found in the **ADwin** directory, see chapter 3.1 on page 5.

- The **ADbasic** program defines the processes running on the **ADwin** system, as well as measurement, open and closed loop control, and time-critical evaluation.

The following examples are available:

- BAS_DMO1: Online evaluation of measurement values
- BAS_DMO2: Online setting of control parameters
- BAS_DMO3: The example <BAS_DMO3> acquires a sequence of measurement values and displays them as curve.
- BAS_DMO7: Signal generation

All example programs are written for **ADwin-Gold** with the device no. 0x150 (336). For different settings of the **ADwin** systems you have to adapt the source code and recompile.

For Windows, follow these steps:

- Open the **ADbasic** source code <BAS_DMOx.bas> and adapt the settings under "Options ▶ Compiler".

For **ADwin-Pro I** there are separate example programs in the directory <C:\ADwin\ADbasic\samples_ADwin_Pro\>.

- For **ADwin-light-16** the source code remains unchanged.

If you use **ADwin-Gold II** or **ADwin-Pro II** you have to include the corresponding include files and adapt the instructions ADC and DAC.

- Generate a new binary file with "Build ▶ Make Bin File".
- In the Python source code
 - change the constant DEVICENUMBER to the number of the specified **ADwin** system.
 - adapt the name of the operating system files <ADwin9.btl> and the name of the binary file <BAS_DMOx.T91> an.

For Linux, these steps be used appropriately. The compiler use under Linux is described in the manual "ADwin for Linux/Mac".



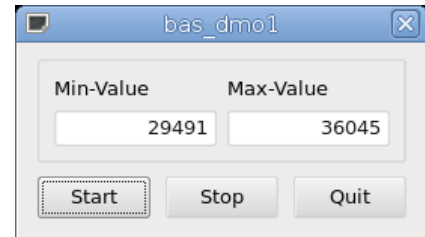
BAS_DMO1

Online evaluation of measurement values

The example <BAS_DMO1> acquires measurement values in cycles, evaluates them online and displays the result.

The example executes the following tasks:

- The Python program loads the **ADwin** operating system for the T9 processor: <ADwin9.btl>.
- The Python program loads the **ADbasic** binary file for the T9 as process 1: <BAS_DMO1.T91>.
- With the button **Start** you start
 - the loaded **ADbasic** process 1 and
 - the timer.



The **ADbasic** process acquires 1000 measurement values at analog input 1, evaluates the minimum and maximum value and saves the two values in the global variables *PAR_1* and *PAR_2*. This measurement cycle is repeated until the process is stopped. After the first measurement cycle the process sets the global *PAR_10* to value 1.

The timer checks five times per second if the global variable *PAR_10* has the value 1. If so, the function reads the values of the global variables *PAR_1* and *PAR_2* and displays them in the windows for minimum and maximum values.

If you have no signal at the analog input 1 the displayed values fluctuate around zero, that is around the value 32768.

- With the button **Stop** you stop
 - the **ADbasic** process 1 and
 - the timer.

Online setting of control parameters

The example <BAS_DMO2> sets the control parameters of a closed loop control process, a digital P-controller. The control parameters may be changed online.

The example executes the following tasks:

- The Python program loads the **ADwin** operating system for the T9 processor: <ADwin9.btl>.
- The Python program loads the **ADbasic** binary file for T9 as process 1: <BAS_DMO2.T91>.
- With the button `Start` you start the loaded **ADbasic** process 1.



- Using the slide controls you adjust the Setpoint and the Gain of the digital P-controller.

With each new setting the Python program writes the values of the slide controls into the global variables `PAR_1` and `PAR_2`.

The **ADbasic** program continuously reads the global variables and uses them as control parameters.

- With the button `Stop` you stop the **ADbasic** process 1.

You find a more detailed description of the **ADbasic** process in the tutorial.

BAS_DMO2

BAS_DMO3

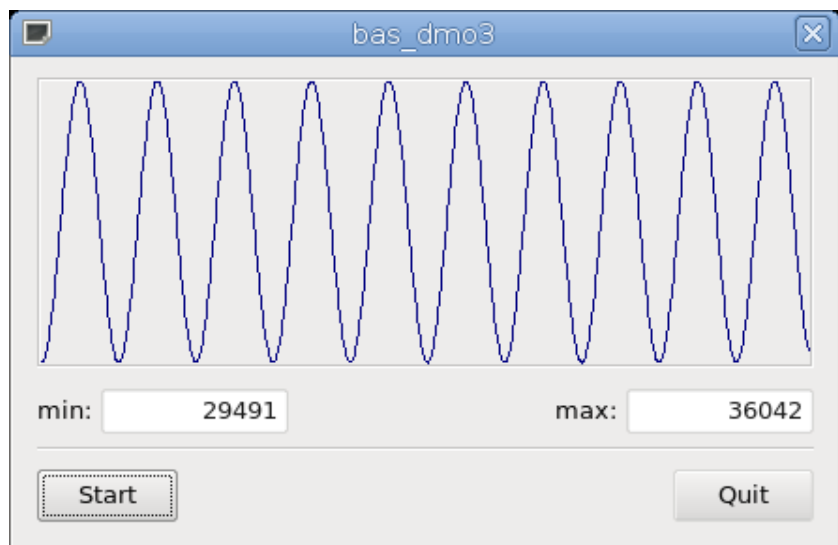
The example <BAS_DMO3> acquires a sequence of measurement values and displays them as curve.

The example executes the following tasks:

- The Python program loads the **ADwin** operating system for the T9 processor: <ADwin9.btl>.
- The Python program loads the **ADbasic** binary file for T9 as process 1: <BAS_DMO3.T91>.
- With the button `Start` you start
 - the loaded **ADbasic** process and
 - the Python function `Timer1`.

The **ADbasic** process `BAS_DMO3` acquires 1000 measurement values at analog input 1 and saves them in the global array `DATA_1`. Then the process sets the global variable `PAR_10` to the value 1 and stops.

The Python function `Timer1` checks ten times per second if the global variable `PAR_10` is set to the value 1. If so, the function reads 1000 values from the global array `DATA_1` and displays them as curve.



The displayed curve depends on the signal sequence at analog input 1.

- You can repeat the acquisition of a measurement sequence whenever you want to.

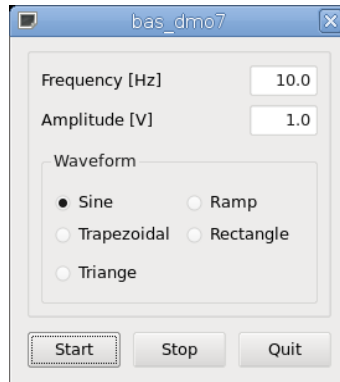
Signal generation

The example <BAS_DM07> contains an **ADbasic** process running as function generator. Via user interface the signal form, the frequency and the amplitude of the output signal are set online.

The example executes the following tasks:

- The Python program loads the **ADwin** operating system for the T9 processor: <ADwin9.btl>.
- The Python program loads the **ADbasic** binary file for T9 as process 1: <BAS_DM07.T91>.
- With the button *Start* you start the loaded **ADbasic** process 1.
- Set the parameters for the output signal:
 - Frequency: 0...1000 Hz
 - Amplitude: 0...10 V
 - Signal form: Sine, ramp, trapezoid, rectangle, triangle.

As soon as you change one of the parameters, the Python program writes the parameter values into the global variables *PAR_1*, *PAR_2* and *PAR_3*.



The **ADbasic** program reads the global variables and generates the appropriate output signal.

- With the button *Stop* you stop the **ADbasic** process 1.

BAS_DM07

A.2 Error messages

No.	Error message
0	No Error.
1	Timeout error on writing to the ADwin-system.
2	Timeout error on reading from the ADwin-system.
10	The device No. is not allowed.
11	The device No. is not known.
15	Function for this device not allowed.
20	Incompatible versions of ADwin operating system , driver (ADwin32.DLL) and/or ADbasic binary-file.
100	The Data is too small.
101	The Fifo is too small or not enough values.
102	The Fifo has not enough values.
150	Not enough memory or memory access error.
200	File not found.
201	A temporary file could not be created.
202	The file is not an ADBasic binary-file.
203	The file is not valid. ¹
204	The file is not a BTL.
2000	Network error (Tcplp).
2001	Network timeout.
2002	Wrong password.
3000	USB-device is unknown.
3001	Device is unknown.

1. Possibly the file <ADwin5.btl> has no memory table, or another file was re-named to <ADwin5.btl> or the file is damaged.

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