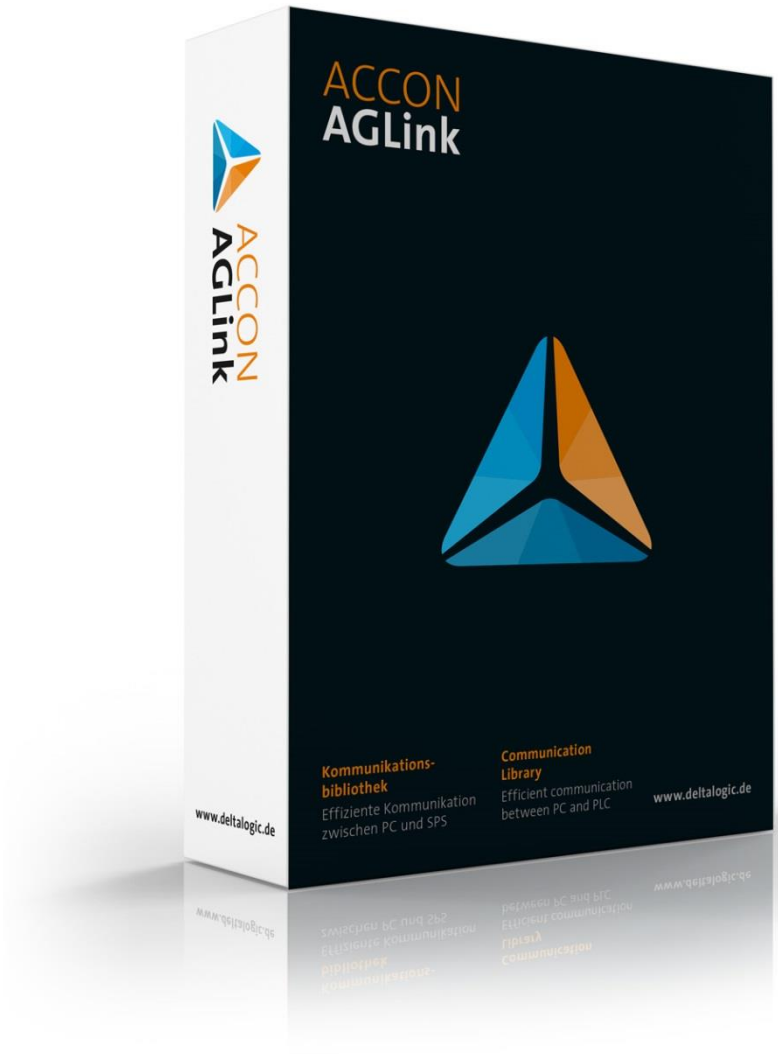
DELTA LOGIC
A RAINER HÖNLE COMPANY
More than just PC PLC communication. Simple. Different.

Basic Manual
ACCON-AGLink



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Note:

We have checked the content of this manual for conformity with the hardware and software described. Nevertheless, because deviations cannot be ruled out, we cannot accept any liability for complete conformity. The data in this manual have been checked regularly and any necessary corrections will be included in subsequent editions. We always welcome suggestions for improvement.

Last update: 01/02/2023, ACCON-AGLink Version 6.0.0.0 All technical changes reserved.

S7-200®, S7-1200®, S7-1500®, S7-300®, S7-400®, HMI®, WinCC®, WinCC flexible®, ProTool®, STEP®, TIA®, TIA Portal®, SINUMERIK®, SIMOTION® and SIMATIC® are registered trademarks of Siemens AG, ACCON® and DELTALOGIC® are registered trademarks of DELTA LOGIC Automatisierungstechnik GmbH.

ACCON-AGLink Version 6

with

ACCON-AGLink S7 seriell

ACCON-AGLink S7 seriell/TS

ACCON-AGLink S7-PB

ACCON-AGLink S7-TCP/IP

ACCON-AGLink S7-PC/CP

ACCON-AGLink S7-RedConn

ACCON-AGLink S5-AS511

ACCON-AGLink S5-TCP/IP

ACCON-AGLink RFC1006

ACCON-AGLink RK512/3964R

ACCON-AGLink S7 SymbolikPro

ACCON-AGLink S7-TCP/IP TIA

ACCON-AGLink S7-SymbolikPro TIA

ACCON-AGLink Sinumerik AddOn

Preface

The quality of an automation solution depends strongly how far the different levels production control, production planning and quality assurance are integrated. One of the main problems is that production data are recorded by a PLC, but a long-term storage and a meaningful evaluation of these data isn't practicable on the PLC. PCs are excellently suitable for an economical solution of such tasks. You can save lots of more data and you are able to process these data due to the higher programming languages much more efficiently. Unfortunately, until now PLC and PC couldn't be coupled program technically so that automation solutions often weren't realized optimally.

This is where ACCON-AGLink helps you. This consists of a single library that extends all common programming languages under Windows, WinCE, Linux and Solaris by the ability to contact SIMATIC controls directly out of the PC and exchange data between PLC and PC in a simple way. As from version 4.5, you also receive a 64-bit variation of the library for Windows or Linux in addition to the 32 bit implementation. You can build up the process data communication traffic from nearly any programming language by calling simply manageable, efficient and tested functions. The developer needs no knowledge about the different used communication protocols, he/she can fully concentrate on further processing of the data (e.g. by means of a data base).

ACCON-AGLink suite offers the following highlights:

- Up to 256 devices can be accessed by one PC at the same time.
- Via every device up to 16 PLCs can be adressed at he same time, depending on the protocol and the used hardware.
- ACCON-AGLink is written in high optimized C/C++. For this reason there is very little time needed for the communication. The underlying application benefits from this.
- ACCON-AGLink is available as DLL for Windows (32 Bit resp. 64 Bit), WinCE as well as a Shared Object for Linux (32 Bit resp. 64 Bit) and Solaris.
- ACCON-AGLink supports a variety of programming languages. This enables you to concentrate on your application and not have to learn additional programming languages.
- Because of the uniform programming interface you can access the different controls without change of the PLC program.
- With the enclosed configuration tool all communication parameters can be adjusted without having to program the corresponding dialogues.
- With ACCON-AGLink you can develop applications which collect a large amount of process data. These are converted into any format suitable for the subsequent treatment and stored. So you can carry out expressive evaluations and configure or steer your process optimally. You can also influence the process in an easy manner by changing certain data areas in the PLC memory and changing thus process parameters. Therefore e.g. a recipe management is very simply realizable.

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1. The accompanying documentation of ACCON-AGLink

ACCON-AGLink is developed constantly. This has arranged us to build up our documentation modular. It divides in the following components:

ACCON-AGLink Version 6.x Getting started guide

The getting started guide is added as leaflet to your delivery and contains tips for the installation.

ACCON-AGLink Basic Manual

This is the present manual. Here you find the bases to ACCON-AGLink.

ACCON-AGLink First Steps in C/C++, VB, Delphi, LabVIEW

Here we introduce to you the basic approach with the help of the source code of example programmes written in Microsoft Visual Basic, Borland Delphi, Microsoft Visual C/C++, LabVIEW and g++ (Linux).

ACCON-AGLink Reference guide C/C++, VB, Delphi

The functional reference for the »classical« programming languages C/C ++, VB and Delphi.

ACCON-AGLink Reference guide .NET

For the use under .Net we have built a special Wrapper-DLL with managed classes. This manual contains an introduction to the use of these classes and a functional reference for the programming languages C# and VB.NET.

ACCON-AGLink First Steps under .NET

Here we explain the use under .NET with the help of easy, provided examples.

ACCON-AGLink API-Guide

The ACCON-AGLink API guide is an online reference for C ++, Delphi, C #, VB.NET and Java which offers explanations and examples to nearly all functions. Moreover you find out further details in this manual.

ACCON-AGLink Configuration of the Communication Paths

The easiest possibility for the setting of the communication path is the use of the configuration program AGLink40_Config.EXE. The accompanying manual shows the possible settings in detail.

ACCON-AGLink TIA and SIMOTION Reference guide C/C++, VB, Delphi

Starting with version 5 ACCON-AGLink provides functions to access controls that have been programmed with the TIA Portal. In this manual you will find the programming reference of these newly added functions for the »classical« programming languages C, C++, Visual Basic (VB), Visual Basic for Applications (VBA) and Delphi

ACCON-AGLink Basics

In this guide you will find the programming reference of the newly added functions for the TIA Portal and SIMOTION for the »conventional« programming languages C / C ++, Visual Basic (VB), Visual Basic for Applications (VBA) and Delphi.

ACCON-AGLink TIA –First Steps using .NET

Here we explain the use of the TIA functions under .NET with the help of an easy example.

ACCON-AGLink TIA – First Steps in C/C++

Here we explain the use of the TIA functions with the help of an easy example in C++.

ACCON-AGLink SINUMERIK application notes

Here we explain the use of ACCON-AGLink in relation with SINUMERIK controls.

2. ACCON-AGLink

2.1. The idea behind ACCON-AGLink

There are different control and communication standards in the industrial automation surrounding. If access to different products is required, this often means:

- Search for a communication toolbox supplier
- Acquisition of a new communication toolbox
- Training into the contained functions
- Hoping that the tools of the different manufacturers can be used from one single program without problems.
- Adaptation of the own programs
- Administration of different releases

This procedure is not only cost, but also time-consumming. With ACCON-AGLink it is now possible to access different communication drivers with a uniform software interface. For sure, this can also be handled with OPC, indeed not with such a low overhead and the compactness of ACCON-AGLink.

The mode of communication and the communication parameters can be set comfortable with a separate program and also by program code. The currently used communication driver can be determined at run time. Furthermore, every communication module still offers additional functions, to address the controls quite specifically. For the purposes of a portable programming you only have to take care, that other modules can return an error code as function result for these functions.

With this technique it is possible to change the interface for the S7 access or to modify the local access into an access via telephone and modem without changing the program.

2.2. Support for ACCON-AGLink

If questions or problems arise when using ACCON-AGLink, please consult our technical support. You can contact us either by phone (+49)-(0)7171-916-112 or preferably by e-mail via support@deltalogic.de.
Send us your questions or the problem description in detail of the compiler release, the operating system release and the **minimum source code part** or even better with a **minimum project** with which the behavior can be reproduced. You will get support from the developer team of ACCON-AGLink very quickly. First please check in the appendix in chapter »Frequently asked questions«, if your problem is already solved and a solution is already offered or a new release is available.

2.3. Project support

Contact us if you have a personnel bottleneck or if you just need our competent project support. We can realize low-priced partial or also complete projects with ACCON-AGLink according to your wishes and requests. Of course, this is possible in line with an individual training. At its end you have prepared a working standard project which can be expanded and completed. If you are interested just contact us, we will make you an offer without obligation.

2.4. Modules

ACCON-AGLink is built up modular, wherein all functions of your license are included in a single library. The possible communication modules are:

ACCON-AGLink S7 serial

to access the SIMATIC S7-300, S7-400, Sinumerik 840D and drives (MicroMaster or Sinamics) via the ACCON-MPI-Adapter respectively the PC-Adapter and to access SIMATIC S7-200 via PPI-cable

ACCON-AGLink S7 serial/TS

to access the SIMATIC S7-300 and S7-400 via modem and TS-Adapter. This module includes ACCON-AGLink S7 serial.

ACCON-AGLink S7-PB

to access the SIMATIC S7-200, S7-300, S7-400, S7-400H, Sinumerik 840D and drives (MicroMaster und Sinamics) via ACCON-NetLink, ACCON-NetLink Pro, ACCON-NetLink USB, ACCON-, Hilscher- and Softing PROFIBUS cards

ACCON-AGLink S7-TCP/IP

to access the SIMATIC S7-200, S7-1200, S7-1500, S7-300, S7-400, S7-400H, LOGO! 0BA7, LOGO! 0BA8, Sinumerik 840D (pl and sl) and drives (MicroMaster or Sinamics) via TCP/IP as well as for configured connections to SIMATIC S7-300 and S7-400 via TCP/IP.
This module supports the S7-1200 and S7-1500 only in compatibility mode using absolute addressing

ACCON-AGLink S7-TCP/IP TIA

to access the SIMATIC S7-1200 and S7-1500 with symbolic addressing and accessing the optimized data blocks. For the symbolic access the module S7-SymbolikPro TIA is mandatory, as all symbolic information must be determined from the current TIA Portal project.
This module includes ACCON-AGLink S7-TCP/IP.

ACCON-AGLink S7-PC/CP

to access the SIMATIC S7-200, S7-300, S7-400, S7-400H, Sinumerik 840D and drives (MicroMaster or Sinamics) via Siemens CP 5511, CP 5512, CP 5611, CP 5613, CP 5614 and CP 5711.

ACCON-AGLink S7-RedConn

to access fault tolerant SIMATIC S7 controls and for parallel or redundant connections. The communication is done via the corresponding communication module.

ACCON-AGLink S5-AS511

to access the SIMATIC S5 family via AS511

ACCON-AGLink S5-TCP/IP

to access the SIMATIC S5 family via TCP/IP

ACCON-AGLink Sinumerik AddOn

for access to SINUMERIK controls via TCP/IP and ACCON-NetLink PRO compact.

ACCON-AGLink RFC1006

to access devices with native TCF1006 Protocol (via TCP/IP). You have to differentiate between this protocol and S7-TCP/IP which internally also uses RFC1006. Here you can use RFC1006 as a transport frame and and specify your own user data content of the messages. If you want to access an S7 controller, then you need the S7-TCP/IP module

ACCON-AGLink RK512/3964R

to access the RK512/3964R communication processors.

As modules without own communication functionality additionally are integrated:

ACCON-AGLink S7-SymbolikPro

to resolve symbolic names and data block structures in classical S7 projects. In predecessor's versions before version 4.4 you find this module partially as an independent library. The stronger growing dovetailing between symbolic and absolute addressing has caused us to integrate this module into the core library.

ACCON-AGLink S7-SymbolikPro TIA

to resolve symbolic names and data block structures in TIA portal projects. The S7-300, S7-400, S7-1200 and S7-1500 controllers are supported. This module is mandatory to access the optimized data blocks with module S7-TCP/IP TIA.
This module includes ACCON-AGLink S7-SymbolikPro.

Please take the supported hardware on PC and PLC side as well as the topical availability and the planned realisation from the following tables.

ACCON-AGLink Module	PC-Hardware	SPS/CP	Win 32 Bit	Win 64 Bit	Win CE	Linux 32 Bit	Linux 64 Bit	Linux embedded	Solaris	OS9	VxWorks
S7 serial	PC-/MPI-/TS-Adapter	S7-300/S7-400	X	X	X	X	X				
		Sinumerik (2)	X	X	X	X	X				
		Drives (3)	X	X	X	X	X				
	PPI-Kabel (Singlemaster)	S7-200	X	X	X	X	X				
S7 serial/TS	AT-Modem	S7-300/S7-400	X	X	X	X	X				
	TAPI	S7-300/S7-400	X								
S7-PB	ACCON-NetLink/-S7	S7-300/S7-400	X	X	X	X	X	X	X	X	X
		S7-200	X	X	X	X	X	X	X	X	X
		Sinumerik (2)	X	X	X	X	X	X	X	X	X
		Drives (3)	X	X	X	X	X	X	X	X	X
	ACCON-NetLink-PRO	S7-300/S7-400	X	X	X	X	X	X	X	X	X
		S7-200	X	X	X	X	X	X	X	X	X
		Sinumerik (2)	X	X	X	X	X	X	X	X	X
		Drives (3)	X	X	X	X	X	X	X	X	X
	ACCON-NetLink-USB	S7-300/S7-400	X	X		X	X				
		S7-200	X	X		X	X				
		Sinumerik (2)	X	X		X	X				
		Drives (3)	X	X		X	X				
	Hilscher-PB-Interfaces	S7-300/S7-400	X	X							
		S7-200	X	X							
		Sinumerik (2)	X	X							
		Drives (3)	X	X							
	Softing-PB-Interfaces	S7-300/S7-400	X								
		S7-200	X								
		Sinumerik (2)	X								
		Drives (3)	X								
S7-TCP/IP	Ethernet	CP 343-1	X	X	X	X	X	X	X	X	X
		CP 443-1	X	X	X	X	X	X	X	X	X
		CP 243-1	X	X	X	X	X	X	X	X	X
		S7-31x PN	X	X	X	X	X	X	X	X	X
		S7-41x PN	X	X	X	X	X	X	X	X	X
		S7-1200 (4)	X	X	X	X	X	X	X	X	X
		S7-1500 (4)	X	X	X	X	X	X	X	X	X
		LOGO! 0BA7	X	X	X	X	X	X	X	X	X
		LOGO! 0BA8	X	X	X	X	X	X	X	X	X
		Sinumerik (2)	X	X	X	X	X	X	X	X	X
		Drives (3)	X	X	X	X	X	X	X	X	X
S7-TCP/IP TIA	Ethernet	S7-1200 (5)	X	X	X	X	X				
		S7-1500 (5)	X	X	X	X	X				
S7-PC/CP	PG-PC-interface	S7-300/S7-400	X	(1)							
		S7-200	X	(1)							

ACCON-AGLink Module	PC-Hardware	SPS/CP	Win 32 Bit	Win 64 Bit	Win CE	Linux 32 Bit	Linux 64 Bit	Linux embedded	Solaris	OS9	VxWorks
		Sinumerik (2)	X	(1)							
		Drives (3)	X	(1)							
S7-RedConn	Depending on the module	S7-400H	X	X	X	X	X				
		S7-300/S7-400	X	X	X	X	X				

Table 1: ACCON-AGLink synoptical table for S7-connections

ACCON-AGLink Module	PC-Hardware	SPS/CP	Win 32 Bit	Win 64 Bit	Win CE	Linux 32 Bit	Linux 64 Bit	Linux embedded	Solaris	OS9	VxWorks
S5-AS511	ACCON-COM-Cable	S5	X	X	X	X	X				
	ACCON-COM-Cable USB	S5	X	X							
	ACCON-COM-Cable IE	S5	X	X							
	VCOM	ACCON-S5-LAN	X	X							
S5-TCP/IP	Ethernet	CP 1430 TCP	X	X	X	X	X	X	X	X	X
		INAT S5 TCP	X	X	X	X	X	X	X	X	X
		VIPA S5 TCP	X	X	X	X	X	X	X	X	X
		ACCON-S5-LAN	X	X	X	X	X	X	X	X	X

Table 2: ACCON-AGLink synoptical table for S5-connections

ACCON-AGLink Module	PC-Hardware	SPS/CP	Win 32 Bit	Win 64 Bit	Win CE	Linux 32 Bit	Linux 64 Bit	Linux embedded	Solaris	OS9	VxWorks
RFC1006	Ethernet	Ethernet	X	X	X	X	X	X	X	X	X
RK512	COM-Port	RK512-CP/PC	X	X	X	X	X				
		3964(R)-CP/PC	X	X	X	X	X				

Table 3: ACCON-AGLink synoptical table for other connections

ACCON-AGLink Module	Project format	SPS/CP	Win 32 Bit	Win 64 Bit	Win CE	Linux 32 Bit	Linux 64 Bit	Linux embedded	Solaris	OS9	VxWorks
SymbolikPro	S7 classic	S7-300/S7-400	X	X	X						
SymbolikPro TIA	TIA portal (5)	S7-300/S7-400	X	X	X	X	X				
		S7-1200	X	X							
		S7-1500	X	X							

Table 4: ACCON-AGLink synoptical table for symbolic

Notes on the tables:

X Protocol support is available

* Protocol support is planned

Protocol support is neither available nor planned and is realised on order

(1) Protocol support is available for 32 Bit Code running under 32 or 64 Bit

(2) Sinumerik = Sinumerik 840D pl or Sinumerik 840D sl

(3) Drives = MicroMaster- or Sinamics drives

(4) The S7-1200/S7-1500 is supported only for non-optimized access without symbols

(5) The S7-1200/S7-1500 is supported for optimized access with symbolism.

Other operating systems will be implemented on demand. If you are interested, please feel free to tell us without obligation.

2.5. Supported programming languages

The function library has been developed and tested in detail for Windows, Windows CE (4.2, 5.0, 6.0) as well as for Linux (Kernel 2.6). The current version for windows has been tested on Windows XP, 2008R2, 7, 8.1, 10, 11 and 2012R2, Windows-Server 2022.

The test programming languages MS Visual C/C++ (MS Visual Studio 6, 2005, 2008, 2010), MS Visual BASIC 6, Borland C++ Builder 6, Borland C++ Builder 2006, Embarcadero Delphi XE3, MS Excel and MS Word (resp. VBA) were used under Win 32.

The provided examples for 64 bit Windows have been developed with MS Visual Studio 2005, 2008 and 2010.

For the use under .NET a Wrapper-DLL was written and tested using MS Visual Studio 2008 or 2010 with C# and VB.NET. This DLL supports 32 and 64 bit operating systems.

Another Wrapper for use with Java has been tested with the development environments Eclipse and NetBeans under Windows XP. A prerequisite is at least version 1.6 of the Java runtime.

The LabVIEW integration was developed and tested with LabVIEW version 2009. It ought to function also with older versions which support a .NET-wrapper interface.

Please, contact us if you need the support for other platforms or programming languages.

Supplemental to the functional library, examples are delivered to clarify the use and make the first steps easier. Another introduction is given by the ACCON-AGLink API Guide. This provided application contains the documentation to every function and the possibility to try out interactively. You can generate moreover example code using your programming language (C#, VB.Net, C ++, Delphi and Java) and copy this code into your project.

2.6. Licensing models

ACCON-AGLink is available as a single licence and as a developer licence. Furthermore a demo version exists.

The developer licence contains only the modules required by you. Subject to the licence terms it contains an unlimited number of runtime licences. For this licence you can conclude a maintenance contract.

The single licence contains all modules and is available with a software-based activation or with an USB dongle.

2.6.1. Demo Limitation

The demo version for Windows is fully functional. Only a small notice appears all 5 minutes which indicates that it‘s a demo version of ACCON-AGLink. A further limitation concerning e.g the amount of data only applies to functions of the module ACCON-AGLink S7-SymbolikPro. So you can put the ACCON-AGLink to the acid test in your own programs and get an idea of the performance of this toolbox

All functions of the full version are available to you for functions from the module ACCON-AGLink S7-SymbolikPro without time restriction. The whole number of the functional calls is limited to 1024. Every 128 functional calls a small tip appears, telling that a demo version is running. After the maximum number of function calls, all functions return AGLSYM_EXPIRED.

When initializing the demo version of the ACCON-AGLink for Linux it reports that this version is a demo. This message is carried out by the standard error output »stderr«. The demo has a 20-minute limit after the first use. After this limit all calls from device and communication functions will output the error code » AGL40_TIME_EXPIRED». Presently this demo version contains no SymbolikPro functions.

3. Installation

3.1. Windows

Use the setup program »SetupAcconAGLink.exe« from the «DELTA LOGIC-Automatisierungs-technik-CD« for installation. You can download this setup also from our web page. Select the suitable licence variation. For the single licence you have to specify whether you dispose of a hardware authorisation using an USB-Dongle or a software authorisation. With the acquisition of a developer licence, you receive two licensed DLLs AGLink40.DLL and AGLink40_x64.DLL containing your modules on data carrier (e.g., disk).

The setup program substitutes the demo version files AGLink40.DLL and AGLink40_x64.DLL in the provided examples with the licensed version. Then, however, these are executable only with the suitable licensing. In case of a developer version you must therefore rebuild the examples and insert your activation key in the source code at each call of the function AGL_Activate.

3.1.1. Licensing of the single licence USB

The licensing is effected by an USB dongle. Furthermore a driver for this Dongle is required. Follow moreover the »**Getting started guide ACCON-AGLink Version 6.x«,** added as leaflet to your delivery.

3.1.2. Licensing of the developer licence

You receive an activation key together with your licensed files AGLink40.DLL and AGLink40-_x64.DLL. Use the function AGL_Activate with this key in your programs to license. Follow moreover the »**Getting started guide ACCON-AGLink Version 6.x«,** added as leaflet to your delivery.

3.1.3. Directories

The provided examples aren’t filed in the program folder, selected during the installation, but below the public documents. You find the example folder with a shortcut in the start menu. This filing allows the modification of the examples without administrator's rights. That's why you also do not find the files required by your development environment (Header, import libraries, definition files) in the selected program folder. Follow moreover the shortcut »Files for the IDEs« in the start menu.

3.1.4. Update of older versions

In versions 4.x before 4.4 the module **ACCON-AGLink S7-SymbolikPro** was in the library file AGLink40_Sym.DLL. This file is provided furthermore, so that you must not rebuild your present applications. Indeed, this file in the present version contains only references to the file AGLink40.DLL. If you have used this module, hence pay attention to distribute both files together when updating your application.

Before Version 4.6 the device configuration files has been searched in the folder DELTA LOGIC\ACCON-AGLink under the application data, as far as they haven’t been found in the folder of the AGLink40.DLL (resp. AGLink40_x64.DLL) and no path was specified with the function AGL_ SetParaPath. From version 4.6 in this case the folder DELTA LOGIC\ACCON-AGLink under the public documents is searched.

3.2. WinCE

3.2.1. Licensing of the developer licence

You receive an activation key together with your licensed file AGLink40_CE.DLL. Use the function AGL_Activate with this key in your programmes to license.

3.3. Linux

3.3.1. Licensing of the developer licence

Before describing the installation process it is necessary to go into the nomenclature's features of mutually used libraries (shared objects). The library data contains the version information in the data name e.g. libAGLink40.so.5.0.2.0. Shortcut data files belong to the proper library data which refer to it and contain in the name only the main version (or no version information) e.g libAGLink40.so.5 and libAGLink50.so. The use of shortcuts always allows referring to the same library data. The shortcut leads intrasystem in each case to the actual library.

To install do the following. When using a graphical user interface open the console (command input window). Go to the folder which conatins the library and the shortcut data files (cd <folder>). Copy the library data and the shortcut data files into a mutually used library folder e.g. /usr/lib. Superuser rights are required! As the case may be swap to the superuser mode via the command »su« and enter the root password or contact your system administrator.

To copy the data files enter the following commands. Insert into the first command the appropriate data name of your actual version.

```
cp -f    libAGLink50.so.5.0.2.0 /usr/lib
cp -f -d libAGLink50.so.5        /usr/lib
cp -f -d libAGLink50.so          /usr/lib
```

Check the successful copy e.g. when entering:

```
ls /usr/lib/libAGLink40*
```

At least the above indicated data files have to be listed.

Finally the internal library cache has to be rebuild by this command:

```
/sbin/ldconfig
```

The execution of this command may take considerable time.

The AGLink40 Library is now installed. If necessary leave the superuser mode by the command »exit« and if desired leave the console by typing exit again.

4. The Basics

4.1. Communication Sequence in principle

This chapter explains the basic procedure of a communication sequence in short. Please take a detailed description of the single functions as well as its parameter and return value from the reference part.

4.1.1. Initialization

If you are using a developer licence, please activate the licence at program start. Use the function AGL_Activate with the key provided for your licence.

With a single licence no special initialization steps are necessary

4.1.2. Configuration of the communication path

ACCON-AGLink offers you a huge number of different communication paths. Hence, before building up a connection you must specify and parameterize the used interface.

You can do this with calls of configuration functions. Nevertheless, it is easiest if you use moreover the provided program AGLink40_Config.EXE. This also has the advantage that you can change the used communication hardware without changing your program. In your application you only use the suitable device- and PLC-number. You will find a detailed description of the configuration possibilities in the manual »ACCON-AGLink Configuration of the Communication Paths«

The configuration program saves the configuration in device configuration files. ACCON-AGLink searches these files first in the folder of the AGLink40.DLL (resp. AGLink40_x64.DLL). If this folder don't contains device configuration files, ACCON-AGLink will consider the configuration saved in the default location for public documents.
(XP: Documents and Settings\All Users\Documents\DELTA LOGIC\ACCON-AGLink
Vista, Win 7: Users\Public\Documents\DELTA LOGIC\ACCON-AGLink).

You can use the function AGL_SetParaPath to define a certain folder. Then, ACCON-AGLink will search the configuration files only in the given folder.



The use of the function AGL_SetParaPath () to set a device configuration folder is expressly recommended.

4.1.3. Mounting of a connection to the PLC

The connection build-up consists of several sub-steps which must be carried out successively. Under .Net you can use alternatively the interface IAGLink4 which carries out the described steps independently in the background.

First call the function AGL_OpenDevice. It checks if the selected interface is available in the system. As a parameter you give the desired device number.

Next, call the function AGL_DialUp (to be compatible with the TS option). If you don't communicate via modem, the function always returns successfully. In the other case it is tried to dial into the counterplace.

Now, initialize the communication adapter with AGL_InitAdapter. In case of S7 communication it's now possible, to retrieve the participants connected to the bus with the function AGL_GetLifeList. When communicating via PC/TS adapter, you can get the directly connected PLC with the function AGL_GetDirectPLC.

Establish a connection to the PLC with AGL_PLCConnect resp. AGL_PLCConnectEx.

4.1.4. Communication with the PLC

Now you can communicate with the control, i.e. call functions to write or read data via the existing connection. You can do this as often as required.

4.1.4.1. Error handling

During the communication errors can occur. You recognize this by the return values of the functions. Especially on disruptions of the connection it can be necessary to dismount the connection and to mount it again.

4.1.5. Dismounting of the connection

The dismounting of the connection occurs in reverse manner to the mounting.

Disconnect from the PLC with AGL_PLCDisconnect.

Log off from the communication hardware with AGL_ExitAdapter

Quit a modem connection by AGL_HangUp.

Release the resources by AGL_CloseDevice.



It is very important that you call for each function AGL_OpenDevice, AGL_DialUp, AGL_InitAdapter, AGL_PLCConnect (resp. AGL_PLCConnectEx) the reverse function AGL_Disconnect, AGL_ExitAdapter, AGL_HangUp, AGL_CloseDevice as appropriate.

4.2. Error Codes

Calling a function in ACCON-AGLink returns an error code. When handling these codes please always use the symbolical constants as it is possible that future versions could have different absolute values.

You find the meanings of the error codes in the respective header or module files.

4.3. Schematic Diagram

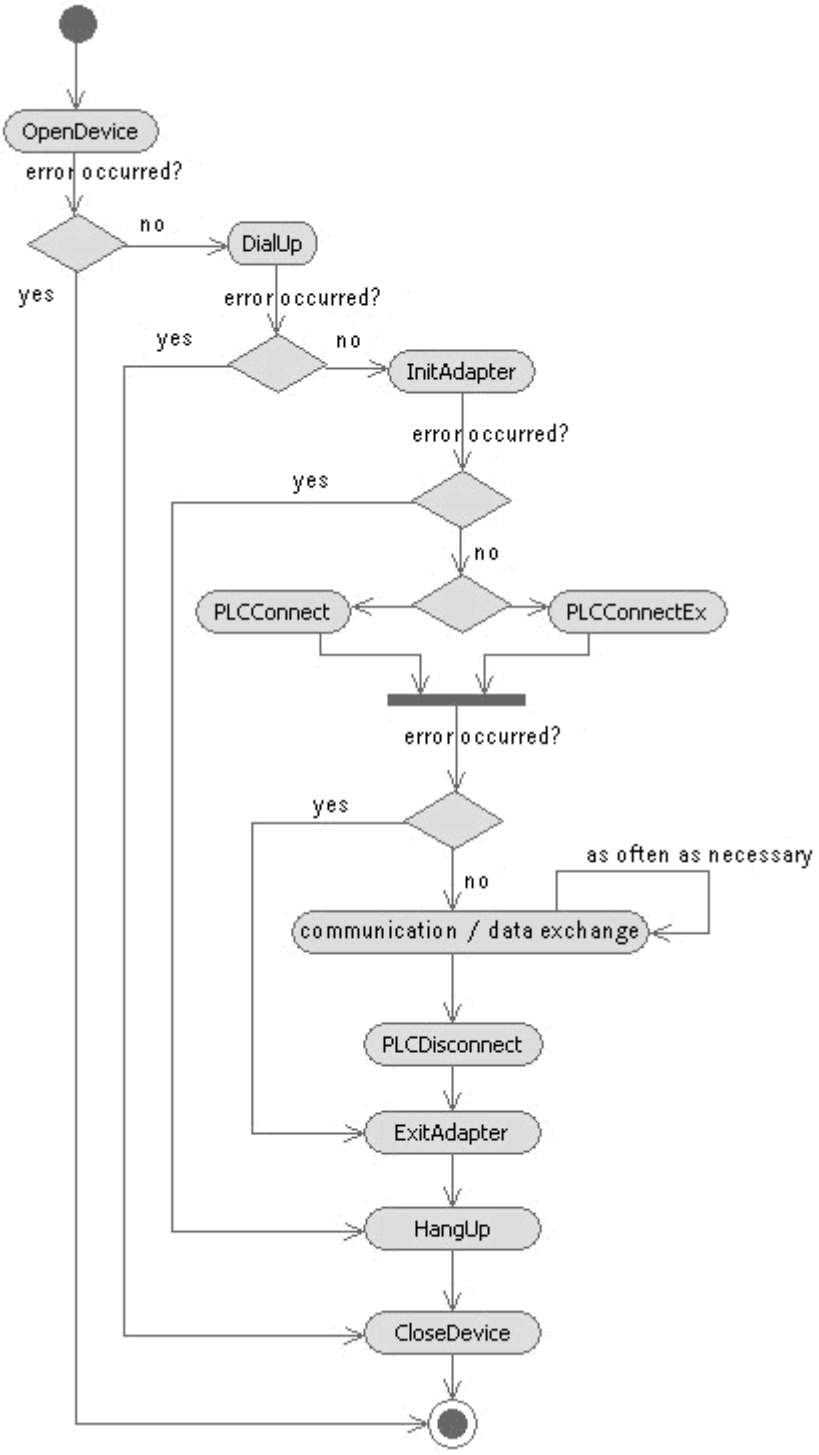


Figure 1: Communication Sequence in principle

4.4. Synchronous or asynchronous Communication

ACCON-AGLink offers the possibility to communicate synchronously or asynchronously with a control.

Synchronously means, that the function returns not until the completion of the communication. This can last some 10 to 1000 ms according to the communication path. Now the

communication result can be used immediately. Use positive timeout values for synchronous communication.



Use Timeout=1, if you want to communicate synchronously with the timeout configured with the communication path.

With asynchronous communication the called function returns immediately after the functional call. The desired process (Read, writing...) is carried out in the background. You receive a notification if the process is concluded. Not till then you can evaluate the result. Use negative timeout values for asynchronous communication.



Use Timeout=0, if you want to communicate asynchronously with the timeout configured with the communication path.
Use Timeout= -1, if you want to communicate asynchronously with infinite timeout.

5. Enclosed Programs

You find the example folder via a shortcut in the start menu. The examples are ordered here after computer languages.

Further examples are described with the help of the source code in the manuals »ACCON-AGLink First Steps in C/C++, VB, Delphi, LabVIEW« and »ACCON-AGLink First Steps under .NET«. In addition, you can generate example code interactively with the ACCON-AGLink API guide. Follow moreover the manual » ACCON-AGLink API-Guide«

5.1. Information Program (AGLink40_Info.EXE)

Just call AGLink40_Info to get information about the present ACCON-AGLink40-DLL. The version, the licence number, the licencee and the scope of licence are shown. The ACCON-AGLink40.DLL (resp. ACCON-AGLink40_x64.DLL) is searched in the current directory resp. in the search path.

With the demo version of the DLL you will receive the following output:

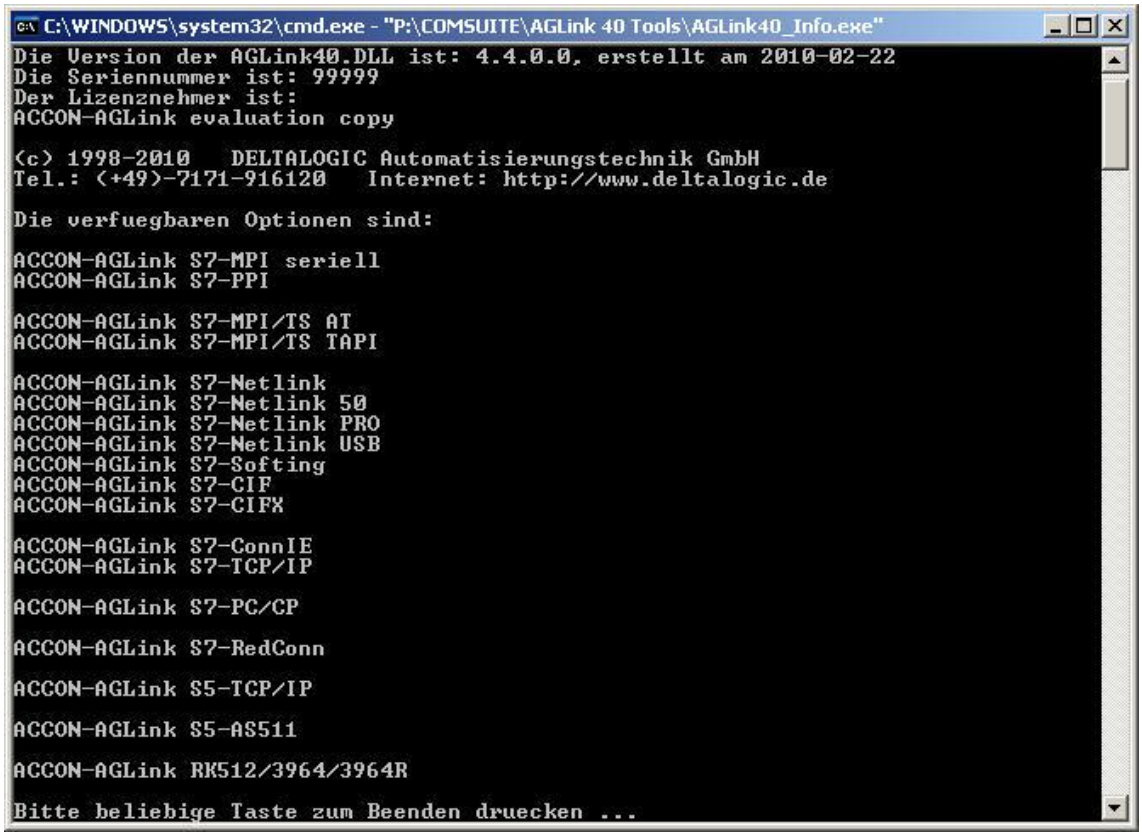


Figure 2: Output of demo version

AGLink40_Info is delivered with complete C/C++ sources for Microsoft C/C++ in the subfolder »VC\AGL4 Tools» of the examples. Here you also find a project for Visual Sudio 2010 including an X64 configuration.

5.2. Performance Check Program (AGLink40_Performance.EXE)

Call AGLink40_Performance to detect the data-transfer rate of the favored connection. For this you can indicate the desired PLC as well as the rack and slot number. Otherwise the first connected PLC is identified with AGL_GetLifeList. First, a lot of information about the selected PLC is displayed. The firmware version and the cycle time can have an impact on the speed of communication, so they must be known for comparison. Subsequent the number of data modules and the biggest data module on this PLC are are sought. This one is used for the tests. Furthermore the size of the flag area on the PLC is determined. If this size is bigger than the size of the biggest data module, the flags are used for the tests. AGLink40_Performance can therefore also be used on CPUs without data modules. The aim of the program is to compare the single communication paths among each other, objectively. In addition, you can determine with the shown results, whether the connection will meet your requirements or whether you should use a different hardware.

To test the connection, package sizes up to 50000 bytes for each transmission are used if the chosen data module has the corresponding length.

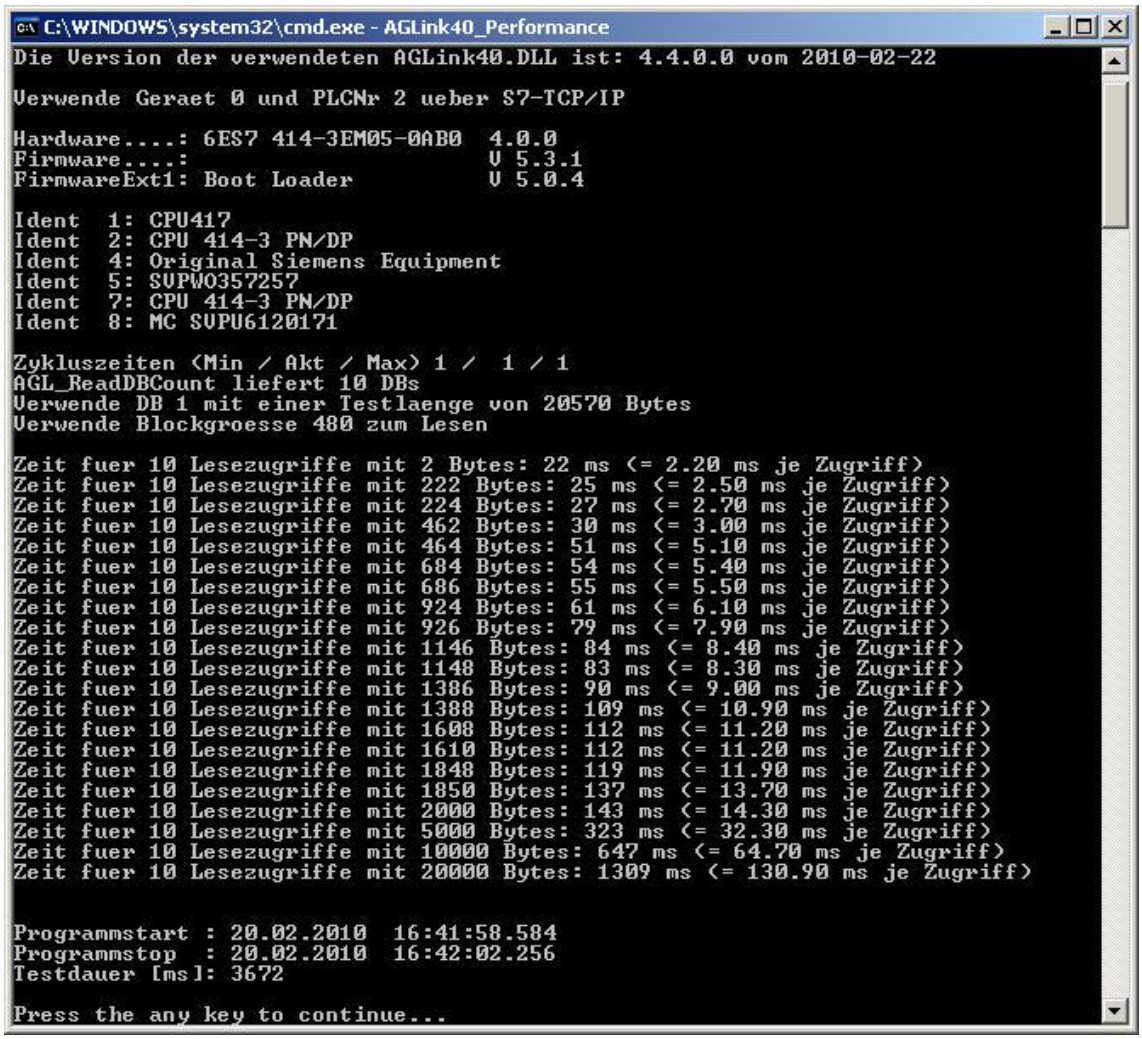


Figure 3: Test data-transfer rate when reading

You can specify the following command line parameters:

-An	Specifies the amount of cycles for each package size. –A100 uses 100 cycles for each package size. If not specified 10 cycles are used.
-Dn	Specifies the number of the used device. –D2 uses device 2 instead of device 0 (standard).
-Pn	Specifies the number of the PLC to use. By default, the connected PLCs are determined with AGL_GetLifeList and the first found participant will be tested. Use this parameter, when you want to test only a certain PLC.
-Rn	Rack number of the desired PLC. This parameter is optional.
-Sn	Slot number of the desired PLC. This parameter is optional.
-Mn	Specifies the max. read-/write-length to be tested. When using S5-TCP/IP you have to specify this parameter, because the lenghts of the data modules cannot be determined automatically.
-Nn	Specifies the number of the used data module. When using S5-TCP/IP you have to specify this parameter, because the data module book keeper cannot be determined automatically.
-V-	Suppress error messages. This option should not be selected because important notices are suppressed.
-W+	Perform reading and writing test. **Attention:** The data of the used DBs or flags will be overwritten! Use this parameter with caution.
-WO	Only perform the write test without read test **Attention:** The data of the used DBs or flags will be overwritten! Use this parameter with caution
-C+	Log the values in a csv file.

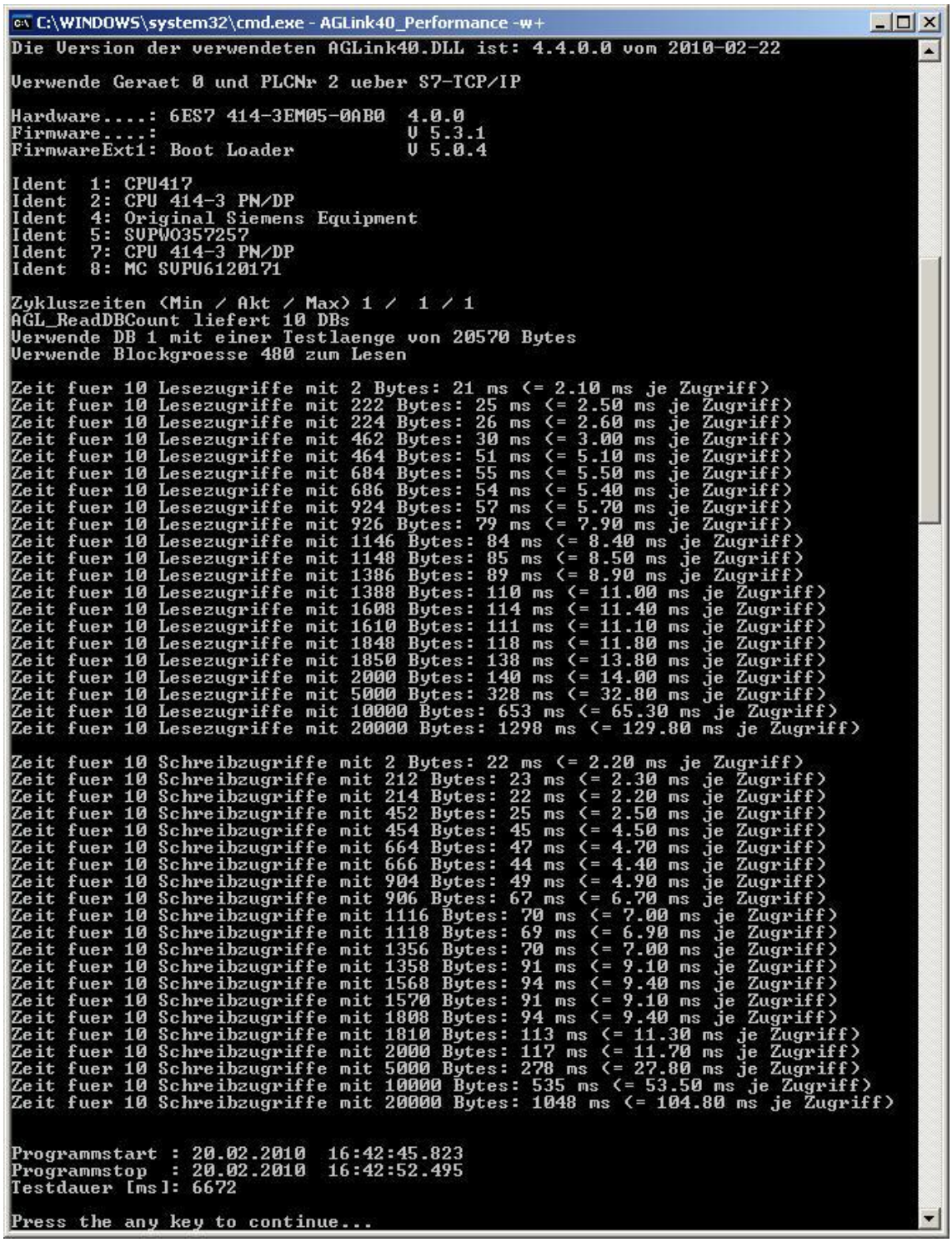


Figure 3: Output example with activated write test

AGLink40_Performance is delivered with complete C/C++ sources for Microsoft C/C++ in the subfolder »VC\AGL5 Tools» of the examples.

5.3. Connection Test Program (AGLink40_ConnTest.EXE)

With the program AGLink40_ConnTest.EXE you can check the reaction to a connection loss respectively how you should react. A connection loss can occur by pulling the plug (adapter is no longer reachable), pitch the adapter from the control (adapter is no longer reachable) or switch off the removed PLC which is accessed to (adapter is still »alive« but the PLC is »dead«). The connection test program does the following: It establishes a connection and reads the operating state in a loop. If the state changes then the actual operating state is traced. Otherwise a »*« is displayed on the screen for every successful access. On access failures an error message is displayed and a connection will be re-established. It is possible to do this in two ways. In the first case the device will be completely closed and re-opended. Then it is tried to connect again to the PLC. In the other case only measures are taken which are absolutely necessary for the specific type of communication followowed by the attempt to reconnect to the PLC. The method can be selected via the command line parameters.

When starting AGLink40_ConnTest you will receive e.g. the following display:

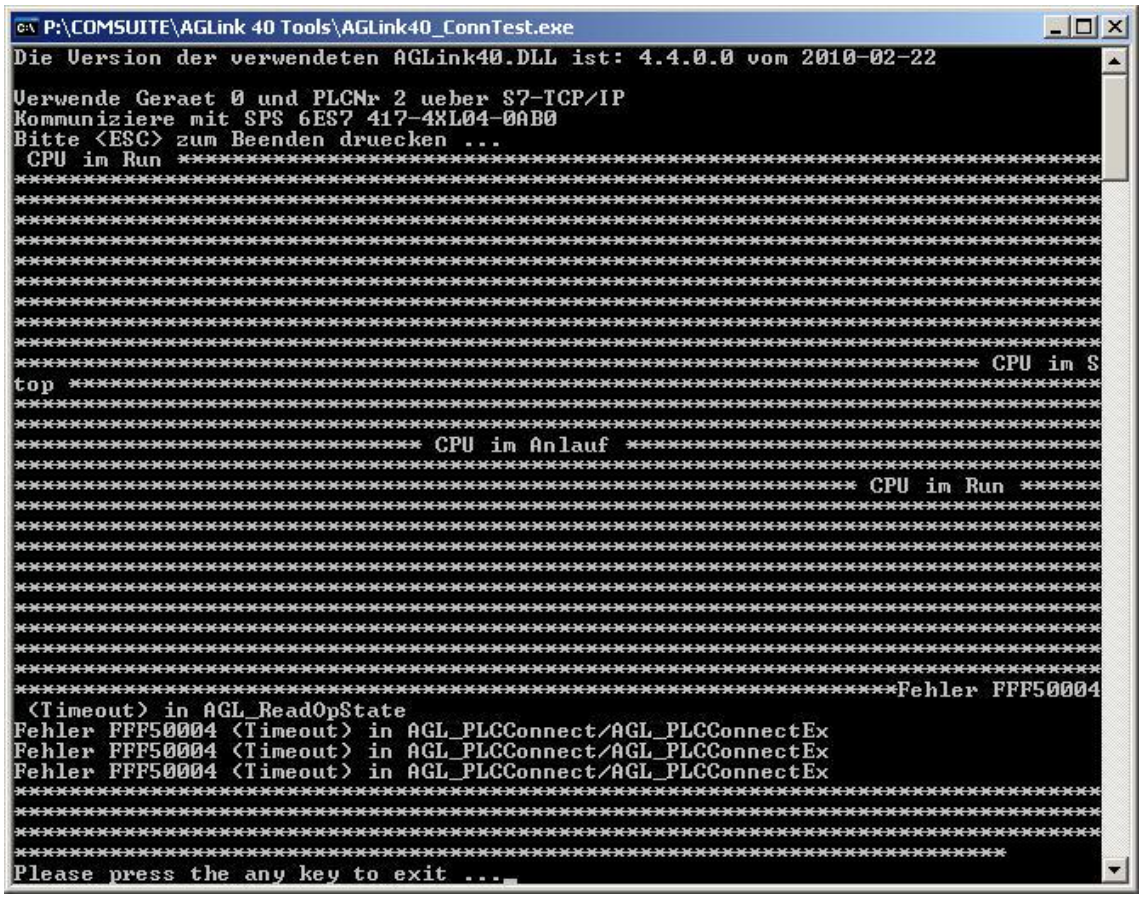


Figure 5: AGLink40_ConnTest screen output

You can specify the following command line parameters:

-Dn	Specifies the number of the used device. –D2 uses device 2 instead of device 0 (standard).
-Pn	Specifies the number of the PLC to use. By default, the connected PLCs are determined with AGL_GetLifeList and the first found participant will be tested. Use this parameter, when you want to test only a certain PLC.
-Rn	Rack number of the desired PLC. This parameter is optional.
-Sn	Slot number of the desired PLC. This parameter is optional.
-V-	Suppress error messages. This option should not be selected because important notices are suppressed.
-C+	Completely close and re-open device on error. By default, only measures are taken which are absolutely necessary for the specific type of communication. This is commented on in detail in AGLink40_ConnTest.CPP.

AGLink40_ConnTest is delivered with complete C/C++ sources for Microsoft C/C++ in the subfolder »VC\AGL5 Tools» of the examples.

5.4. S7-SymbolikPro Explorer

With the program AGL4Sym_Explorer.exe you can test the functionality of the module ACCON-S7 AGLink SymbolikPro. You wil find the program (with complete C/C++ sources) in the subfolder »VC\ AGL4Sym Explorer » of the examples.

After starting the application you will receive an initially empty dialog window. Use the button »S7-Projekt wählen» to open a project. For the sake of convenience, we have included a small demo project in the directory »S7Proj»

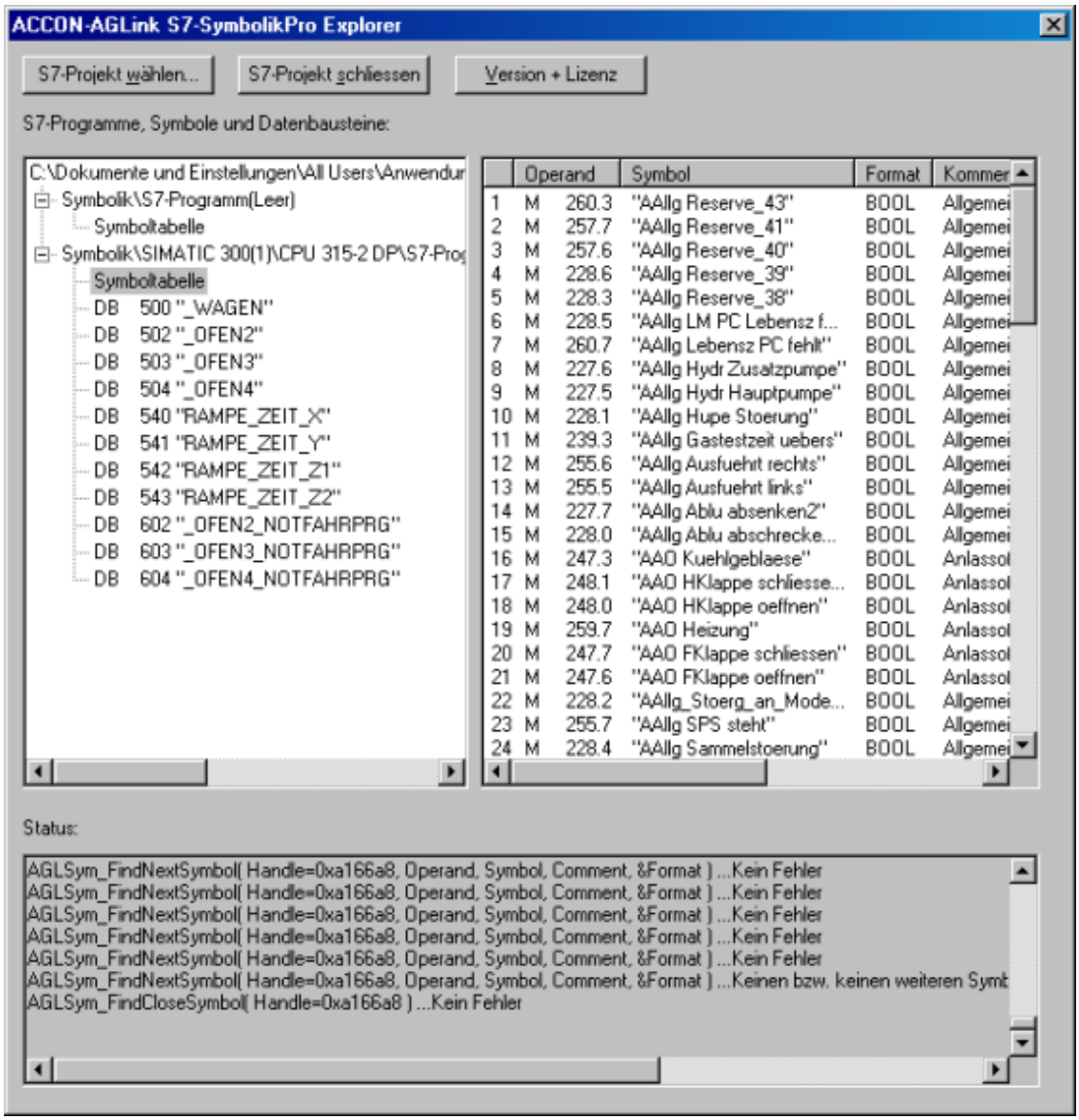


Figure 4: AGLink S7-SymbolikPro Explorer

6. Controller specific notes

Key element in ACCON-AGLink is a common programming interface, so you can access different controls without program modification. The SIMATIC S7-300 and S7-400 serve as base case. When accessing other controls you may have to take into account the particularities shown here.

6.1. S5

ACCON-AGLink uses byte addresses as the S7. The S5 however uses word addresses. When accessing data in a data block of the S5 controllers you must therefore use offsets, doubled against the S5 nomenclature. You get for example DW 3 DBxx in an S5 project by specifying an offset value of 6. ACCON-AGLink recalculates these addresses into the word used when accessing a S5. You will therefore get a parameter error if you use odd offsets. You can of course use the word access functions AGL_ReadDataWords resp. AGL_WriteDataWords. Here you have word addressing known from the S5.

6.2. S7-1200 and S7-1500

AGLink module S7-SymbolikPro TIA and S7-TCP/IP TIA:

Symbolic access to optimized blocks is only possible with these two modules.

Starting from TIA V17 a TLS encrypted communication is used as default setting.

From AGLink V6 this "Secure PG/PC and HMI communication" is supported (as of Windows 7 operating systems).

For AGLink versions < V6 "Allow only Secure PG/PC and HMI communication" must not be activated in the properties of the PLC.

AGLink module S7-TCP/IP:

Access to S7-1200/1500 data is thus only possible to a limited extent.

Optimized blocks and TIA data types cannot be accessed.

To activate this "S7-300/400 compatible communication", the option: "Access via PUT/GET communication" must be enabled in the properties of the PLC.

6.3. S7-200

You can directly access the spezial memory (SM) of the S7-200 via the functions AGL_ReadSFlagBytes resp. AGL_WriteSFlagBytes. Alternatively you can use the functions AGL_ReadFlagBytes resp. AGL_WriteFlagBytes and add 256 to the offset. ACCON-AGLink automatically maps the access to the spezial memory. With this approach you can address the spezial memory at offset 0 as bit memory (flag) at offset 256.

You can directly access the variable memory area (V) of the S7-200 via the functions AGL_ReadVarBytes resp. AGL_WriteVarBytes. Alternatively you can use the functions AGL_ReadDataBytes resp. AGL_WriteDataBytes with DB number 1. ACCON-AGLink automatically maps the access to the variable memory area. With this approach you can address the variable memory byte 0 as DB1.DBB 0.

6.4. LOGO! 0BA7

Please follow the instructions in the manual »ACCON-AGLink Configuration of the Communication Paths« to establish the connection.

With ACCON-AGLink you can read and write the values of the variable memory. The content of the variable memory is mapped into ACCON-AGLink on DB1. In addition, you can access the inputs, outputs and flags. Direct access to the analog inputs, analog outputs or analog flag is not possible. However, these values, as well as the inputs, outputs and flags are mapped to the variable memory. So you can e.g. access to analog input 1 using word 926 of the variable memory. The corresponding table »VM parameter mapping« is part of the help for your LOGO software.

7. Appendix A: Terms

7.1. Job

When reading data from a controller, a given sequence has to be respected. A request is constructed and transmitted to the controller. There, the request will be processed and sent back the results. This is done in the background, invisibly for you. We use the term read job (or write job) for this procedure.

7.2. Device

We refer to the used communication hardware as device. Depending on the hardware it can be communicated with multiple controllers through one device.

7.3. SPS/PLC/AG

In this documentation sometimes you will find the term AG (german Automatisierungsgerät) for a PLC.

8. Appendix B: FAQ list

8.1. Frequently asked questions

Q: How fast is ACCON-AGLink?

A: It all depends on the used hardware or the transmission path. For this just use the supplied program AGLink_Performance and test yourselves. You will find a more detailed description in chapter »5.2 Performance Check Program (AGLink40_Performance.EXE)«.

Q: Do I have to change my program when an additional module is needed?

A: No. Due to the ACCON-AGLink's standard software interface it is possible to bring in a new DLL or shared object and you can adjust the parameters with the program AGLink40_Config.EXE. Then you can use the new hardware, immediately

Q: When I need e.g. MPI serial and TCP/IP do I receive two DLL versions?

A: No. All hardware support modules you have purchased are located in one DLL. A version management (which hardware DLL is on which customer PC) is not necessary.

Q: What advantages does ACCON-AGLink provide?

A: ACCON-AGLink is fast, compact and easy to use. All files needed by the customer suit on one single disc. They can be easily copied to the target PC and a complex installation is not neccesary.
ACCON-AGLink is multi-thread safe and on the other hand it allows an asynchronous communication in all modules. You can quickly react on user inputs in the user interface. During this the communication will be handled unseen in the back. Furthermore, ACCON-AGLink provides a standard software interface for all modules. So, if customers need additional hardware support they do not have to change their programs. It is sufficient to bring in the new DLL or shared object and to configure the interface corresponding to the used hardware.

Q: What happens if there is new hardware which my version of ACCON-AGLink does not support?

A: The development of ACCON-AGLink will be constantly continued and adjusted to the new hardware. To be always up to date we offer a maintenance contract for ACCON-AGLink. With this you will receive all new DLL versions or shared objects via e-mail, automatically. That's comfort.

Q: Is there a demo version of ACCON-AGLink?

A: Of course. You can download it from our web site at www.deltalogic.de. Naturally, we can send you our actual software CD-ROM. A call, fax or e-mail is sufficient.

Q: What are the limitations of the demo version?

A: The demo version for Windows is fully functional. Only a small notice appears all 5 minutes which indicates that it‘s a demo version of ACCON-AGLink.

Q: Do I need Siemens' TS-software when using the ACCON-AGLink S7 serial/TS?

A: No. All functions to manage telephone numbers, to establish a connection and for data transmission are handled by the ACCON-AGLink S7 seriell/TS.

Q: What happens when pulling the cable from the ACCON-AGLink S7-MPI serial?

A: You will receive a corresponding error message. In this case please completely deinitialize the interface with AGLPLCDisconnect, AGLExitAdapter and AGLHangUp. Now start the communication again using AGLDialUp and AGLInitAdapter. As soon as the adapter is plugged in you will not receive an error message with AGLInitAdapter. Then start AGLPLCConnect and continue the communication. You can also look for the example AGLink_ConnTest in chapter »5.3«, containing the complete source code.

Q: What is the max size of the requested data?

A: In principle there is no limitation. The ACCON-AGLink automatically separates the data packages for the PLC into suitable pieces considering the transmission medium as well as the PLC family. You do not have to do anything, e.g. you can request 8192 data bytes in one piece. You will receive a corresponding error message from the PLC if the block size is too big for the PLC as the requested inputs are not available

Q: Can I read double words with ACCON-AGLink?

A: As in S7 standard, ACCON-AGLink always reads byte for byte when requesting blocks. With AGL_ReadMix, AGL_WriteMix or AGL_ReadMixEx and AGL_WriteMixEx you have powerful functions which can process words, double words and even bits besides bytes. If there are words, double words, real numbers, etc. in a read data block, ACCON-AGLink contains corresponding converting functions for reading respecitvely writing access into the apropriate buffer.

Q: Do I have to change the S7 program when accessing a PLC?

A: No. You only have to know which control data files are important for you. With ACCON-AGLink you can access the data, input, output and marker bytes as well as the timers and counter of the PLC completely transparent.

Q: Can I access a control with ACCON-AGLink S7-MPI via Profibus, too?

A: Yes. There is no difference. But when accessing via Profibus it is important that you select the correct baud rate and the correct profile for the communication in AGLink40-Config.EXE (or program-controled).

Q: What can I do if the communication via PC adapter is too slow?

A: The easiest way is to use our MPI/Profibus card or an adapter from our ACCON-NetLink family. They immediately provide a higher data throughput in relation to moderate costs. PLC-sided there is no CP required.

Q: How can I access a S7 via PC adapter if the MPI interface is busy by a OP?

A: MPI is a bus system. So to connect the OP you just need a corresponding bus plug with lead-through. It is only important that the voltage feed is looped in otherwise the adapter remains off.

Q: How can I access several controls simultaneously with ACCON-AGLink?

A: Very simple. On function call you indicate which PLC you want to access to. But you have to remember a few hardware restrictions when accessing parallely. Depending on the used hardware the number of connections at the same time are limited to 2 (MPI adapter), 4 (PC adapter and ACCON-NetLink), 12 (ACCON-NetLink-PRO or ACCON-NetLink –USB) and 16 (ACCON-AGlink). When exceeding this amount you can log off from one PLC and log into the next, by doing this you can prevent to go beyond the maximum amount.
Alternatively, you can split your bus system into smaller segments. Then use a

communications adapter for each segment (valid for MPI/Profibus). ACCON-AGLink supports up to 256 devices at the same time with a maximum limit of 16 PLCs each. That means you can directly acces up to 4096 PLCs. When using TCP/IP it is sufficient to parametrize and use a further device. It is not necessary to use additional PC hardware for the 4096 PLCs.

Q: AGL-PLCConnect is successful when using ACCON-AGLink S7 TCP/IP. But reading data results errors. What's wrong?

A: Probably, when parametrizing via AGLink40_Config (or via programming code) you have entered the rack and slot number of the CP and not of the CPU. Extract the correct values from the hardware configuration and enter them via AGLink40_Config into the parameters. The device test AGLink40-Config is the easiest way to try it out. When entering wrong rack and slot numbers this program shows you the correct numbers.

Q: Where do I have to place the device configuration files »AGLink40CfgDev0000.xml« for the program sequence?

A: ACCON-AGLink searches the files first in the folder of the AGLink40.DLL (resp. AGLink40_x64.DLL). If this folder don't contains device configuration files, ACCON-AGLink will consider the configuration saved in the default location for public documents:
Vista, Win 7: Users\Public\Documents\DELTA LOGIC\ACCON-AGLink.
The Linux- and Solaris-version of ACCON-AGLink search in the user folder under the path ".DELTA LOGIC/ACCON-AGLink".
You can use the function AGL_SetParaPath to define a certain folder. Then, ACCON-AGLink will search the configuration files only in the given folder.

Q: Is it possible, to store the ACCON AGLink library in a separate folder?

A: Statically loaded DLLs are searched in the following order by the Windows operating system:

- Application folder
- Windows system folder
- Given by the system variable »Path=«. You can add a folder to the environment variable »Path«. Therefore the necessary DLL is also searched in this folder.
- Keep in mind, that you also can load the AGLink40.DLL (resp. AGLink40_x64.DLL) dynamically.

F: Which files are required by the configuration program?

A: The configuration program needs the following files:

AGLink40_Config.exe	The actual configuration program
AGLink40_Config.xml	The parameters of the configuration program
AGLink40_Config_de.mo	German language data
AGLink40_Config_en.mo	English language data

If you want to perform a device test, you further need:

AGLink40.dll	(Demo-)Version of ACCON-AGLink
AGLink40_Error.txt	File with AGLink error messages

Q: What connection type do I have to specify (PG-connection/OP-connection/Other)?

A: In the functionality all types are same but it is possible to parametrize a number of reserved connections for each connection type in the hardware configuration. Different connection types are counted separately.

Q: I use the device type AGLink PC / CP and get no connection with another S7 CPU or get not indicated all bus-participants with the function AGL_GetLifeList.

A: Increase the timout value in AGLink_Config.exe to at least 15000 ms.

Q: Why can't I connect to my PLC if another master (e. g. PG, OP...) ist active on the bus?

A: The connection resources of the S7 are depleted. Reduce the number of reserved connection resources for S7 base communication. Therefore you will get more connection resources for PG-, OP and other connections. However there S7 compatible PLC, which accept only one connection for each connection type PG and OP. In this case test simply another connection type.

Q: What are the differences between RK512 and 3964 functions?

A: Here we have to differentiate the usecase:

1. Basically you can use the protocol RK512 without special functions. ACCON-AGLink can access RK512 devices, e.g., CP 524 or CP 525. You can use functions like AGL_ReadDataBytes, AGL_ReadFlagBytes etc. without changing your application. You need the functions specific for RK512 only if you yourselves want to react to RK512 messages.
2. The 3964 functions give the possibility to send (AGL_Send_3964) or receive (AGL_Receive_3964) pure data buffers (byte) between two participants. An addressing where the data are from or where they have to go is not used(Layer 2). Both counterplaces must agree about the used data contents.
3. The special functions RK512 contain informations which data should be handled in which address in an automation system (Layer 4). An automation system can also be a PC application. It must not necessarily be a PLC!
   - AGL_RKFetch (Send a read job)
   - AGL_RKSend (Send a write job)
   - AGL_Receive_RKSend (Receive a write job, opposite side to RKSend)
   - AGL_Receive_RKFetch (Receive a read job, opposite side to RKFetch)
   - AGL_Send_RKFetch (Response to a read job, reaction to RKFetch)

Q: Which port addresses are used by AGLink on PC side? Is only one port used?

A: Each AGLink connection automatically uses its own port number of the Windows TCP/IP stack on the PC side. This port number is not configurable. The connection is similar to a connection of a browser to a web server. RFC1006 uses port number 102 on the control side (server side).